PATTERN AND EARLY TREATMENT OUTCOME OF ABDOMINAL INJURIES AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM, TANZANIA.

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MMed (General Surgery) Dissertation

Muhimbili University of Health and Allied Sciences

September 2012

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A Dissertation Submitted in Partial fulfillment of the Requirements for the Degree of Master of Medicine (General Surgery) of the Muhimbili University of Health and Allied Sciences (MUHAS) Dar es Salaam, Tanzania.

September, 2012.

CERTIFICATION

The undersigned certifies that he has read and hereby recommend for acceptance of dissertation entitled: **Pattern and Early Treatment Outcome of Abdominal Injuries at Muhimbili National Hospital**, in partial fulfillment of the requirements for the degree of Master of Medicine (General Surgery) of Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania.

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Professor of Surgery MUHAS

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Signature……...

Date ……..

THE DECLARATION AND COPYRIGHT

I, IBENZI Ernest Njile, declare that, this dissertation is my own original work and that it has not been presented and will not be presented to any other University for similar or any other degree award.

Signature……..Date……..

ACKNOWLEDGEMENTS

It is not possible for a single individual to cover all the aspects that has made this dissertation into the way it is, I therefore deeply give thanks to all those who have, with such good grace given their time and energy to supply valuable opinions, facts or even moral support. Much appreciation should go to my supervisor Prof Leonard E.K. Lema for his endless guidance and for his patience as he devoted his time towards the supervision of this work. In his absence it could not be like this.

My heartfelt appreciation is directed to the Head of Department General Surgery, Dr Mabula D. Mchembe and all other members of the department for their contributions and constructive ideas which made this work much better.

My sincere thanks also go to Dr. Witness A. Kavenuke for her assistance on data collection and for her moral support.

DEDICATION

To my dear and lovely wife, Josephina for her support, patience and care. My son Ibenzijunior, my daughter Ester and her cousin Emmagolingo for the courage they gave me and for their patience while I was away. My dear Parents Mr. and Mrs. Godfrid Ibenzi Mwele for their prayer may God bless them.

ABSTRACT

Background: Abdominal trauma is among the leading causes of morbidity and mortality in all age groups in the world. However, identifying serious intra-abdominal pathology due to trauma can be a challenge. Many injuries may not manifest during the initial assessment and treatment period. Mechanisms of injury often result in other associated injuries that may divert the physician's attention from potentially life-threatening intra-abdominal pathology. There is an increase in reports about Motor Traffic Accidents from every corner of our country. These accidents have led to a surge in the number of patients presenting to health care centers including Muhimbili National Hospital with abdominal trauma. Currently there are no published data on pattern of abdominal injury and our surgical department has no guidelines for management of trauma patients. A study aiming to determine the Pattern and Early Treatment Outcome of patients with Abdominal Injury was conducted at Muhimbili National Hospital.

Methodology: A descriptive, prospective, hospital-based study involving observation of patients from admission to final outcome of management at discharge or death was carried out. Consecutive admissions of 92 patients with abdominal injuries attended to at the department of surgery Muhimbili National Hospital were enrolled in the study. The study was conducted from April to December 2011. The data were analyzed using SPSS software.

Results: Ninety two patients were enrolled into the study. The male to female ratio was 7.4:1. Sixty two patients (67.4%) were in the age group of 21-40years. Fifty one patients (55.4%) sustained abdominal injuries following motor traffic accidents. Sixty patients had blunt injury, 32 patients had penetrating injuries. Associated injuries were found in 36.9% of patients. All the patients underwent laparotomy. The spleen was found to be the most commonly injured organ in blunt trauma constituting 33.3% of patients with blunt abdominal injuries while bowel was found to be the commonest injured intra-abdominal organs occurring in 37% of all cases. Negative and non therapeutic laparotomies constituted 21% of all cases. There were 3 patients with complications and

7 deaths. The mean length of hospital stay was 5.03 days. None of the patients underwent a re-laparotomy.

Conclusions: Blunt trauma was the commonest type of abdominal injury and the spleen was found to be the most common organ injured among patients with blunt trauma. Laparotomy was carried out in all patients with abdominal injuries, no conservative treatment was employed. FAST results were found not to be reliable to most patients with abdominal injuries. The rate of negative and non therapeutical laparotomy was high. In abdominal trauma patients the rate of post operative complications was low.

Recommendations: Protocol for management of patients with abdominal injuries should be made and be available for guiding surgeons on management of patients with abdominal injuries. Utilization of other investigative tools such as contrast CT scan is necessary to reduce the rate of negative and non therapeutic laparotomies. Selective conservative management should be used in patients with minor abdominal injuries.

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ACRONYMS, ABBREVIATIONS AND DEFINITION OF TERMS

CT ……....Computed Tomography

DPL……..Diagnostic Peritoneal Lavage

FAST……Focused abdominal sonography for trauma 1996

-Focused Assessment with Sonography for Trauma 1997

HVI……Hollow viscus injury

MNH…….Muhimbili National Hospital

MUHAS……Muhimbili University of Health and Allied Sciences

MTA…….Motor Traffic Accident

SPSS……...Statistical Package for Social Sciences

Damage control surgery…….. rapid termination of an operation after control of life- threatening bleeding and contamination followed by correction of physiologic abnormalities and definitive management.

Conservative management……. Management that is designed to avoid radical medical therapeutic measures or operative procedures

Non therapeutic laparotomy…….Laparotomy in which the injured organ needed no repair or removal

Negative laparotomy……...The finding at laparotomy of no injured organ

CHAPTER ONE

1.1.0 INTRODUCTION AND LITERATURE REVIEW

It is estimated that by the year 2020, 8.4 million people will die every year from injury, and injuries from road traffic accidents will be the third most common cause of disability worldwide and the second most common cause in the developing world.[1] In 2001, over 18,000 patients attended the Johannesburg Hospital Trauma Unit and approximately 140 priority-one casualties were treated per month. In that year there were 1715 resuscitations for trauma, 688 for blunt abdominal trauma, of which the majority were associated with road traffic accidents. There are characteristic injury patterns, with multisystem injury being the rule rather than the exception. In 1990, about 5 million people died worldwide as a result of injury.[2] Optimal care of severely injured patients requires a coordinated approach from the point of injury, through a hospital facility organized to cope with the demands of looking after multisystem problems, to a rehabilitation structure that can return the patient to his or her maximum potential level of function within a society. Although sophisticated prehospital and trauma centre systems have been shown to reduce the number of preventable deaths after trauma, maximum impact in reducing the burden of trauma must come from injury prevention strategies.[3]

Abdominal trauma is among the leading causes of morbidity and mortality in all age groups worldwide.[4] Men tend to be affected slightly more than women.[5] However identifying serious intra-abdominal pathology due to trauma can be a challenge. Many injuries may not manifest during the initial assessment and treatment period. Mechanisms of injury often result in other associated injuries that may divert the physician's attention from potentially life-threatening intra-abdominal pathology.[4] In alert and non-comatose patient, physical examination is the method of choice to rule out significant abdominal injury. However, signs of peritonism may take hours before becoming clinically evident, which is an important downside of this strategy. If the patient is intubated, intoxicated or

suffers from impaired neurological function (e.g. tetraplegia), clinical examination may lose its value and the decision to carry out a surgical intervention or otherwise based solely on clinical findings becomes unreliable.[6,7] In his series of 90 patients with free intraabdominal fluid but without solid organ injury, Livingston showed that 19% of patients without abdominal tenderness actually had a significant abdominal injury.[6] One indirect sign, which seems to be associated with hollow organ injury (if free fluid without solid organ injury is found) are seat belt marks, which increase the likelihood of a significant abdominal injury 2- to 4-fold.[8]

