Transitional cell carcinoma carries a relatively good prognosis, and most urologists favour conservative management with transurethral resection and intravesical chemotherapy,[16,17] without significant difference in 5-year survival rate as compared to other modalities.[18,19]

Eighteen patients with bladder tumour form the basis of this discussion and the current literature is reviewed.

## CASE PRESENTATION

A 42 years old female was admitted in Muhimbili Medical Centre with a one month history of lower abdominal pain and a suprapubic mass. The pain was intermittent and associated with desire to pass urine. However she could pass only a little urine with every visit to the toilet and felt that she could not empty completely her bladder. The suprapubic mass was gradually increasing in size and was painful. She had hesitancy in initiating the urinary stream. She had also reported various episodes of painless intermittent haematuria and occasional passage of shreds in urine for the past four months prior to admission. She had no cough or bone pains. She admitted to have lost weight, anorexia and general body weakness. She gave no history of having been treated for schistomiasis before.

She was a peasant residing in coastal region, married with four children and had never smoked or taken alcohol.
Her past medical history was insignificant.

Examination revealed a moderately wasted and dehydrated lady. She was afebrile, pale and her skin was dry. She had no jaundice or peripheral enlarged lymph nodes or peripheral oedema. Her blood pressure was 130/90 mmHg and she had a pulse rate of 90 beats per minute. Chest examination was normal. The liver, spleen and kidney were not palpable. A tender suprapubic mass was palpated which was symmetrical arising from the pelvis of about 14 cm from the pubis. Vaginal examination revealed, the same mass which was cystic. The cervix was felt posteriorly and was normal. A foul smelling vaginal discharge was noted. A digital rectal examination was normal.

A urethral catheter was passed and about 2 L of blood stained urine was drained slowly and the mass disappeared. The patient was relieved of suprapubic pain.

A working diagnosis of bladder neck tumour with chronic urinary retention was made.

The following investigations were carried out and results obtained.

Serum creatinine was 920 µmol/L and blood urea nitrogen was 34.8 mmol/L. Serum electrolytes could not be done on the day of admission. The hemoglobin was 12.0 gm/dl, hypochromic red blood cells. Urinalysis revealed a clear yellowish urine with specific gravity of 10.10, and there

was no albumin or sugar. Urine culture revealed no bacterial growth.

The patient was maintained on intravenous fluids and continuous bladder drainage. Three days later serum electrolytes reported a sodium of 140 mmol/L and potassium of 3.6 mmol/L and creatinine of 79 µmol/L.

She was cystoscoped under general anaesthesia. The urethra was normal. A polypoid edematous and ulcerating growth was seen on the posterior wall and was filling most of the bladder. Several tissue biopsies were taken. Bimanual examination revealed the mass to be limited to the wall. There was no involvement of the vagina and pelvic wall. The tumor was staged as $T_2N_xM_x$. Histopathology revealed invasive transitional cell carcinoma grade I and chronic inflammation. Intravenous pyelography a necessary investigation in this case to evaluate upper urinary tract function was not performed due to lack of contrast media. Chest X-ray was normal. Serum alkaline phosphatase was also normal.

The patient was explained of her disease and consented for pre-operative radiotherapy followed by total cystectomy. She received radiotherapy 400 rads daily to a total dose of 1200 rads. Preparation for operation was begun 3 day prior to operation. She was put on a low residue diet, liquid paraffin 20 mls three times a day and Flagyl 400 mg three times a day. Enemas were given at 10 p.m and at 6 am

the night before surgery. Three units of blood were cross-matched.

**Operation:** Under general anaesthesia, a lower midline incision was made. An inverted V incision was made into the peritoneum beginning at the umbilicus and continuing bilaterally to the internal inguinal ring. The abdominal cavity was inspected and the liver and kidneys were normal. No lymph node enlargement was observed. There was no involvement of adjacent organs to the bladder. From the internal ring the incision was carried to the posterior peritoneum in a cephalad direction. This was done first on the right side. This exposed the ureter and pelvic nodes which were not removed. The posterior peritoneum was then divided at the uterovesical pouch and the bladder was dissected bluntly from the anterior vaginal wall. The ureters were divided at about 1.5 cm from the bladder. Lateral pedicles were divided between clamps and ligated. The urethra was divided at the level of urogenital diaphragm, the bladder and surrounding tissue were removed.

The divided ends of the ureters were spatulated, and the ureters were implanted into the taeniae of the sigmoid colon. A 5 cm incision was made through the adventitia and muscularis. The muscularis was elevated from the mucosa for a few millimeters. Stay sutures were placed in the mucosa at the distal end of the incision and a stab incision 1.5 cm was made between the sutures. A polythene tube was passed for about 10cm into the ureter and secured

to the rectal mucosa with catgut 4/0. Then anastomosis of rectal mucosa to ureter was performed using interrupted 4-0 chromic catgut. The outer muscular and serosal coats of the colon were closed around the ureter creating a submucosal tunnel. The abdomen was then closed. The ureteric tubes were pulled out through the anus by the aid of a sigmoidoscope and fixed outside. A rectal tube was left in situ.

Postoperatively patient developed wound sepsis, anaemia and hypostatic pneumonia. She was given antibiotics (Gentamycin and flagyl) and improved. The ureteric tubes were removed at fifth day together with rectal tube. She was discharged 4 weeks after operation. She was re-admitted again after having stayed home for 5 weeks with fever and severe anemia. She died 6 hours later after admission despite blood transfusion and antimalarials.

## DISCUSSION

### AETIOLOGY

Much evidence has suggested that the cause of bladder carcinoma is related to local influences which could either be endogenous or exogenous constituents of urine and/or irritative phenomena within the bladder or bladder wall.[1,10] There are several risk factors which have been identified to be related to bladder carcinoma.

Rehn in 1895 first observed that occupational relationship between certain industrial aromatic amines and the

development of vesical neoplasm.[14] Since then most evidence has suggested beyond doubt that beta-naphthylamine, 4-aminodiphenyl, 4-introbiphenyl and 4, 4-diaminobiphenyl are well established causes of vesical neoplasm in man.[14] All these compounds are intermediary products in the synthesis of a wide range of colour dyes and pigments. The industries associated with risk are chemical, printing, textile and plastic. The reported duration of latent period varies from a mean value of 16-22 years.[13] Most of these chemicals are concentrated in urine as orthohydroxylated metabolites complexed to sulfates and glucuronic acid, a process done in the liver. However, beta-glucurunidase in the bladder splits the glucuruonides exposing the bladder epithelium to higher levels of the active carcinogens.

Goebel in 1905 and Ferguson in 1911 observed the association of schistosoma haematobium and vesical carcinoma, since then several workers have supported this actiological connection.[2,3,4,5,7,8,10] However not all patients afflicted with schistosomiasis will develop urinary bladder cancer. The histological type is squamous cell carcinoma. In this study, 13 patients had suffered schistosoma haematobium sometime during their life time. Only 4 out of 9 patients had schistosoma haematobium ova on histology. These were also seen in some patients with transitional cell carcinoma. The mechanism of schistosomal cystitis leading into neoplastic changes are not entirely known. Several mechanism have been postulated.[5,10]

1. Bladder stasis resulting from schistosomal fibrosis permitting longer contact period between mucosa and carcinogens.

2. The effects of inflammation in reducing the mucusal barrier to carcinogens.

3. Secondary bacterial cystitis resulting from poorly functioning fibrotic schistosomal bladder. Bacteria then catalyses the nitrosation of secondary amines with nitrates or nitrites to form nitrosamines which are well known for their carcinogenic effect.

4. Elevated urinary beta-glucuronidase levels in schistosomal patients thus liberating carcinogenic amines from sulfate or glucuronides in the urine.

5. Mechanical irritation of the bladder epithelium by the ova of schistosoma haematobium.

6. Reduced immuno-surveillance through chronic infection plays a permissive role.

7. Chemicals produced by both worms and miracidia or their ovas. These produce chronic irritation and inflammation. This may lead into hyperplastic and metaplastic changes then neoplastic hanges.

Disordered tryptophan metabolism with increased production of kyurenine and some of its closely related compounds are elevated in increased amount in patients with bladder cancer. L-tryptophan promotes chemically induced carcinogenesis.[1,14]

Numerous studies have demonstrated a consistent relationship between cigarette smoking and bladder cancer in both male and female. The disparity habits of cigarette smoking may account for male to female ratio in bladder of 3:1 which seems to be decreasing because more women have smoked for longer period.[13]

Cyclosphosphamide a cytotoxic drug causes hemorrhagic cystitis and atypia in urothelium and increases the risk of bladder cancer.[12] Alcohol consumption, coffee drinking, intake of artificial sweeteners, viral infection have been implicated as possible contributors to the genesis of bladder cancer but evidence is highly controversial.[1]

**PATHOLOGY**

Most squamous cell carcinoma bladder tumours in this study were located in the lateral wall while transitional cell carcinoma were located in trigone, see Table 2.1.1. This is in agreement with the fact that transitional cell carcinoma occupies the most dependent trigone region of the bladder while trigone is rarely affected by schistosomal cancer.[14].

Table 2.1.1: Site of tumour N = 18

| Site | SCC | TCC | Adenocarcinoma | Total |
|---|---|---|---|---|
| Lateral | 6 | 1 | - | 7 |
| Posterior | - | 2 | - | 2 |
| Anterior | 1 | - | - | 1 |
| Trigone | 1 | 4 | 1 | 6 |
| Whole | 1 | 1 | - | 2 |
| Total | 9 | 8 | 1 | 18 |

- Most frequent site for SCC is lateral wall while TCC is the trigone.

The gross appearance of schistosomal bladder tumors is usually solid and ulcerative[3,5,20] and true papillary almost never seen. What we have been commonly seeing here are large fungating necrotic ulcerating masses. In the non-schistosomal bladder tumors, transitional cell carcinoma, papillary pattern is common.[1,5,15] This basic

pattern may be complicated by fragmentation of tips of the papillae, ulceration and hemorrhage.

Histological classification according to WHO, classifies bladder tumors into transitional cell carcinoma, squamous cell carcinoma, Adenocarcinoma, mixed carcinoma, undifferentiated carcinoma and carcinoma in situ. This study's findings were squamous cell carcinoma in 9 patients (50%), Transitional cell carcinoma in 8 patients (44.4%) and Adenocarcinoma in 1 patient (5.5%), (Table 2.1.2.) The se results are comparable with series elsewhere where schistosoma haematobium is endemic.[2,4,5,6,8] The histological pattern in industrialized countries shows transitional carcinoma as the commonest where industrial chemicals have been implicated in the aetiology of bladder tumours.[13]

Table 2.1.2. Histological type N = 18

| Type | Number of Patients | Percentage |
|---|---|---|
| Squamous cell carcinoma | 9 | 50 |
| Transitional cell carcinoma | 8 | 44.5 |
| Adenocarcinoma | 1 | 5.5 |
| Total | 18 | 100 |

Based on the degree of atypia exhibited by cancer cells, transitional cell carcinoma can be graded into grade 1, 2, and 3 meaning well-, moderately- and poorly-differentiated

respectively. The higher the grade the poorer the prognosis. High grade superficial tumors kill their patients twice often as low grade (70% against 30%) within five years.[16] The grade of tumor is a good guide in selection of treatment in superficial tumors. However no satisfactory definitions have been developed for squamous cell tumors and adenocarcinoma.

The most widely used staging system for urinary bladder is TNM staging system of the union internationale contrela cancer (UICC) and Marshall's modification of the staging system initially proposed by Jewett and Strong (1946).

Summary of different methods of staging systems.

| Description | Jewett + Strong 1946 | Jewett 1952 | Marshal 1952 | Clinical $T_2$ TNM |
|---|---|---|---|---|
| Confined to Mucosa | | | 0 | ToNxMx |
| Carcinoma in situ | | | | TIS |
| Infiltrating of Submucosa | A | A | A | $T_1$NxMx |
| Infiltration of 1. Superficial muscle | B | $B_1$ | $B_1$ | $T_2$NxMx |
| 2. Deep muscle | B | $B_2$ | $B_2$ | $T_{3a}$NxMx |
| Perivesical fat infiltration | C | C | C | $T_{3b}$NxMx |
| Infiltration of adjacent organs: Prostate, uterus and vagina | | | $D_1$ | $T_{4a}$NxMx |
| Fixation to the bony pelvis | | | | $T_{4b}$NxMx |
| Distant metastasis Mx | | | $D_2$ | Any T |

No = No lymp node involvement

$N_1$ = Homolateral lymph node involvement
$N_2$ = Contralateral or bilateral lymph node involvement
$N_3$ = Fixed mass on pelvic wall separate from bladder
$N_4$ = Juxta regional lymph node involvement

The staging system is based on depth of bladder wall invasion, clinically two broad category are usually used to indicate prognosis. Superficial tumours ($T_0$, $T_1$) and muscle infiltrating tumors ($T_2T_3$, $T_4$). Superficial tumors

are generally perceived to have a better prognosis than those which infiltrate muscle. It is important to note that some of tumors no deeper than lamina propria have already produced occult metastatic disease. Clinical staging has an error of over 50% and the error is especially in the middle stages $T_2$ to $T_3b$ if compared to pathological staging.[16] Nevertheless, it provides clues for treatment planning. Pathological staging is most accurate but has one disadvantage that it cannot be done prior to definite therapy because it is only after definitive surgery that tissue are available for the pathologist.

**Table 2.1.3:** **Clinical Staging (TNM) of our patients N=18**

| Stage | SCC | TCC | Adenocarcinoma | Total | Percentage |
|---|---|---|---|---|---|
| TIS | - | - | - | - | - |
| $T_o$ | - | - | - | - | - |
| $T_1$ | - | 1 | - | 1 | 5.5 |
| $T_2$ | 1 | 4 | - | 5 | 27.8 |
| $T_3$ | 3 | - | - | 3 | 16.7 |
| $T_4$ | 5 | 3 | 1 | 9 | 50.0 |
| Total | 9 | 8 | 1 | 18 | 100.0 |

- Most patients present with muscle infiltrating tumor (94.5%)

Most of our patients present late. In this study 94.5% of patients had muscle infiltrating tumour, (Table 2.1.3). This could be attributed to the fact that squamous cell carcinoma is an aggressive tumor and invades muscle early. Another factor could be that patients report early to their health centres, however are delayed and treated as cases of schistomiasis before being referred to hospital.

## Clinical features and diagnosis

The age group most affected for squamous cell carcinoma was 40-49 years and for transitional cell carcinoma was 50 - 59 years. It seems that squamous cell carcinoma presents itself a decade earlier. In Europe and USA where transitional cell is the commonest bladder cancer tends to present itself at an older age than areas where squamous cell is common.[7,8,9]

**Table 2.1.4:** Age distribution n = 18

| Age group | SCC | TCC | Adenocarcinoma | Total |
|---|---|---|---|---|
| <30 | - | - | - | - |
| 30-39 | 2 | 1 | - | 3 |
| 40-49 | 3 | 2 | 1 | 6 |
| 50-59 | 2 | 3 | - | 5 |
| 60-69 | 1 | 2 | - | 3 |
| 70-79 | 1 | - | - | 1 |
| Total | 9 | 8 | 1 | 18 |

- Overall, most of the patients were in 40-59 age group.

Bladder tumor have been reported to affect more males than females, with a male to female ratio of 3:1 for transitional cell carcinoma and 3:2 for squamous cell carcinoma.[12,13] However, in this study, see table 2.1.5., overall male to female ratio was 5:4; while for squamous cell carcinoma was 2:1 and transitional cell carcinoma was 1:1.

**Table 2.1.5:** Sex distribution

| Sex | SCC | TCC | Adenocarcinoma | Total |
|---|---|---|---|---|
| Males | 6 | 4 | - | 10 |
| Females | 3 | 4 | - | 8 |
| Total | 9 | 8 | 1 | 18 |

The clinical features observed in this study, see table 2.1.6. were haematuria in thirteen patients (72.2%), vesical irritability on eleven patients (61%), lower abdominal pain in ten patients (50%), weight loss in six patients (33.3%), passage of shreds in five patients (27.7%), suprapubic mass in four patients 22.2% and bladder ~~week~~ Neck obstruction in three patients (16.7%).

Prior history of having been treated of schistomiasis was present in thirteen patients (72.2%).

Table 2.1.6: Clinical features n = 18

| Symptom & Signs | Number of Patients | Percentage |
|---|---|---|
| Hematuria | 13 | 72.2 |
| Vesical irritability | 11 | 61.0 |
| Suprapubic pain | 10 | 50.0 |
| Weight loss | 6 | 33.3 |
| Passage of shreds | 5 | 27.7 |
| Bladder neck obstruction | 3 | 22.2 |

Hematuria is by far the most important presenting symptom in bladder tumor.[12,13] It is usually intermittent and painless. Rarely bleeding is so profuse as to require emergency blood transfusion. No patient in this study required blood transfusion for haematuria.

Vesical irritability manifested by frequency urgency and burning sensation on micturation are usually present if secondary, bacterial infection supervenes. It also signifies carcinoma in situ.[13]

Suprapubic pain is usually due to perivesical extension of the tumor and may be constant and severe. However most of the patients in this study pain was due to urinary retention or cystitis.

Two patients in this study presented with bladder neck obstruction and were operated as cases of benign prostatic

hypertrophy, just to find a solid bladder tumor. This emphasizes careful evaluation particularly the need for cystoscopy in patients with bladder neck obstruction.

Passage of shreads in urine is almost pathognomonic of bladder cancer.

The physical findings are usually non-specific which include wasting, suprapubic mass or tenderness and anemia.

Cystoscopy and biopsy ~~to~~ form the most important investigation in patient suspected of bladder cancer, and should be performed on every patient with haematuria. Specimen should be deep enough to enable the pathologist to determine the type, grade, depth of invasion and the presence of lymphatic and vascular involvement, all of which are good prognostic 149indices.[16] Random biopsy specimen for adjacent and remote areas may be able to reveal association carcinoma in situ. This is important in treatment plan. Bimanual examination follows, an essential procedure for clinical staging of the tumour.

Intravenous pyelogram are important in evaluating the functional status of the upper urinary tract. This procedure may reveal the presence of ureteric obstruction with hydronephrosis or other urothelial neoplasms.

Lymphagiogram is another important investigation. It provides the status of regional lymp node involvement. The

false negative in this examination is estimated at 25% and is due in large part to involvement of obturator and hypogastric nodes, which are not routinely visualized by the technique. A lymphagiogram interpreted as positive is 94-100% accurate[21,22] the presence of positive lymph nodes correlates with poor prognosis.[16]

**TREATMENT**

The choice of treatment of bladder tumours is influenced by histological cell type, stage, histological grade, tumor size, multiplicity, age and general condition of the patient and the need of bladder function preservation. Ideally treatment should be planned after a proper staging workup by multimodality team of surgeons, pathologists and oncologists. Modalities available for treatment of bladder cancer are surgery, radiotherapy and chemotherapy or combination chemotherapy.

Non-invasive tumours ($T_a$, $T_1$ or O and A)

The preferred treatment by many urologists for superficial non-invasive tumor-stage $T_a$, $T_1$ (O and A)) is by transurethral resection. One patient in this study had a stage $T_1$ grade I tumor which was removed successfully by transurethral resection and fulguration.

Transurethral resection is an effective modality for stage $T_a$, $T_1$ transitional cell carcinoma of the bladder. It is associated with low morbidity and insignificant mortality. Jaske and associates reported a 10-year survival rate of

95% for patients with Ta grade I disease, 89% for Ta grade 2, 84% for stage Ta grade 3, 78% for stage T1 grade 2 and 50% for stage T1 grade 3 disease.[23] However, tumor recurrence wither in the same area or elsewhere occurs in about 50-70% of patients and in about 10-20% the neoplastic process will progress to underlying muscle.[24] The percentage of first tumor recurrences at the same site increased with grade.[23] Hence the need for adjuvant intravesical chemotherapy. Controversy currently exists as to whether intravesical chemotherapy is appropriate for disease that penetrates through lamina propria or whether these patients should be treated more aggressively either by a wide local transurethral resection or partial cystectomy or with a total cystectomy and urinary diversion. Follow up cystoscopy and bimanual examination with biopsy is mandatory in all patients who undergo transurethral resection. Recurrence can be dealt with by repeat endoscopic resection and intravesical chemotherapy.

Carcinoma in situ

Carcinoma in situ is a rare finding in our environment. The management of patients with carcinoma in situ of bladder is controversial and ill defined. Firm recommendation regarding therapy of an individual case are difficult when one considers the variable natural history of the disease and the wide variety of potentially effective therapeutic options available todate. Cystectomy while curative is deferred justifiably in most cases in favour of a trial of conservative therapy with intravesical

agents. It has been observed that persistent intensive conservative intravesical chemotherapy in the face of recurrences and persistent disease is associated with significant risk of progression and development of metastasis.[25]

However, even supervision and monitoring of drug administration and disease status, do not obviate the risk. The risk is variable, it is 10% when carcinoma in situ occurs alone[26] and it is 40 - 83% when it is associated with papillary tumor.[27]

The rationale for intravesical chemotherapy is that high concentration of drug may be in contact with tumor bearing mucosa for prolonged period, the likelihood of tumor implantation after resection may be reduced by destroying viable cancer cells, a cytotoxic effect on residual carcinoma may be provided, a salutory effect on precursor mucosal may occur, there is minimal toxicity owing to limited systemic absorption, and progression of disease requiring more intense local therapy cystectomy or systemic chemotherapy may be delayed or prevented.[17]

The most used drugs are Thiotepa, doxorubin and Bacillus calmette-Guerin (BCG). However, BCG is superior to Thiotepa or doxorubin in retarding progression and decreasing recurrences of superficial bladder cancer.[28] Whether the drugs placed within bladder produce their effect by interfering with cell metabolism or by

intravesical cauterization, which promotes sloughing of the offending malignant mucosa is unknown. Nonetheless these intravesical agents rid the patient of tumor with varying effectiveness.[29]

Invasive Tumors ($T_2$, $T_3$, $T_4$, $B_1$, $B_2$, C

The treatment of superficial muscle invading tumor $T_2$ ($B_1$) remains a controversial issue. It ranges from transurethral resection to total cystectomy. Most urologist have favoured either partial or total cystectomy for any degree of muscle invasion owing to the well recognized difficulty determining clinically the depth of invasion by tumor and therefore the uncertainty of endoscopic resection. Henry and associates (1988) reported comparable good results using transurethral resection alone as compared to the standard radical surgery with or without radiotherapy in terms of survival rate and time to distant metastasis.[18] The five-year survival rate for stages $B_1$ and $B_2$ disease were 63 and 38percent respectively and the failure rate was 25% who subsequently underwent salvage cystectomy for local failure. Endoscopic re-staging with urine cytology, bimanual examination and transurethral biopsy or resection has been advised, which may identify a subset of patients with limited muscle infiltrating bladder tumors that can be managed conservatively without immediate cystectomy.[19]

Segmental cystectomy has fallen into disfavour because of high intravesical recurrence rates in the residual

bladder.[29] When used it is to patients with no evidence of atypia or carcinoma in situ at other sites within bladder either adjacent or distant from the offending invasive malignancy. Urologists who favor radical cystectomy have used it for any superficial muscle invasive disease ($T_2$), high grade tumour with lamina propria invasion ($T_1$) and carcinoma in situ, multifocal superficial high grade tumor and predominant carcinoma in situ refractory to intravesical chemotherapy or immunotherapy. Malkowicz and associates demonstrated that radical cystectomy is highly effective in curing patient with high grade superficial disease including those with superficially invasive disease associated with nodal metastasis.[30]

One patient in this study with clinical stage T2NxMx underwent pre-operative radiotherapy and total cystectomy. The value of radiotherapy prior to cystectomy is controversial.[31,33] The rationale for pre-operative radiotherapy for operable tumours are to prevent tumor seeding at the time of cystectomy, to sterilize subclinical microaggregates of tumor left beyond the limits of surgical resection and to allow pathological down staging as an important prognostic criterion. Occasionally preoperative radiotherapy is used to attempt to convert fixed inoperable primary tumor to an operable one. However superficial low grade tumors do well with surgery alone and do not benefit significantly from preoperative radiation.[34]

Table 2.1.7: Treatment of Transitional cell carcinoma (TCC) No = 8

**Table 2.1.7: Treatment of Transitional cell carcinoma (TCC) No = 8**

| Stage | Number of patient | Endo-scopic | Preop ERT | Cura-tive ERT | Palli-tive ERT | Termi nal care |
|---|---|---|---|---|---|---|
| $T_1$ | 1 | 1 | - | - | - | - |
| $T_2$ | 4 | - | 1 | 3 | - | - |
| $T_3$ | 0 | - | - | - | - | - |
| $T_4$ | 3 | - | - | - | 2 | 1 |
| Total | 8 | 1 | 1 | 3 | 2 | 1 |

- The majority of patients were of low stage (5) and were given curative treatment

**Table 2.1.8: Treatment of Squamous Cell carcinoma (SCC) N = 9**

| Stage | Number Patients | Curative XRT | Palliative XRT | Terminal Care |
|---|---|---|---|---|
| $T_1$ | - | - | - | - |
| $T_2$ | 1 | - | 1 | - |
| $T_3$a+b | 3 | 1 | 2 | - |
| $T_4$a+b | 5 | - | 3- | 2 |
| Total | 9 | 1 | 6 | 2 |

- Majority with SCC were of high stage (8) and were palliated with radiotherapy (3000 rads)
- Note one patient with Adenocarcinoma was palliated with radiotherapy.

Eight patients with squamous cell carcinoma had stage $T_3$ or above and 3 patients with transitional cell carcinoma had $T_4$ diseases. The main objective in tumor which had gone beyond bladder wall is palliation of haematuria and

dysuria. The majority of these patients in this study had advanced tumor, were given palliative radiotherapy and some were given no treatment, see Table 2.1.7. and 2.1.8.

Skinner observed that 50-65% of patients with tumor penetration of the perivesical fat or with metastasis to the pelvic nodes have widespread metastasis disease within 30 months (90% within 24 months).[33] Haematuria is well controlled by palliative total dose of 3000 rads, however dysuria is poorly controlled.[5] In this study haematuria was controlled in all patients but all remained with painful micturition.

## CONCLUSION

Haematuria and vesical irritability are the most common presenting symptomms in carcinoma of the urinary bladder. This emphasizes the fact that every patient presenting as such, a urine cytology and a cystocopy and biopsy should be performed.

Most patient with Transitional cell carcinoma present with low stage tumour while those with squamous cell carcinoma have a high stage tumour at the time of diagnosis. This points to the fact that squamous cell carcinoma is more aggresive than Transitional cell carcinoma.

Radiotherapy offers good palliation for haematuria but not to dysuria.

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## 2.2: THE MANAGEMENT OF URETHRAL STRICTURE

**SUMMARY**

Twenty two adult male patients were managed in the surgical firm III at Muhimbili Medical Centre within a period of 4 months between April and July 1990. Their ages ranged from 23 years to 80 years with the majority being in the 21-50 years age group.

Inflammatory urethral strictures were more common consituting 66.6% of patients while traumatic strictures constituted 27.3% of patients. The site most affected for inflammatory strictures was the bulbous urethra while for traumatic strictures was the membranous urethra.

Majority of patients with inflammatory urethral strictures had more than two urethral infections. The time lapse between the first infection and stricture formation ranged from 1 year to 25 years, for the majority it was between 11 and 15 years.

Most traumatic strictures had resulted from road traffic accidents and pelvic fractures while gonococcal infection was the commonest cause of inflammatory strictures.

More than half (59.0%) of patients presented late with urinary retention. Suprapubic cystostomy was performed to relieve obstruction. The diagnosis was confirmed by

urethrogram and urethroscopy. Intermittent urethral dilatation was the main mode of treatment.

## INTRODUCTION

Stricture of the urethra is one of the oldest problem facing an urologist. The earliest records reported from India[1] dated 600 - 1000 BC or pre-Hypocratic era, strictures were managed by the use of tubes open at both ends made of iron, wood or shellane. Well lubricated with clarified butter, were gently introduced into the urethra to dilate and that thicker and thicker tubes were dully introduce into the urethra every 3 day. This mode of management has changed little up to this modern era of urologic practice.

Urethral stricture disease remains endemic in East and Central Africa where more than two thirds are of inflammatory origin and most patients still seek medical attention in its most complicated state, only as a last resort.[2,3,4] This is attributed to a number of factors among which ignorance of the relationship between gonococcal infection and stricture formation, poverty and problem of access to hospital centres.

