

**The pattern of urologic injuries and treatment outcomes in obstetric and Gynaecologic
Surgeries as seen at Muhimbili National Hospital**

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Department of Surgery



**THE PATTERN OF UROLOGIC INJURIES AND TREATMENT
OUTCOMES IN OBSTETRIC AND GYNAECOLOGIC SURGERIES
AS SEEN AT MUHIMBILI NATIONAL HOSPITAL**

By

Edward Joseph Ogola

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree
of Master of Medicine (Urology) of**

**Muhimbili University of Health and Allied Sciences
October, 2018**

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **“The pattern of urologic injuries and treatment outcomes in obstetric and gynaecologic surgeries as seen at Muhimbili National Hospital”**, in (partial) fulfillment of the requirements for the degree of Master of Medicine in Urology, of the Muhimbili University of Health and Allied Sciences.

Prof. Charles Mkony

(Supervisor)

Date

DECLARATION AND COPYRIGHT

I, **Dr. Edward Ogola**, declare that this **dissertation** is my original work and that it has not been presented nor will it be presented to any other University or learning institutes for a similar or any other degree award.

Signature

Date

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I hereby express sincere acknowledgement to Professor Charles Mkony for he was never tired while constantly reading and coming out with constructive criticism which has made this study possible. I wish to express my gratitude to Professor K. S. Mnyika, who devoted tireless efforts in providing advice in this study.

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And last, but not least, I would like to acknowledge my family, my friends, and my colleagues for their patience, their understanding, and their encouragement throughout the entire process

And those persons that I did not mention here due to limited space but have contributed in one way or another to make this study a reality are also acknowledged.

DEDICATION

I dedicate this work to my father Joseph Ogola, mother Lawrencia Joseph, and my children Careen and Warren.

ABSTRACT

Background: It is estimated that 0.5% to 10% of urologic injuries are caused by obstetric and gynaecologic surgeries worldwide. However, there is paucity of information regarding the magnitude, pattern and treatment outcome of urologic injuries occurring as a result of obstetric and gynaecologic surgeries in Muhimbili National Hospital. This study is designed to describe the magnitude, pattern and treatment outcomes of iatrogenic urologic injuries complicating obstetric and gynaecologic surgeries in Muhimbili National Hospital.

Broad Objective: To determine the magnitude, pattern, treatment and treatment outcomes of urological injuries after obstetric and gynaecological surgeries as seen at Muhimbili National Hospital.

Methodology: This was a cross sectional study conducted in departments of urology and obstetrics and gynaecology of Muhimbili National Hospital. The study population included all females who were diagnosed to have urinary tract injury in MNH following obstetric or gynaecologic surgery done in MNH or referred from other hospitals for 10 years from June 2006 to May 2016. Data was collected from patient files using structured data sheet..

Results: During the 10 years of the study, there were a total of 1083 patients aged 18 and above with urologic injuries seen at MNH. Among these, those that met inclusion criteria were 52 (4.8%). Among these, 27 (45%) had bladder injuries, 29 (48.3%) had ureteric injuries. The total urologic injuries were 60 because 2 patients had both ureteric and bladder injuries and 2 patients had both bladder and urethral injuries.

Fourteen (51.9%) of bladder injuries were caused by laceration; 2 (7.4%) by transection, 1 (3.7%) by devascularization. There were 9 (33.3%) bladder injuries with unspecified causes. Ligation of ureter(s) caused 10 (34.5%) of ureteric injuries followed by transection and lacerations having caused 6 (29.4%) and 5 (20.7%) respectively. Most of mechanism of ureteric injury was unspecified in 12 (39.1%) cases.

Thirteen of bladder injuries were managed by bladder repair, 7 cases by VVF repair; 5 cases by urethral catheterization and 2 cases were not yet repaired. Twenty two of ureteric injuries were managed through ureteric reimplantation, 2 injuries by ureterostomy (ureteric exteriorization) . Other ureteric injuries were managed by nephrostomy (1), ureteroureterostomy (3) and catheterization (1).

Post management repair outcome was good in 19 of bladder and 25 of ureteric injuries. It was fair in 6 bladder and 3 ureteric injuries and was poor in 2 bladder and 1 ureteric injuries.

Conclusions and recommendations: Urologic complications following gynaecological and obstetric surgeries are common in MNH at a prevalence of 4.8%. These iatrogenic injuries to the urinary tract occur more common during trans-abdominal hysterectomies and caesarean sections. Most of these injuries (70.3%) seen at MNH were referral from non academic hospitals. Surgeries done by Assistant Medical Officers contributed to 53.6% of these injuries which is twice than injuries caused by specialists and medical officers/registrar altogether. Post treatment/management outcomes were good for these injuries. However, documentation and reporting was found, in this study, to be inadequate. It is therefore recommended from this study that:

- There is a need to improve documentation in case notes of injuries in theatres so that accurate data/information may be available when needed.
- Obstetrics and gynaecological surgeries are highly specialized surgeries that should be done by surgeons who have acquired good training on surgical skills and relevant anatomical relations of pelvic organs. Assistant Medical Officers should not perform such surgeries.
- Hysterectomies are the main surgery that led to many urologic injuries (both bladder and ureteric injuries). Extra care should be practiced while OBGY surgeons perform such surgeries to avoid causing such urological injuries.

- The government through Ministry of Health, Social Welfare, Gender and Children should train more medical officers and OBGY specialists and distribute them in non teaching hospitals.
- Most of bladder injuries are originating from emergency obstetric surgeries. It is clear that knowledge of correct protocols and adherence to precautions are important and should be maximally practiced while emergency obstetric surgeries are performed to avoid bladder injuries.