Whilst sonography and conventional radiography remain well-established techniques, CT scanning of the abdomen and pelvis is the procedure of choice to evaluate the hemodynamically stable patient who has sustained blunt or penetrating trauma. CT has replaced Diagnostic Peritoneal Lavage (DPL) as the first method of choice in many trauma centers worldwide. Its major advantage is that it is not only capable of revealing the presence of intra-abdominal or intra-thoracic hemorrhage but can to some extent also identify the organ involved. [9] In centers where a CT scan is not available or limited to office hours, frequent re-evaluation of the patient's condition, repeated sonography and DPL remain the cornerstones of the diagnostic work-up of abdominal trauma. In the setting where clinical evaluation alone is relied upon to determine whether or not a patient requires surgery, negative laparotomy rates may be up to 40%.[10] In centers where a positive DPL is regarded as the gold standard when deciding on an intervention, diagnostic laparoscopies or laparotomies are performed routinely. The downside of this strategy is a potentially high number of unnecessary or non-therapeutic operations.[11] The limitation of DPL in detecting retroperitoneal injuries particularly if performed too soon after initial trauma, can miss intestinal perforation in the abdomen without evidence of solid organ injury.[12]

One of the largest systematic reviews, conducted by Rodriguez and co-workers, found 10 articles in which isolated free abdominal fluid was seen without organ injury. The study included 463 patients out of a total of 16000 (2.8%) with signs of free intra-abdominal fluid without obvious solid organ injury who had received a CT scan for blunt abdominal trauma. A therapeutic laparotomy was performed in only 122 patients and the authors

concluded that laparotomy is not warranted if the patient is alert and can be monitored with repeated physical examination.[13]

1.1.1.0 There are 2 main types of abdominal trauma:

Blunt and penetrating

1.1.1.1 Blunt Abdominal Trauma

This can result from either compression (secondary to a direct blow or against a fixed external object, e.g. seatbelt), or from deceleration forces. The most commonly injured organs are the spleen, liver, small bowel, kidney, bladder, colon, rectum, diaphragm, and pancreas. CT scanning has increased the identification of injuries. The care of the trauma patient is demanding and requires dedication, diligence and efficiency. Evaluating patients who have sustained blunt abdominal trauma remains one of the most challenging and resource-intensive aspects of acute trauma care.[14] Missed intra-abdominal injuries and concealed hemorrhage are frequent causes of increased morbidity and mortality, especially in patients who survive the initial phase of an injury.[15] Physical examination findings are sometimes unreliable for several reasons; including the presence of distracting injuries, an altered mental state, and co-existing drug and alcohol intoxication in a patient.[14]

1.1.1.2 Penetrating Abdominal Trauma

This is the abdominal trauma whereby the abdominal cavity communicates with the exterior. The causes are multiple and include gunshots, high velocity missiles and knives. The extent of intra-abdominal injuries may be difficult to predict. However, a high index of suspicion must be maintained to avoid missing occult injuries.[16]The increased use of CT scan in patients with penetrating abdominal injuries has reduced the rate of negative and unnecessary laparotomies.[17] In one study of 21 patients with penetrating abdominal injury who underwent CT, 5 had laparotomies and all were positive laparotomies. The remaining 16 were managed conservatively and all had uncomplicated recovery.[17]

1.1.2.0 ORGAN SPECIFIC INJURIES

1.1.2.1 Splenic injury: The most commonly injured intraabdominal organ following blunt trauma is the spleen. Laparotomy should be performed on haemodynamically unstable patients with suspected splenic injury. If the patient is stable (conscious, normotensive and normal pulse) surgery may not be required as many injured spleens heal without surgical intervention. The occurrence of overwhelming post-Splenectomy sepsis in a minority of patients who have had a Splenectomy for trauma, and recognition that non-operative management of children with ruptured spleens reduces the requirement for blood transfusion and decreases the length of hospital stay compared with aggressive operative intervention, has led to an increased acceptance of non-operative management. This has now been expanded to include adult patients.[17] Adjunctive procedures, such as embolisation of splenic blood vessels have also been used to reduce the need for operative intervention.[18] Six factors have been identified that predict failure of conservative management for blunt splenic injury.[19] They include;

- Haemodynamic instability
- Grade of injury III, IV and V
- Size of haemoperitoneum
- Contrast blush on CT
- Age older than 55 years
- Pre-existing splenic disease.

Older patients and patients with injury to a diseased spleen are thought to be poor candidates for non-operative management; however, various studies have now been published that show neither factor should mandate operative treatment on its own. Patients who are hypotensive at presentation and fail to stabilise with small volumes of resuscitation, or who develop recurrent hypovolaemic shock, should be operated on. If contrast is seen to 'blush' or pool on CT then angiography or surgery is required.[20] Any patient selected for non-operative management must be carefully assessed and closely

monitored by an experienced practitioner, with an operating theatre immediately available just in case deterioration requires operative intervention.[21]

1.1.2.2 Hepatic Injury: Approximately 85% of all patients with blunt hepatic trauma are stable. In this group, non-operative management significantly improves outcomes over operative management in terms of decreased abdominal infections, decreased transfusions, and decreased lengths of hospital stay[22.] For unstable patients, operative surgery is still the rule, with the damage control approach now accepted as the standard of care.[23] Bleeding is controlled, often by use of perihepatic packing and the patient's time in the operating theatre is kept to a minimum. CT scanning is the mainstay of diagnosis for hepatic injuries after blunt trauma in the stable patient; the initial CT findings will help the trauma surgeon to determine the suitability for non-operative treatment. Some of the factors likely to lead to a failure of non-operative management of blunt liver injury have been identified.[24]They include;

- Hemodynamic instability
- Grade of injury (grade III and IV) according to the American Association for the Surgery of Trauma Scale
- Periportal tracking
- Contrast pooling on CT scan.

1.1.2.3 Hollow Viscus Injury (HVI) OR BOWEL INJURY: Individuals subjected to high-speed deceleration in MTAs can experience rupture of intraabdominal hollow viscera. The mechanism of injury is thought to be compression of closed-loops of bowel by seat-belt restraints. Ecchymosis (bruising) may be seen across the torso in the distribution of the belt, but this finding is not universal. The reported incidence of bowel and mesenteric injuries after blunt abdominal trauma is approximately 1.3%**.** [25] The most pressing concern for surgeons treating blunt abdominal injury is occult bowel (i.e. injury that occurs and is clinically silent). These injuries can be difficult to identify on the non-invasive screening tests (CT and ultrasound), as there may be little associated bleeding. The increasing use of such tests to screen for intraabdominal injury and a reduction in the reliance on diagnostic

peritoneal lavage increases the risk of missing these injuries. The accuracy of spiral CT is excellent for solid organ injury; however, the same cannot be said for HVI. Accurate and timely recognition can be difficult, and delay in diagnosis has been shown to be associated with significant morbidity and mortality.[26] In a recent review, several important observations were made: Increasing grade of injury to a specific solid organ did not correlate with increasing rate of HVI. The higher the number of organs injured, the higher the incidence of HVI. Any combination of solid organ injury with pancreatic injury had a high rate of HVI. When three solid organs were injured, HVI was 6.7 times more likely than when one solid organ was injured, and the presence of a pancreatic injury plus solid organ injury was associated with HVI in more than a third of patients. [27] A high index of suspicion must be maintained and the surgeon must be prepared to repeat imaging techniques (CT scanning or diagnostic peritoneal lavage) or to proceed to operative intervention.