Urethral stricture disease is common in Tanzania, and one of the major cause of lower urinary outlet obstruction.[3] The management is mainly palliative with intermittent dilatations as urologists are few for urethroplasty.

Based on 22 patients the aetiology, pathology, clinical presentation and management of urethral strictures are discussed and is literature reviewed.

**CASE PRESENTATION**

A 32 years old male was admitted due to difficult in passing urine for 3 weeks prior to admission. The patient had noted, increased frequency of micturation and burning sensation on passing urine. The urine was of a foul smell with sediments. The patient used to wake up six times in the night to empty the bladder but each toilet visit passed only a small amount of urine. The urinary stream was progressively becoming weak and improved on straining. The symptoms had worsened in the past 7 days prior to admission. There was no blood in the urine or passages of stones. Three day prior to admission had also noted a painful swelling in the right scrotum and perineum. The pain worsened on passing urine.

He denied to have suffered from gonococcal urethritis or urethral discharge in the past or a previous history of pelvic injury or perineal trauma in the past. Admitted to have suffered bladder schistosomiasis 19 years ago and he was treated. He was unmarried and sexually active and had many sexual partners. He was a non smoker and non alcoholic.

Examination revealed a well built young man who was in pain and restless. He was febrile (temp 38.5@C) and not

pale. A blood pressure of 150/90 mm Hg and a pulse rate of 84 beats per minute, regular and of good volume were recorded. Right inguinal nodes were palpable and tender. he had no peripheral oedema or puffy face. The respiratory system was normal. The heart sounds were normal. The apex beat was felt at fifth intercostal space on mid clavicular line. The liver, spleen and kidney were not palpable. The urinary bladder was distended and tender on palpation. The renal angles were free. A tender, fluctuant mass involving the perineum and right scrotum was palpated. The cord and both testis were normal. A digital rectal examination revealed a normal prostate and no rectal mass was palpated.

Urethral catherization failed, A suprapubic cystostomy was performed under local anaesthesia.

A working diagnosis of urethral stricture and periurethral abscess were made. The following investigations were done and results obtained.

Hemogram: Hemoglobin 12.8 g/dl

White blood count were of normal distribution

Serum creatinine was 79 micromoles per litre

Serum electrolytes: Sodium 140 mmol/L

Potassium 3.9 mmol/L

Chloride 102 mmol/L

Urine (catheter specimen) - Leucocytes 20-25/HPF
- No protein
- Bacterias were seen.

Urine culture revealed proteus species sensitive to gentamycin. Resistant to furadantin, co-trimoxazole, ampicillin and tetracycline.

Urethrogram was performed first and revealed a tight bulbous urethral stricture, diverticular at the level of prostatic urethra and irregularities of the urethra wall, indicating urethritis.

Urethroscopy revealed a pale urethra, a pin hole opening at bulba level. Dilatation failed, even to filiform bougies.

Intravenous urography was normal.

The diagnosis of impassable bulbous urethra stricture was confirmed. The patient was informed of the disease and single stage island patch (orandi) urethroplasty was planned. The patient consented.

**Operation**

Under general anesthesia the patient was put in lithotomy position with Trendelenberg tilt. The lower abdomen, genitalia and perineum were cleansed with antiseptic and draped sterile. A metallic bougie was passed in the urethra encountering the stricture and another one was passed through the suprapubic cystostomy down to encounter the stricture proximally. A longitudinal incision was made on the stricture. Haemostasis was secured. A dartos pedicle skin patch was fashioned to the size of the

stricture and released. A Foley catheter size 20 ch was introduced through the urethra to the bladder. The skin patch was sutured over urethral catheter to the edges of the incised urethra in 2 layers using vicryl 5/0 and 3/0 interrupted sutures. The incision was closed in layers.

Post operatively pethidine, gentamycin and intravenous infusions were prescribed. The post operative period developed a perineal fistula which closed after treatment. The catheter was removed at 21st day, and patient could void per urethra without any problem. He was discharged for follow up in the urological outpatient clinic. However the patient never turned up. (I hate this).

## DISCUSSION

### AETIOLOGY

In this study, 66.6% of patients seen had inflammatory urethral strictures (Table 2.2.1). Thirteen patients had agreed to have suffered urethral pus discharge and dysuria. It was not possible to differentiate previous gonococcal from non-gonococcal urethritis as most of the patients had already received treatment in dispensaries.

Table 2.2.1: Aetiology of Strictures n = 22

| Cause | Number of Patients | Percentage |
|---|---|---|
| Infection:<br>- gonococcal (13)<br>- schistosomiasis (haematobium) (1) | 14 | 66.6 |
| Trauma<br>- RTA (5)<br>- Fall from tree (1) | 6 | 27.3 |
| Iatrogenic<br>- prostatectomy (1)<br>- indwelling catheter (1) | 2 | 9.1 |
| Total | 22 | 100.0 |

- Post-gonococcal urethritis was the main cause of urethral stricture
- Road traffic accident ranged second.

Several authors in tropical countries still report inflammatory stricture as the most common.[3,4] Adwok[2] (1986) at Kenyatta National hospital reported 71.4% of urethral strictures were inflammatory while 27.3% were traumatic. This is similar to the results of the present study. Bhandari[5](1983) in India in a study of penile urethral strictures reported 93.3% were inflammatory and 4.7% were traumatic. However Koraitim[6](1985) in Egyptin a study of posterior urethral strictures found that 87% were post-traumatic and 13% were post-inflammatory.

In the vast majority of inflammatory strictures are a late results of Neisseria gonorrhoea urethritis. However, not all

patients with gonorrhoea will develop strictures.[7] It may be that strictures ensue only when patients receives no treatment or inadequate treatment for the initial infection or when there are repeated infections. Koraitim[6] had reported post inflammatory strictures were caused by gonorrhoea urethritis in 63.6% of patients.

One patient in this study had schistosomal urethral stricture. Othershave also reported similar cases.[2,4,6] Tuberculous strictures have also been reported but are rare.[4,6,8] No patient in the present study had tuberculous stricture. Lymphogranuloma venereum, in view of severe rectal strictures caused by these organisms, it has been suggested that the more severe stricture with fistulae
and lymphoedema of the scrotum are caused by lymphogranuloma venereum, but there is no evidence to support this hypothesis.[2,7]

Table 2.2.2: Frequency of urethral infection n = 13

| Frequency | Number of patients |
|---|---|
| Single infection | 3 |
| Repeated infection | 10 |

- Most patients in this study had repeated urethral infections.

Non-specific urethritis has increasingly been incriminated as a major aetiological factor of inflammatory urethral stricture especially in developed world.[8] Organisms which

have been isolated in non-specific urethritis include Haemophilus vaginalis, herpex simplex type II, cytomegalovirus, Trichomonas vaginalis, chlamydia and candida albicans. Balanitis Xerotica obliterans also known as lichen sclerosis et atrophicus is another cause of urethral stricture.[5]

Trauma is the second commonest cause of urethral stricture accounting for 27.3% in this study. Five patients had trauma to the urethra due to Road traffic accident and pelvic fractures, while one was due to a fall from a coconut tree and pelvic fracture. These results are similar to those reported by Adwok[2] at the Kenyatta National hospital. Traumatic urethral stricture follows unskillful or delayed initial treatment of rupture of the urethra. Other trauma which may result in injury to the urethra are falling astride on a projecting object, a kick in the perineum, cycling and gymnastic accidents. Post-traumatic urethral strictures are commonest in developed countries where there is increased use of motor vehicle and other machineries with subsequent increase in road traffic accidents and industrial catastrophes.

Iatrogenic strictures. Catheterization and endoscopic manouvres are the commonest cause of iatrogenic strictures.[10,1] Iatrogenic urethral strictures are becoming more common in the developed countries, especially due to increased use of endoscopic instruments in the urinary pathways.[12] Oliech[13] in 1988, had also noted iatrogenic strictures as an increasing problem at Kenyatta

National hospital. About 4% of cases after prostatectomy irrespective of method employed develop a stricture, usually situated in the proximal end of the prostatic urethra.[14] In this study one patient developed urethral stricture following prostatectomy. Amputation of penis is another iatrogenic cause.[14]

Malignancy in the male urethra is a rare cause of urethra stricture in about 0.7%.[13]

## PATHOLOGY AND PATHOGENESIS

In this study most of the inflammatory strictures (8 of the 14) were located in the bulbous urethra, Table 2.2.3. The second most frequent part was the pendulous urethra. Three patients had multiple stricture in form of beads or connected lakes all located in the anterior urethra. All post-traumatic urethral stricture were located in the membranous urethra.

Table 2.2.3: Location of the Stricture N = 22

| Site of the stricture | Number of Patients | Percentage |
|---|---|---|
| Membranous urethra | 6 | 27.4 |
| Bulbous Urethra | 9 | 40.9 |
| Pendulous (penile) urethra | 4 | 18.1 |
| Multiple sites | 3 | 13.6 |
| Total | 22 | 100 |

- Most of the inflammatory strictures were located in the bulbous urethra
- Multiple strictures were located in the anterior urethra
- All traumatic strictures were located in the membranous urethra.

Urethral stricture is more a lesion of the periurethral tissue than of the urethra. The stricture is not formed by the scar tissue in the layer of urothelium alone but it is the healing response of the delicatecorpus spongiosum.[7,15] The spongio-fibrosis that results from healing process will largely determine the nature of stricture in the bulbo-penile urethra.

Partial loss of the urothelial lining, whether it be due to urethritis, internal or external trauma, is the primary factor in the development of almost every spongio-urethral stricture. The loss of any portion of the circumference of the epithelial lining generally results in a proportional narrowing of the lumen during healing because the margins of the residual epithelium are approximated by the natural

urethral closing pressure so that the effect forms a cleft which tends to heal rapidly by cross-adhesion and epithelial bridging.[15] The intermittent passage of urine opens the clefts, with extravasation of infected urine into the periurethral tissue. This repeated separation and re-exposure of vascular spongy tissue spaces to urine leads to gradual increase in the underlying spongio-fibrosis leading into development of a stricture.

Singh and Blandy[11] are of the opinion that this is the major cause of deep seated fibrosis.

Following inadequately treated gonorrhoea, infection persists in the periurethral glands and spreads to the periglandular tissue and results into localized thrombophlebitis of the corpus spongiosum which becomes infiltrated with inflammatory cell and fibroblasts. Gradually the infiltrated periurethral tissue contracts with the formation of scar tissue. These plaques of scar tissue coalesce until the lumen becomes encircled and occlusion occurs.

Chambers and Baitera[16] (1977) had pointed out that squamous metaplasia of urethral mucosa resulting from chronic infection as an important factor in the genesis of a stricture and not bacterial infection as such. Squamous metaplasia in the urethra is supported by muscle cells and is in elastic. Overstretching during voiding causes microscopic epithelial tear and that accumulation of the

subsequent microscopic scars lead to the formation of an urethra stricture. Squamous metaplasia of the epithelium may further undergo dysplastic changes to develop squamous cell carcinoma of the urethra.

The site of post gonococcal strictures has been observed to match exactly the distribution of peri-urethral glands.[11] The periurethral glands are richly distributed in the proximal bulbous urethra becoming sparse at the penoscrotal junction in the penile urethra. A small amount are found by the fosa navicular.

Multiple strictures may result from increased hydrostatic pressure proximal to first ring causing dilatation of urethra. The urothelium becomes thin, together with stasis and secondary infection, spontaneous tear of mucosa may occur. Infected urine extravasation occurs causing inflammatory reaction in the periurethral tissue, further lengthening the area of fibrosis proximally and the results into another constricting ring. These constricting rings of scar tissue become successively tighter and thicker as the lesion extends proximally.[14,16] The rings may be spaced over several centimeters being felt as chain of beads or may be almost confluent forming a cord.

Further obstructive changes which occur proximal to the stricture include ectasia of prostatic ducts, bladder muscular hypertrophic changes, which compensates for the obstruction, hydroureter and hydronephrosis secondary to

hypertrophy of the ureterotrigone complex or vesical ureteral reflux.[17] With stasis resulting from back pressure, secondary infection occurs which may lead into periurethral abscess and urethrocutaneous fistulas, prostatitis, cystitis and pyelonephritis.

Catheterization and other forms of urethral instrumentation result into urethral mucosa damage and subsequent ulcer, as a consequent of faulty insertion, inflammatory response provoked by catheter material and avascular necrosis. These are associated with use of large catheter and bow string effect of self retaining catheter under traction.[10]

The striking difference between traumatic and inflammatory stricture is that the former is a limited pathological segment regardless of length formed between the normal health urethra proximally and distally, whereas in the latter the lesion is more diffuse with the narrowed portion merely representing the area of maximum involvement that merges into a diseased scarred urethra.[15] This knowledge is important guide in the selection of treatment. The extent of the spongio-fibrotic urethral abnormality and not the stricture itself is the factor which determines whether an anastomosis or a substitution repair procedure is appropriate.

## CLINICAL FEATURES

In this study the peak age incidence overall was between 21-50 years. The post-traumatic strictures were between

21-30 years whereas inflammatory strictures were common between 41-50 years. These results are similar to a study by Kirei[3] 1986 conducted in the same centre. Adwok[2] (1986) and Oliech[13] (1988) at Kenyatta National hospital showed that the age incidence in post-traumatic strictures was 21-30 years whereas post inflammatory strictures was 30-40 years. The fact that post-traumatic strictures are more common in the younger age group than post inflammatory stricture could be explained by the fact that inflammatory stricture have a longer lapse period.

**Table 2.2.4:** Age distribution in relation to cause N = 22

| Age in Years | Inflammatory | Traumatic | Iatrogenic | Total |
|---|---|---|---|---|
| <20 | 0 | 0 | 0 | 0 |
| 21-30 | 1 | 4 | 1 | 6 |
| 31-40 | 3 | 2 | 0 | 5 |
| 41-50 | 5 | 0 | 0 | 5 |
| 51-60 | 2 | 0 | 0 | 2 |
| 61-70 | 1 | 0 | 1 | 2 |
| >70 | 1 | 0 | 1 | 2 |

- Youngest patient was 23 years and the oldest was 80 years.
- The peak incidence for Traumatic stricture was between 21-30 years whereas inflammatory was between 41-50 years.

The lapsed period between the first episode of urethritis and stricture manifestations was between 11 and 15 years in the majority of patients (61.5%), (See Table 2.2.5.). Most strictures develop during the first year of gonorrhoeal infection, but they may not give rise to difficulty in micturition for ten to 15 years.[14] At Kenyatta National hospital average lapse period between the first period

of urethritis and stricture formation has been reported to be 5 years.[2] Traumatic strictures have been reported to develop within six months of initial injury.[13]

**Table 2.2.5: Lapse period before stricture formation n = 13**

| Time in Years | Number of Patients | Percentage |
|---|---|---|
| 0 - 5 | 2 | 15.4 |
| 6 - 10 | 1 | 7.7 |
| 11 - 15 | 8 | 61.5 |
| 16 - 20 | 1 | 7.7 |
| 21 - 25 | 1 | 7.7 |
| >26 | 0 | 0.0 |
| Total | 13 | 100 |

- Shortest period was 1 year and the longest was 25 years.
- The lapse period before stricture symptoms was 11-15 years (61.5%)

Early manifestation of urethral stricture are occasional passage of flakes in urine from desquamated epithelium and a varying amount of urethral discharge, most evident in the early morning.[14] In this study no patient presented with early symptoms. This could be attributed to the fact that most were being treated for urethritis or urinary tract infection at dispensaries ortraditional healers.

In established urethral stricture the urinary stream becomes progressively narrower and weak, micturation is prolonged and after it has seemingly ended dribbling occur due to trickling of urine from the dilated urethra proximal to the stricture.[14] Increased frequency is another complaint which at first is diurnal and then both diurnal and nocturnal. However, frequency is noticed more during the night than day time because of the inconvenience it causes the patient during the night.[7] Forking and spraying of the urinary stream as well as feeling of incomplete emptying of the bladder may occur.

In this study most of these clinical features were obtained from the history, but most patients sought medical attention only when they had developed complications of urethral strictures. Similar observations have been reported before by several authors in Africa.[18,19]

Table 2.2.6: Complications associated with urethral strictures n = 22

| Complications | Number of patients |
|---|---|
| Urinary retention | 14 |
| Acute 13 | |
| Chronic 1 | |
| Perineal abscess and fistula | 5 |
| Epididymo-ordirtis | 3 |
| Urinary bladder stones | 2 |
| Malignancy | 1 |

- Most patients sought medical attention when they had developed complication.
- And the commonest complication was acute urinary retention.

In this study most patients (See table 2.2.6.)presented with acute urinary retention. Acute retention can set in while the stricture is still of moderate calibre due to supperadded oedema of the urethral mucous membrane adjacent to the stricture.[17] Oedema can result from renewed outbreak of local infection, by voluntary retention, alcoholic excess and sexual activity.[7,14] In the present study three incidents of acute urinary retention following alcoholic excess were recorded. No incidents following sexual intercourse were noted in this study.

Other complications recorded in the present study were perineal abscess and fistula, epididymo-orchitis, urinary bladder stones and malignancy (squamous cell carcinoma of the urethra). Complications associated with urethral

strictures result from chronic obstruction and infection. Apart from those observed in this study other complications include, extravasation of urine, prostatitis and prostatic abscess, bladder neck fibrosis, cystitis, pyelonephritis, effects of back pressure (vesico ureteric reflux, hydroureter, hydronephrosis and eventually renal failure) urolithiasis, effects of straining like, hernia and rectal prolapse, and male infertility.[7,18]

In this study 14 patients had urethrograms both anterograde and retrograde while seven patients had both urethrograms and urethroscopy.

Urethrogram is a very useful investigation as it provides information concerning the length and location of a stricture, of dilatation or diverticulum formation above the stricture and false passages.[14] A good urethrogram must be available to allow for the urologist to select appropriate operative management.[3]

Other supportive investigation done to all patients with urethral stricture include hemogram, urinanalysis, urine culture and sensitivity, blood urea and creatinine and intravenous urograms.

Diagnostic bougies and urodynamics studies are other available investigations. However, were not done in this present study, on the account that most patients presented with urine retention and that catherization and bouginage

had been attempted elsewhere before reaching this centre. Many times this procedure had traumatized the urethra or have created false passages.

## TREATMENT

The goal in the treatment of a urethral stricture is a patent, continent urethra without jeopardizing any sexual function present. The key to good results lies in the selection of a proper operation for every individual stricture, experience of a surgeon and the availability of facilities and any poor results is not fault of the procedure in as much as it reflects a bad selection of cases.[6]

Most of the patients seen in the present study who presented with acute or chronic urinary retention and those who have perineal fistulas were initially managed by suprapubic cystostomy to relieve obstruction and diverge urine from stricture before any surgical management was undertaken. Any urinary sepsis, anemia, malnutrition and fluids and electrolytes deficits were corrected accordingly.

## INTERMITTENT DILATATION

Periodic dilatation by bougies was the main mode of treatment for most patients in this study, Table 2.2.7. Urethral dilatations were done under local anaesthesia or general anaesthesia in the tight strictures. Strict antiseptic and aseptic measures were adhered to. The

procedure were carried out gently with metal bougies of increasing size. Forceful and over dilatation were avoided as the resultant trauma induces inflammatory oedema and subsequent formation of more fibrous tissue. Whenever metal bougies had failed filiform bougies with follower were usually passed under direct vision afforded by urethroscope. Dilatations were carried out weekly until when a 28-30F catheter could be passed easily then it was continued monthly for one year. Others have recommended dilation should be done at increasing intervals, every 14 day, monthly, every three months and then six monthly for life.[17]

The aim of dilatation is to dilate the stricture with minimum trauma and discomfort. Intermittent dilations is mostly effective for early stages of urethral strictures as it has been for many years and should be regarded as a palliative procedure.[20,21]

This procedure is not without complications. The reported complications include creation of false passages, hemorrhage, urinary retention, extravasation of urine, and septicemia.[7,20] Two incidences of false passages were recorded in the present study. Intermittent urethral dilatations is still the best way of managing urethral strictures in our environment, as we lack other facilities

and urologists are few. It is known that stretching of scar tissue tends to further scarring. Nevertheless by repeated dilatation of the stricture a stable scar may be achieved.

**Table 2.2.7.** **Management of urethral stricture n = 22**

| Type of treatment | Number of patients |
|---|---|
| Suprapubic cystostomy to relieve obstruction | 14 |
| Intermittent dilatation | 15 |
| Urethroplasty, | 5 |
| single stage 3 | |
| two stage 2 | |
| Optical urethrotomy referred to KCMC | 1 |

- Most patients were managed by intermittent dilatation (68.1%)

Surgery for urethral stricture is indicated in:[18,20,21,23]

1. Impassable strictures.
2. Strictures requiring bouginage at frequent intervals with frequent failures.
3. Established false passage.
4. Dilatations that cause pain, bleeding or infection.
5. Complications especially bladder neck stenosis.
6. Factors like poor attendance due to patients ignorance of the gravity of the condition and other socio-economic factors.

URETHROTOMY

Internal optical urethrotomy is the second in line for the treatment of urethral strictures. However, for many surgeons it has become, the first line of management.[22]

It is suitable for uncomplicated short and long strictures located peno-bulbous urethra.[15,20] Wolukau-Wanambwa[24] has extended its use to complicated stricture with good response after preliminary control of sepsis or fistula by proximal diversion of urine, as not all complicated strictures are long, multiple, impassable or associated with severe spongio-fibrosis.

Optical urethrotomy is carried out under general anaesthesia or regional anaesthesia. The technique involves a deep single cut at 12 O'clock position through the rigid stricture down to supple well vascularized normal spongy tissue.[24] A ureteric catheter may be passed through the stricture before incision, as a guide. An indwelling catheter is normally left in situ for 2 - 3 days. Intermittent dilatation will still be required after urethrotomy. The reported success rate with this procedure ranges between 84-93%[24,25] Turner-Warwick[15] observed that the 12 o'clock urethrotomy in the bulbar penile urethra where spongy tissue is only 3-4mm thick and commonly spongio-fibrotic and firmly attached to the under surface of the corpora may fail to find an adequate supple tissue Layer to enable the lumen to expand. He recommended in this case an incision at 4-8 o'clock sector which are more likely to extend into a expandable supple spongiosum surrounding the bulbo-spongio-fibrosis and the subcutaneous adventitia outside the penile spongio-fibrosis. The 3 and 9 O'clock position are avoided to protect the urethral arteries.

After urethrotomy, the natural closing pressure of urethra empties its lumen and the margins of the incisional clefts tend to approximate. Thus the long term success of an internal urethrotomy depends upon whether the incisional clefts re-epithelialize before they close. This is unlikely to happen, when long complete occlusion are associated with massive spongio-fibrosis.[15,24] Unfortunately attempts to delay cleft closure and promote circumferential epithelialization by local application of steroids and urostatic distention have met with only limited success and the incidence of recurrent stenosis is not convincingly reduced by prolonging the period of indwelling catheter stenting from days to weeks.[15] Restenosis has tended to be treated by repeated urethrotomy and that patient can be taught to self dilate their urethra. Pelterson[26] had advocated use of primary endourethral split skin grafting as one method of diminishing scar tissue formation after urethrotomy.

The reported hazards of urethrotomy are hemorrhage, extravasation of urine, priapism, impotence and penile pain and edema.[15,17,20,24] However when carefully performed the procedure is highly useful for primary management of any urethra stricture. In the present study only one patient had internal optical urethrotomy, done at KCMC- Moshi.

## MEATOTOMY

This procedure involves splitting up of a stenosed meatus followed by regular dilatation for at least three weeks to prevent the raw edges from sticking together. The results are usually satisfactory. In this study no patient had this procedure.

## URETHROPLASTIES

Several well established urethroplasty techniques have been devised that are so adaptable that almost any stricture can now be offered a chance of permanent cure.[27] They are grouped into two broad categories namely, one stage urethroplasty and multistaged urethroplasty. The choice of a particular technique is largely dictated by the site of the stricture, length, aetiology and the experience of the surgeon.[3] Bewes[23] 1986 had suggested that urethroplasty is the answer to the treatment of urethral strictures in most patients of developing countries who cannot be followed up.

## SINGLE STAGE URETHROPLASTY

1. **Meatoplasty:** This procedure is indicated to those strictures that meatotomy has failed and those with a long meatal stricture. The procedure consists of an inverted U shape incision on the posterior aspect of the meatus. The edges of the incised skin flap are then stitched to the defect thus converting the narrow meatal opening into a form of trumpet.[28] In this study no patient had this procedure.

2. **Excision and end to end anastomosis (Marions operation)**

This procedure is suitable for short traumatic stricture of 1 cm in length. The stricture is excised and urethra is mobilized. The ends are split one ventrally and the other dorsally and spatulated. The ends are then anastomosed to give an elliptical anastomosis with a bigger calibre to avoid restenosis. A 18F catheter is left in the urethra for 10-14 days to divert urine. This procedure has a disadvantage of forming chordee of the penis and stricture recurrence.[15,19] One patient in the study had this procedure and required several dilatations after the operation.

3. **Dartos pedicle skin patch urethroplasty (orandis urethroplasty**

Two patients in this study with bulbopenile inflammatory urethral strictures had this procedure with good results, however a longer period of follow up is necessary. The technique involves mobilizing a pedicle patch from scrotal or penile skin with its blood supply. The patch is sewn to the opened urethra to reconstruct the urethra. The preservation of its vascular pedicle naturally increases the chance of survival of the skin patch graft. In one stage island patch urethroplasty is an excellent and reliable technique which is recommended for straight forward strictures which are not unduly complicated by infection, false passages or fistulae.[15,29]

4. **Free full thickness skin graft urethroplasty**

Free grafts are used for urethral reconstruction on a one stage basis. Success naturally depends upon 100% survival of the graft. Long grafts are naturally more prone to restenose than short ones because the risk of failure increases proportionally with increase in length.[15] Therefore this technique is suitable for uncomplicated short strictures. The penile skin is preferred than scrotal skin, as the latter is soft, pliable, tough, hairless, accessible and abundant and that it is adapted to wet ambiente.[20] Scrotal skin on the other hand is not adapted to wetness and therefore eczema, inflammatory reaction, infection and stone formation are more common with subsequent graft failure,[3,15] This procedure was not used in the study.

TWO STAGE URETHROPLASTY

Two stage urethroplasty can be used to treat most of the stricture but is mainly indicated for strictures complicated with periurethral abscess, perineal urinary fistulas, extravasation of urine and long inflammatory strictures. The purpose of the first stage is to establish an open inlay throughout the stricture extending at least 2cm into overtly normal urethra both proximally and distally. The swinneys type of urethroplasty, widely used, includes laying open all sinuses and abscess in communication with urethral. The stenosed urethra is incised and laid open. The edges of the incised urethra are stitched to the skin incision all around. A catheter

is left in place for 10 days. During interval period intermittent dilatations of both proximal and distal urethra stumps is necessary. This is continued until maturation of the scar take place. The interval, period, ranges from 6 - 12 months.[30] The second stage closure is simple, a complete tube being reconstructed. Two patients tube being reconstructed. Two patients in this study with complicated strictures were treated in this manner.

Scrotal flap in lay procedure is another two staged urethroplasty not used in this study.

## CONCLUSION

1. Inflammatory strictures are still common in our environment and traumatic strictures may be increasing.

2. Urethral dilatation is an effective mode of treatment of uncomplicated urethral strictures, however in complicated urethral strictures urethral strictures, two stage urethroplasty is the best choice.

3. Prevention of sexually transmitted disease through mass education, proper management of gonococcal urethritis, are some of the necessary measures to reduce the incidence of inflammatory strictures.

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## SECTION III: ORTHOPAEDIC AND TRAUMA

## 3.1. THE MANAGEMENT OF FEMORAL SHAFT FRACTURES

**SUMMARY**

Twenty four patients with femoral shaft fractureS were managed by the author in the department of Orthopaedics and Trauma of Muhimbili Medical Centre for a period of 4 months between August and December 1990.

Males predominated with a male to female ratio of 3:1. Their ages ranged from 11 years to 42 years and the most affected age group was 11-20 years. Road traffic accidents accounted for most fractures 62.5% (15 of 24 patients). Thirteen out of 24 patient had other injuries other than femoral shaft fracture.