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LIST OF ABBREVIATIONS

AMO	Assistant Medical Officer
BTL	Bilateral Tubal Ligation
CS	Caeserean Section
HIV	Human Immunodeficiency Syndrome
IBI	Iatrogenic Bladder Injury
LAP	Laparotomy
MUHAS	Muhimbili University of Health and Applied Sciences
MO	Medical Officer
OPD	Out Patient Department
OBGY	Obstetrics and Gynaecology
SPSS	Stastical Package For Social Sciences
STAH	Subtotal Trans Abdominal Hysterectomy
UN	United Nations
US	United States
UR	Uterine Repair
VVF	Vesico Vaginal Fistula
WHO	World Health Organization

DEFINITION OF TERMS

Urological injuries will be defined as either bladder, ureteric, urethral or kidney injuries.

Mechanisms of urologic injuries will include laceration, transection, avulsion, electrocauterly, crushing, devascularization or ligation of the urinary tract structure during obstetrics and gynaecological surgeries.

Timing of presentation: In this study, the timing of presentation of injury will be noted as 'immediate' = intraoperatively; 'early' = within seven days of operation; 'late' = after seven days of operation

The primary disease refers to the disease condition that necessitated the obstetric or gynaecological surgery (primary).

CHAPTER ONE

1.0 INTRODUCTION AND LITERATURE REVIEW

The increasing repertoire of obstetric and gynaecologic surgeries emphasizes the importance of understanding the anatomy of the pelvis in order to prevent and manage lower urinary tract misadventures.(1–3).These complications or misadventures lead to an increase in number of patients referred for treatment of complications following gynaecological or obstetric surgeries.

Urinary tract injuries are known complications of obstetric and gynaecologic surgeries. They remain a source of great concern to surgeons and patients due to their associated morbidity and occasional mortality. The female reproductive system and urinary tracts are anatomically closely related. Therefore, the potential for injury to the urinary system must always be considered when operating on the reproductive system.(1,2,3)

Urologic complications following obstetric and gynaecologic surgeries range between 0.4% and 4.3% in the US, whereas in France, gynecological surgery results in urological complications in 0.5% to 10% cases(3). The incidence of urologic injuries or complications following obstetrics and gynaecologic surgery was found to be about 3.5% after analysis of 41 urologic injuries from 37 patients who were admitted at CUUA University hospital of Cotonou throughout 5 years study period. Thirty patients (73.2%) were referred from a non-academic hospital, while 7 patients (17.1%) were referred from academic hospital. Caesarean section was the primary surgery in 22 cases (53.7%) and hysterectomy in 19 cases (46.3%). Clinically, the predominant symptoms were leakage of urine through the vagina and obstructive anuria with or without back pain. They found 31 cases of VVF, 5 cases of bilateral ligation of the ureters, 3 cases of unilateral ligation of the ureter, 1 ureteral injury and 1 uretero-vaginal fistula. These complications were diagnosed postoperatively in 95.1% of cases. (4)

In another study, all cases of urological injuries managed in a unit that were deemed to be of obstetric and gynaecologic origins within the study period were analysed(1). A total of 16 patients were identified as having iatrogenic urological injuries following obstetric and gynaecological surgeries. Only four patients presented early. Four patients had injuries to the bladder, while 11 had ureteric injuries; one of the 16 patients had both types of injuries. Seven cases of ureteric injuries affected only the left ureter, while three were bilateral and two affected the right ureter. One patient with a vesicovaginal fistula (VVF) was successfully managed by urethral catheter drainage alone. Three patients had trans-abdominal repair of the VVF, while ten had uretero-ureterostomy and one had diversion procedure. Simple nephrectomy was performed for one patient with a non-functioning kidney. They concluded that iatrogenic urological injuries are still common in their environment.

Immediate diagnosis would save the patients serious complications(5). The most important factor in prevention is good knowledge of pelvic anatomy and good knowledge of the surgical techniques of caesarean section and trans-abdominal hysterectomy(1). In order to reduce the risk of injury, adequate preoperative preparation like emptying bladder before surgery and preoperative imagings were recommended and meticulous surgical technique based on proper understanding of the anatomy of the urogenital system should be practised by the surgeon(1,2,5,)

Bladder injuries are the most frequent urologic injury inadvertently caused by surgeons during OBGY procedures (2,7). The bladder is most frequently injured during obstetric procedures.....incidences of 6.1% during obstetric procedures, 1.8% during caesarean section and 1.5% during gynaecological surgeries per 1000 cases have been reported(7)

Early clinical suspicion, coupled with appropriate and reliable radiologic studies, facilitate prompt intervention and the successful management of bladder injuries. To avoid IBI, the gynaecologist should identify high risk cases, evaluate them preoperatively and prepare for eventualities. Simple procedures such as emptying bladder preoperatively, or inserting a Foley catheter and monitoring the urine colour and output and having good surgical exposure might prevent IBI intraoperatively.