In a more recent single centre review of 2651 trauma admissions, 14 (0.5%) patients had free intraabdominal fluid without solid organ injury in the initial CT scan.[28] Eleven of these 14 patients underwent therapeutic laparotomy based on the presence of hypotension, peritoneal irritation or additional findings on CT associated with non-solid organ injury. In their discussion, Yegiants et al. stressed that the decision on whether to operate or not is made too often by solely relying on the surgeon's personal experience, with the amount of free fluid detected rarely playing a role.[28]

FAST is useful as the initial diagnostic tool for abdominal trauma to detect intraabdominal fluid.[29] FAST is a goal directed study answering a simple question as to whether there is intraperitoneal fluid or not. It is a safe quick diagnostic tool that can be learnt easily.[30,31] It is of great value for those patients who are haemodynamically unstable and who cannot be shifted to CT scan room. One of the great advantages is that it can be done at bedside during resuscitation without the need to move the patient from the resuscitation room. The great value of FAST lies in its high sensitivity for detecting intraperitoneal fluid which accumulates in dependent areas around the liver, spleen and pouch of Douglas.[30] This sensitivity may reach up to 100%. The finding of free intraperitoneal fluid in a hypotensive

patient alerts the treating doctor that the patient may need an urgent laparotomy. Limitations of ultrasound have to be well understood when using FAST. Ultrasound is not accurate in obese patients due to lack of penetration of sonographic waves. Furthermore, it will be difficult to visualize intra-abdominal structures in case there is ileus or surgical emphysema under the skin. Ultrasonography is highly accurate in detecting intraperitoneal fluid but it cannot differentiate between blood, urine, bile or ascites. That is why the sonographic findings have to be correlated with the clinical findings to make critical decisions. FAST has to be used within a diagnostic algorithm to have a proper role.[32] Ultrasound should be used as the clinician's stethoscope in the clinical setting. In case the patient is haemodynamically stable then the CT scan of the abdomen is the diagnostic modality of choice.[33] Ultrasound will miss 25% of intra-abdominal injuries in case it is the only diagnostic tool.[34,35] Furthermore, ultrasound is not accurate in detecting retroperitoneal or gastrointestinal lesions.[34,35]

1.1.3.0 PATTERN OF ABDOMINAL INJURY

A retrospective study on Pattern of abdominal injuries was conducted in Aminu Kano Teaching Hospital, Kano Nigeria. The study analyzed all patients with abdominal trauma who were operated upon from January 1997 to December 2001. Sixty seven patients were managed during the study period and all were males, with a peak age range of 20 - 29 years. Penetrating abdominal injury occurred in 36 patients (53.7%), with 15 of them (44.4%) arising from missile injuries. Thirty-one patients (46.3%) sustained blunt abdominal trauma, mainly from road traffic accidents in 80.6% of cases. The spleen was the most commonly injured organ in blunt abdominal trauma occurring in 18 patients (58.1%), while in penetrating injury; it was the small bowel in 19 patients (55.5%). The mortality rate in this study was 8.9%. Abdominal injuries are quite common in Nigeria and remain a major source of morbidity and mortality. The study recommended preventive strategies be focused on reduction of road traffic accidents, violent crimes and social conflicts.[36]

Another study on the Pattern and outcome of abdominal injuries at Kenyatta National Hospital, Nairobi Kenya revealed that abdominal injuries predominantly involve the male gender. Among the 80 patients studied they found a male to female ratio of 12.3:1, the majority were in the third decade of life with a range 15-56 years and mean of 28.2 years. Blunt abdominal injuries had more tendencies to be associated with extra- abdominal injuries. Duration prior to presentation to hospital and surgery depended on severity of injury. Modes of management varied between attending surgical firms. The rate-of negative laparotomies was found to come down by 10% over the past 15 years. Penetrating when compared to blunt abdominal injuries had a 2:1 ratio with the leading causes of injury being stab wounds, gunshot wounds and road traffic accidents. The outcome of management depended on the severity and type, of injury sustained. Penetrating injuries had a better interventional outcome. Penetrating abdominal injuries had higher rates of complications while the blunt injuries had higher rates of mortality. Overall, both the complication and mortality rates were 12.5%. Determinants of mortality included delay before surgery, associated injuries, need for blood transfusion, admission to intensive care unit and duration prior to admission. Patients stayed in the hospital for an average of 6.4 days. Patients with blunt injuries had more complications and their hospital stay was close to twice as much as their penetrating injury counterparts.[37]

A prospective study on abdominal injury was done at Mbarara in Uganda, in which Abdominal trauma was a common emergency at Mbarara Regional Referral Hospital accounting for 14.23% of admissions due to injury and 4.8% of patients admitted in the surgical department. Blunt abdominal injury was the commonest cause of injury (85.7%). Most injuries were a result of road traffic accidents (47.1%) and assault. Alcohol consumption was a major predisposing factor. Peasants were more predisposed to abdominal injuries. Non-operative management was found to be safe in hemodynamically stable patients.[38]

A study on abdominal injuries in 52 children admitted at Muhimbili Medical Centre Dar es Salaam was done between January 1987 and December 1990 that revealed road traffic accidents as the most common cause of injury (57.7%, followed by falls from height

(32.7%). Blunt abdominal injuries occurred in 77% of patients and 23% patients had penetrating injuries. The commonest organ injured was the spleen followed by the liver. Approximately 32.6% had associated extra abdominal injuries. The mortality was 7.6%.[39]

1.2.0 PROBLEM STATEMENT

It is estimated that by the year 2020, 8.4 million people will die every year from injury, with injuries from road traffic accidents as the third most common cause of disability worldwide and the second most common cause in the developing world.[1]

There is an increase in reports about Motor Traffic Accidents from every corner of our Country. Data from Tanzania Police Force have shown a yearly linear increase of Motor Traffic Accidents. In 2009 there were 22739 people involved in road accidents with 3223 deaths and in 2010, 24665 road accidents and 3582 deaths. This has led to a surge in number of patients presenting to health care centers including Muhimbili National Hospital with abdominal trauma and there is no current published data on the Pattern of abdominal trauma in our National hospital and our country at large. There are no treatment guidelines on abdominal injuries in the department of surgery.

1.3.0 RATIONALE

To provide evidence based data for informed change in surgical care of patients with abdominal trauma at Muhimbili National Hospital.

1.4.0 OBJECTIVE

1.4.1 BROAD OBJECTIVE; To document the pattern and early treatment outcome of patients with abdominal injuries managed at Muhimbili National Hospital.

1.4.2 SPECIFIC OBJECTIVES;

1. To determine the causes and risk factors related to abdominal injuries.

2. To determine the types, frequency of injury of various intraabdominal organs as well as associated extraabdominal structures.
3. To determine the management interventions carried out and the treatment outcome at discharge.

CHAPTER TWO

2.0.0 METHODOLOGY

2.1.0 DESIGN: A descriptive, prospective, hospital-based study involving observation of patients from day of admission to final outcome of management at discharge or death**.**

2.2.0 SETTING: The study was conducted in the department of surgery of Muhimbili National Hospital (MNH) which is a public University Teaching Hospital and a National Referral Centre for our country. The hospital is located in Dar es Salaam city, Tanzania. The city of Dar es Salaam has a projected population of 4 million people served by three public District hospitals with MNH as their referral centre. MNH has 1500 beds with 300 of these dedicated to general and paediatric surgical services. Patients with isolated skeletal, head and spine injuries are managed in a different institute.

2.3.0 PATIENTS: All consecutive admissions of patients with either blunt or penetrating abdominal injuries attended to in the department of surgery from April to December 2011.