Conservative management in a form of skeletal traction on a Bohler-Braun splint was the initial treatment in all patients. Seventeen out of 24 patients had satisfactory results with this mode of treatment. Internal fixation with Kunstcher intramedullary nail was performed in five patients and plating was performed in two patients.

### INTRODUCTION

The femoral bone contributes significantly to the hip joint above and the knee joint below and to weight bearing. In uncomplicated femoral shaft fractures, healing is usually rapid and non union is infrequent as the femur is rich in blood supply.[1] The biggest problem with femoral shaft fractures is the bulky and powerful muscles which surround

the bone and tend to shorten and angulate the limb making maintenance of fractured bone fragments in a reduced position difficult. It is ideal that reduction be as perfect as possible as angulation, shortening or residual rotation of the fractures segments result into grave biomechanical problems in hip and knee joint apart from gait. Femoral shaft fracture management is often complex, and has been managed successfully by either conservative[2,3,4,5] or operative methods.[6,7,8]

Based on 24 patients, the available methods of femoral shaft fracture treatment are reviewed.

## CASE PRESENTATION

A 42 years old male soldier was referred from Lugalo hospital due to a non-union mid third femoral shaft fracture.

The patient had been involved in road traffic accident 10 weeks prior to admission at this Centre. He was a passenger in a lorry which overturned and sustained injury to the left thigh. He lost consciousness for about 30 minutes and did not sustain any other external injuries. He was admitted at Mbeya hospital and was put on Perkins traction for eight weeks, however the fracture failed to heal.

Examination revealed a well built man who was not in pain, fully conscious and well oriented in time, person and

place. He was not pale. A blood pressure of 130/90 mmHg and a pulse rate of 90 beats per minute was recorded. Respiratory system was also normal. The cardiovascular system examination was normal. The liver, spleen, kidney were normal. Fluid thrill, muscle guarding and tenderness were absent in abdominal examination. The spine and pelvis were normal.

The left thigh was resting on a pillow and there was muscle wasting. He could not lift the left lower limb and was unable to walk. There was pain and mobility at mid thigh. A shortening of 4cm was recorded. The knee joint was stiff. There was no neurovascular deficit.

These findings were consistent with a non-united femoral shaft fracture. X-ray films revealed a transverse mid third fracture with overriding displacement and little callus formation and there was no bone alignment thus confirming diagnosis. Open reduction and internal fixation with Kunstcher intramedullary nail was planned. The patient was informed of the operation and consent was obtained.

Pre operative preparations included daily brushing with soap and luke warm water wash of the left thigh, left buttock and upper left leg. On the night before and in the morning of the operation day, the site were cleaned with savlon and drapped with sterile towel. Two units of blood were cross-matched and were obtained for the operation.

**Operation:**

Under general anaesthesia the patient was placed in a supine position at the edge of the left side, with a tilt to the right, of the operating table. The left lower limb including the buttocks was cleansed and drapped sterile. The left knee and hip were flexed. The fracture was exposed through a longitudinal posterolateral incision. An incision was made through the fascia lata in line with skin incision. Through the lateral intermuscular septum the vasta lateralis muscle was retracted anteriorly exposing the fracture site. A soft callus and muscle tissue was found interposed between the fracture site.

The soft callus and interposed muscles were removed and the fracture site was refreshened exposing the medullary canal on both fragments. A perforator was introduced retrogradely in the proximal fragment until it emerged through the greater trochanter. The medullary canal was reamed manually to both proximal and distal fragments to the exact size of the diameter of the nail chosen (42cm long, 11mm in diameter). The Kuntscher nail was introduced by retrograde technique. In acutely flexed proximal fragment the nail was hammered slowly retrogradely until the nail was felt protruding from the greater trochanter. A small incision was then made over the nail. Hammering of the nail continued until the nail was level with the fractured surface of the proximal fragment. The fragments were then reduced and aligned. The assistant then hammered

back the nail into the distal fragment until 2cm of nail was left protruding above the tip of the greater trochanter, the wound was irrigated with normal saline. The wound was closed in layers with a drain using dexon O. Nylon 2/O was used for the skin. A crepe bandage was applied around the thigh.

Post operatively control X-ray showed bone in good alignment and apposition. The proximal end of the nail was protruding 2cm above the trochenter and distal end of the nail was about 3cm from the articular surface of the distal femur. Post-operative period was uneventful. The drain was removed after 48 hrs. Skin sutures were removed on 10th day. The patient was sent to the physiotherapy department for flexion and extension exercises of the left knee joint and allowed on partial weight bearing on crutches. He was seen 3 months latter at follow up clinic, where the patient was examined and found to have clinical and radiological healing and a knee flexion of $90^{o}$. He was advised to continue with knee exercises and to come again for review every two months and start on weight bearing.

## DISCUSSION

### AETIOLOGY

In this study, road traffic accidents accounted for most of the fractures of the femoral shaft 15 out of 24 patients. Most of the patients were pedestrians. (Table 3.1.1). Other causes observed in this study were falls from height, falls at home, sports and bullet injuries.

Table 3.1.1. Causes of Femoral Shaft Fracture U =24

| Causes | No. of Patients |
|---|---|
| Road traffic accident | 15 |
| Falls from height | 4 |
| Falls at home | 2 |
| Sports | 2 |
| Bullet | 1 |

- Road traffic accidents accounted for 62.5% of fractures, and nine out of 15 were pedestrians.

Road traffic accidents is the most common cause of femoral shaft fracture in this study similar to other reports elsewhere[1,6,9]. Other causes not seen in this study include occupational and industrial accidents. Fatigue fractures of femoral shaft fractures have been reported in military recruits as well as runners and joggers with an incidence as high as 17%.[10] However, up to 69% of these fractures are usually asymptomatic. Pathological fractures[11] can arise from primary and secondary metastatic

bone tumors, osteomyelitis, osteoporosis, congenital anomalies such as osteogenesis imperfecta or osteopetrosis, or nutritional deficiencies such as rickets or scurvy. Others are unicameral bone cyst, aneurysmal bone cysts eosinophilic granulomas and fibrous dysplasia. Hyperparathyroidism may also result into apathological fracture.

## CLINICAL FEATURES

The femoral shaft fractures are injuries of the young adult and are usually the result of severe trauma. In this present study the age ranged from 11 to 42 years and thirteen out of 24 patients were in their teens and seven were in the twenties (Table 3.1.2.) These results are similar to the one reported by Buxton[5] in 1981 where out of 50 patients, 27 were in their teens and 12 were in twenties. Age ranged, between 11 and 70 years. In this study males predominated with a male to female ratio of 3:1 while Buxton[5] had a male to female ratio of 4:1. It is evident that the high incidence of femoral shaft fracture in the young adult male could be explained by the fact that this is the most active age group.

Table 3.1.2. Age and Sex Distribution

| Age in Years | Male | Female | Total |
|---|---|---|---|
| 11 - 20 | 10 | 3 | 13 |
| 21 - 30 | 5 | 2 | 7 |
| 31 - 40 | 2 | 1 | 3 |
| 41 - 50 | 1 | 0 | 1 |
| Total | 18 | 6 | 24 |

- The youngest patient was 11 years and the oldest was 42 years

- The patients below 10 years of age were admitted in paediatric ward and were not included in this study.

Clinical features of the femoral shaft fractures include pain, swelling, deformity and impaired function. Pain is usually present and becomes severe with motion at the fracture site. Gross swelling is present within a very short period and it has been estimated that over a litre of blood can be lost from bleeding fracture surfaces and muscular injury. Bleeding also increases with movement at the fracture site. There is usually angulatory, rotatory and shortening deformities as a result of powerful muscles pull surrounding the femoral shaft. Deformities depend on the level, direction of violence, muscle contraction and gravity. In the upper third femoral shaft fractures, the proximal fragment is flexed by the ilipsoas muscle, abducted by the gluteal muscle and everted by the external rotators. The distal fragment is adducted by the adductor muscles, drawn proximally by the ham string and quadriceps

and everted by weight of the limb. In middle and lower third fractures, backward rotation of the distal fragment is by the heads of the gastrocnemius and shortening due to the distal fragment being pulled upward by the hamstrings and the quadriceps femoris muscles.

The most important local concern with the femoral shaft fracture is neurovascular bundle injuries. They are usually common in injuries of the lower third of the bone and open fractures due to gunshot or missile injuries. It is therefore mandatory to test for sensory and motor function of the limb and test for tibialis posterior and dorsalis pedis pulse. Sometimes, arteriography or exploration of the vessels is necessary to confirm injury when signs of ischemia are present or cannot be ruled out.[11] In this study no neurovascular bundle injury was recorded.

**Radiological appearances:**

The basic pattern of femoral shaft injury associated with direct localized severe trauma are transverse and at its worst comminuted. Oblique or spiral fracture result from torsional force and tend to occur in older age groups.[1] Table 3.1.3. shows radiological appearances of fracture seen in this study.

Fracture of the femoral shaft may be associated with ispsilateral dislocation of hip and fracture of femoral neck or the fracture may be segmental. The femoral shaft

fracture may obscure the typical deformity of a hip dislocation and can easily be missed. It is therefore advised to have X-rays of the whole femur including the hip and knee joint.

**Table 3.1.3. Radiographic types of femoral shaft fracture 24**

| Type | Number of Patients |
|---|---|
| Transverse | 10 |
| Comminuted | 6 |
| Oblique | 5 |
| Spiral | 3 |
| Total | 24 |

- Middle third was the most affected site (17 out of 24)
- Simple transverse fracture were the commonest type seen.

**Associated Injuries**

Femoral shaft fracture usually results from severe violence and therefore not surprisingly that these fractures are commonly associated with head, chest and abdominal injuries and other fractures elsewhere.[1,6,11,12,13] Associated injuries play an important role in the determination of the initial treatment and in the rehabilitation of the patient. Life threatening injuries such as head, chest and

intraabdominal injuries take priority in the management of the patient. Other common injuries associated with femoral shaft fracturesinclude bilateral femoral fractures, ipsilateral femoral and tibia fractures, ipsilateral fractures of the femoral neck and intertrochanteric fractures, ipsilateral ligamentous injuries of the knee and patella and neurovascular bundle injury.

**Table 3.1.4. Associated injury n = 24**

| Type of Injury | Number of injuries |
|---|---|
| Head injury | 7 |
| Lower limb injury other thanfemoral shaft fracture | 5 |
| Upper limb injuries | 2 |
| Pelvic injury | 1 |
| Chest injur | 1 |

- Sixteen associated injuries were observed in thirteen out of 24 patients
- No abdominal viscera injury was observed.

**TREATMENT**

The objectives of treatment like any other fracture include restoration of length and alignment, immobilization of the fracture and prevention of knee stiffness. This can be achieved by either conservative or surgical methods. Ideally the best treatment should permit rapid union with

the least overall risk, hence shortest time in bed and hospital, thus early return to family, community and work, and rapid recovery of knee flexion with no risk of residual joint stiffness.[14] It would appear that operation would be the best choice if the risk of infection is minimal.

However, factors such as age, site, type of fracture, occupation, availability of facilities and expertise have considerable influence on the choice of treatment. In this centre and especially district and regional hospitals in this country because of the risk of infection, lack of facilities and big load of work in operating theatres make non-operative methods the initial treatment. Internal fixation of femoral shaft fracture is the best choice in centres where risk of infection is minimal.[14] In this centre operative treatment is reserved for patients with specific indications in whom none of the conservative treatment is practicable.

Emergency treatment at the scene of accident, include splinting of the fractured limb thus alleviating pain and minimizing further tissue damage and bleeding. Splinting is achieved by wooden splints or can be splinted to the contralateral limb or optimally a traction applied over a Thomas splint if available. In case of open fracture with protruding and bones, repositioning should not be done until proper debridment has been carried out. Thus avoiding carrying microorganisms into the deeper tissues.

Table 3.1.5. Method of treatment offered N=24

| Treatment | Number of Patients |
|---|---|
| Traction<br>Skeletal (15)<br>Skin (2) | 17 |
| Kuntscher nailing<br>(open method) | 5 |
| Plating | 2 |

- All patients were initially treated by traction on a Bohler -Braun splint, with satsfactory results in 17 patients (70.8%).

**Conservative Management**

Conservative management of femoral fracture, gives almost always satisfactory results and union usually takes place without problem.[1,2,3,4,5] The two main conservative methods of treatment are traction and functional bracing. However, conservative management with traction has several disadvantages. These include:

- prolonged immobilization which can lead to deep vein thrombosis, pulmonary embolism and bed sores.

- Knee stiffness with delay in restoration of normal range of motion.

- High incidence of malunion and non-union than internal fixation

- Pin-tract infection
- Refracturing after immobilization

**Traction:** Reduction like any other fracture should be obtained by traction and manipulation under general anaesthesia before immobilization in a Thomas splint.[1,3] In this study using a Braun splint reduction was achieved by a steady pull without help of general anaesthesia in bringing bone ends to an acceptable position. Traction can either be skin or skeletal. This technique counsists of the application to the distal fragment of aweight through pulleys attached to the limb by either skin or skeletal traction.

Skin traction is suitable when weight needed for traction does not exceed 4.5 kg or 10 lbs as greater weight will cause injury to the skin, in children over two and a half years or weight more than 25 kg to avoid damaging growth plate and in elderly patients with osteoporosis. This technique involves application of adhesive or zinc oxide plaster stuck to each side of the lower limb from the distal fragment to the ankle. The adhesive strapping is held firmly by a circular bandage. Cotton wool pad are applied on bony prominences to avoid pressure sores. Skin traction was applied to two 11 year old girls in this study.

**Skeletal traction** is suitable for adults when the skin is injured, ulcerated, atrophic and inelastic. A steinmann

pin or better Denham or threaded pin is passed through the tibial tubercle and u-shaped stirrup is applied from which a cord is attached to a suspended weight. The tibia tubercle is preferred because it has been found that insertion of pin through the lower end of the femur, theoretically logical, has an increased tendency to adhesion formation within suprapatellar pouch and to aggravate stiffness of the knee.[1,3] Conditions such as osteoporosis and skin infection prevent the use of skeletal traction. When inserting a pin aseptic measures including meticulous cleaning of skin with antiseptic preparations should be strictly observed. The pin is inserted from lateral to medial to avoid injury to the common peroneal nerve.

Traction weight normally used to maintain reduction is usually calculated as 10% of body weight. However length of the limb should be checked with tape measure and weight reduced or increased as necessary.

Counter traction is achieved by using the weight of the body. This is brought in action by elevating the foot of bed one inch for each pound of traction applied so that the trunk and pelvis tend to slide away from the source of traction.

**Immobilization**

**Bohler-Braun splint:** This method is easy and often succeeds. In this splint, the control of alignment of

fragments is only given by degree of traction. Weight needed to maintain proper alignment causes distraction, whereas weight enough to keep the fragment in contact is not enough to prevent angulation. The worst shortcoming of this method is that the splint is heavy and virtually part of the bed, this usually results in constant angulation every time the patient is moved during nursing procedures and certainly it is uncomfortable. The distraction and movement may be responsible for delayed union or non union. In this study Braun splint was used in all patients with satisfactory results in 17 out of 24 patients (70.8%).

**Thomas splint:** Most of the femoral shaft fractures can be treated satisfactorily in a Thomas splint with either skin or skeletal traction.[1,2,3]. This method offers maintenance of reduction already achieved but does not reduce the fracture by itself. It is therefore necessary to correct the displacement and angulation by traction and manipulation before using the splint. This can either be fixed traction by tightening the traction cords to a notch at the end of the Thomas splint or a sliding traction by attaching weight to traction cords running over pulley at the end of bed. The limb lies in the Thomas splint supported by slings from one bar to the other. By the judicious tightening and loosening of the these slings, together with the use of cotton wool pads medially and laterally a very accurate alignment of the femur can be obtained. This method is appropriate for developing countries as it is easy to make and if followed with proper

attention to detail, nearly all fracture of the shaft, can be treated successfully without serious shortening deformity, knee stiffness or non union. To add comfort to the patient the splint can be suspended from an overhead beam.

**Prevention of knee stiffness:** Knee stiffness is a very common complication with conservative management. There are several modifications of the Thomas splint and other methods which prevent knee stiffness by allowing the patient to start early exercises of the knee joint. These methods include:

1. **Pearson knee flexion attachment** is a u-shaped metal frame hinged at its upper end to short clamps fitting over the side bars of the Thomas splint just above the knee level. This allows early exercises of the knee joint even before union is sound enough especially if there is an associated intra-articular fracture. It is effective only with combination skeletal traction using a tibial pin.

2. **Fisk traction:** This is a simplified version of the Thomas splint with a pearson flexion knee attachment where the lower half of the Thomas splint is sawn off at the level of the knee after the pearson piece has been attached. Suspension cords are attached to the sawn ends and are passed over pulley to an overhead beam with a weight of 1.8 kg or 4 lbs near the head of

the bed. The patient could actively do flexion exercises by pulling the cords while still depending on the continuous traction from a skeletal pin in the upper end of the tibia.

Apart from the Bohler Braun splint there are other methods where every principal in immobilization is discarded and traction alone is relied upon to maintain length and alignment, these include Hamilton Russel and Perkin's traction.

**Hamilton Russel traction:** In this method no splint is used, but uses a combination of skin traction, a cloth sling over the knee attached to a system of pulleys. It is not advised for routine treatment of femoral shaft fractures but has a place in the treatment of patients with multiple injuries and later stages of treatment. It is comfortable for the patients and facilitates a wide range of movements at hip and knee joints. It gives greater traction along the axis of the femur but does not protect bone fragments against backward or lateral angulation.

**Perkin's traction:** differs from Hamilton Russel traction in that it uses skeletal traction, instead of skin, through a pin in the tibial tubercle. No splint is used but the fracture site can be supported by a sling. Weight traction recommended is so great that distraction can occur resulting into delayed union. Buxton[5] 1981 using Perkin's traction in 50 patients in which most patients were in

their teens and twenties, reported good results. All patients had at least 120$^{o}$degrees of knee flexion at the time of traction removal and 47 patients had clinical and radiological union at 12 weeks. This method is useful when Thomas splint is scarce or when good nursing is a priority.

**Cast bracing for femoral shaft fractures** initially treated with skeletal traction allows rapid mobilization of the patient and results in more rapid union and better functional return of knee motion. Cast bracing can also shorten considerably the period of hospitalization required for conservative treatment. For this method to succeed careful attention to detail and cooperation of the patient is necessary. Cast bracing has been shown to be an effective method of treatment of femoral shaft fractures combining the advantage of non-operative management with early mobilization possible with intramedullary fixation but with the disadvantage of operative treatment.[2,4,15] The average time for traction is 6 weeks, for hospital stay is 7.6 weeks and average time in a brace 7.4 weeks. The average time for clinical union is 12 weeks. The advantages of cast bracing together with the inadequacy of operating facilities, increased risk of infection, provides a best alternative in management of femoral shaft fractures in developing countries.

The complications observed in this study are shown in table 3.1.6.

Table 3.1.6. Complication seen in patients managed conservatively N = 15

| Type of Complication | Number of patients |
|---|---|
| Knee stiffness | 9 |
| Non union | 3 |
| Delayed union | 3 |
| Shortening | 2 |
| Angulation (malunion) | 2 |
| Osteomyelitis | 2 |
| Pin traction infection | 1 |

Knee stiffness was the commonest complication noted.

The commonest complication noted in this study was knee stiffness, however all patients were able to flex knee 90° after three months of physiotherapy. There is no significant statistical difference in the final knee function in comparative studies of open medullary nailing and conservative methods with skeletal traction.[6,16] Non union and delayed union were the second commonest complication. There were two patients with limb shortening more than 2 cm and angulation was noted in two patients. Osteomyelitis occurred in patients with open fracture one of them had a bullet injury. Pin tract infection occurred in one patient.

INTERNAL FIXATION

The disadvantages of conservative management can be circumvented by open reduction and internal fixation. Indications for operative methods vary from one institution to another depending on the availability of facilities and the risk of infection. Proponents of non operative methods have reserved operative methods to special circumstances which include

- Soft tissue interposition between bone fragments
- segmental fractures
- pathological fractures
- Failure of non-operative methods resulting into delayed union, non union and malunion
- angulation and shortening ,
- situations where it is impossible to maintain even a simple fracture in a reasonable position by non operative methods which include head injury with marked muscle spasms, mentally confused patients, elderly senile patients, traumatic paraplegia requiring constant turning to avoid sores and multiple injuries and fractures.
- Fractures of the femur with ipsilateral patellar fracture.
- major vascular surgery requiring arterial surgery.

In this study, 7 patients were treated by operative methods, 5 with Kuntscher nail and 2 with heavy duty plate. Kuntscher nailing was done in 3 patients with non-union due to muscle interposition and one patient with a mid third transverse fracture with overriding and shortening.

Plating was done in 2 patients with distal third fracture one due to comminution grade IV and one due to posterior angulation and muscle interposition.

Proponents of internal fixation have extended the indications for internal fixation to practically every fracture provided one has the right tools and the risk of infection is minimal. Lhowe and Hansen[8] 1988 advocate immediate intramedullary nailing of an open femoral fracture with acceptable rate of complications provided thorough debridgment of the wound, proper equipment and an experienced surgical team are present. Winquist and associates[6] have extended internal fixation to comminuted fractures and open fractures using Kuntscher nail and cerclage wires or interlocking pins with good results. Two open fractures in this study were managed by an external fixator in one and the other by skeletal traction after thorough surgical debridgment.

The best time to operate is controversial especially in uncomplicated fractures. Advocates of delayed internal fixation claim that it increases the rate of union, that the danger of developing a fat embolism syndrome was past and the surgeon and operative room team will have additional time to plan and prepare the patient. Wilber[17] observed that when femoral fractures are managed by operative reduction and internal stabilization a decreased incidence of delayed union and non-union can be achieved by delaying the operative stabilization five or more days

after fracture. Winquist and associates[6] did not notice an increase in fat embolism with early operation and that rapid restoration of fluids may have aided in preventing this complication. Furthermore, a primary advantage of early fixation of all long bone fracture is that it allows earlier mobilization of patient, thus facilitating pulmonary care and preventing secondary complication related to prolonged bed rest and traction. Early internal fixation is appropriate for patients with multiple long bone fractures, including those with bilateral femoral fractures or ipsilateral fractures of the femur and tibia and those with a femoral shaft fracture and concomitant injuries to the head chest or abdomen. The more serious the patient the greater is the need for earlier internal fixation. Dahud and Vasey[9] found that delayed internal Fixation does not increase the rate of union nor is it associated with high incidence of postoperative infection.

The advantages of internal fixation include[6,7,17]

- the hospital stay is effectively reduced and the risk of long confinement to bed which include both general systemic complications that may occur in the elderly and local complications that occur in all age groups are avoided by early mobilization.
- stabilization of a greater variety of fractures is achieved with diminished incidence of delayed union, non-union and malunion.

The main disadvantage of internal fixation is the risk of infection which ranges from 0 - 10% which can be minimized by closed intramedullary nailing and sometimes failure in obtaining the desired rigidity which may lead to mechanical failure. In this study the effectiveness of internal fixation cannot be judged as the follow up has been short.

**Intramedullary nailing:** Kuntscher nail is the most favored method of treatment of femoral shaft fracture since it was introduced in 1918. The most unhappy results are those in whom infection leads to life long problems of osteomyelitis with knee stiffness, shortening, chronic sinuses and repeated exacerbations. The closed method of Kuntscher nailing under image intensifier and special fracture table has the lowest, risk of infection and almost all papers emphasize the low infection rate compared with open nailing.[6,18] In this study open Kuntscher nailing was performed in five patients. Kuntscher nail is applicable to almost any type of fracture with slight modification with cerclage wires, interlocking nail or screws. Ender's nail has been advocated for elderly patient who are osteoporotic in whom other major open methods are hazardous and cannot achieve rigid fixation with a plate.[19] It is also suitable for pathological fractures. The advantages of Ender's nail are that it is easy to introduce and allows movement at fracture site which stimulates external callus formation. Intramedullary fixation permits load sharing more often than extramedullary fixation and should be used on femoral fractures whenever possible.[20]

**Plating of femoral shaft fractures:**

Although intramedullary nailing can be used almost to every type of fractures there are situation where plates may be of benefit. Plates have been used in long oblique and spiral fractures, severely comminuted fractures where grafting is needed. Plates are also used where conventional Kuntscher nailing gives inefficient fixation of a fracture at the junction of the middle and lower thirds of the femoral shaft. Two patient were treated with a plate, one had a severely comminuted fracture and one for fracture lower third not suitable for Kuntscher nailing.

## CONCLUSION

Femoral shaft fractures commonly affects the young adult male and road traffic accidents being the commonest cause. Most of these femoral shaft fractures can be treated with satisfactory results by traction on a Bohler-Braun splint. However close supervision is essential in order to attain good results.

Results of non operative methods can further be improved if other methods are introduced in this centre especially those that prevent knee stiffness so that the patient, can have their knee function as early as possible.

I would still reserve operative methods for special cases and avoid using it as a routine procedure.

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## 3.2.THE MANAGEMENT OF CHRONIC OSTEOMYELITIS

**SUMMARY**

Twenty three patients with chronic osteomyelitis were managed by the author for a period of four months between August - December, 1990, in the department of orthopaedic and trauma of Muhimbili Medical Centre. The age ranged from 8 years to 51 years and the most affected age group was betweetn 10 - 20 years. Nineteen patients were male while four were females.

Nineteen patients had spontaneous onset of osteomyelitis. In three patients osteomyelitis was due to open fractures and in one patient followed open bone surgery.

The commonest bones affected were the femur followed by the tibia. The presenting clinical features in this study were pus discharging sinuses (69.5%), swelling (56.5%), pain (26.0%) Fever (13.0%) and pathological fractures (8.6%). Duration of symptoms before reporting for medical treatment in a specialized hospital ranged from 1 month to 10 years, with most patients reporting within the first year. Nineteen patients had positive pus swab cultures. Thirteen of the culture specimen grew staphylococcus aureus sensitive to cloxacillin and erythromycin. Other organisms cultured were Klebsiella, Proteus and pseudomonas and were sensitive to gentamycin and cotrimoxazole. Saucerization and sequestrectomy together with appropriate antibiotics for an adequate period of time was the commonest mode of treatment employed.

## INTRODUCTION

The management of chronic osteomyelitis still remains a challenging problem facing an orthopaedic surgeon. Chronic osteomyelitis, usually results from unrecognized or inadequately treated acute osteomyelitis, has a high morbidity rate with great mental stress, crippling and often difficult to cure. However improvement in surgical care and chemotherapy have proved to be effective in patients afflicted by chronic osteomyelitis. But even with proper surgical care and specific antimicrobial therapy 20-30% of patients still develop recurrent sepsis within 2 years.[1] This has been mainly attributed to retained sequestra, poor blood supply, resistant microorganisms to antibiotic with defective host defence mechanisms.[2]

The improved outlook of chronic osteomyelitis will mostly depend on the energetic initial management of acute haematogenous osteomyelitis, open fractures and strict aseptic measures in operating theatres.

The present discussion is based on a study of twenty three patients while current literature on the subject is reviewed.

**CASE PRESENTATION**

H.H. a 12 years old boy was referred to Muhimbili Medical Centre complaining of swelling and multiple pus discharging wounds from the left thigh for the past six months.

The patient had experienced severe pain and swelling of the left thigh following an episode of fever, a year previously. He was sent to a dispensary where he was given five injections of penicillin and a course of chloroquine. However, he developed an abscess in proximal left thigh which was drained at the dispensary followed by amelioration of fever and pain. The "abscess" has continued draining pus for the past six months without closing despite treatment. He also developed another "abscess" in the distal third of the left thigh four months ago which also has not healed.

On admission to this centre, he was afebrile, without pain or cough or urinary symptoms. He denied history of trauma, jaundice or blood transfusions. The patient had not suffered from any other illness.

Physical examination revealed an afebrile boy who was short for his age. He was moderately wasted and anemic and was not jaundiced. He had a limping gait. Cervical and axillary lymph nodes were not palpable. His blood pressure was 100/60 mmHg and a pulse rate of 72 beats per minute. The head, neck and cardiorespiratory system were normal. Liver, spleen and kidney were not palpable.

The spine and upper limbs were normal. The left thigh was swollen with multiple discharging sinuses in the lateral aspect of the thigh. The temperature was normal. There was no tendernes. The left hip joint was medially rotated, adducted and in flexion deformity which was limited at about $30^{o}$. There was a real shortening of the limb by 2 cm. The knee was in flexion deformity.