Ureteric injury is defined as any recognized or unrecognized trauma to the ureter that prevents it from functioning properly or effectively. The injury may lead to acute ureteral obstruction (e.g. ureters are inadvertently ligated), chronic ureteral obstruction (i.e. crush injury, ischaemia) or formation of fistulas. Patients who have received pelvic radiation or who have advanced pelvic cancers requiring extensive surgical procedures are more likely to experience ureteral injuries.(8)

Ureteric injuries are uncommon and usually not recognized immediately and have the potential to be life-threatening(2,5). Traditionally, gynaecological procedures have been reported to account for between 50 and 75% of iatrogenic ureteric injuries since the ureter lies very near the female reproductive organs throughout its course from the pelvic brim to the bladder.(5). Nevertheless, when ureteral injury does occur, quick recognition of the problem and a working knowledge of its location and treatment are essential in providing the patient with optimal care. If not treated these injuries may result in permanent kidney damage or removal of a kidney as a result of kidney-non function.(9)

The six most common mechanisms of operative ureteral injury are crushing from misapplication of a clamp, ligation with suture, transection (partial or complete), angulation of the ureter with secondary obstruction, ischaemia from ureteral stripping or electrocoagulation and resection of a segment of ureter. Any combination of these injuries may occur. The incidence of different forms of injury are complete transection, 61%; excision, 29%; ligation, 7% and partial transection, 3%. (10,11)

Injury to the ureter is a risk of any pelvic or abdominal surgery, including laparoscopy and ureteroscopy. The morbidity associated with such injury may be serious, resulting in increased hospital stay, compromise of the original surgical outcome, secondary invasive interventions, reoperation, and potential loss of renal function and deterioration of the patient's quality of life. Management of ureteric injuries, in conjunction with frank and open dialogue with the patient, can lead to an optimal outcome(5)

Management of iatrogenic ureteric injuries poses major challenges to urologists practicing in developing countries such as Tanzania where most ureteric injuries after abdomino-pelvic surgeries are diagnosed late postoperatively with fever, loinpain, per-vaginal urine leak, prolonged ileus, oliguria, anuria and uraemic symptoms(3,5). Some patients may remain asymptomatic and present years later with hydro-nephrotic, non-functioning kidney on investigation.

Majority of abdominopelvic operations in developing countries are performed by general practitioners and junior doctors who may have limited experience in performing such operations as well as prompt intraoperative identification and appropriate correction of ureteric injury.(1,2,3,5,10,13)

The commonest obstetric/gynaecological procedures that predispose to urinary system injuries includes hysterectomy (radical, abdominal and vaginal), and caesarian sections(3,5). Also may result from myomectomy or genital prolapse surgeries.(3)

Urological injuries may be recognized intraoperatively, some hours, days or weeks after surgery. Post-operative presentations may be loin pain, pyrexia, fistula or non specific signs. About 80% of injuries are not discovered intraoperatively. They may have more complex complications than those detected intraoperatively(2). The most important determinant of outcome of ureteric injuries is the time interval between the injury and repair. The longer the interval, the worse is the outcome. Late presentation is a common presentation in developing countries.(1,3,5,)

The outcome depends on the nature of the injury, the severity of the injury, time at which the diagnosis was made, the overall health status of the patients, localization and the functionality of the kidneys.(1)

The risk factors associated with these injuries have been documented. These include cancer, haemorrhage, endometriosis, adhesions and an enlarged uterus(1,5). One study found that, urological complications occurred most when the “junior” obstetricians were not directly assisted(3).

1.1 Statement of Problem

The urologic complications following gynecologic and obstetric surgery are more frequent in the developing countries. The need to reduce maternal and neonatal mortality rate in these countries (Tanzania inclusive) pushes the government to train more ‘surgeons, many of them are young and unskilled. They often lack the knowledge of the anatomic relationship between the urinary and the genital tracts. This increases chances of urologic injuries complicating obstetric and gynaecologic surgeries. There is no published study that determines the prevalence and pattern of urologic injuries resulting from obstetric and gynaecological procedures/surgeries in Tanzania. There is need for better understanding of such injuries and their outcomes in order to inform more comprehensive strategies for their prevention and management

1.2 Rationale of the study

There is need for better understanding of patterns of urologic injuries complicating OBGY surgeries in our environment, where malpractice (substandard) to surgery exists. Such understanding might have input on adopting comprehensive strategies for detection, prevention and management of such complications.

This study aims at identifying the pattern and outcomes of urological injuries secondary to gynaecological and obstetric surgeries and therefore will highlight measures to prevent such injuries and to improve treatment outcomes

Upon data analysis, it is envisaged to set focused strategies to be recommended to medical practitioners, especially surgeons, and patients or community at large to help in reduction of such injuries and possible remedies to improve the outcomes and quality of life should these injuries be encountered.

1.3 Research Questions

The following is the primary research question for this study: Do we really have urological injuries as a complication of obstetric and gynaecological surgeries in our settings?

The secondary research questions include:

1. What is the magnitude and type of urologic injuries complicating obstetric and gynaecological surgeries?
2. What could be the factors contributing to the occurrences of urologic injuries complicating obstetric and gynaecological surgeries?
3. What can be done to reduce such complications
4. What are the treatment and the treatment outcomes of these injuries to the victims

1.4 Study Objectives

1.4.1 Broad Objective

To determine the magnitude, pattern, treatment and treatment outcome of urological injuries after obstetric and gynaecological surgeries as seen at Muhimbili National Hospital

1.4.2 Specific Objectives

1. To measure the magnitude of urological injuries secondary to obstetric and gynecological surgeries as seen at MNH
2. To determine the types of urological injuries after obstetric and gynecological surgeries as seen at MNH
3. To determine the treatment for urological injuries after obstetric and gynaecological surgeries as seen at MNH.
4. To determine the treatment outcomes of urological injuries after obstetric and gynecological surgeries as seen at MNH

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study Design

This was a cross section study, data were collected retrospectively.

2.2 Research settings/area

The study was conducted in departments of urology and OBGY (both in and out patients) of Muhimbili National Hospital. This is a tertiary national referral hospital and a teaching hospital having total bed capacity of 1500. It is located in Dar es Salaam city, which has a population of about 4.4 million people. Being a referral hospital it receives urologic cases referred from peripheral hospitals throughout the country, some of whom are results of OBGY surgeries. Some OBGY cases operated in this hospital do suffer urologic complications as well.