Sample Size:-The formula used to calculate the minimum sample size

$$N=\frac{Z^2P(1-P)}{E^2}$$

Where **N**=Number of patients constituting the minimum sample size.

Z-95% confidence interval=1.96

P-Proportion of Patients with abdominal injury admitted in the surgical unit at Mbarara Regional Referral Hospital, Uganda =4.8%.[38]

E-Standard error=0.05

That $N=\frac{1.96^2X0.048\ (1-0.048)}{0.05^2}$ =70 Patients

However convenient enrollment technique was employed in which all patients with abdominal trauma admitted in the surgical department during the study period were included in the study.

2.4.0 Ethical consideration: Ethical clearance was sought for conducting the research from the Research Ethics Committee of Muhimbili University of Health and Allied Sciences. Before carrying out the study, permission was also sought from the management of Muhimbili National Hospital. Patients themselves or relatives and guardians of those unconscious, below 18years or very ill were informed about the purpose of the study. This was done at any point during inpatient period once a patient met the inclusion criteria. Data were extracted from the patient, relative or guardian and from the case hospital record. The data were entered in the data collection tool.

2.5.0 EXCLUSION CRITERIA: -patients who died before confirmation of definitive diagnosis and those who sustained trauma without gaining admission into the department of surgery.

2.6.0 VARIABLES STUDIED: These included age, sex, occupation, causes and risk factors leading to accident, type of abdominal trauma, associated extra abdominal injuries, treatment offered and outcome of treatment at discharge. All enrolled patients were first resuscitated at the Department of Emergency Medicine before being transferred to the theater or surgical ward for definitive surgical interventions.

2.7.0 OUTCOME MEASURES: these included length of hospital stay, morbidity and mortality. All patients were followed up to death for patients who died while still inpatient or up to one month for survivors.

2.8.0 Data processing and analysis: Manual analysis was carried out through sorting out all the questionnaires collected. Data were entered in the computer by the principal investigator followed by data cleaning. Data analysis was done using SPSS program version16.0. Demographic data, types and causes of injury, associated injuries, intervention offered, morbidity and mortality were used to determine frequencies distribution and proportions.

2.9.0 STUDY LIMITATIONS

This study was done at Muhimbili National Hospital which is a tertiary care referral centre, thus the findings may not reflect a true image of the magnitude of abdominal trauma in Dar es Salaam and the adjacent county. Also in this study Injury Severity Scores was not recorded because it is not practiced routinely on all injured patients in our hospital and the researcher was not necessarily the person evaluating all the injured patients included in this study.

CHAPTER THREE

3.0 RESULTS

A total of 92 patients with abdominal trauma managed in the surgical department during the study period were enrolled. Males were 81and females were 11with the male to female ratio of 7.4:1. The age range was 7 to 55years with the mean age of 29.43years. Sixty two patients (67.4%) were in the age group of 21 to 40 years. Occupational wise petty traders were most involved in accident constituting 42.3% of all cases. Seventy four patients (80.4%) were residents of three districts of Dar es Salaam and 18 patients (19.6%) were upcountry residents.

Figure 1: Age distribution in years of the 92 studied patients

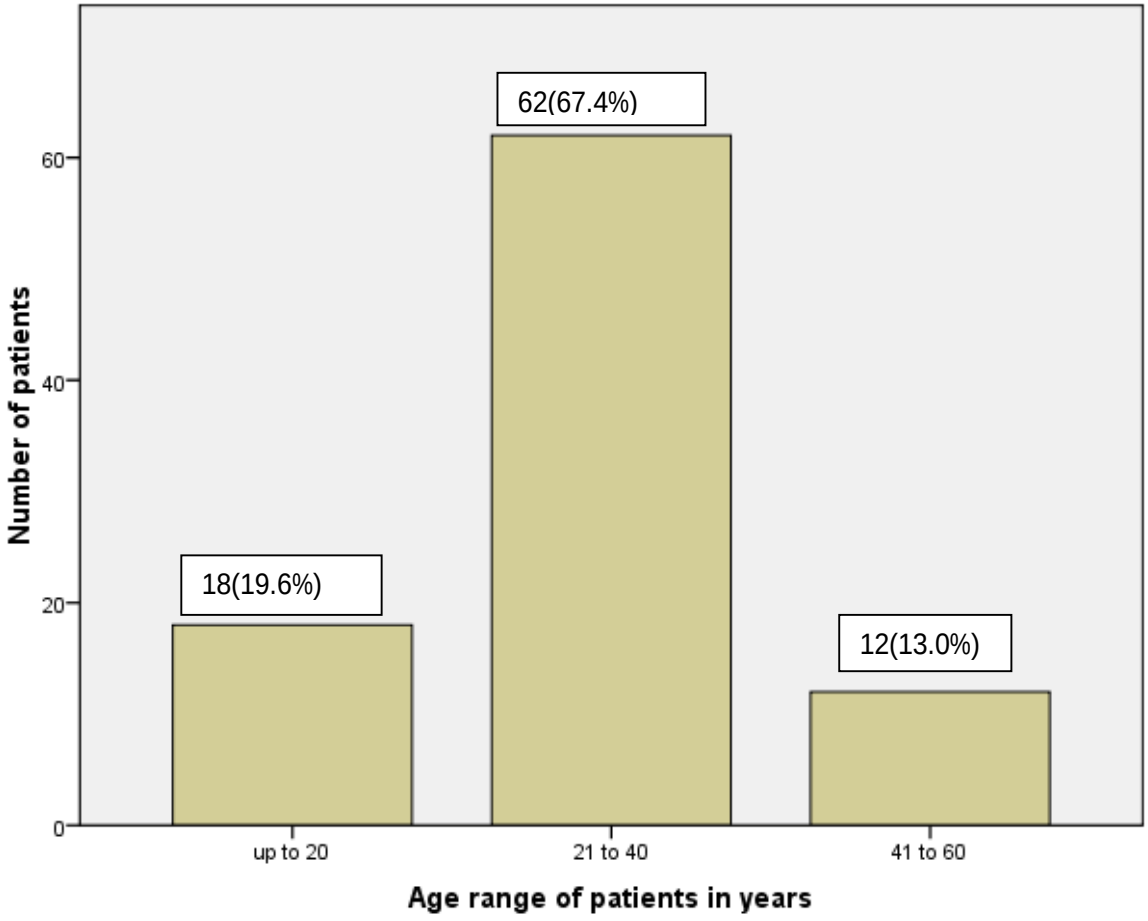
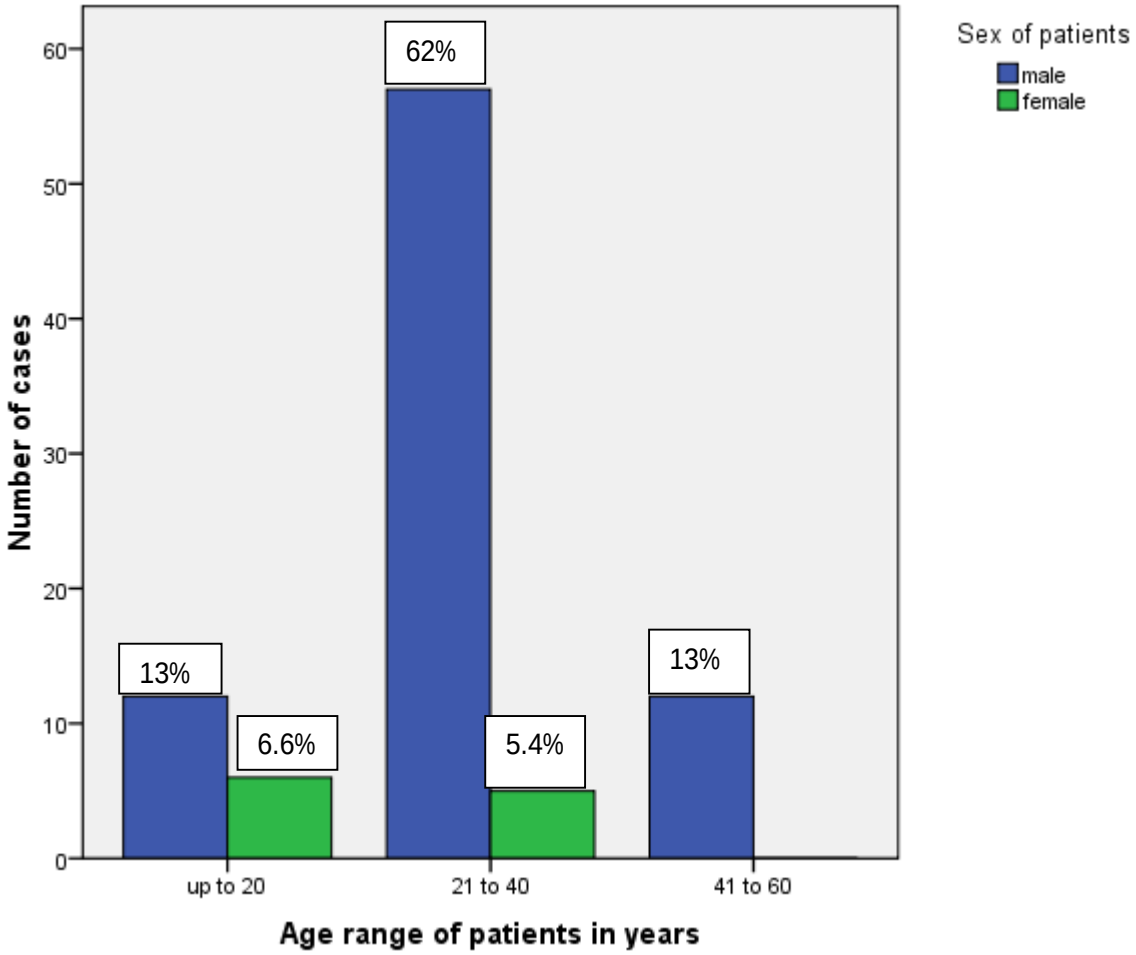