A provisional diagnosis of chronic osteomyelitis of the left femur was made and the following investigations were done.

Hemogram revealed a hemoglobin of 6.8 gm/dl with microcytic and hypochromic red blood cells. White blood cell count, morphology and distribution was normal. Platelets count were adequate. ESR was 60 mm per hour. Sickling test was negative.

Pus swab taken deep from the sinus tract were taken for culture and sensitivity test. Staphylococcus aureus, were grown and were sensitive to cloxacillin and Erythromycin while resistant to penicillin, tetracyline and chloramphenical. No anaerobes were cultured.

Radiographic studies showed a sequestrum and complete destruction of the femoral head with cephalad displacement of the femur. The soft tissue were swollen

and knee joint was normal. The diagnosis of chronic osteomyelitis was confirmed.

The patient was started on high protein diet, vitamin supplements and iron tablets. Two units of blood were cross-matched for transfusion. The parent were informed of the operation and consent was obtained.

**Operation:** While the patient was under general anaesthesia the lower limb was cleansed and drapped. The sinuses tracts together with granulation tissue were excised up to the femoral bone. The bone was saucerized and a long sequestrum was removed. Surgical debridement was continued with curretage of all devitalized bone tissue leaving out a healthy bleeding bone. The wound was copiously irrigated with hydrogen peroxide and normal saline, and left open to promote drainage.

Postoperatively, the patient was transfused with two units of blood, oral cloxacillin and daily EUSOL dressing of the wound.

Two weeks later the wound appeared clean with good granulation tissue. The wound was not skin grafted. At the end of the fourth week postoperatively the wound had healed. He was discharged home and advised to come at orthopaedic out patient clinic for follow up.

## DISCUSSION

**ETIOLOGY**

Chronic ostomyelitis may result from unrecognized, untreated or inadequately treated acute Haematogenous osteomyelitis.[3,4,5] Chronic osteomyelitis may also be chronic from onset if infection is by a low virulence organism. Introduction of microbials through penetrating wounds, open fractures, or during bone surgery can also lead to chronic osteomyelitis if the acute phase is not recognized or treated adequately.[5,6]

Osteomyelitis may develop as a conseqence of contigous spread of infection from adjacent soft tissue and is more likely where vascular insufficiency or where blood supply can be jeopardized.[5] This is more common in diabetes, SCD. Leprosy, tuberculosis, calorie-protein malnutrition, peripheral neuropathy are other conditions at risk of developing osteomyelitis.[7]

In this study nineteen patients had osteomyelitis resulting spontaneously while four patients had chronic osteomyelitis resulting from either open fracture or bone surgery, Table 3.2.1.

Table 3.2.1. Causes of Osteomyelitis N = 23

| Cause | Number of patients | Percentage |
|---|---|---|
| Spontaneous | 19 | 82.6 |
| Open fracture | 3 | 13.0 |
| Bone surgery | 1 | 4.4 |
| Total | 23 | 100 |

- Chronic osteomyelitis resulting spontaneously was the most common. (82.6%).

Almost any pathogen can cause osteomyelitis, that is why a firm bacteriological etiology should be established in each case. Staphylococcus aureus is the most frequent organism isolated in about 60%of pateints with chronic osteomyelitis.[8] Other gram-positive organisms known to cause osteomyelitis are, staphylococcus albus, staphylococcus epidermis and Haemophilus influenza and streptococci.[3,8] In this study stapholococcus aureus was isolated in 13 patients (56.6%), Table 3.2.2.

Aerobic gram negative organisms less frequently cause osteomyelitis and infection is less virulent than gram-positive cocci, and may be isolated in about 20% of cultures.[8] In this study Klebsiella, proteus vulgaris and pseudomonas were isolated. Others are Escherichia coli and enterobacter species. Pseudomonas is most frequently isolated in osteomyelitis resulting from punctured wounds and in drug addicts.[9] For unknown reaons salmonella

osteomyelitis may be seen as a complication of sickle cell disease and will often involve the diaphysis of a long bone rather than the metaphysis.[10]

Myocobacterium leprae and tuberculosis, treponema, fungi and parasites are other known causes of osteomyelitis. Anaerobic osteomyelitis is less rare than was preivously believed. Anaerobes are more frequently isolated in osteomyelitis resulting from trauma such as open fractures, penetrating wounds or osteomyelitis associated with vascular insufficiency. In a patient with a foul smelling wound with severe necrosis the possibility of an anaerobic infection should be seriously considered. Anaerobic osteomyelitis carries a poor prognosis. The most common isolated anerobes include bacteroid fragilis, peptococcus magnus, anaerobic streptococci and clostridium.[8,11]

Table 3.2.2. Isolated micro-organisms on culture and their sensitivity n = 23

| Organism isolated | Number of patients | Sensitivity |
|---|---|---|
| Staphylococcus aureus | 13 | Clox/Eryth |
| Klebsiella | 3 | Gent/Cotrim Tetr. |
| Proteus vulgaris | 2 | Gent/Cotrim |
| Pseudomonas Aeruginosa | 1 | Gent/Chlor |
| No growth | 4 | - |
| Total | 23 | |

- Staphylococcus aureus was the most frequent microbial isolated (56%) and were all uniformely sensitive to cloxacillin and erythromycin. No Anaerobes were cultured. No patient had mixed infection.

**PATHOLOGY**

**Haematogenous Osteomyelitis:**

Haematogenous osteomyelitis is primarily a disease of childhood, occurring most frequently between the age of 5 and 15 years.[3] The site of predilection is nearly always the richly vascularzied metaphysis of the rapidly growing bones. The vasa nutritia branches in the metaphysis at the level of the epiphyseal disc make a sharp bend and widen into sinusoids as a result the bloodflow slows down producing a likely site for bacteria to settle.[2,3,4] In addition it is believed that the development of inflammation is facilitated by the fact that endothelial cells in afferent tracts of the metaphyseal vessels have no or insufficient phagocytic properties.[3] Local trauma may

influence the location of the bone infection, but often it appears to be purely a chance. [12] This theory was based on fact that with trauma or mechanical stress in a growing child, leads to metaphyseal hemorrhage and necrosis thereby providing a suitable environment for bacterial growth.

The initial host response is infiltration of polymorphonuclear leukocytes differing little with response in other soft tissues and combination of bacteria and leukocytes together constitute an abscess. The fate of this abscess will depend on the virulence of the invading organisms and resistance of the host; it may subside or become chronic or may spread. The infection may be closely contained so as to create a chronic abscess within the bone surrounded by sclerotic bone. This is what is known as a Brodie's Abscess and are common in tuberculous patients.

Since bone is a rigid structure, interstitial edema leads to increased intraosseous pressure resulting into capillary destruction, thrombosis, loss of circulation and the subsequent death of trabecular bone resulting into formation of sequestra. Increased pressure causes pain and flexion deformity of contiguous joint. New areas of bone become involved as the process progresses. This necrotic bone serves in turn as a culture medium for bacteria. The infection spreads either, to the medullary canal or through haversian and Volkmann's canal of the cortex to the subperiosteal space, elevating it. The

subperiosteal abscess in turn may open into adjacent soft tissue and to the skin forming discharging sinus tracts.

Spread to the joint is determined by local vascular pattern which depends appreciably on the patients age. Below the age of 1 year a few blood vessels enter the epiphyseal disc which also show sinusoid dilatations just as in the metaphysis. Consequently haematogenous osteomyelitis is frequently associated with arthritis and severe damage of the epiphyseal cartilage below the age of 1 year. Also due to the fact that the periosteum is loosely attached, the involucrum is usually massive. Between 1 and 16 years the epiphysis remains unaffected by inflammation, as the avascular barrier develops in the epiphysis in humans between the age of 8 to 18 months. Therefore osteomyelitis is not associated with arthritis, however, a massive involucrum also develops. The exception to the rule is the hip joint as the capital femoral epiphysis lies within the joint capsule. In adults the sites of predilection are the vertebral bodies and pelvis. In long bones it is characterized by rapid spread of infection along the entire length of the bone and the abscence of a large sequestra. The absence of epiphyseal disc facilitates the occurrence of articular inflammation.

In this study nineteen patients (69.6%) had chronic haemotogenous osteomyelitis at the time of referral to this centre. This was mainly due to improper initial treatment or missed diagnosis. Traditional healers played their

role in delaying treatment in some patients. The presence of therapeutic marks served as evidence of the work of traditional healers.

**Non haematogenous osteomyelitis.**[6]

In this type of osteomyelitis the microbials gain access to the bone through penetrating wounds or contigous infected adjacent soft tissue. Penetrating wounds include open fractures, puncture wounds, gun shot wounds, bone surgery and pin tract infection.

In this study there were 3 patients with chronic osteomyelitis resulting from open fracture and one following bone surgery, Table 3.2.1.

Haematoma is an extremely important factor in the development of non haemotogenous osteomyelitis as it allows bacteria to reproduce. Blood constituents are an ideal medium for bacteria growth as the patients own humoral and cellular defence system against infection cannot reach the haematoma. Another important factor is necrotic tissue, itself an ideal culture medium for bacterial growth, together with haematoma and edema lead to increased pressure on the tissue, which disturbs microcirculation suffieciently to cause compartment syndrome in some cases thus causing more necrosis to tissue. Implants are also an ideal place for baterial settlement and growth, out of reach of the host's defense system and antibiotics. Instability is another factor favouring infection. With

instability blood supply to the area is distrubed and the area of necrosis becomes more extensive, and microbials still find a large area without defense.

One difference between haematogenous and non-haematogenous osteomyelitis is that in the latter the exudate produced during the acute phase can drain out easily through defect in the bone cortex and wound itself. In such a situation interaosseous pressure does not raise very much, therefore less necrosis of bone and spread is less extensive. If acute osteomyelitis is not recognized or not subjected to initial radical treatment it progresses to chronically relapsing osteomyelitis.

## CLINICAL FEATURES AND DIAGNOSIS

### Clinical Features:

In this study the age ranged from 7 years to 51 years and Mean Age was 20.5 years. The most frequently affected age group was 11 to 20 years (Table 3.2.3.) There were nineteen males and four females with a male to female ratio of 4.75:1.

Burgess 1982[14] reported a mean age of 30 years with a male to female ratio of 3.5:1.

**Table 3.2.3.** Age and Sex distribution N = 23

| Age in Years | Male | Female | Total |
|---|---|---|---|
| <10 | 1 | 3 | 4 |
| 11 - 20 | 9 | 0 | 9 |
| 21 - 30 | 6 | 1 | 7 |
| 31 - 40 | 1 | 0 | 1 |
| 41 - 50 | 1 | 0 | 1 |
| >51 | 1 | 0 | 1 |
| Total | 19 | 4 | 23 |

- The age ranged from 8 years to 51 years
- Majority of patients were in 11 - 20 years age group
- Mean age was 20.5 years
- Male to female ratio was 4.7:1

The long bones of the lower limb, femur and tibia are most frequently affected in more than 80%.[2,3,7,14] In this study femur accounted for 47.8%, tibia for 26.1% and humerus 13.0%, Table 3.2.4.

Table 3.2.4. Site of bone involved N = 23

| Bone | Number of Patients | Percentage |
|---|---|---|
| Femur | 11 | 47.8 |
| Tibia | 6 | 26.1 |
| Humerus | 3 | 13.0 |
| Fibula | 1 | 4.3 |
| Radius | 1(1) | 4.3 |
| Ulna | 1(1) | 4.3 |
| Total | 23 | 100 |

- The femur was the most frequently affected bone followed by tibia.

- Two pateints had more than one bone involved.

**Diagnosis**

In this study the diagnosis was established by clinical findings, radiological features and bacteriological studies. The transition from acute into chronic inflammation is gradual without sharp histological or clinical dividing lines. Chronic osteomyelitis is characterized by a relapsing course and by the rarity of spontaneous recovery.

The clinical features in this study are shown on Table 3.2.5. All patients had clinical features of chronic osteomyelitis: The common presenting clinical feature ware multiple pus discharging sinuses, swelling and loss of

function in adjacent joints and sometimes pathological fracture. Most patients with chronic osteomyelitis are afebrile and hardly feel any pain. However exacerbation of chronic osteomyelitis, fever, pain, tenderness and warmth are present. Anemia and malnutrition are usually present due to long standing sepsis.

**Table 3.2.5.** Clinical features

| | Number of patients | Percentage |
|---|---|---|
| Pus discharging sinuses | 16 | 69.5 |
| Swelling | 13 | 56.5 |
| Pain | 6 | 26.5 |
| Fever | 3 | 13.0 |
| Pathological fracture | 2 | 8.2 |

- Majority of patients were seen late with already discharging sinuses.

The length of duration of symptoms in this study ranged from 1 month to 10 years with a mean duration of 2.5 years. However majority of the patients were seen in the first year of the disease, Table 3.2.6.

Table 3.2.6. Duration of symptoms n = 23

| Duration of symptoms | Number of Patients |
|---|---|
| 0 - 6 | 9 |
| 7 - 12 | 5 |
| 13 - 24 | 1 |
| 25 - 36 | 3 |
| > 36 | 4 |

- Majority of the patients were seen in the first year of the disease.

Radiological studies in chronic ostomyelitis show bony sclerosis, dimineralization, periosteal elevation and often sequestra. Sequestrum if not demonstrated by routine radiological studies, tomography may be indicated. These bony manifestations do not appear until about 10 to 14 days.[2,3]

ESR is frequently elevated in chronic osteomyelitis and is an excellent parameter to follow the evolution of osteomyelitis and its treatment.[2] If treatment is successful the ESR will fall gradually. Leukocytosis is virtually exclusive of acute osteomyelitis or exacerbations of chronic osteomyelitis.

For accurate institution of antibiotic therapy bacteriological studies are necessary. Reliable specimen can be obtained either from aspiration, deep into the discharging sinuses or form bone obtained at

surgery. Waldvogel (1980)[9] emphasised that repeat sinus tract culture are as accurate as a culture of bone tissue. Wheat (1985)[16] advocates culturing bone tissue obtained at surgical debridment as the appropriate method for establishing bacteriological diagnosis. In this study culture material was obtained deep from the sinus tract. It is also advised to take specimen for culture material for aerobes and anerobes, mycobactterium and fungi. Bone biopsy has the advantage of ruling out bone tumors espcially Ewings tumor which may occur together with osteomyelitis.[2]

**TREATMENT**

Optimal treatment of bone infection often requires a combination of antimicrobial and surgical therapy. Inadequacy in either aspect may result in persistence or relapse of infection. Success in treatment of patient with osteomyelitis also depends on health education to the general population regarding reporting to the hospital for early diagnosis and prompt administration of specific antibiotic therapy. The delay in instituting proper treatment, persistent with conservative treatment, inadequate surgery and the ability of the host to resist spread of infection are the factors which lead into chronicity of osteomyelitis.[2,6]

The aims of treatment will therefore be the correction of anemia, energy-protein deficiency, vitamin deficiency, electrolytes imbalance, which go hand in hand with the

eradication of infection by antibiotics and surgery, thus promoting effective healing.

**Antibiotics**

The antibiotic therapy is the mainstay treatment for acute osteomyelitis. Bacterial identification and sensitivity test are primary factors in selection of appropriate antibiotics. In general the least toxic active antibiotics, based on sensitivity results should be chosen. In chronic osteomyelitis without symptoms and signs of exacerbation allows time for obtaining adequate culture material. However very ill patients with constitutional symptoms emperical therapy based on presumed bacteriology must be instituted prior to isolation of bacteria. In these circumstances aspiration of pus or bone tissue for culture and biopsy should be done prior to institution of antibiotics. Definitive therapy is instituted later when culture results are available. Once the causative organism is identified, a narrow spectrum most specific agent should be used whenever possible rather than broad spectrum coverage.

Coles et al (1982)[17] recommended a combination of cloxacillin and penicillin with an overall cure rate with a single course of 83%. Cloxacillin is given at a dose of 100-200 mg/kg/24 hours and Benzylpenicillin at 250,000 - 1,000,000 i.u. 6 hourly intravenously until fever subsides and local signs decrease. Drugs are then changed to oral route for a total period of six weeks.

Nade (1983)[2] used a single drug. Cloxacillin was given at a dose of 100 - 200 mg/kg/24 hours intravenously until patient is well with no fever and local signs have disappeared. The drug was changed to flucloxacillin 50 - 100 mg by oral route for a total period of 6 weeks. Fusidic acid is added to prevent appearance of resistant strains.

Harrelson 1986[3] recommended a combination of penicillin and methicilin, once specimen for culture have been obtained. Intraveouns administration for 2 weeks followed by appropriate oral antibiotics for an addition 4 weeks. Generally antibiotics should be discontinued when all inflammatory signs are absent and ESR has returned to normal. Optimal duration of treatment in orthopaedic infections is not firmly established. In established adult osteomyelitis it is generally believed that 4 - 6 weeks of antibiotic therapy is usually necessary.[8]

Parenteral route has the effect of reaching high serum concentration of antibiotics for a short time. However in chronic osteomyelitis antibiotics may not reach the organism in devitalized soft tissue and bone. That is why in chronic osteomyelitis emphasis has been laid on excision of all devitalized tissues.

When gram-negative organisms were isolated gentamycin 1 - 2 mg/Kg/24 hours was given parenterally for 2 weeks and continued with cotrimoxazole for another 4 weeks.

Other antibioitics effective in osteomyelitis are cephalosporins (cephalothin, cephapirin) at a dose of 25- 30 mg/Kg/24 hours are the drugs of choice in penicillin allergic patients. Vancomycin (15 mg/Kg/24 hours) is bacteriocidal against staphylococcus aureus and epidermidis, streptococcus pyogens and pneumonia, Corynebacterium species and bacillus species. Clindamycin usually bacteriostatic has good bone penetration and effective against, anaerobes, staphylococci and streptococci. It is primarily used against Bacteroid flagilis.[18] All patients in this study needed surgery.

**Table 3.2.7.** Mode of treatment N = 23

| Treatment | Number of Patients |
|---|---|
| Saucerization + sequestrectomy + antibiotics | 19 |
| Incision and drainage +antibiotics | 3 |
| Removal of implants +antibiotics | 1 |
| Total | 23 |

- The majority of the patients were managed by saucerization plus sequestrectomy and antibiotics.

**Surgical Treatment of Chronic Osteomyelitis**

The objectives of surgical intervention in chronic osteomyelitis is excision of all devitalized tissue and elimination of dead space resulting from the operation and immobilization.[18] Surgery is indicated where there is an abscess as judged clinically and when x-ray show dead sclerotic bones or sequestra.

**Incision and Drainage**

In this study three patients were managed by incision and drainage, Table 3.2.7. Surgical decompression is part of the initial treatment of osteomyelitis if pus is obtained on aspiration from the supberiosteal space or from medullary, cavity. In case of an abscess in the metaphysis a window is made to facilitate drainage.[19] The wound is either packed for subsequent secondary closure or close it with a large suction catheter.

**Saucerization and Sequestrectomy**

Nineteen patients in this study were managed by saucerization and seqeustrectomy. A vertical incision is made which includes excision of sinus and all infected and devitalized soft tissue up to the bone. The involucrum is saucerized and in case of a cloacal its edges are excised by an osteotomy. Infected bone and dead bone tissue are currated until spot bleeding from the cortical vessel is seen. Implants should all be removed. The wound is then copiously irrigated with hydrogen peroxide and normal saline, after which the wound is left open to fill with granulation tissue. The wound is covered with vasseline

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gauze. The wound is exposed on the third day, followed by daily dressing with Eusol. Healing may be accelerated by split thickness skin grafting. Onuba[15] advised that early sequestrectomy should be avoided until enough involucrum has formed.

Danhott (1982),[18] reported that good results can be achieved by radical surgical debridement, primary wound closure and closed suction drainage. This reduces the hospitalizaton time and quantity of antibiotics to be administered. Modern approach in the treatment of chronic osteomyeltitis has been the use of gentamycin (polymethilacrylute - PMMA) impregnated beads, following debridement.[4] The beads are laid in the cavity created by surgery and are removed after 14 days. The local treatment is more comfortable for the patient since it takes place with the wound closed as a rule without systemic administration of antibiotics. In this study five patients were managed by gentamycin - PMMA beads after radical surgical debridement and healing was prompt.

One patient in this study presented with osteomyelitis complicating a fracture after open reduction and internal fixation. In this patient the plate and screw were removed and the femur was immobilized by external fixator. This resulted in healing of the fracture.

Often as a consequence of radical debridment, a sizable bone cavity will result. Non-vascularized cancellous bone

grafts have been used successfully to obliterate bone defects in patients with bone cavity with whom are associated with infection and poor soft tissue coverage.[20] It is most successful in metaphyseal defects. Onubo 1988[15] using non-vascularized ipsilateral fibula bone graft succeded in bridging a defect in diaphysis of the tibia in two patients. These non-vascularized graft usually undergo a sequence of necrosis and creeping substituion and may not become incorporated despite prolonged splintage.[21]

The use of local muscle flap or free vascularized muscle transfer is another method of obliterating bone cavity.[1,22] For a local muscle flap to succeed the defect must be in the anatomic location of the muscle flap. This method is applicable in proximal and middle third of tibia, femur, pelvis, humerus and spine. Muscle flap is used to treat osteomyelitis when primary antibiotics therapy has failed or when wound coverage is inadequate. The effectiveness of a muscle flap is based on the following factors:[1,22]

1. Wound debridement is less restricted because of the ability of the muscle flap to provide coverage.

2. The well vascularized muscle flap applied directly to the bone defect provides a new source of antimicrobial defense by improving oxygen or leukocyte delivery.

Leung 1984[23] reported successful reconstruction using vascularized bone graft from the iliac crest to bridge a defect in the proximal femur. Vascularized bone segment

transfer procedure are particularly indicated in patient who require an extensive bone resection for an adequate debridement.[24] Others have used microvascularized prepared free muscle flaps taken from the latissiums dorsi.[25] However, this methods is not feasible in most developing countries as microvascular surgery is not available.

**CONCLUSION**

Chronic osteomyelitis most frequently affects young adults in there teens and is usually of haematogenous origin. Staphylococcus aureus is the most common organism isolated (56.6%) and is uniformly sensitive to cloxacillin and erythromycin. The femur, Tibia and Humerus are the most frequently affected bones in that order.

In our enviroment most patients are referred to specialized Centres at a chronic stage. The incidence of chronic osteomyelitis can be reduced by improving the nutritional status of the general population, educating the general population and traditional healers, early diagnosis and prompt initial therapy which includes appropriate antibiotics and surgical evacuation of abscessof acute osteomyelitis.

The main stay of treatment for chronic ostemyelitis is surgical debridement and immobilization.

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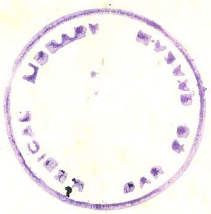
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# A DISSERTATION OF

# TEN SURGICAL CONDITIONS



BY

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A DISSERTATION OF TEN SURGICAL CONDITIONS SUBMITTED IN PARTIAL FULFILLMENT OF THE AWARD OF MASTER OF MEDICINE (SURGERY) DEGREE OF THE UNIVERSITY OF DAR ES SALAAM.

DECEMBER, 1991

**UNIVERSITY OF DAR ES SALAAM**

**FACULTY OF MEDICINE**

This is to certify that the surgical conditons presented in this book were managed by Doctor Samson Kizwalo Simbila during his postgraduate training in General Surgery under my direct or delegated supervision.

Dr. R.E. Kisanga

THE HEAD, DEPARTMENT OF SURGERY

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## ABSTRACT

This dissertation consists of three major sections of the ten surgical conditions studied in General Surgery, Urology and Orthopaedics and Trauma.

General Surgery is comprised of five surgical conditions, while urology consists of two and orthopaedic and Trauma three such conditions. All these conditions have been studied, during the three years training at Muhimbili University College of Health Sciences of the University of Dar es salaam.

For each condition, one case is presented in details. The salient feature of the presented case are compared with other cases and presented in tabular form. Each condition is discussed with review of the pertinent literature followed by a conclusion at the end.

## ACKNOWLEDGEMENT

I wish to thank all those who assisted in one way or another in my training. My special thanks go to my supervisor Dr. M.R.Aziz whose guidance, teaching and tolerance have made my three years training a success.

I am indebted to Prof. B.R. Kirei and Dr.C. Mkony of urology unit and Dr. E.M.Kessi, Dr. Mhina and Dr Museru of orthopaedic and Trauma Department for reading through and advising in their respective subjects.

I owe much to my teachers in surgery including Dr. R.E.Kisanga, the Head of Department of surgery, Prof. J.K.Shija, Prof. B.M.Minja, Dr. S.M.Mlay, Dr. L.E.K.Lema, Dr. Moshi, Dr. A.D.A.Kinasha, Dr. Kinunda, Dr. Malliwah and Dr. Amir for their generous knowledge and skills during my training.

I wish to thank Ms. Joyce Gondwe and Mrs N.M. Kheri who sacrificed a lot of their time in typing this dissertation.

Last but not least my special thanks should go the Director General of Muhimbili Medical Centre, Prof. P.M. Sarungi and then Prof. Mwaluko for their support in ensuring that all that was needed was available on time.

**Dedication:**

To my parents, Leah and Paul, for their guidence and advices.

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## SECTION I: GENERAL SURGERY

### 1.1. BENIGN GASTRIC OUTLET OBSTRUCTION IN ADULTS


SUMMARY

Ten patients presenting with gastric outlet obstruction were attended by the author in surgical Firm I between August 1988 to November 1989. In all cases, gastric outlet obstruction was confirmed endoscopically. The ages of patients ranged from 27 years to 75 years with a mean age of 48.1 years. There was a Male preponderance with a sex ratio of 4:1. History suggestive of peptic ulcer disease was present in 8 of the ten patients. The duration of symptoms before presenting for management ranged from 2 months to 20 years with a mean duration of 7.3 years before obstructing.

The clinical features consisted of vomiting (100%), loss of weight (100%), epigastric pain and fullness (88.9%), dehydration (100%), succusion splash 77.8% and visible peristalsis (55.7%). Truncal vagotomy and gastrojejunostomy was the preferred treatment for most patients regardless of the degree of duodenal disease with successful results. This procedure is simple and can be done at any district hospital with good results.


#### INTRODUCTION

Benign gastric outlet obstruction is caused by several conditions; peptic ulcer disease being the most frequent cause in adults.[1,2,3] Obstruction is encountered in ulcers involving either the duodenum or prepyloric region, that is

why the term benign gastric outlet obstruction is more appropriate than "pyloric stenosis" which is anatomically inaccurate. Although it may produce serious vomiting and fluid electrolytes disturbances it rarely is a threat to life.[2]

Benign gastric outlet obstruction is significantly more common in developing than in developed countries a recognized feature of peptic ulcer disease in many parts of the developing world.[4]

In developed countries despite recent advances in medical therapy for peptic ulcer disease, complications such as bleeding, perforation and occasionally obstruction continue to occur. However, Penston[5] (1990) observed that bleeding, perforation and obstruction may be prevented by maintenance treatment with $H_2$-receptor antagonists. But Gray and associates[6] observed that stenosis may develop for the first time in patients receiving $H_2$ receptor antagonists and it is conceivable that accelerated healing with these agents may favor the development of stenosis.

A case of benign gastric outlet obstruction is presented, the clinical features are described and discussed with reference to those noted among other cases of the same nature and review of the pertinent literature.

**CASE PRESENTATION**

MM a 60 year old female presented at Muhimbili Medical Centre with a 4 months history of vomiting, abdominal pain and fullness.

Initially vomiting occurred once a day but had increased in frequency to 2-4 times a day. It was more marked in the evening and consisted of large volumes of bile free fluid, usually contained food eaten in the morning or the previous night. Pain was located in the epigastrium and was constant but relieved by vomiting. She also had a sensation of abdominal fullness particularly towards the evening which was relieved by vomiting.

The patient admitted to having lost weight over the past four months. She had no history of hematemesis. She also complained of constipation but there was no history of melena.

She also admitted to a hitory of periods of epigastric pain over the past 8 years for which she was taking antacids. She gave no history of smoking or drinking alcohol. This had been her first admission to hospital.

Physical examination revealed a dehydrated and wasted lady with no pallor, jaundice or enlargement of supraclavicular nodes. Her pulse rate was 80 beats per minute, regular and of good volume while her blood pressure was 150/100 mm of Hg. Abdomen was asymmetrically distended around the

umbilicus and visible peristalsis from left to right. The liver, spleen and kidney were not palpable and there was no other palpable mass. Succusion splash was positive. There was no ascites. A digital rectal examination was normal.