2.3 Research subjects/participants and selection criteria

The study population included all female patients 18 years and above who were diagnosed to have urinary tract injury in departments of urology, OBGY (both in and out patients) of Muhimbili National Hospital for 10 years from June 2006 to May 2016.

The information was extracted from patient files. Particular patient's file was obtained through reviewing admission registers and theatre surgical logbooks from these departments.

2.4 Inclusion criteria

Patients with unequivocal urinary tract injuries resulting from obstetric and gynaecological surgeries were identified and were the target population

2.5 Exclusion criteria

Patients that had urologic injuries from obstetrics and gynaecological surgeries that were lost for follow up.

2.6 Study period

The study will be conducted from June 2016 to December 2016 and report submitted June 2017.

2.7 Sampling and sample Size

No randomization was done. Convenient sampling – eligible patients for the study were recruited during the whole study period. The estimated sample size N is computed using the formula below,

$$N = \frac{Z^2 p (1-p)}{e^2}$$

OR

$$N = \frac{Z^2 p (100-p)}{e^2}$$

Where;

N = Estimated Sample Size

Z = is the standard deviation in normal population, which turns out to be 1.96 on using the 95% confidence interval.

P= prevalence of urologic injuries among patients undergoing obstetric and gynaecological surgeries in previous done studies

e= margin of error

From the previous, most recent study done, the prevalence of urologic injuries complicating gynaecological and obstetric injuries was found to be around 3.5 % (4). Hence from the formula above the sample size will be:-

$$N = \frac{1.96 \times 1.96 \times 46.3}{5 \times 5} (100 - 3.5); \quad N = 52 \text{ adding } 10\% \approx 60$$

2.8 Study instruments and data collection

Structured data sheet was used to collect data regarding patients' particulars and other information

Data was collected from patient's medical files. Information included the patients' age, parity, level of education, occupation, referring hospital, type of injury, duration between injury and referral, presenting symptoms and the nature of the antecedent surgery, type of treatment, and the result of the treatment.

The following clinical presentations of patients were sought from the case notes: leakage of urine per vagina, leakage of clear fluid from the operation site.

Other presentations were presence of abdominal pain, abdominal distension, past abdomino-pelvic surgeries, malignant conditions and duration of urethral catheterization after surgeries. The cadre of surgeons involved in primary surgery was also recorded.

Two research assistants (trained health workers) one working in urology department and the other in urology OPD underwent a brief protocol training session of three days on the purpose of the study, familiarization with data collection tools and practical skills sessions on how to administer the tool for data collection.

2.9 Data Analysis

The data obtained from the above records was analysed using SPSS version 20.0.0 and hereby presented as charts, tables and figures. Proportions and percentages were used in data analysis.

Independent Variables: type of injury, referring hospital, duration between complication and referral, and the nature of the antecedent surgery, cadre of surgeon,

Dependent variables: The outcome of treatment of urological injury complicating obstetric and gynaecological surgeries/procedures. The outcome is deemed ‘Good’ = there is no leakage of urine from urinary tract; ‘Fair’ = there is leakage of urine from the urinary tract or urinary diversion is performed; ‘poor’ = there injuries beyond medical or surgical repair.

Background Variables: patients’ age, parity, level of education, occupation

Confounding variables: will probably be identified after study results

2.10 Ethical Considerations

Research ethics committee approval was considered necessary and involved the MUHAS Senate Research and Publications Committee. Permission to conduct the study was sought from the Director of Clinical Services – MNH. Informed consent was not administered as the study involved collecting information from patient files.

2.11 Study limitations

Some patients were lost to follow-up as they did not appear again after initial discharge. Due to poor documentation of patients’ files, some data were missing, especially to those patients referred from health centres, district hospitals or regional referral hospitals.

CHAPTER THREE

3.0 RESULTS

During the 10 year of the study (June 2006 to May 2017), there were total of 1083 female patients aged 18 years and above with urologic injuries seen at MNH. Among these, those that met inclusion criteria (i.e had urologic as a result of OBGY surgeries) were 52 (4.8%).

Table 1: Type of urologic injury and indication of primary surgery

Type of injury	Indication of primary surgery			TOTAL
	Emergency obstetric surgery	Emergency gynaecologic surgery	Elective gynaecologic surgery	
Bladder injury	20(74.1%)	2 (7.4%)	5(18.5%)	27(100.0%)
Ureteric injury	11(37.9%)	2(6.9%)	16(55.2%)	29(100.0%)
Urethral injury	4(100.0%)	0(0.0%)	0(0.0%)	4(100.0%)
Kidney injury	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
TOTAL	35(58.3%)	4(6.7%)	21(35.0%)	60(100.0%)

Among the urological injuries that resulted from OBGY surgeries, there were 27 (45%) bladder injuries, 29 (48.33%) ureteric injuries and 4 (6.67%) urethral injuries. Total urologic injuries were 60 because some patients had multiple injuries.

Out of 27 bladder injuries, 14 (51.9%) were caused by laceration; 2(7.4%) by transection, 1 (3.7%) by ligation and 1(3.7%) by devascularization. There were 9 (33.3%) bladder injuries with unspecified causes.

Ligation of ureter(s) caused 10 (34.5%) injuries followed by transection and laceration having caused 6 (20.7%) and 5(29.4%) injuries respectively. Ureteric injuries were unspecified in 12 (39.1%) injuries. No ureteric surgery was attributable to avulsion, electrocauterly or crushing.

There was no specified cause of injury in all the 4 urethral injuries; however all these injuries were associated with bladder injuries. These were all referral cases from district hospital category.