Table 1: Demographic characteristics of the 92 studied patients with abdominal injuries

Characteristics	frequency	Percent
Age range(years		
>0-20	18	19.5
21-40	62	67.4
41-60	12	13.1
Sex		
Male	81	88.0
Female	11	12.0
Occupation		
petty traders	39	42.3
nonprofessionals	23	25.0
Pupils /students	13	14.1
Driver	8	8.7
Peasant	7	7.6
professionals	7	7.6
Residence		
Kinondoni	28	30.4
Ilala	24	26.1
Temeke	22	23.9
Upcountry	18	19.6
Total	92	100.0

Most patients were in their 3rd and 4th decades of life constituting 67.4% of cases.

Figure 2: A bar chart showing age and sex distribution of the 92 studied patients.



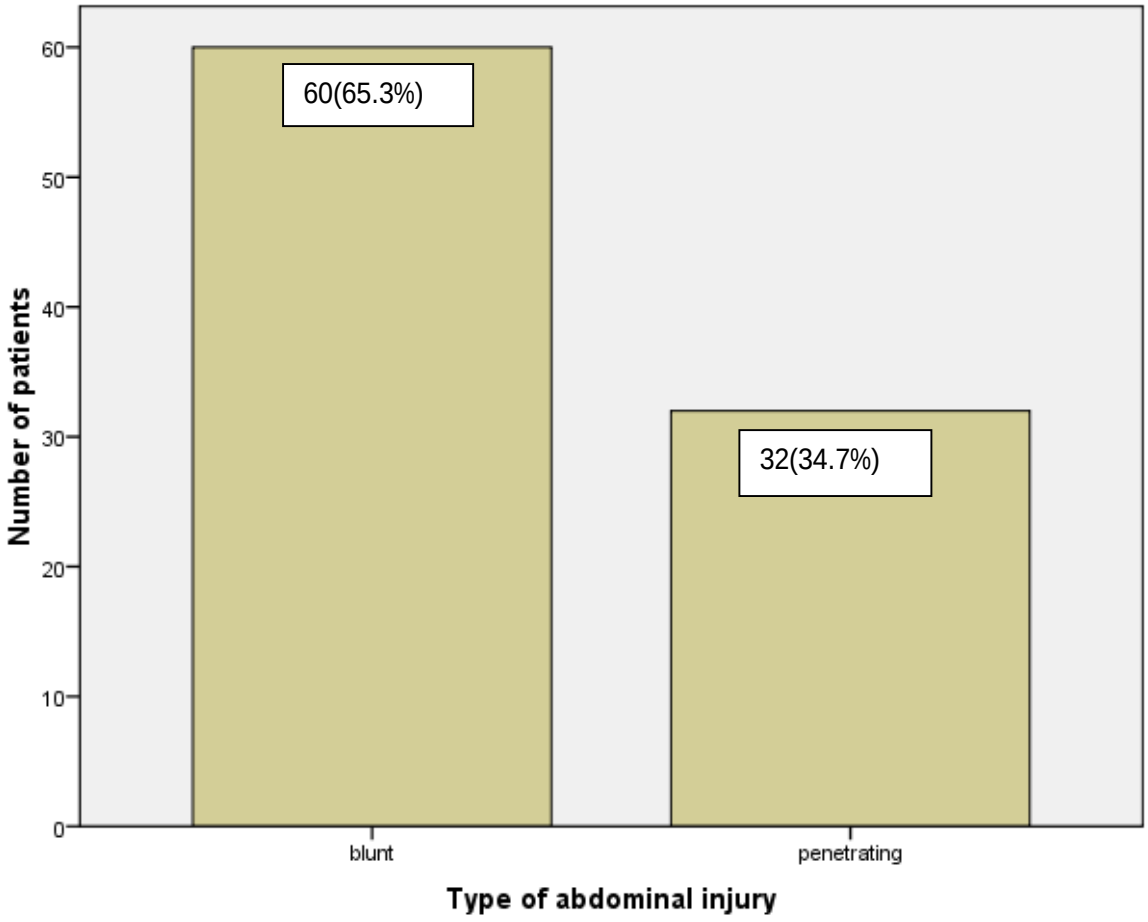
Out of 92 studied cases 57 (62%) were males of age group of 21 to 40 years. There were no females above age of 40 years.

Table 2: Causes of injury in relation to the type of abdominal injury

	Type of abdominal injury		
Cause of injury	Blunt	Penetrating	Total
MTA	44	7	51(55.4%)
Assaults	2	22	24(26.1%)
Crush	8	2	10(10.9%)
Dairy accidents	2	0	2(2.2%)
Falls from heights	4	0	4(4.3%)
Gunshot	0	1	1(1.1%)
Total	60(65.3%)	32(34.7%)	92(100.0%)

MTA was the most common cause of injury constituting 55.4% of case and most of them had blunt injuries. Out of 24 patients who were involved in assaults, 22(91.7%) had penetrating injuries. In this study there was only one case of gunshot injury.

Figure 3:Distribution of types of abdominal injury of the 92 studied patients



Blunt trauma was the commonest constituting 60 patients (65.30%). Penetrating injury occurred in 32 patients (34.7%).