A Ryles tube was inserted and about 2L of fermented fluid free of bile was aspirated. The abdominal distention disappeared following the procedure. The tube was left in situ for gastric aspiration.

A provisional diagnosis of gastric outlet obstruction probably due to chronic peptic ulcer disease was made. The following investigations were done. Full blood picture:. The haemoglobin was 12.0 gm/dl with a normal red blood cell morphology. White blood count was normal. Serum creatinine was 75 micromol/L, sodium was 140 micromol/L and potassium was 3.0 micromol/L. Bicarbonate was not reported.

↓ (N) 3.5–5.5

Gastroscopy revealed a dilated stomach with massive fluid retention. The pylorus was deformed, edematous and constricted and through the pyloric canal an ulcer crater was visualized.

A decision to operate was made and the stomach was lavaged with normal saline until all debris were removed. Blood was taken for serum electrolytes, creatinine, hemogram and two units of blood were cross-matched. Fluid and electrolytes disturbances were corrected with normal saline and Darrow's solution.

**Operation**

Under general anaesthesia, the abdomen and lower chest were cleansed and drapped sterile. An upper midline incision was made, the left lobe of the liver was mobilized by division of triangular ligamenet. The abdomen was explored and the stomach was found to be grossly dilated with scarring and adhesions around the pylorus and the first part of the duodenum. The liver and gallbladder were normal. The regional nodes in the greater and lesser curvature, and coeliac group of nodes were not enlarged. The spleen and the intestines were carefully packed off.

The lower esophagus was identified by palpation of nasogastric tube and a transverse incision was made over the overlying peritoneum. The lower 5cm of oesophagus was then mobilized by gentle dissection with index finger and was hooked. The stomach was pulled downwards by an assistant, this tensed the vagal trunks and were identified. The main trunks were divided between clamps and ligated. Specimen of the divided part were taken for histology and were later confirmed to be nerve tissues. Search of additional vagal fibres was done and those found were divided.

A retrocolic gastrojejunostomy was then performed. The greater omentum and the transverse colon were brought out of the wound turned upward and held under traction by an assistant. With a blunt dissector, a vertical opening was made in the avascular mesocolon between the middle

colic and left colic arteries. It was gently stretched by fingers to a length of 10cm. The stomach was pulled through the opening. An area of the jejunum was identified about 14 cm from the duodenal-jejunal flexure. A segment of jejunum was isolated between intestinal clamps. The posterior wall of the stomach was then exposed. Two stays sutures were placed to stomach muscular wall at the extrimities of the area selected for anastomosis (the most dependent part of the stomach). The stomach was then anastomosed to the jejunum in two layer by silk 2/0. The transverse mesocolon was secured to the stomach by three interrupted suture on each side of the anastomosis. Packs were then removed and haemostasis was achieved and the abdomen was closed.

The postoperative period was uneventful and the patient was discharged for follow up at surgical outpatient clinic. She was followed on monthly basis for 4 months, where her general condition improved. She was eating a normal diet, had no abdominal pain and was gaining weight. She was advised to report to outpatient clinic every 6 months and she was okay.

## DISCUSSION

### INCIDENCE

Gastric outlet obstruction is a significantly more common complication of chronic peptic ulcer disease in African countries south of Sahara, a fact accepted by most surgeons.[4,7,8] This pattern is different from that seen in developed countries where bleeding and perforation are common and obstruction is an occasional complication.[4,5] Tsega[9] in Ethiopia in 1985 using fibre optic endoscopy reported bleeding as the commonest complication the same as in developed countries. Arbad[10] in Sudan reported also bleeding (41%) the commonest complication followed by obstruction (15%) and perforation (4%).

These differences between developing and developed countries could be due to availability of diagnostic facilities such as fibre optic endoscopy in the latter facilitating diagnosis. Furthermore, patients with bleeding, or perforation may die before reaching hospital and that most reports in Africa could be surgically biased.

Tovey[7] observed that it seems possible that obstruction develops more frequently and rapidly in developing countries than in developed countries. The average duration in developing countries was 5 years while in developed countries was 10-20 years, from the initial symptoms of peptic ulcer disease to the development of obstruction. In this study the average duration was 7.3 years.

**Table 1.1.1.: Age and Sex Distribution n= 10**

| Age Group | Males | Females | Total |
|---|---|---|---|
| 20 - 29 | 1 | 1 | 2 |
| 30 - 39 | 1 | 0 | 1 |
| 40 - 49 | 2 | 0 | 2 |
| 50 - 59 | 3 | 0 | 3 |
| 60 - 69 | 0 | 1 | 1 |
| 70 - 79 | 1 | 0 | 1 |
| Total | 8 | 2 | 10 |

- The mean age for peptic ulcer associated with obstruction was 48.1 years.

- Male to female ratio was 4:1 for peptic ulcer disease with obstruction.

In general peptic ulcer disease mostly affects a younger age group between 30 to 40 years in African countries as compared to developed countries where the age group affected is between 45 to 55 years.[7,9] As would be expected obstruction in African countries occurs at an earlier age. The mean age at obstruction in this series was 48.3 years, See Table 1.1.1. which compares well with other African countries (45 -46 years), while the man age in British series was 76 years.[4] However, McMahon 1976 reported a mean age of 53.6 years.[11]

Peptic ulcer disease is predominantly a male disease. The male to female ratio shows great variation around the world, in England it is 2:1, India 18:1, in Africa it is 9:1.[7] The occurrence of gastric obstruction in peptic ulcer also shows a male to female variation. In one study the reported male to female ratio was 9:2 for pyloric

stenosis and 7:2 for duodenal stenosis in an African population while in the British it was 1:1.[4] In this study the male to female ratio was 4:1, Table 1.1.1.

**AETIOLOGY**

The most common cause of benign gastric outlet obstruction is peptic ulceration. The site of ulceration is duodenal in 75% of patients.[2] In a small number of patients the site of the ulceration may be pyloric, or prepyloric region. In this study site of obstruction was in the duodenum in 8 patients and was prepyloric in 2 patients.

Uncommon cause of benign gastric outlet obstruction include:

1. Benign tumors: These are rare causes of benign gastric outlet obstruction. Tumors in the antrum may grow to enough size to cause obstruction. It is not uncommon for a pendunculated polyp to prolapse through the pylorus or present at the gastric outlet causing intermittent obstruction.

2. Hypertrophic pyloric stenosis which usually presents in infancy may occasionally become, manifest in adult life as adult hypertrophic pyloric stenosis.[3]

3. Pancreatic rests in the pylorus and annular pancreas are other rare causes of obstruction.

4. Intragastric bezoars (trichobezoars and phytobezoars) can grow to size sufficient to cause obstruction.[3]

5. Inflammatory diseases such as Crohn's disease of the duodenum may cause gastric outlet obstruction.

6. Non mechanical obstruction may occur, but rare, in diabetes, drugs such as narcotic analgesics, ganglion blocking drugs and drugs with anticholinergic activity, scleroderma, dermatomyositis, anorexia nervosa, functional dyspepsia and myotonic muscular dystrophy.[3]

**Table 1.1.2. Causes of obstruction N = 10**

| Cause | Number of patients |
|---|---|
| Duodenal ulcer | 8 |
| Prepyloric ulcer | 2 |
| Total | 10 |

## PATHOLOGY

A duodenal ulcer or pre-pyloric ulcer during period of activity is often associated with impaired gastric emptying. This usually develops as a result of narrowing of the lumen by inflammation and edema around the ulcer. This is potentially reversible to the extent that gastric motor dysfunction can be corrected. However, in many cases gastric motor dysfunction is secondary to cicatricial stenosis of the lumen of Pyloro-duodenal region. As stenosis develops the stomach compensates for the obstruction at its outlet by means of hypertrophy of

its muscular wall and a forceful peristalsis in the antrum. Eventually as stenosis becomes increasingly severe the stomach becomes atonic. Ingested material and gastric secretion gradually accumulate to produce gastric dilatation.

In a study by McMahon[11] it was reported that obstruction due to inflammation and edema constitutes one third of patient and due to true fibrosis constitutes about two thirds. Six patients in this study had true cicatricial stenosis.

**FLUID AND BIOCHEMICAL DISTURBANCES**

Protracted vomiting of large volumes of gastric content is the eventual outcome in patients with gastric outlet obstruction. This, together with ineffective oral intake invariably leads to fluid and electrolytes disturbances. The fluid that is lost from the stomach has a high chloride and hydrogen concentration in relation to sodium.

For every hydrogen ion lost with vomiting of gastric contents a chloride ion is similarly lost and a bicarbonate ion enters circulation. Therefore during the early phases of obstruction blood coming from the stomach is alkaline with high content of $HCO_3$ ion and the patient develops metabolic alkalosis.

The resulting alkalosis is compensated primarily, by renal mechanisms, since respiratory compensation is generally small and cannot be detected in most patients. The kidneys clears the bicarbonate ion as sodium bicarbonate and loss

of chloride ion are minimized by renal tubular reabsorption. The urine is characteristically alkaline with appreciable amounts of sodium and low in chloride. In effect the kidney converts loss of hydrochloric acid from the stomach to a net loss of sodium chloride from the body, chloride ion are lost from the stomach and sodium ion from urine. In addition alkalosis itself causes increased renal excretion of potassium ions. (hypokalemia)

As the loss of sodium chloride and fluids mounts both from stomach and kidney the strong renin-angiotensin aldosterone mechanism intervene. The results is that much of the filtered sodium is now reabsorbed by renal tubules as sodium bicarbonate in exchange for postassium and hydrogen ions in an attempt to conserve sodium and fluid. This worsens the alkalosis and hypokalemia and urine at this stage may be paradoxically acidic. In effect the kidney is no longer compensating for metabolic alkalosis but sodium and fluid losses. The final physiological picture is of fluid depletion, metabolic alkalosis, hypochloremia and hypokalemia.[13,14]

## CLINICAL FEATURES AND DIAGNOSIS

Table 1.1.3. shows the symptoms and signs of gastric outlet obstruction seen in this study. A history of vomiting and loss of weight was present in all patients (100%). Epigastric pain and/or fullness was present in eight patients (80%). Wasting and dehydration were the most common physical findings and were present in all patients

(100%). Succusion splash was elicited in seven patients (70%), while visible peristalsis was seen in five patients (50%).

**Table 1.1.3. Clinical features N = 10**

| Symptoms/Signs | Number of Patients | Percentage |
|---|---|---|
| Vomiting | 10 | 100 |
| Loss of weight | 10 | 100 |
| Epigastric pain/fullness | 8 | 80 |
| Previous historyof PU disease | 8 | 80 |
| Dehydration/wasting | 10 | 100 |
| Succusion splash | 7 | 70 |
| Visible preistalsis | 5 | 50 |

Obstruction is usually heralded by progressive vomiting of food eaten the previous day. Vomiting can either be spontaneous or induced and usually relieves pain and abdominal fullness. Patients also present with anorexia and morbid aversion to food.[13]

A long history of peptic ulcer disease is obtained in most cases. In this study eight patients had a long history of peptic ulcer disease. The mean duration of symptoms before obstruction was 7.3 years in this study, comparable to a duration of 5 years reported in Africa and India.[7] In USA and Europe the duration is much longer ranging from 10-20 years.[7,11]

The diagnosis of obstruction is easily made on clinical grounds and can be confirmed by placement of nasogastric tube with finding of resting gastric juice of more than 300 mls or more, containing undigested food residue after an overnight fast.

Radiological features are fairly characteristic. An abdominal plain film may show evidence of gastric stasis with a large gastric shadow and a large amount of gastric fluid. Barium meal examination shows marked gastric dilatation with a large gastric residue containing food debris. The barium would normally be emptied from the stomach in less than 2 hours, but in obstruction the barium may be emptied a little or not at all up to 6 hours after ingestion.

Endoscopy is by far the most important investigation. In this study the diagnosis was confirmed by endoscopy in all patients. If the stenosis is the result of duodenal ulceration, the endoscope may pass through a normal pylorus and demonstrate duodenal ulceration and stenosis. However in prepyloric ulcer stenosis or inflammatory oedema, sometimes the endoscope cannot be negotiated into the duodenum. In this case biopsies must be taken to exclude a malignant gastric outlet obstruction.

Both radiology and endoscopy are reliable methods of diagnosis. However, endoscopy provides access to 16tissue biopsy and radiology gives more information about the function, severity, length of stenosis and relationship to adjacent organs.

A rising serum sodium and chloride ions and normalization of T waves on ECG indicate good electrolytes replacement.

The alkalosis abnormality will respond by volume replacement and require no special therapy. However, sodium and potassium must be given with chloride as anion. The best solution used in gastric outlet obstruction is therefore 0.9% sodium chloride which has 154 mEq/L for both sodium and chloride ions. As a rule half of the fluid electrolytes deficit should be given in the first 24hours. Treatment is continued until pre-renal azotaemia, metabolic alkalosis and hypokalemia have disappeared.

2. **Gastric decompression**

While correcting fluid and electrolytes disturbances, gastric decompression is begun to eliminate gastric dilation and restore gastric tone. This is achieved by insertion of nasogastric tube and aspirations every 12 hours usually for 3 to 4 days. Continued gastric aspiration by removing secreted gastric acid, will reduce inflammatory edema and may establish gastric emptying.[13] However, this cannot be achieved in cicatricial stenosis. Gastric emptying may be tested at bed side by saline load test. If more than 400mls of saline remain in the stomach 30 minutes after instilling 750 mls of normal saline emptying is impaired and surgery should be considered.[15] If there is emptying, oral fluids and calories can be commenced and ulcer therapy should be started.

Saline load test

3. **Ulcer therapy**

It is usually indicated where obstruction is due only to inflammation and oedema. In this study 4 patients were started on cimetidine 400 mg twice daily for 6 weeks. Symptoms improved during the period of treatment. However all had recurrence of symptoms a few weeks after stopping treatment. It was then decided to perform surgery as definitive treatment. Gray and associates[6] 1982 had noted development of stenosis in 4 patient out of 50 within a year after having been given intensive ulcer therapy of 1 g/day of cimetidine for one month followed by 400 mg at night as a maintenance dose for 60 months.

Table 1.1.4. Mode of treatment N = 10

| Treatment | Number of Patients |
|---|---|
| Anti-$H_2$ prior surgery | 4 |
| Truncal vagotomy & drainage<br>Gastrojenostomy (8)<br>Pyloroplasty (1) | 9 |
| Truncal vagotomy & antrectomy | 1 |
| Total | 10 |

- Four patients had anti $H_2$ receptor drugs before surgery
- Most patients had Truncal vagotomy and a drainage procedure
- There was no death

**Surgery**

Cicatricial stenosis is an absolute indication for surgery, basically a drainage procedure in a form of pyloroplasty, duodenoplasty or gastrojejunostomy.

There is no absolute consensus as to the most appropriate operative treatment of benign gastric outlet obstruction. Truncal vagotomy and drainage by either pyloroplasty or gastroentrostomy is themost commonly used procedure in this Centre. It is favoured because of its low operative mortality as most of the patients are in poor condition with respect to nutritional status and electrolytes disturbances. It is also relatively easy to perform with less operating time.

The trend nowadays is to perform proximal gastric vagotomy in patients with benign gastric outlet obstruction duodenal ulcer disease. McMahon and associates[11] 1976 in a study involving 23 patients with duodenal ulcer and obstruction who underwent proximal gastric vagotomy and digital dilatation and followed from 4 months to 5 years, reported good and excellent results (Visick grad 1 and 2) in 96% of patients. However, they noted a 9% incidence of failure due to restenosis. Rosi and associates[16] 1986 in a study involving 19 patients found that there was a lower visick rating of good to excellent results after proximal gastric vagotomy for patients with pyloric obstruction (58%) than for patients without obstruction (84%).

Barroso and associates[17] performed duodenoplasties in 43 patients with peptic duodenal stenosis as a complementary procedure to proximal gastric vagotomy. Patients were followed up for 8 years with a 4.6% recurrence rate of obstruction due to recurrent ulcer and only 11.6% of the

patients developed gastric stasis which were managed conservatively.

Hooks and associates [18] followed 18 patients for 6 years who had proximal gastric vagotomy with either dilatation (14) or duodenoplasty (6) for accompanying outlet obstruction. Twelve patient (67%) were Visick I, four (22%) were Visick II and were there two failure (11%). Proximal gastric vagotomy with either dilatation or duodenoplasty seems to be a reasonable surgical alternative for treatment of obstructing duodenal ulcer disease. We have no experience with gastric proximal vagotomy with either dilatation or duodenoplasty in patients with peptic ulcer and obstruction.

Vagotomy and antrectomy is widely acknowledged to be the most effective procedure available for curing ulcer since both vagal and gastrin drive on parietal is removed.[19] We used this procedure to one patient with a prepyloric ulcer. It has been recommended in recurrent ulcer after proximal gastric vagotomy and in prepyloric ulcers. There is evidence in literature that ulcer recurrence after proximal gastric vagotomy is increased in those patients with pyloric or prepyloric peptic ulcer disease as opposed to patients with duodenal ulcer.[20,21,22] Recurrence percentages are reported to range from 12% to 44% in these series.

## CONCLUSION

Duodenal ulcer disease is the commonest cause of benign gastric outlet obstruction in our enviroment. Over 80% of patients have a long history suggestive of ulcer disease with a mean duration of 7 years. Clinically it manifested by copious vomiting, loss of weight, epigastric pain and/or fullness. Truncal vagotomoy and retrocolic gastrojejunostomy is the preffered treatment as it avaoids placing an anastomosis or clossure in the scarred duodenum.

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## 1.2. THE SURGICAL MANAGEMENT OF NON - TOXIC GOITRE


### SUMMARY

The period between August 1988 and November 1989, 23 patients with non toxic goitre underwent thyroid gland surgery in surgical Firm I of Muhimbili Medical Centre. There were 21 females and 2 males. The age at operation ranged from 18 to 70 years with a mean age at operation of 40 years.

Most pateints (60.8%) sought medical advice for cosmetic reasons. Most of the patients had neck swelling grade 3 and above according to WHO criteria. Duration of thyroid enlargement ranged from 4 months to 30 years, being below 5 years in 14 patients. Multinodular goitre was the commonest type, (73.9%).

All patients were operated. Five patients developed postoperative complications (21.7%). There was no death. Nodular goitre was the commonest histological description. One patient (4.3%) was reported histologically to have follicular carcinoma of the thyroid gland. On this basis all thyroid tissue removed at surgery should be submitted for histopathology and under no circumstances should the patient be dismissed from the clinic without histopathology results.

## INTRODUCTION

Non toxic goitre is a common disease in Tanzania, and it was even more common in endemic areas such as Ukinga highlands before the introduction of a national programme for erradication of endemic goitre.[1] In its early hyperplastic stage the disease can be reversed by iodine supplements or thyroxine suppresing therapy. However, once nodules have been established they do not regress with Iodine or thyroxine, instead they continue to grow at a variable pace resulting into cosmetic disfigurement. Surgery is the only way one can treat goitre at this stage.

This study is based on experience with 23 patients who had non toxic goitre managed in surgical firm I. One patient is presented in detail and aetiology, natural history, indications and complications of surgery with reference to the other cases and available literature are discussed.

## CASE PRESENTATION

A 45 years old female was admitted at Muhimbili Medical Centre as a referral case from Zanzibar with an anterior neck swelling for more than 10 years.

The swelling was painless and very slowly increasing in size. Six months prior to admission, She had started experiencing dry cough, irritation and difficulty in breathing when in supine position. These symptoms made her seek medical advice. She had no fever or difficulty in swallowing or noted any change in voice.

Her apetite was normal and had not lost weight. Occasionally she had palpitations. She was not nervous and sleep was normal. She had a history of increased sweating and intolerance to heat.

She had never received any drugs for the thyroid enlargement or radiotherapy to the neck. There was no history of goitre in the family and anterior swelling of the neck was not very common in her region. Her diet included rice, beans, maize, cassava, meat and fish.

She was a housewife with 3 children. She was a non-smoker and has never taken any alcoholic drink.

Examination revealed a healthy middle aged lady who was afebrile, moderately pale and was not jaundiced. There were no cervical or axillary lymph nodes enlarged. She had no pedal oedema nor puffy face nor fine tremors. Her blood pressure was 150/90 mm of Hg and her pulse rate was 108 beats per minute with a sleeping pulse rate of 96 beats per minute. Examination of the eyes was normal.

Chest examination was normal. Apex beat was in the fifth intercostal space midclavicular line. Heart sounds were heard and regular. No murmurs were heard. The breathing was vesicular and there were no added sounds. The liver, spleen and kidney were not palpable.

On local examination of the neck, there was a diffuse swelling on the anterior aspect, easily visible from a distance , extending from the sternal notch to the thyroid cartilage. It moved with swallowing and skin over it was normal.

The swelling was non tender and multinodular. It involved both lobes extending on both sides to the posterior triangle of the neck. The mass was not pulsatile and on auscultation there was no bruit. The trachea was central and cervical lymph nodes were not palpable.

On the basis of these finding a diagnosis of multinodular goitre grade III was made. The following investigations were done.

**Hemogram:** The hemoglobin was 7.8 gm/dl with hypochromic microcytic red blood cells. White blood cell count and distribution normal.

Urinalysis was normal and stool examination revealed hookworms.

**Serum electrolytes:** $Na^+$ was 132 mmol/L and $K^+$ was 5.6 mmol/L. Serum creatinine was 67 micromol/L. TSH was 0.3 mu/L and $T_4$ was 84 mmol/L.

Chest X-ray and thoracic inlet were normal. Plain X-ray of the neck both frontal and lateral view showed a homogeneous soft tissue mass anterior tothe trachea with no calcifications.

Indirect laryngoscopy revealed normal vocal cords.
While in the ward she developed a superficial abscess onthe anterior aspect of the neck which was drained. Pus culture and sensitivity test revealed Klebsiella species sensitive to sulphonamides, Tetracycline, Cotrimoxazole, chloramphenicol and Gentamycin and were resistant to ampicillin.
ELISA test was negative.
She was given cotrimoxazole, mebendazole and haematinics. Her haemoglobin improved from 7.8mg/dl to 11.5gm/dl after 6 weeks however the drainage site remained with a disharging sinus. The patient was explained of her disease and the need for surgical treatment. ,Consent was obtained.

**Operation:**

Under general anaesthesia, the patient was positioned with neck extended, cleaned and drapped. A standard crease incision was made. The incision included skin, subcutaneous tissue and platysma muscle. Skin flaps were developed upwards to the level of the thyroid cartilage and downwards to the sternal notch. The investing layer of deep cervical fascia was incised vertically in the midline and the interval between the infrahyoid muscle was opened by dividing these muscles thus exposing the sheath of pre tracheal fascia. The sheath was incised and using a finger the gland was then dissected free from the surrounding tissue. Middle thyroid veins were identified by rotating each lobe medially and were doubly ligated and divided. The superior poles of the gland was delivered at

the wound and the vascular pedicle comprising the superior thyroid vessels become apparent. The vessels were ligated and divided near the thyroid tissue. A finger was then swept round the lower poles of the lobe which was delivered forwards, after the inferior thyroid and other veins have been secured. The gland was retracted medially and inferior thyroid arteries identified and ligated near the thyroid lobe. The recurrent laryngeal nerves and parathyroid glands were identified and preserved. Using sharp dissection the gland was dissected clear from the trachea. Parathyroid glands were left behind. Haemostasis was secured with silk 2/0. The wound was closed in layer with corrugated rubber drain.

Postoperatively patient developed wound sepsis, which was treated with antibiotics. Her voice was normal and there were no muscle spasms. Histology results reported follicular carcinoma of the thyroid gland. She was discharged back to Zanzibar on thyroxine hormone 200 micrograms daily and advised to come for follow up at the outpatient clinic. Total thyroidectomy was considered adequate for follicular carcinoma at this stage.

## DISCUSSION

### AETIOLOGY

The aetiology of non toxic goitre is unclear. Theoretically, any decrease in thyroid hormone circulation of whatever cause may result into a goitre. The loss of negative feedback would lead to increased stimulation of

thyroid gland by TSH with resultant hyperplasia and hypertrophy. This simplistic explanation may explain some of the cases, especially in the endemic type of goitre. It is clear that some other explanation needs to be found to account for most cases of non toxic goitre. However failure of thyroid hormone production for whatever cause may give rise to diffuse enlargement of the thyroid gland and with continued stimulation as time passes the gland gradually becomes nodular.

Iodine deficiency in diet and water accounts for most of the endemic goitre.[3,4] Goitre occurs with varying intensity in almost every country. In tropical Africa there appears to be no true goitre belt but rather circumscribed scattered areas of endemicity.[5] In Tanzania it has been reported to be common in Ukinga and Rufiji.[1] It has been claimed that excess calcium and fluoride in drinking water may exacerbate an underlying state of iodine deficiency.[6,7] Although iodides in food and water may be adequate, increased demands of thyroid hormones cause physiological goitre especially at puberty and during prenancy. Failure of intestinal absorption with excessive fecal loss andincreased excessive urinary loss in nephrosis are other rare causes of goitre not seen in this study.

The daily requirement of iodine is about 100-125 micrograms and dietary intake is reflected by the urinary excretion of iodine. In endemic goitre region urine output of iodine is

40 micrograms or less while in non endemic it is 170 micrograms.[3]

**Goitrogens,** variations in the prevalence of endemic goitre in areas of similar levels of iodine deficiency point to the existence of other causative influences. Goitrogens are substances which act by blocking essential steps in the synthesis of thyroid hormone thus resulting into increased levels of thyroid stimulating hormone (TSH). Calcium and fluorides in water supply promote goitre formation.[6,7] The role of ingested goitrogenic substances has been postulated for many years based on early demonstration of development of goitre in experimental animals fed on naturally occuring foodstuffs such as cabbage, cassava, cauliflower, brussels and others belonging to the brassica family. To be clinically significant in human beings, the food must be consumed in large quantity or represent a major portion of diet. Cassava contains a thiocynate that inhibits iodide transport within the thyroid gland worsening any possible concurrent iodine deficiency. Eltom and associates[4] have observed that a goitrogenic factor in millet which might contribute to the high prevalence of goitre in Darfur region in Sudan.

Familial goitre are caused by impaired iodine uptake by the thyroid gland due to a congenital biochemical defects leading into increased TSH secretion. All are transmitted as autosomal recessive condition. These biochemical defects[8] include:

1. Iodide trapping defect, by the thyroid, salivary and stomach resulting into inability to concentrate iodine in thyroid gland. This defect is corrected by an increased iodine content in diet and may not be apparent in areas with high dietary iodine intake.

2. Peroxidase defect which results into inability to iodinate thyroglobulin.

3. Dehydrogenase defect results to an inability of thyroidal deiodination of monoiodotryrosine and di-iodotyrosine. This defect can also be masked by elevated dietary iodine intake.

4. Disorders of thyroglobulin and Iodothyroxine synthesis.

NATURAL HISTORY

Goitre is thought to begin as a diffuse enlargement of thyroid gland during childhood stimulated by chronic iodine deficiency. However, it is more noted during adolescence, at puberty or pregnancy as a response to increased demand of Iodine occuring at that time. This is a diffuse hyperplastic goitre in which all lobules are composed of active follicles and iodine distribution is uniform. The gland is usually diffuse, soft, smooth and symetrical. The duration of this stage is variable and with increased cell mass the euthyroid state in maintained. This stage is reversible if TSH is supressed by administration of iodine or thyroxine hormone.

With passage of time, because of fluctuating levels of TSH, a mixed growth pattern develops of areas with active and inactive lobules. Active lobules become more vascular and hyperplastic, with it an euthyroid state is achieved and in inactive lobules follicular cell growth ceases and is followed by acccumulation of colloid.[9] For reasons that are unclear the accumulation of colloid is not uniform throughout the gland, and some follicles are hugely distended, while others remain small and may even retain small papillary infoldings of hyperplastic cells. Hemorrhage may occur in the lobules causing central necrosis. Necrotic lobules coalesce to form nodules filled with either iodine-free colloid or a mass of new but inactive follicles. This cyclic growth and regression results into nodular goitre. Most nodules are inactive, and active follicles are present only in internodular tissue. In addition to TSH other thyroid growth factor such as growth stimulating immunogloblins are responsible for growth and development of nodular goitre.[10] With nodular transformation the gland becomes firm irregular and asymetrical.