Among the 29 ureteric injuries, majority 18 (62.6%), resulted from gynaecological surgeries (both emergency and elective surgeries). Those that resulted from emergency obstetric problems were 11(37.93%). None resulted from elective obstetric surgeries.

The major contributing surgery to bladder injury was emergency obstetric surgeries which caused 20 (74.1%) bladder injuries. Seven 7 (25.9%) injuries resulted from gynaecological surgeries; 5 (18.5%) from emergency gynaecological and 2 (7.4%) from elective gynaecological surgeries.

All of the 4 urethral injuries originated from emergency obstetric surgeries. Thus obstetric surgeries contributed to a total of 35 urologic injuries where asgynaecological surgeries contributed to 25.

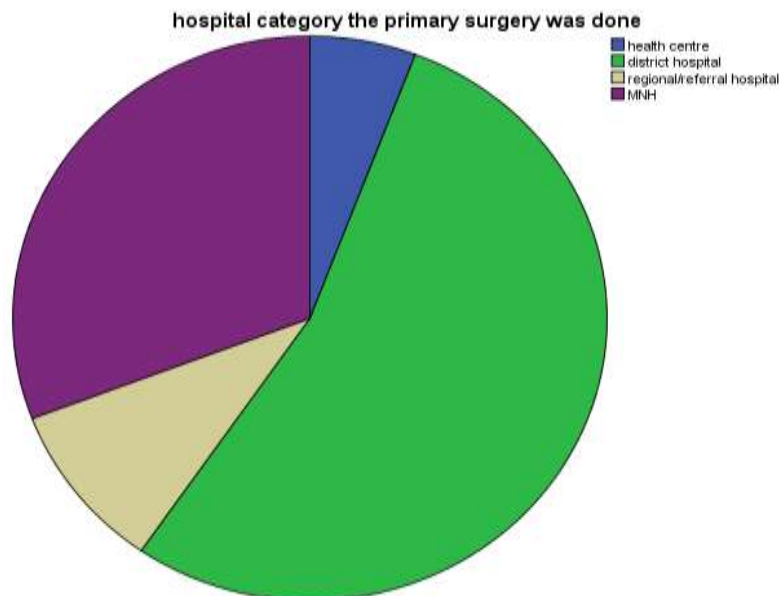


Figure 1: Hospital category where the primary OBGY surgery was done

Most of urologic injuries 36 (70.3%) were referral from non academic hospitals. 17 (30.8%) injuries occurred in MNH.

Table 2: Type of primary OBGY surgery performed and urologic injuries resulting from it

Type of urologic injury	Type of primary OBGY surgery						TOTAL
	C/S	TAH	STAH	BTL	UR	LAP	
Bladder injury	10(37.0%)	9(33.1%)	6(22.2%)	1(3.7%)	1(3.7%)	0(0.0%)	27(100.0%)
Ureteric injury	6(20.7%)	15(51.7%)	4(13.8%)	1(3.5%)	1(3.5%)	2(6.9%)	29(100.0%)
Urethral injury	4(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(100.0%)
TOTAL	20(33.7%)	24(40.0%)	10(16.7%)	2(3.3%)	2(3.3%)	2(3.3%)	60(100.0%)

The primary surgery that caused most urologic injuries was total hysterectomy, causing 24. Caesarean section caused 20 urologic injuries where by subtotal hysterectomy caused 10 of the injuries. Other causes were uterine repair (1), bilateral tubal ligation (2) and laparotomy for ectopic pregnancy (2).

Caesarian section was a primary surgery causing 10 bladder injuries; followed by total hysterectomy (9) and subtotal hysterectomy (6). Bilateral tubal ligation and uterine repair caused 1 bladder injury each.

The major primary surgery that caused more ureteric injuries was total hysterectomy (15); followed by caesarian section (6) and sub-total hysterectomy (4). Laparotomy for ectopic pregnancy caused 2 uretric injuries and bilateral tubal ligation and uterine repair caused 1 of the ureteric injury each. All of the 4 urethral injuries had caesarean section as the primary surger