Table 3: Cause of injury in relation to status of Substance Abuse among the studied subjects

	Substance of abuse.			
Cause of injury	Alcohol	marijuana/cannabis	others(cocaine, etc)	Total
Assaults	14	7	0	21
MTA	12	4	0	16 Crush
1 0		0	1	
Dairy kicks	0	0	0	0 Falls
from heights 0		0	0	0
Gunshot	0	0	0	0
Total	27	11	0	38

Substance abuse on the day of accident was reported by 38 patients. Twenty seven patients (29.3%) reported to have taken alcohol and 11patients (12%) reported use of cannabis. Among the Assaults group 21 of the 24 cases (87.5%) confessed substance abuse on the day of trauma. The substance of abuse was mainly alcohol in 14 of the 21 cases (66.7%).Patients who were assaulted after substance abuses were 21 out of a total of 38 substance abusers (55.3%). None of the subjects confessed the use of drugs such as cocaine, or other similar class of drugs.

Table 4: Abdominal operative findings in relation to the type of abdominal injury

	Type of abdominal injury			
Injured organ.	Blunt	Penetrating	Total	Percentage
Bowel (stomach, small intestine, and rectum)	16	18	34	37.0 colon
Spleen	20	4	24	26.1
Urinary bladder	14	2	16	17.4
Liver	9	5	14	15.2
Mesentery	5	4	9	9.8
Retroperitoneal haematoma	8	0	8	8.7
Normal intra-abdominal organ	2	5	7	7.6
Omentum	3	3	6	6.5
Diaphragm	1	1	2	2.2
Pancreas	1	0	1	1.1

The bowel was found to be injured in 34 patients (37%). Spleen was found to be injured in 24 cases (26.1%). This was followed by urinary bladder injuries which occurred in 16 patients (17.4%). Seven patients (7.6%) were found to have normal intra-abdominal organs.

Table 5: Distribution of the studied subjects in relation to associated extra-abdominal injuries

Extra abdominal injury	Frequency	Percentage
Skeletal injury(limbs, pelvic and spine)	25	73.5
Chest injury	10	29.4
Soft tissue injury	7	20.6
Traumatic Brain Injury(TBI) (Head Injury)	6	18 .0

Associated extra-abdominal injuries were found in 34 patients (37%). Skeletal injuries (upper and lower limbs, pelvis and spine) were the most common associated injuries that occurred in 73.5% of cases with associated injuries. Chest injury occurred in10 patients (29.4%) and seven patients (20.6%) had multiple associated injuries. Isolated abdominal injuries constituted 63% of all cases. The frequency of associated injuries is more than 34 because others had associated injuries of more than one organ/tissue.

Table 6: Surgical procedures performed for the intra-abdominal injuries.

Treatment offered	frequency
Bowel repair	29
Splenectomy	21
Liver repair	15
Non therapeutic laparotomy	13
Negative laparotomy	7
Mesentery repair	6 Urinary bladder repair 4
Splenorrhaphy	2
Diaphragm repair	2
Damage Control Surgery	1

All the 92 patients had a laparotomy done. Splenectomy was done in 21 (87.5%) of 24 cases who had splenic trauma while splenorrhaphy was done in 9.5% of the cases. There was only one case that was managed by damage control surgery. Non therapeutic

laparotomies constituted 14.1% of cases and negative laparotomies constituted 7.6% of all the cases.

.TABLE 7: Extent of intra-abdominal injury in relation to FAST status

Extent of injury	FAST positive	FAST negative	FAST not done	Total	Percent
Significant	45	13	14	72	78.3
Mild injury	8	2	3	13	14.1
Uninjured organ	1	1	5	7	7.6
Total	54(58.7%)	16(17.4%)	22(23.9%)	92	100.0

FAST was done in 70 patients (76.1%). FAST findings were positive in 58.7%, negative in 17.4% of the cases and in 22 patients (23.9%) FAST was not done. Significant organ injury was found in 45 patients (83.3%) out of 54 patients whose FAST results were positive, and 13 patients (81.3%) out of 16 patients whose FAST results were negative had significant organ injury. Eight patients (14.8%) with positive FAST who underwent a laparotomy were found to have mild injury that did not warrant surgery. One patient with positive FAST found to have no injured organ.

Table 8: Patients Treatment Outcome in relation to length of hospital stay

	Days of stay in the hospital			
Treatment outcome	up to 7 days	up to 2weeks	>2weeks	Total
No complication	74	8	0	82
Recovered after complication	0	2	1	3
Died	7	0	0	7
Total	81	10	1	92

Eighty one patients (88%) stayed in the hospital up to a week. There were 7 deaths constituting 7.6% of cases and all occurred within seven days postoperatively. The causes of deaths were uncontrolled haemorrhage and septicemia.

There were 3 patients (3.3%) with complications and these were surgical wound infections. Patients with complications stayed in the ward for 13 to 19 days.

CHAPTER FOUR

4.0 DISCUSSION

Abdominal trauma is most common in the active segment of the population globally and the incidence is highest in the 21-40 year age group.[40] In this study 67.4% of patients were in this age group. These were due to motor traffic crashes, occupational hazards and interpersonal violence or assault. The age range of patients was 7 to 55 years and the Mean age being 29.43years. This study supports the findings of others that the young economically active segment of the population is very vulnerable to injuries including abdominal trauma. In this study there were few children with abdominal trauma. This can be due to the fact that, probably children do sustain more injuries of other body parts especially limbs than the abdomen.

Males were more involved compared to females in a ratio of 7.4:1.This is comparable to the study done by Musau et al at Kenyatta National Hospital in which the male to female ratio was 12.3:1.[37] The large proportion of male involvement is attributed to occupational hazards and other socio-economical activities men are doing that predispose them to injuries. They are more likely to have reasons for moving from one place to another. In most African countries, males also represent the active group in any society that takes part in high risk activities.

Petty traders were most involved in accidents because of the rush through heavy traffic to sell goods, get goods for their business and to reach their business places. Petty traders are often involved in buying and selling goods which necessitates movement from one place to another. All these probably subject them to increased risk to road accidents. Dar es Salaam being the fastest growing city in our country, unemployment to the younger generation tends to encourage urban migration to sustain their living through petty trade. Moreover about 33% of residences of Dar es Salaam are petty traders/businessmen,[41] which probably account for their larger proportion among the studied patients.

Most of the patients (80.4%) were residents of the three districts of Dar es Salaam. The remainder came from upcountry. This shows that most abdominal trauma are managed at lower health care facilities including Regional hospitals. This explains why there were few patients coming from upcountry.

Blunt trauma was the commonest pattern of abdominal injury encountered, occurring in 65.2% of the studied cases. This concurs with the findings of Udeyop et al in Calabar (Southern Nigeria),[42] but contrary to Edino in Kano (Northern Nigeria) who reported higher incidence of penetrating injuries as a cause of abdominal trauma.[43]Some workers reviewing abdominal trauma necessitating laparotomy in the western world have reported penetrating injury as a more frequent cause of these injuries.[44] The motor traffic crash was found to be the commonest cause of blunt abdominal trauma as found elsewhere worldwide. In this study 44 out of 60 patients with blunt abdominal injury sustained their injuries from motor traffic accidents as passengers, drivers or pedestrians. In this study penetrating abdominal injury was found in 34.6% of cases. Most of the patients with penetrating injury were involved in assaults. Out of 24 patients who were involved in assaults, 22(91.7%) had penetrating injury and had high rate of substance abuse. Those who were involved in assaults, 55.3% reported substance abuse on the day of accident. Assaults using sharp objects (e.g knives) were the commonest cause of penetrating injuries. This shows that substance abuse influences assaults subjecting people into violence. In all patients there was only one gunshot injury. This can be explained by the fact that most of the gunshot injuries are common in war injuries and not in civilian life. The restricted ownership of firearms rather than knives and other sharp objects to citizens also probably make the inter-personal violence and civil strives being of non gunshot. Our country is also at peace hence there is a low rate of warfare injuries and armed banditry that is more common in certain African countries.