These nodules have a wide range of biological behaviour.[11] The nodules may grow at a slow and steady rate over several decades, or one of the several nodules may start to grow at a rapid pace, a pattern usually suggestive of benign folicular adenoma. Some nodules may undergo retrogressive changes with degeneration and cystic formation or

hemorrhage into a nodule causing pain. Some nodules may undergo malignant change which is usually of follicular pattern. In the present study, one patient with mulitnodular goitre of long duration was reported histologically to have follicular carcinoma.

Multi-nodular goitre may develop thyrotoxicosis in about 30%[10]. This condition increases in incidence with time as nodules develop autonomous function. The manifestationes are mainly cardiovascular. In this study two patients had mild clinical features of thyrotoxicosis. Rarely multimodulary goitre is associated with hypothyrodism.

Multinodular goitre also can cause pressure effects on trachea of displacement, compression or both resulting into respiratory distress and dysphagia.[12] Rarely they can stretch the recurrent laryngeal nerve unless there are malignant changes.[13]

CLINICAL FEATURES

Most patients are referred for surgical treatment at a relatively young age. Davey[4](1963) in Ibadan University hospital Nigeria reportedthe average age at operation was 39.7 years. Geerden and Hee[12] in Denmark reported the age at operation ranged from 16-69 years with a mean age of 37.7 years. Ssali (1986)[14] in Kampala reported the age of operation ranged from 7 - 67 years; majority being operated between 20 and 40 years. In this study the age at

operation ranged from 18 to 70 years with a mean age of 40 years. Majority were between 20 and 50 years, see table 1.2.1.

**Table 1.2.1 Age and Sex disribution at operation**

| Age Group | Females | Males | Total |
|---|---|---|---|
| 11-20 | 1 | 0 | 1 |
| 21-30 | 3 | 2 | 5 |
| 31-40 | 4 | 0 | 4 |
| 41-50 | 7 | 0 | 7 |
| 51-60 | 4 | 0 | 4 |
| 61-70 | 2 | 0 | 2 |
| Total | 21 | 2 | 23 |

Age at operation ranged from 18 to 70 years with a mean age at 40 years.

Female to male ratio was 10:1.

Non toxic goitre is far more common in females than in males. In this study female to male ratio was 10:1 similar to that reported by Davey (1963) in Ibadan Nigeria. Ssali[14] in Uganda 1986 reported a female to male ratio of 9:1 while Geerdsen and Hee[12] in Denmark 1982 reported a female to male to 7:1. In total goitrogenous endemic regions there is no difference related to sex and the ratio is almost 1:1.[4] The reason for non-toxic goitre being more common in females is not clearly known. It is of intrest that recently oestrogen receptors have been identified in normal thyroid tissue and also in nodular goitre.[10]

Most patients with non-toxic goitre are asymptomatic and do not consult a physician early. Usually they seek medical attention for several reasons which include:

1. **Cosmetic disfigurement** when the thyroid gland has sufficiently enlarged. Usually a diffusely enlarged thyroid gland does not become palpable until the volume of the gland has doubled and visible until the weight is more than 3 times the normal weight of thyroid gland of 20 - 25 grams. Patients are usually unaware of small nodules less than 2 cm in diameter. This was the commonest reason for seeking medical attention (14 out 23 patients). Most had thyroid enlargement in this study were grade 3 and above according to WHO criteria.

2. **Pain:** rapid growth or hemorrhage into nodule resulting into pain, may bring the patient to medical attention. No patients in this study presented in this manner.

3. Pressure Symptoms: These include dysphagia, cough, respiratory distress, a feeling of fullnes in the throat or hoarseness of voice. These are more common in retrosternal goitre and extention of thyroid enlargement into the thoracic inlet.[1] In this study five patients had hoarseness of voice. No patient had dysphagia or respiratory distress. Distention of the jugular vein, indicative of impedance of return of blood, also may be present in goitre extending into thoracic inlet. Paralysis of the recurrent laryngeal nerve and Horner's

syndrome resulting from pressure on superior sympathetic ganglion more frequently suggest malignacy.[13]

4. Recurrence after surgery was another reason for seeking medical advice. Two patients in this study had recurrencies.

Horners syndrome:
miosis
Enophlalmos
Anhydrosis
Ptosis

MEPA

## TREATMENT

### Preventive and Medical therapy

In endemic areas the incidence of goitre has been strikingly reduced by prophylactic measures.[5,10] The use of iodized table salt by potassium iodide 1 part in 10,000 is enough to prevent endemic goitre. The incidence can further be reduced by avoiding or reducing goitrogenic foodstuffs.

In the early stages a hyperplastic goitre can be reversed by daily intake of Lugol's iodine 5 drops in a glass of water or potassium iodide 30 mg or throyxine 40 microgram.[5] The nodular stage of non toxic goitre is irreversible. Shimaoka and Sokal 1974)[15] in a controlled study demonstrated a significant decrease in size of mulitnodular goitre in 60-70% of patients using L-thyronine 50 mg or thyroxine (200 mg). Suppresive treatment with very large doses of iodide or thyroxine daily in some patients may develop thyrotoxicosis known as Jod-Basedow disease. Patients receiving this kind of therapy should be followed closely.

In this study most patients had a trial of medical suppresive treatment before they were referred to this centre.

**Indication for Surgery**

In late multinodular stage, medical therapy with iodine supplements or thyroxine suppresive therapy an ineffective. Surgery may be indicated for any of the following reasons:

**Table 1.2.2 Indication for Surgery n = 23**

| Indication | Number of Patients |
|---|---|
| Cosmetic reaons | 12 |
| Pressure symptoms | 5 |
| Solitary nodule (Biopsy) | 3 |
| Thyrotoxicosis | 2 |
| Recurrence | 1 |
| Total | 23 |

- Most patients were operated for cosmetic reasons.

**Indications for Surgery**

1. Cosmetic deformity. A multinodular goitre is often uncomfortable and unsighty and subtotal thyroidectomy is advisable unless life expectancy is short. This was the commonest indication for surgery in this study similar to another study done in Uganda[14]

2. Pressure on the trachea resulting into respiratory distress is another indication. Oliech (1979)[16] reported that pressure on the trachea was the main indication for operation at Kenyatta hospital.

3. Biopsy: In this study surgery was indicated in three patients to establish diagnosis as fine needle aspiration results could not confirm the suspected

malignancy. Biopsy is indicated if there is a sudden or continued growth of the goitre or a hard nodule or a single nodule that continues to grow in a multinodular goitre or a solitary nodule. Fine needle aspiration cytology is now accepted as the most precise diagnostic procedure in these situations as it is accurate and allows time to plan treatment. With anexperinced cytopathologist interpreting the results, a repoted accuracy of 95 to 97 per cent has been achieved.[11] We lack the expertise and experience in the centre.

4. Substernal goitre, or low lying goitres and goitres which encircle the trachea which are more likely to produce symptoms of obstruction. No patient in this series was operated for this reasons.

5. Prophylactic surgery to prevent occurrence of thyroid carcinoma is usually not justified in multinodular goitre.

6. Multinodular toxic goitre may be another indication for surgery. Two patients were operated in this study for multinodular toxic goitre.

Surgical resection aims at removing nodules and leaving up to 8 grams of relatively normal tissue in each remnant. When multinodular change is asymmetrically distributed with one lobe significantly involved and the other lobe minimially involved, unilateral total lobectomy on the

affected side is the appropriate management. If both lobes are equally involved bilateral subtotal lobectomy is performed. And when nodularity involves only the isthmus isthmectomy is appropriate. Table 1.2.3. shows what was performed at surgery in this study. However, others recommend total thyroidectomy as a procedure of choice of multinodular goitre where the whole gland is involved, as leaving a small portion of diseasd gland is unlikely to prevent the need for long term thyroxine replacement or suppressive treatment with thyroxine does not guarantee that there will be no recurrence.[17]

**Table 1.2.3 Operations performed in 23 patients**

| Operation | Number of patients |
|---|---|
| Subtotal Lobectomy | 15 |
| Bilateral | 9 |
| Unilateral | 6 |
| Unilateral total lobectomy | 5 |
| Total thyroidectomy | 2 |
| Isthmectomy | 1 |
| Total | 23 |

- Most of the patients underwent subtotal thyroidectomy either bilateral or unilateral.

The use of thyroxine post operatively is controversial. Thyroid-substitution medication is often recommended after operation for goitre in order to prevent recurrence as the cause of goitre might still be there. Reeve and Roltee (1982)[18] reported no difference of TSH, thyroxin ($T_4$) and

triiodothyronine ($T_3$) serum levels between a group with recurrence and without recurrence. They recommended thyroid substitution therapy when there is obvious hypothyrodism or marked elevated TSH. Hedman and associates[19] followed 95 patients after thyroid lobectomy for benign disease on average of 15 years and there was no follicular recurrence regardless of thyroxine treatment or not. They concluded that routine prescription of thyroxine after thyroid lobectomy is not warranted. However patients should be followed by functional assessment and thyroid palpation. Ssali[14] in Uganda noted that recurrence occurred in young women especially when they become pregnant after partial thyroidectomy and recommended post operative thyroxine after partial thryoidectomy to young women.

Complications after Surgery

Mortality rate accompanying thyroidectomy nowadays is very low. Large series of thyroidectomies of more than 1000 operations have reported no death.[13,20] Ssali[14] in Kampala reported a mortality rate of 1.8%, 2 patients out of 110 thyroidectomies performed and were due to hemorrhage.

Morbidity rate vary from one series to another. Ssali[14] in Kampala had a complication rate of 13.6% while Geerdsen in Denmark overall complication rate was 10%. In the present study overall complication rate was rather high at 21%.

Mortality and morbidity rate following thyroidectomy mostly depends on the experience of the surgeon. In this study complications encountered are shwon in table 1.2.4. Most patients did well within a week of operation. Life threatening complication (hemorrhage) occured in one patient, but there was no death.

**Table 1.2.4. Complications after surgery n = 23**

| Complications | Number of patients |
|---|---|
| Wound infection | 2 |
| Hemorrhage | 1 |
| Voice hoarseness | 1 |
| Hypoparathyroidsm | 1 |
| Death | 0 |

- Total frequency of postoperative complications was 21%.
- There was no death.

**Hemorrhage** is the most severe life threatening complication after thyroid surgery. Usually occurs in the recovery room or during the first 6 - 8 hours post-operatively. It results either from reactional hemorrhage from thyroid remnant, but most usually from slip of suture from inferior or superior artery. Occasionally bleeding results from thyroid vein. Rarely these patient are in shock and death is usually due to airway obstruction if not recognized early. The patient may complain of pain, bulging wound or shortness of breath. Drains do not offer protection and bulky dressing usually delay recognition of bleeding.[20] However, in this study we have used drains routinely.

Treatment constitutes opening of the wound, evacuating haematoma and securing the bleeding vessel. This is an emergency and if time does not allow the wound should be opened, haematoma evacuated at bedside. It is advisable to have sterile instruments at bed side. In this series one patient a 50 year old female, who was hypertensive developed tension haematoma. She was re-explored and found to have active bleeding from right superior artery which was secured.

**Nerve injury** involves the recurrent laryngeal nerve which is easily recongnized and external branch of the superior laryngeal nerve which is less recognisable. Recurrent laryngeal nerve is commonly injured and it is of fundamental importance to identify at operation in order to protect it.[7,21] However, other surgeon say that there is no need for identification but the important thing is to be ready and be able to recognize and preserve them if they appear in the operating field.[20] The injury can be related to dissection and the nerve is intack or may be included in a ligature or inadvertently sectioned.; < were the nerve is in most danger is at the level the two upper tracheal ring when it passes through the ligament of berry or when it passes between the branches of inferior thyroid artery. Injury to the recurrent nerve allows the cord to assume a paramedian position and when bilaterally involved the glottic opening will be closed.

When the nerve is intack recovery occurs usually within

3-6 months utmost within 9-12 months. Unilateral paralysis results in disturbances of voice with varying degree of hoarseness and does not usually result into airway obstruction. Teflon injections into the paralysed cord to move it to the midline can often improve the voice. A bilateral cord paralysis is initially managed by a tracheostomy. Latter procedures include arytenoidectomy or arytenoidopexy which displaces the posterior portion of the vocal cord laterally. They provide an adequate airway but cause further deterioration of voice. These procedures should wait for at least a period of 6-12 months in order to be certain that there is no returning of function. The wound may be explored if there is vocal paralysis at the time of extubating the patient. A ligature is released or the transected nerve can be directly repaired at the time of thyroidectomy if recognized.

Injury to the external branch of the superior laryngeal nerve is not as serious as recurrent laryngeal nerve injury. However may impair voice in a professional singer. **Hypoparathyrodism** is directly related to the extent of surgery. Subtotal thyroidectomy is associatd with low incidence of hypoparathyrodism while with total thyroidectomy the incidence is as high as 30%. This depends on how careful the parathyroid are dissected. This complication may be due to devascularization of the parathyroid glands, which is prevented by ligating thyroid artery close to the thyroid gland after it has given a branch to the parathyroid gland. Leaving one gland in situ

with a good blood supply is adequate to avoid complication. May also result from inadvertent removal of all parathyroid gland. In such cases, the parathyroid can be minced into 1-2mm cube and autotransplatned in the sternomastoid muscle.[22]

**Hypothyrodism** invariably results after total thyroidectomy and all patients should receive thyroxine at a dose of 100 microgram daily for life. The occurrence of hypothyrodism after subtotal thyroidectomy for benign non toxic goitre capacity is between 5-7%. Berglund and associates[23] in a study of 201 patients followed for 8 yrs indicated that histological grading of lymphocytic infiltration in the thyroid gland may be useful for predicting the risk of postoperative hypothyrodism., With severe lymphocytic infiltration the risk of hypothyrodism is high. It represents a change in the auto-immune response from stimulation to destruction of thyroid cells.[10]

**Wound infection** occurred in two patients in this study. Only one patients needed treatment and it was expected as he had abscess before operation.

Keloid scar and stitch granuloma are other complications which were not observed in this study.

## CONCLUSION

Non Toxic multinodular goitre is a common surgical condition at Muhimbili Medical Centre where by most patients seek medical advise for cosmetic reasons. The mean age at operation is 40 years.

Although the aetiology of non toxic goitre is not clearly known, endemic non toxic goitre can be controlled by correcting iodine deficiency. However, sporadic goitre is difficult to control and still occurs worldwide.

Surgical management will still be indicated for several reasons mainly cosmetic. Surgery of the thyroid gland is a safe procedure, however it should be undertaken by an experienced surgeon.

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## 1.3. THE MANAGEMENT OF EMPYEMA THORACIS


### SUMMARY

During a period of 4 months between July and October 1991, seventeen patients with empyema thoracis were managed in the thoracic unit of Muhimbili Medical Centre. There were thirteen males and four females. Tuberculosis was the leading cause of empyema thoracis. Bronchopleural fistula was present in thirteen patients. An enzyme linked immunosorbent assay test (ELISA) for human immunodeficient virus (HIV) antibodies was positive in seven patients. All patients were managed initially by closed tube drainage and was successful in 9 patients, 52.9% overall. It is less effective in pulmonary disease with bronchopleural fistula, 43%. The rest of the patients required rib resection and open drainage by creation of a chest "window", when closed tube drainage failed to controll empyeng cavity.


### INTRODUCTION

Empyema thoracis is a common condition seen in the thoracic unit of Muhimbili Medical Centre, where by tuberculosis accounts for about 61% of all cases.[1] With mycobacterium tuberculosis (MTB) emerging as a major opportunistic pathogen in human immunodeficiency virus (HIV) positive patients irrespective of whether they have asymptomatic HIV infection or acquired immunodeficiency syndrome (AIDS), the number of patients with lung and extrapulmonary tuberculosis have increased in recent years in this country, Burundi, Zambia and USA.[2,3] Seroprevalence

surveys indicate that 30 - 60% of patients from sub-sahara Africa who present MTB are also infected with HIV-1.[2] We should also expect the incidence of tuberculous empyema to raise.

Empyema thoracis is treated by administration of appropriate antibiotics and surgery. There are several surgical options in use for treating this condition, depending on the stage in which the empyema is first diagnosed. This include intermittent needle aspirations, continuous closed drainage, rib resection and open drainage, decortication and thoracoplasty.

It is the purpose of this study to review the management of empyema thoracis whose morbidity is quite high. One case is presented in detail and current literature is reviewed.

## CASE PRESENTATION

J.P. a 32 year old male was admitted in Muhimbili Medical Centre with a history of cough and chest pain for one month. The cough was constant and productive. The sputum was white in colour, not blood stained and could produce up to a cup in a day. The cough was worse on lying supine and was not affected by dust or seasonal changes. Chest pain was on the right hemithorax which was sharp, worsened by cough and movement. The patient could not lie on the right side because of pain. He also reported difficulty in breathing on lying flat. These symptoms were associated with fever especially during the night and night sweats.

Eight days prior to admission he had a bout of diarrhoea of 8 motions per day, which were watery, yellowish and in small amounts. There was no abdominal pain or vomiting. There was no history of dysuria, polyuria or haematuria. Agreed to have lost weight during the period of illness.

There was no history of asthma or tuberculosis contact. He was married with one child. Worked as a prisons warden and later changed to night watchman. He used to drink beer to an average of one litre per day and did not smoke.

On examination he was found to be wasted and pale but not jaundiced. There was no finger clubbing or peripheral oedema. Axillary temperature was 38$^{o}$C, a blood pressure of 90/50 mm of Hg and a pulse rate of 126 beats per minute of small volume, weak and regular. Respiratory rate was 42 per minute and shallow. Discrete supraclavicular and inguinal lymp nodes were palpated.

Chest examination revealed shifting of trachea to the left and chest expansion was decreased on the right hemithorax. There was a stony dull percussion note with no vocal fremitus or breath sounds on the right hemithorax. Crepitations were heard on the left hemithorax base. Apex beat was in the 6th intercostal space lateral clavicular line. Heart sounds I and II were heard in all areas. There were no murmurs.

The abdomen was scaphoid with no scars or distended veins. Liver was palpated 2 cm below the costal margin. Spleen and kidney were not palpable. Inguinal orifices and external genitalia were normal. A digital rectal examination was normal.

A diagnostic thoracocentesis was performed and revealed a dark brown fluid followed by pus. A provisional diagnosis of right empyema thoracis probably resulting from pulmonary tuberculosis was made.

The following investigation were made and results obtained.

Culture of pleural fluid revealed numerous diplococci resembling pneumococcus and there was 99% polymorphonuclears. No acid fast bacilli were seen. Chest X-ray revealed a massive opacity on the right side with multiple milliary patches on the left lung. Sputum for acid fast bacilli was negative 5 times. Culture was also negative. Hemogram revealed a hemoglobin of 8.2 gm/dl and red blood cell morphology of slight hypochromia and normocytic. ELISA test was positive. Tuberculin skin test (Mantoux test) was negative. Cervical lymph node biopsy was consistent with tuberculosis.

Repeated therapeutic needle aspirations were performed and the patient was put on first line antituberculous drugs but failed to control empyema. A closed tube thoracostomy was performed under local anaesthesia and two litre of thick

pus was drained. The patient was found also to have a bronchopleural fistula. Anti-tuberculous therapy was changed to second line of Rimactizide (10 mg/kg), Pyrazinamide (35 mg/kg) and Ethambutol (25 mg/kg) daily. Three months later it was decided to do rib resection and open drainage by creating a chest window as closed thoractostomy has failed to control empyema cavity. The postoperative period was uneventful. Daily Eusol dressing was continued until thewound became clean. The patient was discharged home on thiazina 450 mg daily and to continue with Eusol dressing the nearest dispensary. The patient was advised to come for follow up once every month. By the time of writing this paper, four months later, the general condition has improved considerably. He was last attended four months after discharge when the there was no more discharge but the wound was still unclosed.

## DISCUSSION

### INCIDENCE

In the preantibiotic era, empyema thoracis was very common. The incidence of empyema thoracis has decreased considerably particulary in developed countries following the introduction of antibiotics to treat lung infections.[7] However, in Africa empyema thoracis continues to be an important problem mainly because many people do not have easy access to medical care, but also because of mismanagement of pneumonia or liver abscess.

For unknown reasons empyema thoracis is more common in males than females. In this study there were 13 males and 4 females with a male to female ratio of 3:1 similar to one reported in Kenya.[5] A previous study in this centre the male to female ratio was reported to be 5:1.[1]

It would appear that empyema thoracis is common in young adults. In this present study the age group most affected were between 21-30 years and 41-50 years, Table 1.3.1. In a similar study in this centre most of the cases were between 21 and 40 years[1] while in Nairobi, Kenya the most affected age was between 11 and 30 years.[5]

**Table 1.3.1. Age and Sex distribution n = 17**

| Age | Male | Females | Total |
|---|---|---|---|
| 11 - 20 | 3 | 0 | 3 |
| 21 - 30 | 3 | 3 | 6 |
| 31 - 40 | 2 | 1 | 4 |
| 41 - 50 | 5 | 0 | 5 |
| Total | 13 | 4 | 17 |

- The most affected age groups were 21-30 and 41-50 years

- The male to female ratio was 3:1.

## AETIOLOGY AND PATHOGENESIS

Empyema thoracis ordinarily results from primary disease elsewhere. The majority are secondary to pulmonary

infection. Any inflamatory condition in the vicinity of the pleura may give rise to an empyema, namely:

a. Chest wall (wound, osteomyelitis of rib)
b. Lung (pneumonia, abscess, brouchiectasis, Tuberculosis, new growth).
c. Postoperatively (thoracotomy).
d. From oesophagus (perforations, carcinoma).
e. From below the diaphragm (subphrenic and liver abscess).

The infection reaches the pleural cavity either via direct extension or through lymphatic vessels or blood stream. Occasionally empyema may result from a more distant source of infection through lymphatic or haematogenous spread. This is more common in patients with debilitating diseases or whose immune mechanisms are compromised by HIV infection or drugs including steroids.

In this study tuberculosis was the leading cause of empyema thoracis, as shown in table 1.3.2. This is in accord with other findings in Eastern Africa. Lema[1] in 1990 in this centre had found that, at least 62% of empyema thoracis was of tuberculous origin in his series of 63 cases. McCord[4] in Mozambique had similar findings while Kamdar and associates[5] 1983 in Kenya did find tuberculosis to be second commonest to empyema following open/closed chest injuries and pleural aspirations.

**Table 1.3.2.** Cause of empyema thoracis n 17

| Cause | Number of Patients |
|---|---|
| Tuberculosis | 11 |
| Lung abscess | 2 |
| Pneumonia | 1 |
| Post operative - thoracocentesis | 2 |
| - thoracotomy | 1 |
| Total | 17 |

- Tuberculosis was the leading cause of empyema thoracis (64.1%)
- seven patients were ELISA positive.

In post-pneumonic empyema the actual pleural infection is preceded by the development of a serous effusion followed by subsequent invasion by microorganisms from the lung resulting into exudate.[6] Tuberculous empyema results from a cavity rupturing into pleural cavity. Tuberculous cavities are usually surrounded by inflammatory reaction, producing dense pleural adhesions which prevent rupture or collapse. When ruptures occur a bronchopleural fistula is created and this almost always occurs in a patient with poor resistance and rapidly progressing disease either untreated or resistant to the treatment being given.[4]

Infection may be introduced into the pleural space from without by penetrating chest injuries, diagnostic and therapeutic chest needle aspiration or thoracocentesis or and following thoracotomy. In the present study, see table

1.3.2, two patients had empyema following thoracocentesis for a closed chest injury and one following pneumonectomy for Bronchiectasis. These could be prevented by adherence to strict aseptic measure during the procedure.

**DIAGNOSIS**

Since empema thoracis is usually secondary to a disease elsewhere outside the pleura cavity it is important to find the primary source as this is crucial for its proper management. The diagnosis of empyema thoracis can be made purely on clinical grounds. However clinical features may be masked considerably by the underlying disease or the use of antibiotics. The clinical picture is of an acute pleuritic pain and a rapid developing of a large pleural fluid collecting in a toxic patient. The rapid increasing purulent pleural effusion is signaled by increased cough. The patient usually has a rapid and shallow respiration, febrile and may go into septic shock. This acute picture usually follows a rupture of a lung abscess into the pleural cavity. Clinical examination usually reveals a stony dullness, absence of vocal fremitus and breath sounds in the affected area.

A finding of pus and air in the pleural cavity is a serious condition for it usually means there is a communication of tracheobronchial tree and the pleural cavity with constant oral contamination of the pleural space.

However, when antibiotics have been given for the underlying lung disease, empyema maybe suspected by an unexplained persistence of fever, delayed resolution and slow convalescence following a pneumonic illness.

Roentgenographic studies should be performed both lateral and frontal views to exactly localize the empyema cavity. There are also necessary for follow up during treatment. Chest x-ray may show opacity indicating fluid or air fluid level, shifting of trachea and mediastinum, elevation of diaphragm and the status of the opposite lung.

The diagnosis is confirmed by aspirating pus from the pleural cavity which should be sent for bacteriological studies.

Bacteriology of empyema have changed during antibiotic eras. In the pre- antibiotic era the commonest organisms isolated were pneumococcus and streptococcus.[7] However, with the wide use of antibiotics staphylococcus aures has become the commonest organisms isolated followed by gram-negative organisms. Kamdar and associates [5] where tuberculosis was not common, staphylococcus aureus was the most frequent organism isolated. In a study by Lema[1] in this centre, acid fast bacilli and staphylococcus aureus were most frequent organisms isolated. Other organisms isolated are E. Coli, Klebsiella species, proteus, pseudomonas and streptococcus. In this present study no acid fast bacilli were isolated from pleural effusion, but

was isolated from sputum in 6 patients. Culture of empyema fluid were positive in only 5 patients and organism isolated were pneumococcus in one patient, proteus in one patient sensitive to gentamycin. Streptococcus was isolated in 3 patients and was sensitive to penicillin, erythromycin and tetracycline. The rest cultures were sterile most probably because of use of previous antibiotics for underlying lung disease. In this study 7 patients were ELISA positive for HIV antibodies.

Tuberculin skin test (mantoux test) was performed in all patients and was positive in 3 patients. Although a positive tuberculin skin test increases the likelihood of tuberculosis, a negative test does not exclude diagnosis. Many clinicians believe that patients with HIV infection and tuberculosis rarely have positive tuberculin test.[2] In patients with HIV infection a tuberculin test of more than 5 mm is regarded as positive. Acid fast smear of sputum should be performed and were performed to rule out tuberculosis. In this study only 5 patients had sputum positive of AFB's. Studies from Sub-Saharan Africa have found that many patients do not produce sputum and those who often do have negative smears.[8] Sputum smear examination must therefore be currently regarded as more unreliable.[3] Mycobacterium culture should therefore be performed.

## TREATMENT

The goals of treatment include:

- controlling of primary infection and its secondary manifestation, the empyema,by appropriate antibiotics

- evacuation of the purulent contents of the empyema and eradication of cavity.

- re-expansion of the underlying lung in order to restore function.

Antibiotics are given based on bacteriological studies. In this study 10 patients were put on first line antituberculos therapy of streptomycin (15-20 mg/kg or < 50kg. 750 mg, >50 kg, 1g) and thiazine (450 mg daily) while four patients were put on second line antituberculous therapy either because had received previous first line or had a strong positive sputum for acid fast bacilli. These drugs include Rimactizide (10mg/kg), pyrazinamide (35mg/kg) and Ethambutol (25mg/kg) for 3 months to continue with thiazine 450 mg.

Several surgical methods are in use for the purpose of drainage, elimination of cavity and re-expansion of lung, these include:

1. **Needle aspirations** are sometimes used by physicians in acute phase where pus is thin. May also be used as an emergency procedure when there is respiratory embarrassment. This method is valuable in children and elderly. With intensive antibiotic therapy it is possible to control the empyema with good results.[6,7] In this study

this procedure usually failed because of bronchopleural fistula. Aspirations are done on alternate days and if pus is still produced after 14 days the procedure should be abandoned and proceed to insertion of large bore intercostal tube.

2. **Closed tube thoracostomy and drainage**

This represents an intermediate stage between thoracocentesis and open drainage with rib resection. It is used at a stage when collapse of the lung and shift of mediastinum might result from open drainage and as an emergency in all bronchopleural fistula to relieve tension pneumothorax or respiratory embarrassment. This will reduce toxemia in a seriously ill patient.