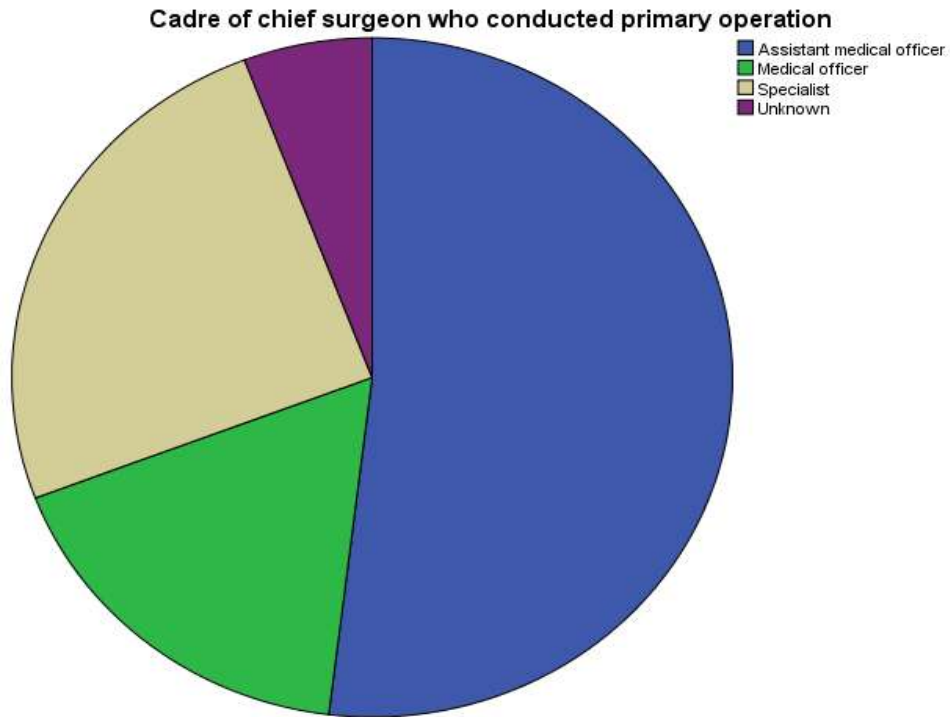


Figure 2: Cadre of surgeon who performed primary OBGY surgery

Assistant Medical Officers (AMO) surgeries resulted in 30 (13 bladder and 17 ureteric) urologic injuries. Medical Officers (MO) surgeries resulted in 9 (7 bladder, 2 ureteric) injuries. Specialist surgeries resulted in 14 (6 bladder, 8 ureteric) injuries. There was unknown cadre of Chief surgeon who performed primary surgery in 1 of the bladder injuries and 2 of the ureteric injuries.

Table 3: Methods adopted for management of urologic injuries

Type of urologic injury	Method adopted for management of injury								TOTAL
	Ureteric reimplantation	nephrostomy	catheterization	Bladder repair	Ureterostomy	VVF repair	UU	Repair not yet	
Bladder injury	0(0.0%)	0(0.0%)	7(25.9%)	10(37.0%)	0(0.0%)	8(29.6%)	0(0.0%)	2(7.4%)	27(100.0%)
Ureteric injury	22(75.9%)	1(3.4%)	3(3.4%)	0(0.0%)	2(6.9%)	0(0.0%)	3(10.3%)	0(0.0%)	29(100.0%)
Urethral injury	0(0.0%)	0(0.0%)	1(25.0%)	1(25.0%)	0(0.0%)		2(7.4%)	2	4(100.0%)

Of the 27 bladder injuries that occurred, 10 injuries were managed through bladder repair, 8 cases managed by VVF repair; 7 cases by urethral catheterization and 2 cases were not yet repaired.; 5 of these cases had co-existing ureteric injuries and ureteric re-implantation was done as adjunct bladder repair. Post repair (or post management) outcome for bladder injuries was good in 19 of bladder injuries, fair in 6 injuries and poor in 2 injuries

Majority of ureteric injuries (22) were managed through ureteric re-implantation; 2 injuries by ureterostomy. Other injuries were managed by nephrostomy (1), ureterouretrostomy (3) and ureteric catheterization (1). The outcome in ureteric injuries was good in 25 of injuries; fair in 3 of ureteric injuries and poor in 1 of the injury.

Outcome was good in 2 of the urethral cases and fair in 2 of the remaining cases.

Table 4: Outcomes of management offered to patients with urologic injuries secondary to OBGY surgeries as seen at MNH.

Type of urologic injury	Post repair/management outcomes			TOTAL
	Good	Fair	Poor	
Bladder injury	19 (70.4%)	6 (22.2%)	2 (7.4%)	27 (100%)
Ureteric injury	25 (86.2%)	3 (10.3%)	1(3.4%)	29(100%)
Urethral injury	2(50.0%)	2 (50.0%)	0(0.0%)	4 (100%)
TOTAL	46(76.7%)	11(18.3%)	3(5.0%)	60(100.0%)

The number of days spent in hospital for both bladder injuries and ureteric injuries appear to not differ much and is hereby tabulated.

Table 5: Number of days spent in hospital after repair

Urologic injury	1 -7 days	8 – 14 days	15–30 days	>30 days	Total
Bladder injury	8	4	11	7	27
Ureteric injury	12	9	5	3	29

CHAPTER FOUR

4.0 DISCUSSION

The prevalence of urologic injuries seen at MNH during the 10 years of study was found to be 4.8%. This compares well with Diallo et al (3) who in their study found that urologic complications following obstetric and gynaecologic surgeries ranges between 0.4% and 4.3% in the US, whereas in France it was ranging 0.5% to 10%. In another study done at CUUA University hospital of Cotonou the prevalence was found to be 3.5% of 41 injuries.(4)

In this study, there were a total of 60 urologic injuries in the 52 patients that were included in the study. This suggests that some patients had more than one injury. Ureteric and bladder injuries were the most common injuries. There were 27 (45%) bladder injuries and 29 (48.3%) ureteric injuries and 4 (6.7%) urethral injuries. Four of the patients had both ureteric and bladder injuries. There were four patients who had urethral injury 2 of whom had both urethral and ureteric injury and other 2 had both urethral and bladder injury.

However the number reported in this study may only be a fraction of the total number of patients affected since most of operations done in our geographical area done by personnel in peripheral hospitals who are not qualified to carry out such operations. Some of these patients may not have presented yet as was the case of two of the patients in this series who did not present for the treatment after initial evaluation. In addition, some of the complications may be 'silent', such as an asymptomatic unilateral ureteric obstruction when the contra lateral kidney has normal function.

Ligation in 10 cases (34.5%) was the most frequent mechanism for ureteric injuries followed by transection and laceration having caused 6 (20.7%) and 5 (29.4%) injuries respectively. This compares to the study by Asifa et al and Chalya et al who found that ligation was the commonest cause of ureteric injuries followed by transection and laceration in that order (5,14). Most 12 (39.1%) of ureteric injuries had no specified mechanism for injury as it was not appearing in the patient files (recording and documentation problems). It is usually true that any combination of these mechanisms can occur. There were no ureteric injuries caused

by avulsion, electrocautery or crushing which are other known mechanisms for ureteric injuries.