Abdominal injuries are commonly associated with other injuries and these may complicate the management and affect the outcome.[37] In this study, 34 patients (37%) had other associated injuries. Skeletal injuries (pelvic, Lower and upper limbs fracture) were the most

common associated injuries that occurred in 25 patients (73.5%) of cases with associated injuries and seven patients (20.6%) had multiple associated injuries. Isolated abdominal injuries constituted 63% of all cases. Those who had traumatic brain injuries had Glasgow Coma scores of 13 to 15 indicating that they had mild traumatic brain injuries. There were no patients with moderate or severe traumatic brain injury. This can be probably due to fact that some of these patients died before arrival to the hospital. Those with skeletal injuries were treated with various forms of internal or external fixations. Those with chest injuries were treated either conservatively or by thoracostomy. These associated injuries had no effect on the length of hospital stay. This is because these associated injuries were treated immediately or were mild. This is not in agreement to other studies where the associated injuries were found to be significantly associated with both mortality and length of hospital stay.[45]This difference can be attributed to early recognition and treatment of the associated injuries.

The prehospital care of trauma patients has been reported to be the most important factor in determining the final outcome after the injury.[46]In this study, 82 patients (89.1%) were brought to the hospital by ambulance as referred cases from the three district hospitals of Dar es Salaam and those from the adjacent Coastal region. This group of patients received some form of pre hospital care. The remainder were either brought by relatives, good Samaritan or police. This is in contrast to Chalya et al in their study in Mwanza Tanzania where very few patients were brought by ambulance.[45]This study reflects the improved ambulance transportation of patients in the Dar es Salaam city from district hospitals to MNH.

In this study, FAST was the commonest tool used to diagnose patients with abdominal injuries contrary to other centers where CT has been used as the first method of choice in many trauma centers worldwide.[10]Seventy patients were investigated by use of FAST however the results were not reliable. Out of 54 patients with positive FAST results, 9(17%) had negative laparotomy that if an investigative tool with high specificity had been used to evaluate, would need no exploration. Also 16 patients with negative results who

underwent exploration 13 underwent therapeutic laparotomy. This can be due to over dependence on the tool that is not effectively discriminative to sort out well most patients with abdominal injuries hence a need for application of a better tool such as CT scan. FAST lies in its high sensitivity for detecting intraperitoneal fluid which accumulates in dependent areas around the liver, spleen and pouch of Douglas and not on the specific injury to the organ.[30]Thus in patients with organ injuries without substantial haemoperitoneum it may lead to a miss of such an injury. Clinical decision may not be well guided by FAST when dealing with patients with haemoperitoneum without significant injury to the organs or those with prior ascites cannot delineate the results. In this study only 4 patients with abdominal injury were evaluated by Abdomino-pelvic ultrasound and none by use of CT scan. Those who were evaluated by use of ultrasound all had significant injury to organ. Three of them their FAST results were positive and one had negative FAST result. The CT scan was not used to evaluate probably patients were unable to afford, not easily accessible or it can be due to lack of the guideline on the application of CT scan on assessing patients with abdominal trauma.

All patients with abdominal trauma in this study underwent a laparotomy. The spleen was found to be the most commonly injured intra-abdominal organ in blunt injuries while bowel was the commonest organ injured when all injuries are combined. Splenectomy was the commonest means of treatment of splenic injuries. Only 2 patients underwent splenorrhaphy. This is in agreement with Chalya et al in their study in Mwanza Tanzania that reported more than 80% of patients treated operatively with most of them subjected to splenectomy.[45]This is in contrast with other centers in the world where the success of conservative strategies on the injured spleen has been complemented with CT scan and angiographic embolisation for splenic injury to control hemorrhage. Currently non operative treatment is attempted in 60 – 90% of patients with splenic injuries.[47]The tendency of treating splenic injuries by splenectomy can be attributed to limited access to CT expertise as well as lack of treatment guidelines in imaging such injuries. This also probably could be explained by the fact that patients attended had high grade splenic injuries although degree of splenic injury was not mentioned except in one patient whose

injury was grade three. When all forms of intra-abdominal injuries are combined, bowel repair (repair of perforations and/or resection and anastomosis) was the commonest modality of treatment. This shows that when all forms ofabdominal injuries are combined the bowel is likely to be injured compared to other intra-abdominal organs. This can be attributed to the fact that large portion of the abdominal cavity is occupied by the bowel. There was one case managed by damage control surgery. This patient had liver injury that was treated by perihepatic packing. The low rate of damage control practice in this study can be attributed to fact that, probably patients with severe injuries who need aggressive resuscitation and damage control surgery died before reaching the tertiary hospital. None of the patients underwent re- laparotomy for any complication. The rate of negative and non therapeutic laparotomies in this study was high (21 %). This agrees with the findings of Siddig et al who had a rate of 30.5% and ultrasonography was the evaluating tool used in their study. [43] This is contrary to the reports from other centers where CT scan was used and the rates of negative and non therapeutic laparotomies were low.[33]The high rate of negative and non therapeutic laparotomies can be due to poor evaluation tools or lack of expertise, dedication, diligence and efficiency on assessing trauma patients. Moreover this can be due to lack of guidelines for trauma patient management.

In this study there were three patients who developed complications. These were surgical site wound infections. Two patients had blunt and one penetrating injuries. All patients with complications had bowel injuries and sepsis could be due to contamination of the surgical wounds by intestinal contents spillage. This agrees well with the study of Ayoade et al in which the commonest complication in their study was wound infection.[40]This low rate of complications can be due to the fact that the patients were lavaged meticulously before closure of the abdomen. This also could due to provision of effective prophylactic antibiotics and diligence post operative care. None of the patients with associated injuries developed complications secondary to abdominal injury.

In this study there were 7(7.6%) deaths. The deaths occurred within the first week following surgical treatment. One patient died on the first day, four died on the second day

and two died on the third day following laparotomy. Six of them had blunt injuries and one had penetrating injury. Uncontrolled hemorrhage was the cause of death in one of the patient who died after 2 days following a laparotomy with perihepatic packing. Three patients had splenic injuries, one-had retroperitoneal haematoma, one-had mesenteric injury and another one who was admitted on the sixth day post injury was found to have peritonitis due to multiple perforations of the ileum, retroperitoneal haematoma and deranged electrolytes. Though details of interval between time of accident and arrival to hospital, as well as interval between arrival to hospital and time of operative intervention could not be ascertained, a delay in resuscitation and intervention may have contributed to the adverse outcome.

The length of hospital stay has been reported to be an important measure of morbidity among trauma patients. Prolonged hospitalization is associated with an unacceptable burden on resources for health and undermines the productive potential of the population through time lost during hospitalization.[48]In this study, the hospital stay for survivor and deceased ranged from 1 to 19 days with mean stay of 5.03 days (S.D 2.7). This is not in agreement to Ayoade et at in their study whose duration of hospital stay ranged from 1 to 130 days with the mean of 24.6days (S.D. 26.4).[40]The relatively short hospital stay in this study reflects early death in the deceased group and mild to moderate degree of injury among the survivors hence reduced the length of hospital stay. This also could be due to early identification and treatment of the associated injuries. Patients with penetrating injuries were found to have shorter period of hospital stay compared to those who sustained blunt injuries. This could be due to less immediate complications among patients with penetrating injuries compared to those with blunt injuries. This also can be due to the fact that patients with penetrating injuries had immediate surgical attention compared to those with blunt injuries who needed evaluations and investigations to assess their injuries. The associated injuries had no effect on the length of hospital stay. All patients with associated injuries stayed in the hospital for not more than two weeks. This can be attributed to an early identification and treatment of such injuries as well as being of a minor or moderate magnitude.