A large calibre tube with multiple holes size 32 Fr is preferred. This tube was inserted under local anaesthesia usually between eight and nineth intercostal space in posterior clavicular line. The tube is connected through tube to an under water seal drainage bottle which must be kept at the floor level. A large clamp is kept at hand and must be applied immediately to the chest tube in case of accidental disconnection, during bottle changing or when patient leaves for toilet or x-ray department.

UWSD

Respiratory exercises are started as soon as possible to encourage chest wall movements to promote re-expansion, to clear the airways of accumulated secretions and to assist in pleural drainage. Negative pressure may have to be

applied to hasten pulmonary expansion especially in the presence of bronchopleural fistula.[7]

However this method had limitations, it is not suitable when thick pus is present because drainage will be impaired by fibrin masses. Rosenfield and associates[9] modified this method by using a two way tube to allow cyclical irrigation. Theadvantage of this method includes: it keeps the tube patent even when thick pus is present, as it flushes the base of cavity even if the tube is not completely basal and delivers a high concentration of antibacterial drug to all areas of empyema. They obtained good results with this method and reducing considerable hospital stay and wound drainage time. Irrigation is contraindicated in the presence of bronchopleura fistula as the patient may drown or disseminate infection to opposite normal lung.

Closed tube thoracostomy alone achieves satisfactory results in acute and subacute empyema resulting from trauma and pneumonia, while it is less successful in chronic phase. This is attributed to:

- the presence of bronchopleural fistula,
- extensive underlying lung destruction by tuberculosis making it not expansible,
- multiple loculations of empyema,
- thick pus and presence of fibrin clots causing tube blockage often necessitating frequent tube reinsertions.

In this study tube thoracostomy was the initial therapy and was successful in 9 patients. These results are similar to the one reported McCord and Vieira[4] where had success with closed tube thoracostomy in 56% of patients even though most of patients come to a surgeon at least 6 weeks after onset of symptoms.

The tube should be removed only when pus discharge is 10 mls or less. Should never be removed if there is still a cavity. The tube is pulled 1 inch or 2.5 cm every week. Usually an average of 3 to 4 months drainage time is necessary in most of our patients in this centre.

**Table 1.3.3. Surgical procedure offered n 17**

| Surgical procedure | Number of patients |
|---|---|
| Closed tube thoracostomy alone | 9 |
| Rib resection and open drainage | 4 |
| Rib resection and closed drainage | 1 |
| Waiting for rib resection and open drainage | 2 |
| Total | 16 |

- Closed tube thoracostomy was successful in 9 patients (53%).
- One patient died in hospital
- No patient underwent decortication or thoracoplasty.

**3. Rib resection and open drainage "Chest Window"**

Open drainage is the treatment of choice when empyema is walled off, the purulent exudate is thick and there is fixation of the mediastinum. This method is employed when closed thoracostomy have failed or are deemed to fail. It should never be employed as a primary treatment. The size of the empyema cavity should be reduced to the smallest possible dimensions by closed thoracostomy drainage before hand.

In this method a "chest window" is created by resecting two or three ribs over the bottom of the cavity and suturing the skin to the pleura to prevent closure. This will control infection and improve the patients general condition. This is the preferred procedure in this centre, where with adequate drug therapy for underlying disease, the results are good.[1] Lemmer[10] found extremely high failure rate with closed tube thoracostomy but had satisfactory results with rib resection and open drainage.

In this study four patients were later managed by rib resection and open drainage by creating a chest window with satisfying results. Two patients had recurrences after removal of tube and were planned for rib resection and open drainage.

4. **Decortication:** Excision of empyema is the treatment of choice for chronic empyema with a thick "peel" over a large area of lung. In this procedure the aim is to remove all the fibrous wall of the empyema from the lung surface, chest wall and diaphragm leaving the lung free and unhampered to fill the space formerly occupied by the empyema. The procedure can be combined with resection of lung, pleurolobectomy or pleuropneumonectomy if lung is diseased. For decortication to be successful it must be performed at a stage before the thick heavy pleural peel covering the lung has become organized onto the visceral and parietal pleura. Generally this occurs within 2-3 months of onset. To avoid recurrence of empyema it is absolutely necessary to maintain the lung expanded by active pleural suction. Some patients with very old infection and extensive calcification had excellent results with this procedure.[4] This is a major operation and is not suitable for frail elderly or patients whose general condition is poor or where complete resolution of a pneumonic process has not yet occurred. No patient underwent this procedure in this study.

4. **Thoracoplasty** is used as a final surgical method when all the above measure have failed to obliterate empyema cavity. This procedure involves removing the overlying ribs to allow the chest wall to fall in and obliterate cavity. The procedure produces postural deformity and reduces respiratory function, however, it may be the only way to control the problem of dead space. With adequate preparation and with blood available, the results of this procedure are quite satisfactory.[11] Thoracoplasty has been used in this centre to control chronic empyema where decortication could not be possible.[1] In this study no patient needed this procedure.

## CONCLUSION

Tuberculosis mostly affecting young adults is the leading cause of Empyema thoracis in this Centre. Closed tube drainage is effective in controlling the empyema cavity following traumatic or post pneumonectomy empyema. It is less successfull in patient with Tuberculosis and brouchopleural fistula. These patients will require open drainage by creation of chest window. Closed tube drainage with a large bore tube should be used early, together with vigorous breathing exercises which are extremely important for lung expansion. In this way open drainage with its morbidity may be avoided.

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## 1.4 CARCINOMA OF THE OESOPHAGUS


### SUMMARY

A total of 38 patients with carcinoma of the oesophagus were seen at Muhimbili Medical Centre in Surgical Firm Iby the author from September 1988 to November 1989. There were 34 male and 4 female patients. The age of the patients ranged from 37 years to 78 years with a mean age of 56.6 years.

Progressive dysphagia was the commonest symptom found in every patient. Dysphagia had been present,on average, for 4.9 months before the patients were admitted at this centre.

The commonest tumour site was the middle third (55.2%), followed by lower third (36.8%) and upper third (7.8%). Histologically 92.1% were squamous cell carcinoma, and 7.9% were adenocarcinoma. Thirty six patients had palliative radiotherapy with reasonable results in that 33% of patients could eat a normal diet and 50% could swallow semisolid diet. Two patients died before radiotherapy was instituted.


### INTRODUCTION

Carcinoma of the oesophagus is a challenging disease in terms of making early diagnosis and providing cure. The disease is usually advanced at the time of diagnosis,[1,2,3,4] and continues to have a poor five year survival rate (<10%) following either surgery or

radiotherapy.[5,6,7] Most efforts are therefore usually directed to the restoration of the ability to swallow. Surgical resection and reconstruction is considered by many surgeons as the best method in restoring the ability to swallow.[2,5,6,8,9] However, controlled studies compairing the outcome of surgery and radiotherapy are necessary in determining the best modality of treating this condition.

The outlook in carcinoma of the oesophagus in Africa is still dismal and treatment results are disappointing, attributable to late diagnosis and low operability rates.[10,11,12,13] However the prognosis has improved appreciably in western countries and in Japan where surgery is now being performed more frequently.[5,14] These improvements are being attributed to better pre- and postoperative care particularly in the area of nutritional and respiratory support. Development in surgical techniques such as en bloc dissection and three stage oesophagectomy have diminished the likelihood of anastomotic leakage.[5] The aim of this study is to appraise the different global modalities of treatment available for the treatment of carcinoma of the oesophagus.

## CASE PRESENTATION

A 42 years old male was referred from Morogoro with an eleven month history of difficulty in swallowing solid food, and this had worsened progressively until at the time of admission he could swallow only fluids. He also

complained of pain on swallowing solid food and had lost considerable weight. There was no cough, hoarseness of voice, regurgitation or bone pain. Three months prior to admission, he had once vomited blood with clots mixed with food material which was followed by loss of consciousness. He was rushed to Morogoro hospital where he was resuscitated. There was no history of ingestion of corrosives. He denied having suffered from any major illness before.

The patient was a watchman married with two children. He had smoked 20 cigarettes everyday for more than 20 years but had never taken any alcoholic drinks. His diet had consisted of maize, vegetables beans, meat and fish.

Examination revealed a wasted middle aged man, with moderate dehydration. He was not anemic nor jaundiced. He had no finger clubbing or enlarged peripheral lymph nodes. His blood pressure was 120/80 mm of Hg and the pulse rate was 84 beats per minute, regular and of good volume. Chest examination was normal, the apex beat was in the fifth intercostal space mid-clavicular line and heart sounds were normal. The chest was clear with normal vesicular breathing and no added sound. Abdomen was scaphoid and the liver, spleen and kidneys were not palpable. On digital rectal examination the rectum was empty and the rectal mucosa was mobile. The examining glove was stained with brown stool.

A provisional diagnosis of carcinoma of oesophagus was made and the following investigations were requested and reported as follows:

Hemogram: Hemoglobin 11 gm/dl

Red blood cells - normocytic normochronic

White blood cells - normal count and distribution

Platelet - adequate

ESR - 50 mm/hr

Chest X-Ray - Frontal view was normal

Barium swallow revealed a stricture with ragged mucosa in the middle third of the oesophagus with slightly dilated proximal oesophagus. The contrast could not pass through into the stomach.

Serum creatinine: 71 micromoll/L

Serum electrolytes: $Na^+$ 140 mmol

$K^+$ 3.9 mmol

Alkaline phosphatase: 150 i.u./L

Oesophagoscopy: Using a rigid oesophagoscope a tumour was visualized at 34 cm from the upper incisor. Three biopsies were taken from different sites of the tumor for histopathology. The biopsy revealed a invasive, moderately differentiatedsquamous cell carcinoma.

Abdominal ultrasound - the liver was normal.

It was decided to palliate the patient with radiotherapy and this was discussed with the patient. He received a total dose of 3000 rads for a period of 10 days, given at

a dose of 300 rads every day. There was considerable improvement and the patient was able to swallow solid food. Six weeks later he noticed difficulty in swallowing solid food again. The patient was scoped and oesophageal dilation was performed following which was able to swallow solids again. He was discharged to Morogoro and advised to come for follow up at the outpatient clinic every three months. He was followed for one year when he was lost from follow up clinic.

## DISCUSSION

### Incidence and Geographical Distribution

Carcinoma of the esophagus appears to have a marked variation in incidence when analysed by geographical distribution. It is rare in some countries such as France and West Africa, while the incidence is highest in Transkei (South Africa), North East Iran, North China and Kazaklisten (Russia).[15,16,17] Another striking feature is its regional localization within a country. The vast majority of cases are localized to clearly dermacated regions within a country or region. In Tanzania most patients are confined to Tanga, Dar es Salaam, and Kilimanjaro,[10] While in Uganda most patients are confined at the shores of Lake Victoria and Masaka.[12] In South Africa the disease is rare in the west coast while in Transkei district in the east coast, the incidence is among the highest in the world.[15] To explain for these striking geographical and regional variation, it would appear that

environmental factors play a major role in etiopathogenesis of esophageal cancer.

In Tanzania the carcinoma of esophagus constitutes 9-10% of all malignancies, while in South Africa, where the prevalence rates rank with world's highest, it constitutes 16-30% of all malignancies.[17] In Kenya, at the Kisumu Government hospital eoseophageal cancer constitutes 30% of all tumours. At the cardiothoracic unit at Mulago hospital Uganda, the occurrence has been reported to be one in every fifth patient seen.[12]

**AETIOLOGY**

The basic cause of carcinoma of the oesophagus remains obscure. However, certain oesophageal Lesions are known to be precursor lesions for oesophageal carcinoma and that environmental factors play an important role. Stagnation oesophagitis in achalasia will progress eventually to malignant degeneration in about 1-20% of cases after an average duration of 28 years and the tumour always occurs in the dilated part.[18,19] Mckeown[20] observed that the incidence increases with increasing duration of follow up and malignant changes can appear as early as 10 years after the initial symptoms of achalasia.

Corrosive oesophagitis due to caustic burn, leads to benign stricture and malignant degeneration may appear after an average interval of 40 years.[21,22] The commonest site is

usually the middle oesophagus and the histological type is squamous cell carcinoma. Reflux oesophagitis due to hiatus incompetence of whatever cause has been suggested to be a pre cancerous condition.[20] Barret's oesophagus, columnar lined oesophagus, is known to be a precursor lesion for oesophageal cancer and about 10% of these patients will develop adenocarcinoma of the esophagus.[23.24] Chronic iron deficiency anemia (Plummer Vinson syndrome) seems to be an underlying condition in malignant degeneration of esophageal mucosa.[15,16]

Consumption of hot beverages leads to thermal, damage of esophageal mucosa. Heavy consumption of alcohol or tobacco produceschemical injury of the oesophageal mucosa. If chronically administered this will result into chronic oesophagitis. Tobacco, hot beverages and alcohol have been associated with high incidence of oesophageal carcinoma.[8] The relationship between poor nutrition and oesophageal cancer is well known.[15] Nutritional deficiencies including Vitamin A, C, nicotinic and riboflavin are known to result in poor cellular nutrition and thus will affect the intergrity, of oesophageal mucosa. Múnoz and associates[25] have emphasized that chronic oesophagitis is the main precursor lesion for oesophageal carcinoma. This lesion is very common among population in China at high risk and it is significantly associated with consumption of burning hot beverages, family history of oesophageal cancer including second degree relatives, infrequent consumption of fruit and diet staple other than maize. Chronic oesophagitis is

more vulnerable to diet carcinogens among which nitrosamines compounds features prominent[16] Bacteria and fungal contamination of food increases the amounts of secondary amines and promote synthesis of nitrosamines.[15]

**PATHOLOGY**

Carcinoma of the oesophagus may occur at any level but is more common in the middle. Those in the present study, 55.2% were in the middle third of the oesophagus, 36.8% were in the lower third 7.8% were in the upper third (Table 1.4.1.). These results are comparable with other reported African studies.[10,11,12,13] The site of tumour had varied from series to series and is attributed to differences in defining sites and some series have included tumours arising from the stomach but involving the oesophagus. For precise recording, Manuel[15] recommended division of the oesophagus into:

1. Cervical - extending from the oesophageal orifice up to the suprasternal notch.

2. Thoracic Oesophagus
   (a) Upper third extending from the suprasternal notch to the birfucation of the trachea.
   (b) Middle third from this point to the level of the inferior pulmonary vein.
   (c) Lower third from the inferior pulmonary vein to the diaphragm.

3. Abdominal oesophagus from the diaphragm to the oesophagogastric junction.

However, these divisions are only possible at surgery. But knowing the precise site of the tumour is an important guide to the therapeutic planning.

**Table 1.4.1.** **Site of Tumour N=38**

| Site | Number of patients | Percentage |
|---|---|---|
| Upper third 14-23 cm | 3 | 7.8 |
| Middle third 24-31 cm | 21 | 55.2 |
| Lower third 32-40 cm | 14 | 36.8 |
| Total | 38 | 100 |

- The middle third was the commonest site (55.2%)

In our environment most of what we see macroscopically are bulky fungating and obstructing tumors rather than the superficial ulcerated surface spreading tumor producing little obstruction. At the time of diagnosis oesophageal cancer is always advanced and it is usually more than 5 cm in length, nearly or completely circumferential and has penetrated deeply into the wall of the oesophagus.[26] Macroscopic appearance has little prognostic value as compared to depth of penetration or lymphatic spread. t umour has some prognostic value.

Table 1.4.2. Histological type N=38

| Type of Cell | Number of patient | Percentage |
|---|---|---|
| Squamous cell carcinoma<br>Well differentiated (20)<br>Moderately differentiated (8)<br>poorly differentiated (3)<br><br>Not indicated (4) | 35 | 92.1% |
| Adenocarcinoma | 3 | 7.9 |
| Total | 38 | 100 |

- Squamous cell carcinoma is the commonest histological finding (92.1%).

The commonest histological finding in the present series was squamous cell carcinoma, (Table 1.4.2.) This is similar to that reported by other series.[10,12,13,15]. The histological grade of the tumor is of prognostic value since lymph nodes metastasis are more frequently encountered in poorly differentiated carcinomas.[26] Other microscopic findings in this series were adenocarcinoma in 3 patients. Microscopic diagnosis of Adenocanthomas, leimyosarcomas and undifferentiated (oat cell carcinoma) have been reported but are rare.[15]

Invariably carcinoma of the esophagus starts as a in situ carcinoma within the mucosa. It has been noted that these lesions take about 3 years before dysphagia develops and dysphagia usually occurs when about half to two thirds of the circumference of the oesophagus has been involved by tumour.[27] Tumor spread occurs by direct extension,

lymphatic and blood vessels. Direct extension will take the tumour though the esophageal wall to adjacent structures. Infiltration to the trachea, bronchi and aorta makes the prognosis very poor. Lymphatic spread is characterized by extensive spread longitudinally through submucosallymphatics before penetrating the wall of the esophagus into mediastinal nodes. This means that the first node to be involved may be distant from the primary tumor. Usually a cervical tumour will reach cervical nodes particularly the anterior jugular and supraclavicular nodes. A thoracic oesophagus tumor will spread to local mediastinal nodes, as well as supradavicular nodes and occasionally sub-diaphragmatic nodes. A tumor of the lower thoracic and abdominal esophagus spreadsto nodes on the lesser gastric curvature to coeliac glands.

The long interval during which the tumour is asymptomatic, the unique lymphatic drainage and lack of serosa are responsible for early extensive involvement of adjacent organs and lymph nodes. Akiyama observed that at the time of surgical exploration 50-60% of patients with oesophageal cancer will have lymph node metastasis.[28]

Metastasis through blood vessels will take tumour cells most commonly to lungs, liver and bones. However, any part of the body can be involved. Distant metastasis is a late phenomenon in carcinoma of the esophagus.

## CLINICAL FEATURES

**Age and Sex:** The mean age in the present series was 56.6 years (range 37-78 years). The age group mostly affected was 50 - 59 years and males predominated with a male to female ratio of 8:1. These results are comparable with other African series.[10,11,13,29] Very few patients were below the age of 40 years. In Western countries the most affected age group is 60 - 69 years with a male to female ratio of 1.5:1.[6,20] The disease appears to present itself a decade younger in African than Western countries.

**Table 1.4.3.** **Age and Sex distribution N=42**

| Age Group | Males | Females | Total | Percentage |
|---|---|---|---|---|
| 30-39 | 1 | 0 | 1 | 2.6 |
| 40-49 | 8 | 2 | 10 | 26.3 |
| 50-59 | 12 | 1 | 13 | 34.2 |
| 60-69 | 6 | 0 | 6 | 15.8 |
| 70-79 | 7 | 1 | 8 | 21.1 |
| Total | 37 | 5 | 42 | 100 |

- The youngest patient was 37 years and the oldest was 78 years, with a mean age of 56.6 years.

In the present study progressive dysphagia was the presenting symptoms in all patients. The mean duration of symptoms before admission at this centre was 4.9 months. Other African series have reported a duration ranging from 3 to 5 months.[10,13,29] Mckeown observed that supraaortic growth present much earlier with an average duration of

symptoms under 3 months, while in patients with tumour below the aortic arch the average duration is 4 months.[20] However, duration of symptoms has no prognostic value as has no correlation with either size or grade of lesion or its resectability.[15] Other clinical features associated with progressive dysphagia are regurgitation, chest pain, dry cough and wasting, (Table 1.4.4.)

**Table 1.4.4. Clinical Features N=38**

| Symptom/Sign | Number of Patients |
|---|---|
| Progressive dysphagia | 38 |
| Weight loss/wasting | 20 |
| Regurgitation | 19 |
| Cough | 9 |
| Voice hoarseness | 1 |
| Cervical adenopathy | 1 |
| Hepatomegaly | 1 |

- Progressive dysphagia was the main presenting symptoms in all patients.

Symptoms and signs that indicate advanced disease and inoperability include pain radiating to the back on swallowing, voice hoarseness, due to vocal cord paralysis, diaphragmatic paralysis due to phrenic nerve involvement, cough on swallowing indicating tracheoesophageal fistula, superior vena cava syndrome, malignant pleural effusion, hepatomegaly, malignant ascitis and bone pain.

Evaluation of a patient with esophageal cancer

Barium swallow and esophagoscopy are two of the most important investigation in confirming the diagnosis of esophageal cancer and are mandatory for any patient presenting with dysphagia. These investigations were performed in all patients.

Advanced carcinoma of the oesophagus is easily recognized with high degree of accuracy on barium swallow. The characteristic radiographic picture is that of a narrow segment of the esophagus with irregular, ragged mucosa pattern. The contrast becomes filiform and tortuous and may even fail to pass. The oesophagus in carcinoma is usually not associated with marked proximal dilatation. Other features on barium swallow are multiple filling defects if the lesion is of the fungating variety or radio opaque projection beyond the oesophageal mucosal outline if the lesion is a single malignant ulcer. Small mucosa or submucosa, lesions 1-1.5cm in size can be better demonstrated by double contrast esophagograms.[30] However, such small lesions are uncommon in our environment. The degree of deformity of esophageal axis may have predictive value of incurability as the degree of deformity is a results of fixation and distortion of locally invasive cancer.[15] Deformities observed are tortuosity, angulation, deviation and displacement.

Oesophagoscopy is important for establishing tissue diagnosis and determining the upper limit of the lesion.

Chest X-rays are done, and may show lung or mediastinal metastasis or pneumonic changes. Lung function tests are done for patients who will undergo surgery. Evaluation of the cardiac status with electrocardiography is also important in these patients.

Bronchoscopy is recommended in patients with mid and upper esophageal tumors to rule out local spread to airway system. The earliest signs are oedema, elevation of tracheobronchial mucosa and contact bleeding. In advanced stage distortion of the tracheal lumen, widening of the carina and frank tumour growth are evident. Recent advances in endoscopic echography has facilitated the evaluation of lymph node metastasis with a potential of preoperative staging of esophageal carcinoma.[8] It provides precise information on the extent of the tumour and degree of para esophageal invasion.

CT scan is useful in determining bone, lung and liver metastasis and provides accurate information about the extent of disease in the thorax and abdomen. Before the era of CT scan, bone survey, mediastinostomy and staging thoracotomy and laparatomy were in frequent use.

Serum albumin and serum alkaline phosphates are a useful investigation in determining evaluating nutritional status and liver metastasis respectively. Other investigations are Haemogram, creatinine and electrolytes.

## TREATMENT

Carcinoma of the oesophagus is often advanced at the time of diagnosis in about half to two thirds of patients with either extensive locoregional disease or of distant metastasis.[4] As cure is unusual in late-stage of esophageal cancer, palliation of dysphagia and correction of its sequelae and of undernourishment, anemia, hypoproteinemia and pulmonary complications such as aspiration pneumonia, is a major goal in patient management.[8] The main aim is to relieve dysphagia. Modalities available are surgery, radiotherapy, intubation, dilatation and chemotherapy. Controversy still persists regarding the best modality therapy for oesophageal carcinoma. Most literature presents conflicting results and advocate different forms of therapy. However, with all modalities available surgical resection is regarded by most authors as the best mode of palliation of dysphagia.[2,4,5,6,11,28,31] In this study thirty six patients received palliative radiotherapy. Two patients died before he could start treatment. No patient had surgical palliation.

## RADIOTHERAPY

In this study, 36 patients were given palliative radiotherapy of 300 rads given daily for a period of ten days to a total dose of 3000 rads. Twelve patients responded well and could swallow solid food. In eighteen

patients the response was fair in that they could swallow solids. Six patients did not respond at all, (Table 1.4.5).

**Table 1.4.5. Response to treatment after palliative radiotherapy N=36**

| Response | Number of patients |
|---|---|
| Can swallow solids | 12 |
| Can swallow semi solids | 18 |
| No response | 6 |

- Only 33.3% of patients responded well.
- Cobalt-60 unit was employed at our Tumor Centre at Ocean Road Hospital.

Squamous cell carcinoma of the esophagus is radiosensitive.[27] Radiotherapy can be applied to a greater number of patients and most frequently it has been used in tumours of the cervical and in the upper and middle thirds thoracic esophagus. Improvement of dysphagia can be expected in approximately 50% of patients and in those who improve recurrence of dysphagia usually occurs within 2-6 months of treatment.[1] Pearson[32] a strong proponent of radiotherapy, obtained relatively good results in terms of 5-year survival rate using radical radiotherapy dose of 4500-6000 rads. He reported a five year survival rate of 25% for cervical tumours, 16% for mid esophagus tumors and 12% for those in the lower esophagus. However, few investigators have managed to duplicate these results.[5] Desa[6] obtained good results in terms of swallowing after

radical radiotherapy. One year survival of 37%, 2-year survival rate of 5% and no patient who received palliative radiotherapy survived a year. In a series from this Centre Aziz[10] had reported satisfactory results in terms of palliation of dysphagia, however cure was rare. Sinzobahamuya[11] in Harare had disappointing results with radiotherapy. The main reason for these disappointing results in terms of survival have been attributed to the fact that there is a tendency of reserving radiotherapy for patients with extensive disease.[5,6]

Preoperative radiotherapy has been advocated as it is believed to down stage the tumor and improve resectability rate but does not affect the survival rate.[27]

We have favoured palliative radiotherapy in this centre because it is safe, can be applied to most patients, can be stopped any time if the patients condition deteriorates, and specifically because were most patients were unfit for surgery. Hazards of radiotherapy if acceptable dose (4500-5000 rads) is exceeded include pneumonitis, pericarditis, tracheobronchial fistula, perforation and spinal cord injury. Intracavitary irradiation using either irridium or pellets of caesium have emerged as newer methods of palliation of carcinoma of the oesophagus. Rowland and Pagliero[33] using caesium pellets (selectron) for advanced carcinoma of the oesophagus achieved relief of dysphagia in 65% of patients.

**SURGERY**

Surgical resection and reconstruction effectively restores swallowing and gives satisfactory local control of disease, that most surgeons feel that it should be employed whenever feasible, despite its failure to cure the patient.[2,5,6,11,31] Failure to cure the diseaseis attributed to the fact that about 75% of patientshave local extensive or systemic disease at the time of diagnosis.[4] Surgery therefore serves only as palliative procedure in most cases and gives a prospect of cure in early stages of the disease.

Surgical resection and reconstruction carries a high mortality rate, with a world mean post-operative mortality of 29% and a five year over survival of 4%..[7] However, the high mortality rates formerly associated with surgical resection have fallen dramatically and improved five year survival rate are now being reported regularly in Western countries and Japan. Orringer[34] performing transhiatal total esophagectomy for carcinoma of esophagus reported a post-operative mortality of 6%. Skinner[35] 1983 achieved a five-year survival rate of 20% using en bloc dissection for carcinoma of the esophagus. Khoury[14] 1989 at the Akiyama's Tokyo unit in Japan using a three phase approach for total oesphagectomy to have achieved a five-year survival rate of 35.6% for squamous cell carcinoma and 38.9% for adenocarcinoma. This is an outstanding achievement since over half of the patients had with advanced disease. This improved outlook after surgery has

been attributed to a better pre and post-operative care particularly in the area of nutrition and respiration and the development of surgical technique such as en bloc resection, transhiatal esophagectomy without a thoracotomy and three phase esophagectomy have diminished the likelihood of anastomotic leak and local recurrence, once responsible for high morbidity and mortality.

Surgery of the esophagus remains a formidable operation especially in patients whose nutritional and respiratory status have been compromised by impaired swallowing, such that preselection of patients, experience in gastrointestinal surgery are of utmost importance if results have to be improved. Generally accepted criteria for operability are absence of obvious distant metastasis such as to the lung, liver and gross malignant adenopathy, adequate respiratory reserve and reasonable cardiac status and absence of esophago tracheal fistula or evidence of tracheobronchial invasion. These days age alone is not considered an obstacle for surgery as the disease itself is common in old age.[5] In the present study no patient was subjected to surgery as most of them had advanced disease at the time of diagnosis were in poor nutritional status and the centre lacks facilities for intensive nutritional and respiratory care.

If surgical, resection and reconstruction is not feasible, surgical bypass offers another effective alternative.[36] Intubation is reserved for patients with advanced disease

and very limited survival. No patient in this study underwent these procedures. Gastrostomy or jejunostomy with or without cervical esophagostomy are no longer considered palliative procedures and virtually have no place in the management of esophageal cancer.[2,4] Dilatation was used once in this study in a patient who had received palliative radiotherapy. The hazard of this procedure is perforation and hemorrhage.