In a study conducted by Tarek et al, showed that hysterectomy was the main primary surgery that caused many ureteric injuries followed by cesarean section (15). This is also found in this study in which gynaecological surgeries (both emergency and elective surgeries) were the main cause of ureteric injuries. Eighteen (62.6%) ureteric injury resulted from gynaecological surgeries (both emergency and elective surgeries). Those that resulted from emergency obstetric surgeries were 11(37.93%). None resulted from elective obstetric surgeries. This is the same observation made by Chalya PL et al who state that gynaecological procedures have been reported to account for between 50 and 75% of iatrogenic ureteric injuries(5). The prevalence in this study is within this range. The closeness of ureter to the female reproductive organs throughout its course from the pelvic brim to the bladder offers this great possibility of being injured during pelvic surgeries. (2,5)

In 27 bladder injuries, transection was the main mechanism causing more than half of bladder injuries 16 (59.3%). There were 9 (33.3%) bladder injuries with unspecified causes, a result of poor recording system. None of the bladder injury was stated to be caused by avulsion, electrocautery or crushing.

Pandyan et al (3, 8) document that bladder injuries are the most frequent urologic injury inadvertently caused by surgeons during OBGY surgeries and procedures whereby incidences of 61% during obstetric procedures have been reported (7). In this study the major contributing surgery to bladder injury were emergency obstetric surgeries which caused 20 (74.1%) of bladder injuries coinciding with Pandyan et al findings. Seven (25.9%) injuries resulted from gynaecological surgeries of which 5 (18.5%) from emergency gynaecological and 2 (7.4%) from elective gynaecological surgeries).

From these statistics it is clear that knowledge of correct protocols and adherence to precautions are important and should be maximally practiced while emergency obstetric surgeries are performed to avoid bladder injuries. The findings also necessitate that measures

should be taken to increase awareness on the proper surgical techniques and anatomical relations of pelvic organs to prevent these bladder injuries.

The commonest OBGY surgeries that predispose to urinary system injuries include hysterectomy (radical, abdominal and vaginal) and caesarean section. Also myomectomy or genital prolapsed surgeries.(5). In this study the primary surgery that caused most urologic injuries was hysterectomy, causing 24 injuries. Caesarean section caused 20 urologic injuries where by subtotal hysterectomy caused 10 of the injuries. Other causes were uterine repair 1, bilateral tubal ligation 2, and laparotomy for ectopic pregnancy 2.

All subtotal hysterectomies were done during Cesarean section making Cesarean section contributing to 30 (50%) of injuries. This compares to the study done by Pascal et al which found that Cesarean section was the leading primary OBGY procedure that caused more urologic injuries (4). However, it is rather difficult to make comparison or percentages as most of these patients were referrals from other hospitals and denominators for each type surgery could not be easily traced.

Caesarean section was a primary surgery causing 10 bladder injuries; followed by hysterectomy (9) and subtotal hysterectomy (6). Bilateral tubal ligation and uterine repair caused 1 bladder injury each. The major primary surgery that caused more ureteric injuries was hysterectomy (15); followed by caesarian section (6) and sub-total hysterectomy (4).

Thirty six (69.2%) of these patients were referred from periphery or non academic hospitals (health centres, district hospitals and regional referral hospitals). This is slightly lower than 73.2% found in a study done by Pascal et al. (4). Thirty injuries (57.6%) resulted from surgeries done by AMO which may explain the observed increased number of urologic injuries from non academic hospitals where surgeons who perform these surgeries are not trained enough, especially on surgical techniques and anatomical relationship of organs of reproductive system and urinary tract system.

Forty seven (78.3%) of urologic injuries were recognized late after surgeries. Thirteen (21.7%) were identified intraoperatively. The interval between injury and repair is of paramount importance in predicting the treatment outcomes. The longer the interval the worse is the outcome. Patients in developing countries tend to present late. (1,3,5).

Of the 27 bladder injuries that occurred, 13 injuries were managed through bladder repair, 7 cases managed by VVF repair; 5 cases by urethral catheterization and 2 cases were not yet repaired. Post repair (or post management) outcome for bladder injuries was good in 19 of bladder injuries because these patients were completely cured of their symptoms and there were no urine leakage or permanent urinary diversion performed to them. Post repair outcome was fair in 6 bladder injuries meaning that these injuries were not completely cured and these patients were to have permanent urinary diversions. Post repair outcome was poor in 2 injuries because these patients had injuries in a state where surgical repair was no longer an option.

Majority of ureteric injuries, 22 (75.8%) were managed through ureteric re-implantation; 2(6.7%) injuries by ureterostomy. Other injuries was managed by nephrostomy 1(3.4%), ureteroureterostomy 3(10.3%) and catheterization 1 (3.4%). The outcome in ureteric injuries was good in 25 of ureteric injuries were cured successfully hence had good outcome. The outcome was fair in 4 of ureteric injuries as these patients had to continue using permanent urinary diversions. One of ureteric injury had poor treatment outcome as she died due to complications of this injury. Outcome was good in 2 of the urethral cases and fair in 2 of the remaining cases.