CHAPTER FIVE

5.1.0 CONCLUSIONS

Blunt trauma was the commonest type of abdominal injury seen at the Department of Surgery of Muhimbili National Hospital and the spleen was found to be the most common organ injured in blunt trauma while bowel was the commonest injured organ when all types of abdominal injuries are combined. Laparotomy was carried out in all patients with abdominal injuries, no conservative treatment was employed and this resulted into 21.7% unnecessary surgery. FAST was unreliable in 31.4% of cases. The rate of negative and non therapeutic laparotomy was high. The magnitude of abdominal trauma was mild to moderate in severity and the rate of post operative complications was low.

5.2.0 RECOMMENDATIONS

The findings of this study calls for a bigger study to get sufficient data to be used for formulation and operationalization of protocol for management of patients with abdominal injuries to guide surgeons and other clinicians on management of patients with abdominal injuries. Use of investigative tools such as ultrasound and contrast CT scan should be used more in appropriate cases necessary to reduce the rate of negative and non therapeutic laparotomies. Selective conservative management should be used in patients with documented minor abdominal injuries. Ultrasound and contrast CT scan should be used more widely in abdominal trauma where there is doubt on the extent and significance of intra-abdominal injury instead of the controversial FAST in order to reduce the rate of negative and non therapeutic laparotomies.

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QUESTIONNAIRE

Serial no. _____

Hospital reg number _____

1. Age(yrs) _____
2. Sex…….

3. Area Of Residence _____

4. Occupation……...

5. Date of a) Admission…….
   b)Discharge……

6. Do you take alcohol a)YES b) NO

7. If YES ,d id you take alcohol the day you were involved in the accident

8. Do you take any substance of abuse? YES/NO

9. If YES, did you take substance of abuse on the day of accident you were involved in?

10. What were you doing before being involved in the accident

PART B

CLINICAL ASPECTS AND INTERVENTION.

11. Type of abdominal injury a)Blunt
b)penetrating

12. .Associated extra abdominal injuries a)Chest injury
b) Skeletal injuries
c) Others…….

13. Initial resuscitation offered a)CPR
b)IVF
c)BT
d) Others…….

14. Investigations done a)CXR
b)FAST
c)Blood Tests
d)Others……..

15. Treatments offered……...
……

16. Summary of operative notes in case a patient was operated
……

17. Temporal measures in the ward a) temperature….

b) Level of hemoglobin….

c) others……

18. Treatment outcome in the ward and at the day of discharge…… …….

Informed consent Form

ID no _____

Consent to participate in the study about THE PATTERN AND TREATMENT OUTCOME OF ABDOMINAL INJURIES AT MNH.

Greetings! I a m DR. IBENZI a postgraduate student at Muhimbili University of Health and Allied Sciences. I a m conducting study on THE PATTERN AND TREATMENT OUTCOME OF ABDOMINAL INJURIES AT MNH.

I a m requesting you to participate in this study. You will be required to give some information on how you came to be involved in the accident.

Confidentiality about your information will be maintained throughout the study and numbers will be used for identification.

Risks There is no direct risk associated with this study. No penalty if you refuse to participate and no payment to be given and treatment will not be affected.

Who to contact If you have any question about the study, you should contact

DR. IBENZI ERNEST NJILE 0787525455

If you have any questions/concerns about your rights as a participant, you may contact Prof M. Aboud, Chairman of MUHAS Research and Publications Committee. P.O.BOX **65001 Dar es Salaam. Tel 2150302-6**

I …… have read the content of this form .My questions have been answered. I agree to participate in this study**.**

Signature of participant …….

Signature of witness ……..

Date of signed consent …/…/ 2011

Kiswahili version of Informed consent

ID no _____

Hati ya ukubali wa kushiriki kwenye utafiti Unaoangalia tatizo,na matibabu yatolewayo kwa watu wanaopata ajari za tumbo.

Salaam! Naitwa Daktari IBENZI ERNEST NJILE mwanafunzi wa uzamili katika chuo kikuu cha Tiba za Afya cha Muhimbili .

Nakuomba ushiriki katika utafiti huu utaombwa kutoa taarifa iliyosababisha mpaka ukapata ajari .Taarifa zote zilizochukiliwa taarifa zako ni siri na namba zitatumika katika kukutamua.

Madhara

Hamna madhala yeyote juu ya utafiti huu. Kukataa kushiriki hakuta badilisha matibabu na hakutakuwa na malipo yeyote.

Mawasiliano

Ukiwa na maswali kuhusu utafiti huu wasiliana nami , Dr.IBENZI ERNEST NJILE kwa nambari ya simu 0787525455

Ukiwa na maswali kuhusu haki yako kama mshiriki, wasiliana na Prof. Muhsin Aboud, mwenyekiti wa Kitengo cha Utafiti wa Chuo Kikuu cha Afya ya Tiba Muhimbili S.L.P **65001 Dar es Salaam. Tel 2150302-6**

Sahihi ……

Mimi _____ nimekubali kushiriki utafiti huu baada ya maswali yangu yote kujibiwa.

Sahihi ya mshiriki _____

Sahihi ysa shahidi _____ Tarehe __/___/2011

American Association for the Surgery of Trauma Organ Grading Scale

GRADE	CHARACTERISTICS OF INJURY
SPLENIC INJURY I	Hematoma: subcapsular, nonexpanding, < 10% surface area
	Laceration: capsular tear, nonbleeding, < 1 cm parenchymal depth
II	Hematoma: subcapsular, nonexpanding, 10%-50% surface area; intraparenchymal, nonexpanding, < 5 cm in diameter
	Laceration; capsular tear, active bleeding, 1-3 cm parenchymal depth, not involving a trabecular vessel
III	Hematoma: subcapsular, > 50% surface area or expanding; ruptured subcapsular hematoma with active bleeding; intraparenchymal, > 5 cm or expanding
	Laceration: > 3 cm parenchymal depth or involving trabecular vessels
IV	Hematoma: ruptured intraparenchymal hematoma with active bleeding
	Laceration: laceration involving segmental or hilar vessels producing major devascularization (> 25% of spleen)
V	Laceration: completely shattered spleen
	Vascular: hilar vascular injury that devascularizes spleen
HEPATIC INJURY I	Hematoma: subcapsular, nonexpanding, < 10% surface area
	Laceration: capsular tear, nonbleeding, < 1 cm parenchymal depth
II	Hematoma: subcapsular, nonexpanding, 10%-“50% surface area; intraparenchymal, nonexpanding, < 10 cm in diameter
	Laceration: capsular tear, active bleeding, 1-3 cm parenchymal depth, < 10 cm in length
III	Hematoma: subcapsular, > 50% surface area, expanding; ruptured subcapsular hematoma with active bleeding; intraparenchymal, > 10 cm or expanding
	Laceration: > 3 cm parenchymal depth
IV	Hematoma: ruptured intraparenchymal hematoma with active bleeding
	Laceration: parenchymal disruption involving 25%-“75% of hepatic lobe or 1-“3 Couinaud's segments within a single lobe

V	Laceration: parenchymal disruption involving > 75% of hepatic lobe or > 3 Couinaud's segments within a single lobe
	Vascular: juxtahepatic venous injuries (i.e., injuries to retrohepatic vena cava or central major hepatic veins)
VI	Vascular: hepatic avulsion