Endoscopic laser has added to the armamentarium in the management of advanced carcinoma of the oesophagus. Laser palliation improves swallowing and is associated with low morbidity.[3] This modality has several advantages which include: It can be performed under direct vision, patient acceptance is good, unlike radiotherapy there is no maximum dose, so that if the tumor recurs in the same area re-treatment can be performed and it averts the need for surgery and general anaesthesia with its attendant morbidity. The shortcomings of Laser therapy is that it does not affect pathologic tissue outside the oesophageal lumen.

## CONCLUSION

1. Dysphagia in carcinoma of the esophagus is a late symptom.

2. Radiotherapy gives a reasonable palliation for dysphagia in most patients but does not change the survival rate.

3. Survival rate can only be improved by early detection and surgical resection of the tumor.

4. Improving the nutritional status of the general population and abstinence from alcohol and smoking may greatly reduce the incidence of carcinoma of the esophagus.

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## 1.5: THE MANAGEMENT OF FEMALE BREAST CANCER


### SUMMARY

Thirty five female patients with carcinoma of the breast were managed by the author in the surgical department of Muhimbili Medical Centre over a period of 2 years from 1989 - 1991. The highest incidence was in the age group 51-60 years. There were 19 premenopausal women, 2 of whom were pregnant and 16 were postmenopausal women. The commonest presenting feature was a large breast lump usually with concurrent enlargement of axillary lymph nodes in 91.4% of patients. In twenty seven (77.1%) patients the tumor was involving the skin, Edema (peau d'orange) was present in 18, ulceration in 8 and satellite in nodule in one patient. Twenty seven patients (71.2%) presented with an advanced local disease (Stage III TNM classification) and five patients (14.3%) were found to have distant metastasis to the lungs or bone. The commonest pathological diagnosis was invasive ductal carcinoma in 33 patients (82.8%), four (11.3%) had medullary carcinoma, one had a non invasive ductal carcinoma and one had a schwanoma of the breast. Nineteen patients had total mastectomy and axillary clearance while ten had toilet mastectomy and four were inoperable. Only one patient had quadrantectomy. Hormonal manipulation as adjuvant therapy was in thirty three patients while two had adjuvant chemotherapy.

## INTRODUCTION

The management of breast cancer involves local and systemic control of the disease. The mainstay treatment for local control has always been surgery with or without irradiation. Early attempts at surgical extirpation of breast cancer goes back to the first century where Celsus was quoted as saying "some have used caustic, others cauter, other have cut them with a knife..... not withstanding they have returned and occasioned death.[1,2] Since then, over the centuries several operations were recommended with a trend towards radical procedures which culminated into a radical mastectomy. The standard radical mastectomy was described by William Halsted (1890-91) and Willy Meyer (1894). This radicality was based on a theory that breast carcinoma spreads by a wave like permeation of columns of cancer cells along regional lymphatic pathways and spread of cancer by vascular and lymphatic embolization was unimportant.[1,3]

However, it has taken almost a hundred years to prove that both theory and practice were wrong. It is now evident that vascular and lymphatic embolization is vitally important in the spread of breast cancer,[1,3,4] but that by the time carcinoma of the breast cancer presents clinically as a discrete mass, the problem is that of systemic disease albeit occult, which cannot be cured by local therapy alone and effective systemic therapy is necessary.[4,5]

With this knowledge, concerning the natural history of the disease, the development of powerful inhibitory pharmacological agents is now playing a major role in the management of breast cancer. The present trend supported by several controlled and randomized trials[6,7] has now shifted to early detection, conservative surgery and being focused on systemic therapy by either hormonal or cytotoxic drugs.

This study is based on thirty five patients. A case of breast carcinoma is presented in detail and current literature reviewed.

CLINICAL PRESENTATION

K.S, a 50 year old female who presented with a one year history of a right breast lump. The lump started as a small painless swelling which had been gradually increasing in size and was accompanied with a feeling of heaviness. There was no history of nipple discharge or pain. She had no cough, chest pain, bone pain, weight loss or fever. There was no history of contraceptive use, radiation exposure or trauma to the breast.

Her obstetric history revealed that she had an abdominal operation following which she stopped menstruating. The reason for the surgery was an abdominal swelling,? ovaries. She did not remember her age of menarche.

She was married but had never conceived. she smokes

occasionally but did not take alcohol. She did not remember to have a relative with a similar problem.

Breast examination revealed an enlarged breast with upward and lateral retraction of the nipple. The areola was normal. There was dimpling of the skin, but there was no peau d'orange, satellite nodules or ulceration. Superficial veins were not distended. There was a lump in the upper outer quadrant of 9 cm in its maximum diameter, irregular, stony hard and non tender. The skin was fixed to the mass and temperature over it was normal.

A firm mobile non tender node of about 3 cm in diameter was palpated in the right axilla. Infra and supraclavicle nodes were not palpable. The left breast and axilla were normal.

General examination revealed a middle aged lady who had no pallor or jaundice. She was afebrile, her blood pressure was 130/90 mmHg, and her pulse rate was 80 beats per minute. An anterior neck swelling was felt which was hard and moved with swallowing. No cervical lymph nodes were palpable. Chest was normal. Liver, spleen and kidney were not palpable. There was no ascitis. The uterus was normal and adnexas, pouch of douglas were free. Musculo-skeletal and neurogical systems were normal.

A provisional diagnosis of breast carcinoma was made and staged as $T_3N_1Mx$. The following investigations were done:

- The hemoglobin was 9.3 gm/dl with a normal red blood cell morphology and normal white blood count and distribution.
- Alkaline phosphatase was 230 iu per litre
- Aspiration needle cytology of the breast lump revealed features consistent with adenocarcinoma.
- A chest x-ray showed no lung metastasis and x-ray of the neck revealed a calcified thyroid gland.

A biopsy was done and histology was reported as infiltrating ductal carcinoma with productive fibrosis.

A decision for toilet mastectomy and axillary sampling with combined chemotherapy was made and consent was obtained from the patient.

**Operation**

Under general anaesthesia, with right arm in abducted position, the patient was cleansed and drapped with sterile towels. A transverse elliptical incision was made. Both upper and lower flaps were developed. The breast was then mobilized by sharp dissection from the pectoral fascia which seemed not to be involved by the tumor. Bleeding occurring from branches of the internal mammary and intercostal artery were ligated.

The breast was removed together with axillary tail at the same time preserving the thoracodorsal and long thoracic nerve. This was followed by axillary dissection, which include removal of lymph nodes together withfibrofatty

tissue up to the level of axillary vein. There were three enlarged lymph nodes which were all reported to be involved. Haemostasis was achieved and the wound was closed with corrugated rubber drain.

The postoperative period was uneventful and the patient was started on combination chemotherapy of cyclosphosphamide (500 mg ($m^2$), methotrexate (40 mg/$m^2$) and 5-fluorouracil (500 mg/$m^2$) planned for twelve cycles. Intravenous administration at day one of cyclosphosphamide 900 mg, methotrexate 40 mg, and 5-fluorouracil 900 mg and on day 8 methotrexate and fluorouracil only. This comprised one cycle and was repeated every 21 days. Every cycle was preceded by white blood cell count and platelet count. At 7th cycle she developed jaundice, fever and abdominal pain and a tender enlarged liver. The patient was admitted and treatment was stopped. Alkaline phosphatase was 231 i.u. per litre, and transaminases were normal. Her condition improved later and was discharged. She was followed for 9 months thereafter she was lost from the clinic.

## DISCUSSION

### AETIOLOGY INCIDENCE

The cause of breast cancer is still unknown and may as well be multifactorial. However, appreciable sex related, race related, environmental and genetic factors have been observed to contribute to the development of breast cancer.

**Sex Related Factors**

Certainly sex is a contributing factor. Females are more affected than males with a female to male ratio of 100:1. If oopherectomy is performed before the age of 40 years the incidence of the disease is reduced by half.[8] The age at the first full term pregnancy appears to be protective. When the first birth occurs before the age of 18 years, the subsequent protection against breast cancer is 50% compared to when first full term pregnancy occurs after the age of 35 years.[9] The protection appear to stem from the hypothesis that breast cancer is initiated in the premenopause at around 20 - 30 years of age and this could have implication for breast cancer prevention and screening.[10] The setting of the age of menarche and menopause is influenced by the alteration in ovarian function. Macmahon reported that menarche and menopause have minor but significant influences on the incidence of breast cancer.[11] The excessive use oestrogen-containing contraceptive pills early in life,[12] hormone replacement therapy after menopause[13] and estrogen during pregnancy[14] enhance the risk of breast cancer, however the evidence is controversial. Much of this data supports the role of oestrogen in the genesis of breast cancer.

**Race-related and environmental factors**

Breast cancer is regarded as predominantly a disease of the western industrialized countries; however, this may not be true as most developing countries lack reliable statistics. The incidence of cancer varies widely between countries.[2,4] It is very low in Japan with an incidence of 3.76 per

100,000 population and high in USA with incidence of 21 per 100,000 population.

Sex-related factors alone do not fully account for the wide variation between countries suggesting an environmental cause. The incidence of breast cancer has been observed to be associated with intake of dietary fat and with obesity, particularly in the age group of 65-69 years.[15] Exposure to substantial radiation in early life has also been observed to be associated with increased risk of breast cancer.[3]

**Genetic factors.** Breast cancer is more common in those with first degree relatives with the disease. The risk is 2 to 3 times greater than would be expected in the general population and the patients are generally younger with high frequency of bilateral tumor.[2,3,4]

## NATURAL HISTORY

It is now well established that carcinoma of the breast originates in epithelium of the secreting unit of the breast, the terminal duct lobular unit.[3] The origin is multifocal in 15-40% ipsilateral breast and 10% contralateral breast.[4] Starting from a single cell it takes about 5 years to attain a clinically detectable size of one centimeter from 30 doublings.[4] Initially non-invasive, malignant cells soon invade surrounding tissue of breast and enter lymphatic and venous channels and by embolization seed in regional nodes, skeleton and viscera with microscopic deposit. Once this has occurred the

future progress of the disease is predetermined. Fisher suggests that embolization is the most important mode of spread of breast cancer and successful implantation of metastatic cells has been empirically estimated from clinical data to take place when the primary lesion is about 0.5 cm.[16] Others postulated that this occurs when the tumor is one centimeter in size.[3]

As the tumour invades the surrounding glandular tissue, the accompanying fibrosis tends to shorten Cooper's ligaments, clinically expressed by dimpling of the skin or retraction of the nipple. Permeation was at one time thought to be the most important form of spread of cancer cells in breast tumour whereby columns of cancer cells grow out along regional lymphatics pathways ultimately invading the skin itself. Clinically this is expressed by edema (peau d'orange) and is attributed to infiltration and blockage of lymphatic channels impending drainage of fluid from the skin. Ulceration of the skin occurs as the tumor cell replace skin and breaks down. In this study 27 patients out of 35 had involvement of skin in the form of edema or ulceration. All ulceration seen were fungating with foul smelling discharge.

The skin tumor cells pass along lymphatic vessels from the upper outer quadrant to drain to the axillary nodes where malignant cells implant and grow. From here malignant cells spread to supraclavicular nodes and by the way of the right lymphatic trunk to the blood stream heart and lungs.

From the inner quadrant spread occurs to internal mammary nodes and sometimes to the opposite breast. Haematogenous spread sends malignant cells virtually everywhere, but most commonly successful implants occur in lung 65%, Liver 56% and bone 56%.[4]

Breast cancer is now recognized as a systemic disease by the time it presents as a discreet lump. This concept is supported by long-term following of patients who were thought to have curable disease and treated by local therapy alone. Patients have been known to die of metastasis even up to 40 years latter following primary treatment.[17,18] However, considering the age incidence of the disease its excess mortality extends beyond the life span of many patients.

## DIAGNOSIS, PROGNOSIS AND STAGING

The age distribution in this study is shown in Table 1.5.1.

Table 1.5.1: Age Distribution N = 35

| Age Group | Number of Patients |
|---|---|
| <20 | 1 |
| 21 - 30 | 2 |
| 31 - 40 | 7 |
| 41 - 50 | 7 |
| 51 - 60 | 11 |
| 61 - 70 | 7 |
| >71 | 0 |
| Total | 35 |

- The most affected age group was 51-60 years.
- The youngest was 18 years and the oldest was 70 years
- Nineteen patients were premenopausal of whom two were pregnant, and sixteen patients were postmenopausal.

Ojara[19] in Uganda has reported that in Africa breast cancer affects a younger age group with a peak incidence at 31-40 years. The majority of his patients were premenopausal. Chiedozi[2] reported the peak incidence of breast cancer in Nigeria women to occur at 40 - 49 years a decade earlier than in European women and that 73.3% of women were premenopausal. In Britain and USA the age distribution is bimodal with one peak at 40-41 years and the second peak at 60-64 years. It is obvious of one third are premenopausal the rest will be postmenopausal.[10]

In general breast tumor is very rare in the prepubertal female and under the age of 20 years. From 20 years onwards the incidence of breast cancer increases with age and reaches a plateau at 45 - 55 years where it begins to raise again sharply.[4,10]

Breast cancer in younger women (<35 years) is thought to carry a poor prognosis in terms of survival and cure rates than in older women.[21] It has been suggested that older patients have better differentiated cancers with a high proportion of cells in Go and a high concentration of oestrogen receptors.[10]

As most patients with cancer in Africa present in the child bearing age it is expected to be associated with pregnancy or lactation. Chiedozi[22] in his series reported that 10% of breast tumors presented during pregnancy or lactation. Ojara[19] in Uganda reported similar high incidence of tumor during pregnancy as compared with low incidence of 1-2% in USA and Europe. Breast cancer associated with pregnancy or lactation progresses more rapidly and has worse prognosis than cancer in their non-pregnant counterpart because of hormonal influence mostly oestrogens and progesterones.[22]

Table 1.5.2: Presenting Clinical Features N = 35

| Feature | Number of Patient | Percentage |
|---|---|---|
| Lump | 35 | 100 |
| Enlarged axillary LN | 32 | 91.4 |
| Skin involvement | 27 | 77.1 |
| Edema (18) | 18 | |
| ulceration (8) | 8 | |
| Satellite nodules (1) | 1 | |
| Pain | 5 | 14.2 |
| Nipple discharge | 1 | 2.8 |
| Pregnancy | 2 | 5.7 |

The presenting clinical features in this study are shown in Table 1.5.2. Most common presenting clinical feature was a unilateral painless breast lump more than in 5 cm size with concurrent palpable ipsilateral axillary nodes in 91.4% This finding is comparable with other African series in that many African women presented with locally advanced disease.[19,20] While in Europe and USA most patients present in early stages at the time of diagnosis.[4] Late signs such as skin involvement, edema (peau d'orange) ulceration and satellite nodules were present in 27 patients (77%) in this study. Five patients were found to have distant metastasis to the lungs and bones.

Locally advanced breast tumor has little problem in making a clinical diagnosis, as latter signs are often present which include skin dimpling, nipple retraction, edema, ulceration, satellite skin nodules and ipsilateral enlarged axillary or supraclavicular nodes or Edema of the arm. Signs of distant metastasis such as bone pain or dyspnoea

may be present. Small lumps have to be differentiated from benign lesions. With careful clinical examination an experienced surgeon can easily differentiate a malignant lump from a benign one. Malignant lump are usually hard, almost cartilaginous, the edges are distinct, serrated and irregular.

Clinical diagnosis has to be confirmed by histopathological examination before any definitive surgery is performed. Several methods are available for doing breast biopsy which include frozen section, incisional or excisional biopsy, trocar like needle such as Tru-cut or Vim-silverman, and fine needle aspiration cytology (FNAC).

In developed countries the days of frozen section proceed to mastectomy regime are long gone.[3] Today fine needle aspiration cytology is being widely accepted as technique for histological diagnosis of breast cancer and together with clinical examination and mammography can make an unequivocal diagnosis of carcinoma in the clinic or office in more than 90%.[23,24] However false positive results do occur as with other technique frozen section and Tru-cut needle biopsy. Negative results are regarded as no results, since an adequate sample may not have been obtained. However a skilled and experienced aspirator is as necessary as a good cytologist to achieve satisfactory sensitivity and specificity of this diagnostic method.[23] In this centre, the technique is not popular because of

lack of expertise in aspiration and interpretation of cytological results.

In this study tissue for histology was obtained by incisional or excisional biopsy under local anaesthesia if the tumor was small. Frozen section was used occasionally. Delay for a few day for definitive procedure has no effect on the recurrence or survival rate.[4]

**Table 1.5.3: Histological type n = 35**

| Histological type | Number of Patient | Percentage |
|---|---|---|
| Infiltrating ductal carcinoma | 29 | 82.9 |
| Medullary carcinoma | 4 | 11.9 |
| Schwanoma | 1 | 2.9 |
| Non-infiltrating ductal carcinoma | 1 | 2.9 |
| Total | 35 | 100 |

The commonest histological finding was infiltrating ductal carcinoma (82.9%).

The pathologist is required to report on the histologic type, grade of differentiation, involvement of regional nodes and status of Estrogen receptor, factors of which are related to prognosis.

Tumors which special invasive histological type such as medullary carcinoma, tubular, cribriform and lobular have a

long term survival rate as compared to the non-special type with productive fibrosis.[4,25] Tumor of low grade differentiation which are rich in estrogen receptors have a relatively good prognosis compared to those without such features.[5] These features indicate the degree of differentiation or maturity of the tumor and presumably this is reflected in its rate of growth and capacity of invasion.[10]

The presence of lymphatic invasion in the breast is a poor prognostic sign, as is involvement of regional lymph nodes. In one study involving 24136 patients Nemoto reported that patients with one or more positive nodes have a reduced cure rate and survival rate as compared to those with negative axillary nodes.[21] The relationship between number of nodes involved and of both recurrence rate and survival rate is almost exponential. To many surgeons histological examination of all nodes is justifiable to gain such information while others, are satisfied with knowing whether the lower axillary nodes are involved or free from disease.[5] Banadona had also noted that number of histological involved nodes correlates well with disease free survival and survival rate.[26]

The prognostic value of estrogen receptor (ER) and/or progesterone receptors (PR) is still a matter of controversy. Chevalier reported that patients with ER or PR receptor < 5 fmol of cytosolic protein have a shorter

disease free survival and overall survival rate than those with ER or PR concentration >5 fmol.[27]

The clinical staging adopted in this study was the TNM UICC 1982. Stage distribution is shown in Table 1.5.4.

**Table 1.5.4:** Stage distribution N = 35

| Stage | Number of Patients |
|---|---|
| I | 0 |
| II | 3 |
| IIIa | 4 |
| IIIb | 23 |
| IV | 5 |

Most patients were clinically and by X-rays Stage III (71.2%).

**TREATMENT**

The treatment of breast cancer consists of control of (i) loco-regional disease and (ii) systemic disease. The eradication or control of loco-regional disease is through surgery with or without irradiation. Surgery or radiotherapy can be used with a curative intent and even if it does not cure at least it should keep the patient free from advanced ulcerative disease with all its horrors.[1] The control of systemic disease is by hormonal manipulation or cytotoxic adjuvant therapy. Systemic therapy has been shown to effectively improve the actuarial survival of these patients while local therapy has not.[3] There are centres which are using systemic therapy as a primary treatment of breast cancer and surgery as adjuvant therapy. Thus in elderly patients tamoxifen has now largely replaced

surgery as initial therapy.[28] Other have extended this practice to the treatment of patients with large (>4 cm) but still operable tumor in whom either endocrine agents or chemotherapy are given for 3 months before mastectomy.[3]

**Table 1.5.5:** Local therapy in 35 patients

| Number of Patients | Type of Surgery |
|---|---|
| 19 | Total mastectomy + axillary dissection |
| 10 | Toilet mastectomy |
| 4 | No surgery or refused |
| 3 | Local irradiation |
| 1 | Quadrantectomy + axillary dissection |

- Total mastectomy with axillary dissection is widely accepted procedure in the centre for management of loco-regional control of carcinoma of the breast.

Local therapy of breast cancer consists of surgery and radiotherapy. The advances in understanding of the natural history of the disease and recognition of the importance of systemic therapy, the objectives are still curative in early non-invasive or non-aggressive invasion disease. However, in most patients with established invasive carcinoma it is, but to achieve adequate control of its local manifestation. The surgeon and radiotherapist should try to achieve local control with the best cosmetic, functional and psychological results as are humanly

possible. To avoid needless morbidity there has been a gradual trend towards less radical forms of local therapy.[1] Conservative surgery and radical radiotherapy has been supported by clinical trials which have indicated that the local disease free survival is comparable to that obtained with mastectomy provided that the margins of the resected specimen are free of tumor.[29,30]

The major criterion for patients selection is the feasibility of adequately resecting the primary tumor without major cosmetic deformity. Therefore, tumor more than 5 cm under the nipple areola complex, two widely separated tumors and diffuse tumor either clinically or by mammography are poor candidates for conservative surgery.[31] However, Bulman[30] using local excision with radical radiotherapy reported a local recurrence of 9% in patients who had Stage I and II and 11% for patients who had stage III disease and concluded that conservative surgery can be feasible for all patients.[30]

Fisher et al[29] emphasized that local excision should be followed by postoperative radiation therapy, otherwise it is followed by high incidence of local recurrence but there is yet evidence that it can be prevented by systemic therapy.

In this series one patient with a $T_2NoMo$ tumor underwent quadrantectomy with axillary dissection to level one. The

other two with same stage had total mastectomy and axillary dissection.

Axillary dissection is indicated in all patients with clinically suspicious axillary nodes as part of the treatment and simplifies radiotherapy. It also provides information about nodal status. Other prefer sampling of 3 or 4 nodes from the axilla which is sufficient to predict axillary node status with accuracy.[32]

Mastectomy is still required for large tumor, of more than 5 cm and can however result in serious psychosexual morbidity of severe anxiety depression or sexual problems which would require psychiatric help.[1,2,3,4] To the extent this can be minimized by using silicone prosthesis or myocutaneous flamps using rectus abdominis or latissimus dorsi.

In this centre we have always performed total mastectomy and axillary clearance for all large tumors. Most of our patients present with tumors more than 5 cm with skin involvement. Radiotherapy is advocated for the chest wall and regional nodes following simple mastectomy alone and in order to prevent local recurrence. It is also used for recurrent local disease.

Local control of the breast cancer by local excision, radiotherapy and even most radical surgery have not altered the overall survival rate, as the patients fate depends on

whether or not sub-clinical dissemination of the disease had taken place before the primary lesion was removed. Pessimists will say that this occurs in every case and therefore recommend systemic hormonal cytotoxic therapy for all patients.

## SYSTEMIC THERAPY

Systemic therapy was developed primarily to control advanced disease, however it has proved effective in prolonging life and it is now being used as adjuvant to surgery and even as primary treatment with local therapy becoming an adjuvant mode of therapy.[3]

Table 1.5.6: Endocrine and Chemotherapy treatment in 35 patients

| Drugs | Number of Patients |
|---|---|
| Prednisolone | 17 |
| XRT oophrectomy | 13 |
| Tamoxifen | 10 |
| Progesterone | 3 |
| CMF (5-Fluorouracil) | 2 |

As most of our patients present with stage III disease at the time of diagnosis, this centre has always practised the protocol of local control by surgery if feasible followed by radiation oophorectomy with prednisolone 7.5 mg daily for premenopausal women or Tamoxifen alone or Tamoxifen, prednisolone or progesterone alone for postmenopausal women. Combination chemotherapy with cylophosphamide, methotrexate and 5-fluorouracil (CMF) is occasionally used according to the availability of drugs.

The benefit of oophrectomy in the treatment of breast cancer has not been firmly established. A controlled randomized trial in Toronto demonstrated that radiation oophorectomy with 2000 rads in five daily fraction particularly when combined with prednisolone 7.5 mg daily resulted in delayed recurrence and prolonged survival in premenopausal women of 45 years or more.[33] However, in another prospective randomized trial with a follow up of 17 - 22 years surgical oophorectomy demonstrated no significant difference in cure rate, survival time or disease free survival at least in stage I and II disease.[34]

The knowledge regarding the rqle of oestrogen in breast cancer has led to the development of strong inhibitory pharmacological agents, thus ending the era of surgical hormonal manipulation. These include agonists analogues of gonadotropin releasing hormone (GNRH) -(Busrilin) which desensitize the pituitary gland to the natural hormone and suppress ovarian function. Aminoglutethimide a drug now widely used in the treatment of advanced disease, suppresses precursor steroid synthesis and also inhibits conversion of cholesterol to pregnenolone and aromatase activity peripherally. Tamoxifen binds to estogen receptor forming a complex that is no longer receptive to natural oestradiol.

Endocrine ablative procedures influence the tumor by withdrawal of oestrogens. Only tumors which posses

oestrogen receptor protein are sensitive to oestrogen. The ovaries are the main source of supply of these steroids in premenopausal, but once postmenopausal they are synthesized peripherally in fat, muscle, liver by aromatization of $C_{19}$ precusor steroids of adrenocortical origin.

Chemotherapeutic agents are reserved for those tumors insensitive to hormonal influences. Several drugs have been found to be useful however multiple agent chemotherapy with cyclophosphamide, methotrexate and 5-fluorouracil both prolong the disease free interval and increases survival, at least in young women. A meeting held in London 1984 merged controlled randomised trials of adjuvant chemotherapy, absolute survival was prolonged in both with or without axillary lymph node metastasis. The younger women, 50 years or less have twice the advantage over women of 50 years or above.[35]

Significant improvement in overall survival and disease free-survival has been established firmly in young women below 50 years with chemotherapy particularly those given combination of CMF and older women more than 50 years with Tamoxifen given over a period of 1 - 2 years period.[36]

CONCLUSION

It is clear from this study that most of our patients have advanced breast carcinoma with already skin manifestation. Our efforts should at least be directed at reducing the stage of the disease with which the patient present. This

can be achieved by mass education through mass media system and opening of a breast clinic in every hospital. Although we may still be a long way from the eventual cure, working along these lines we can improve the outlook of patient with breast cancer to a status very near to any developed country.

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## SECTION II: UROLOGY

### 2.1: CARCINOMA OF THE URINARY BLADDER

**SUMMARY**

Eighteen (18) patients with carcinoma of the urinary bladder were seen by the author during a period of two years from August, 1988 to July 1990 at Muhimbili Medical Centre. The age of the patients ranged from 32-70 years with a mean age of 50.5 years and the majority of the patients were in the Age group of 40 - 59 years. The disease was predominant in males with a male:female ratio of 2:1 for squamous cell carcinoma and 1:1 for transitional cell carcinoma. The main presenting symptoms were haematuria (72.2%), vesical irritability mainly due to cystitis (61.0%) and lower abdominal pain (50%). History of schistomiasis was present in thirteen patients (72.2%). All patients originated from coastal and lake regions, well known endemic areas for schistomiasis. Late presentation was common with 94.5% of the patients had invasive tumours. Histological results were squamous cell carcinoma in nine patients (50.0%), transitional cell carcinoma in eight patients (44.4%), and adenocarcinoma in one patient (5.5%). Radiotherapy was the main mode of treatment.

**INTRODUCTION**

Carcinoma of the urinary bladder has a worldwide distribution and the incidence varies in different parts of the world[1] and within any one country.[2,3,4,5,6]

There is enough epidemiological evidence to suggest that urinary bladder tumours and bladder schistomiasis are related, and that schistosoma haematobium may be an important causative agent in the aetiology of bladder tumors.[4,5,7,8,9,10] The histological type is usually squamous cell carcinoma when schistomiasis and bladder tumour coexist in about 60%.[11] In Egypt where schistomiasis is endemic, bladder tumours constitute about 20-25% of all malignant tumors.[3] In Tanzania a close correlation between regional distribution of bladder cancer and schistosoma haematobium has been reported.[5]

In non-schistosomal bladder cancer, frequently seen in industrialized countries the histological type is usually transitional cell carcinoma.[12,13] The causative agent has been observed to be related to occupational exposure to certain chemicals.[14,15]

The treatment of bladder tumour is still a controversial issue even with improvement in diagnostic technique and in those investigations which assess the extent of the disease. Modalities of treatment available to date do not offer satisfactory results particularly for schistosomal bladder cancer. The biological behaviour of schistosomal bladder tumour of multicentricity, tendency for early invasion, high stage at presentation and marked resistance to radiotherapy,[3,5] are main reasons for poor results in treatment.