The number of days spent in hospital for both bladder injuries and ureteric injuries appears to not differ much. Those that had bladder injury and spent less than 15 days in the ward were 12 while those that spent 15 – 30 days in hospital for bladder injury were 11. Only 3 of bladder injuries spent more than 30 days after repair. Of the ureteric surgeries, 21 spent less than 15 days in hospital after repair while 5 spent 15 – 30 days after repair. Only 4 patients spent more than 30 days in hospital after repair. These results show that patients that had ureteric injuries spent slightly less days in hospital after repair compared to those that had bladder injuries.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study has shown that:

- The proportion of urologic injuries as a result of OBGY surgeries seen at MNH is 4.8%. This is higher than that found in the same study at CUUA University Hospital of Cotonou where the prevalence was found to be 3.5%.
- Most urologic injuries were caused by hysterectomies 34 (i.e. total and subtotal) followed by Caesarean section that caused 20 urologic injuries. This compares with the study done by Pandyan GVS et al (7). Prevention of these surgeries need proper understanding of pelvic and urogenital anatomy.
- Thirty six (70.3%) of injuries were referral from non academic hospitals where most of the surgeons performing these surgeries are not having both adequate surgical skills and knowledge on anatomical relations of the pelvic organs.
- Bladder injuries were managed through transabdominal bladder repair, VVF repair and urethral catheterization. Two were not yet repaired. Ureteric injuries were managed through ureteric re-implantation, ureterostomy, ureteroureterostomy, and catheterization.
- The treatment is mainly surgical and time for hospital stay to complete cure was comparatively the same for both bladder and ureteric injuries. The treatment/management outcome was good in most of these iatrogenic injuries.

5.2 Recommendations

Urologic complications following gynaecological and obstetric surgeries remain common even in specialized hospitals like MNH. These iatrogenic injuries to the urinary tract occur more commonly during Caesarean section and trans-abdominal total hysterectomies. The followings are recommendations from this study:

- Obstetrics and gynaecological surgeries are highly specialized surgeries that should be done by surgeons who have acquired good training on surgical skills and relevant anatomical relations of pelvic organs. Assistant Medical Officers should not perform such surgeries.
- Hysterectomies are the main surgery that led to many urologic injuries (both bladder and ureteric injuries). It is, therefore, recommended that OBGY surgeons should take preoperative precautions (like preoperative stent insertion and intravenous pyelography prior to operation) while performing such surgeries to avoid causing such urological injuries.
- The government through Ministry of Health, Social Welfare, Gender and Children should train more medical officers and OBGY specialists and distribute them in non teaching hospitals. Study should be carried out to determine the risk factors or causative factors for urologic injuries complicating OBGY surgeries so as to find better ways to reduce morbidity and mortality resulting from such injuries.
- Most of bladder injuries are originating from emergency obstetric surgeries. It is clear that precautions (e.g. emptying bladder before surgery) are important and should be maximally practiced while emergency obstetric surgeries are performed to avoid bladder injuries.

- Documentation and reporting was found, in this study, to be inadequate as about (41.7%) of urologic injuries were not having specific mechanism of injury. There is a need to improve reporting of injuries in the theatre log books and patient case notes so that accurate data may be available when needed.

5.3 Limitations

- This was a retrospective study. Most patients stopped outpatient clinics when they became symptom free. Therefore, long term follow-up was not possible.
- There is a possibility of under reporting urologic injuries as some of these injuries, like bladder injuries, tend to be managed intraoperatively. This may result in lowering the prevalence of such injuries.

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APPENDICES**Appendix I: Patient Data Sheet**

Please fill the answer that is correct for you in the spaces provided or circle where appropriate.

Date of interview: {...../...../2016} Questionnaire serial No:

Name of interviewer:

2. Age

1. 18 – 35 years
2. 36 – 45 years
3. 46 – 60 years
4. >60 years

3. To which organ is injury sustained?**a) Bladder injury**

1 yes

2 NO

b) Ureteric injury

1) Yes

2) no

c) Kidney injury

1) Yes

2) No

d) Urethral injury

1) Yes

2) No

4. Mechanism of injury

a) Laceration,

1) Yes

2) No

3)

b) Transection,

1) Yes

2) No

c) Avulsion,

1) Yes

2) No

d) Electrocautertery,

1) Yes

2) No

e) Crushing,

1) Yes

2) No

f) Devascularization

1) Yes

2) No

g) Ligation

1) Yes

2) No

h) Not known

1) Yes

2) No

5. From which hospital category primary surgery was done
- a) Health centre
 - b) District hospital
 - c) Regional/refferal hospital
 - d) MNH
 - e) Other mention:.....
6. What was the time duration between primary surgery and occurence of symptoms
- a) Intraoperatively
 - b) Within seven days of operation
 - c) After seven days of operation
7. What was the indication for the primary surgery
- a) Emergency obstetric problems
 - b) Elective obsteric problems
 - c) Emergency gynaecologic problems
 - d) Elective gynaecologic problems
8. What was the type of primary surgery or procedure
- a) Not known
 - b) Caeserian section
 - c) Hysterectomy
 - d) Bilateral tubal ligations
 - e) Others: specify.....
 - f) Uterine repair
 - g) Subtotal abdominal hysterectomy (STAH)
 - h) Laparotomy for ectopic pregnancy

9. What was the method adopted for management of the injury _____

- a) Ureteric reimplantation
- b) Nephrostomy
- c) Catheterization
- d) Bladder repair
- e) Ureterostomy
- f) VVF repair
- g) Repair not yet done
- h) Ureteroureterostomy
- i) Urethral repair

10. The number of days spent in hospital after repair in MNH -----

- a) 1 – 7 days
- b) 8 – 14 days
- c) 15 – 30 days
- d) >40 days

11. Post repair outcome

- a) Good
- b) Fair
- c) Poor

12. What was the cadre of the ‘chief surgeon’ who conducted the primary operation

- a) Clinical officer
- b) Assistant medical officer
- c) Medical officer
- d) Specialist
- e) Unknown

13. The type of previous abdominal or pelvic surgery

- a) Caesarian section
- b) Laparotomy
- c) Oophorectomy
- d) Myomectomy
- e) Appendectomy
- f) Others
- g) Septic abortion surgeries