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To Determine the Frequency of Ureteric Injury Among Women Undergoing Total Abdominal Hysterectomy-A Cross Sectional Descriptive Study

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Abstract

Our main objective was to estimate the frequency of ureteric injury complications in total abdominal hysterectomy for any indication.

Background: Hysterectomy is currently the most common major elective gynecologic procedure in the world, with >70,000 hysterectomies performed annually in England alone and approximately 600,000 hysterectomies performed in the US in the early 2000s with 20 million US women had done this surgical procedure. The rates vary in countries depending on differences in morbidity, health economic aspects, traditions, and attitudes. There is little reported data available on the prevalence of hysterectomy in Pakistan.

Methodology: This study was conducted at the department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, from May 2014 to November 2014. As per the inclusion and exclusion criteria, a total of 135 patients (above 35 years of age) were selected for the study, patients were enrolled through OPD. Patients were subjected to standard abdominal hysterectomy (TAH), surgery performed as per RCOG guidelines, and all women were shifted towards for further in-patient care. All the women were followed again on the 5th, 7th, and 9th postoperative days in the hospital and 3 months after post-discharge.

Results: The average age of the patients in our study was 47.53 years +7.2SD compared to TAH with a mean age of 46.12. Ureteral injury (ureteral obstruction) was observed in 5 patients while 130 patients were found free of ureteric injury. Age-wise analysis of ureteric injury total abdominal hysterectomy shows that ureteric injury in old age was a little bit higher than that of younger age.

Conclusions: The risk of ureteric injury after total abdominal hysterectomy remains one of the complications regardless of other risk factors. The risk of ureteric injury is increased in women above fifty years of age group.

Keywords: ureteric injury; total abdominal hysterectomy; ureteric transaction; ureteric obstruction; ureterovaginal fistula

Introduction

Hysterectomy is currently the most common major elective gynecologic procedure in the world, with >70,000 hysterectomies performed annually in England alone[1] and approximately 600,000 hysterectomies were performed in the US in the early 2000s with 20 million US women have had their uterus removed. By the age of 60, more than one-third of all women have had a hysterectomy[2]. Hysterectomy non–pregnancy-related major surgery performed on women. This surgical procedure involves removal of the uterus and cervix, and for some conditions, the fallopian tubes and ovaries. Reasons for choosing this operation are treatment of uterine cancer and various common noncancerous uterine conditions such as fibroids, endometriosis, prolapse that leads to disabling levels of pain, discomfort, uterine bleeding, and emotional stress[3-5]. Methods for hysterectomy include abdominal, vaginal, laparoscopic, or combined methods. Traditional abdominal hysterectomy (AH) is one of the most common gynecological surgical procedures in the treatment of benign gynecological diseases[6, 7]. Though, abdominal hysterectomy as the best invasive technique, is associated with some limitations such as intraoperative and postoperative

obstacles, abdominal trauma and slow postoperative recovery [8]. In November 1843, Charles Clay performed the first hysterectomy in Manchester, England. In 1929, Richardson, MD, performed the first total abdominal hysterectomy (TAH), in which the entire uterus and cervix were removed[9].

The National Women's Health Network (NWHN) believes that unnecessary hysterectomies have put women at risk needlessly and that health care providers should recognize the value of a woman's reproductive organs beyond their reproductive capacity and search for hysterectomy alternatives before resorting to life-changing operations[10]. The rates differ between countries depending on differences in morbidity, health economical aspects, traditions and attitudes. There is little reported data available on the prevalence of hysterectomy in Pakistan. Although hysterectomy is generally considered safe, several possible complications are associated with the procedure. These complications can result in mild-to-severe morbidity and even (although rare) mortality[11]. While mortality after total abdominal hysterectomy (TAH) remains 0.25/1000 procedures, the morbidity occurs in 3-5% with most common complications include infection, hemorrhage, ureteral injury, bladder injury, intestinal injury, deep vein thrombosis and pulmonary embolism[12, 13]. The frequency of ureteral lesions after hysterectomy is the most faced urinary impediment in gynecological operations with an estimate rate of 10% after hysterectomies [14]. The occurrence of the injury inclines to be related to the difficulty of operation or inexperience the surgeon. Even though any gynecological surgery can cause ureteral injury, and is more common after abdominal hysterectomy [15]. Ureteric injury is one of the most serious complications of any abdominal or pelvic surgery with significant morbidity. While in west most cases are due to urological surgeries, data from Africa suggested abdominal hysterectomy still common cause of ureteric injury in developing countries. And it is becoming of medico-legal concern [16, 17].

Ureteric lesions usually provoke acute renal insufficiency requiring nephrostomy[18]. They are easier to manage when detected intra operatively than later[16]. Late diagnosis of ureteral lesions, with or without bladder injury, requires further intervention and is the reason for many medical claims[16, 19, 20]. Although not very common, ureteral complications of gynecologic surgery may be quite morbid; therefore, knowledge about their prevention, diagnosis, and management is of the utmost importance[21]. Main risk factors are enlarged uterus, pelvic adhesions, and massive hemorrhage. Endometriosis reduces the mobility of the ureter and distorts the normal anatomy, and this makes it liable to injury[18, 22]. To avoid ureteric injuries, awareness of gynecologists must be encouraged, and the ureter should be identified in difficult operations such as for large pelvic mass, disturbed pelvic anatomy, and pelvic adhesions[11]. Until 1989, the only surgical approaches for hysterectomy were vaginal and abdominal hysterectomy; then in the early 1990s, three laparoscopic techniques were developed [23]:

- Total laparoscopic hysterectomy (TLH)
- Laparoscopically assisted vaginal hysterectomy (LAVH)
- Laparoscopic supracervical hysterectomy (LASH).

Incidence rate Ureteral Injuries

Unfortunately, 50–70% of ureteral injuries are not diagnosed in the acute setting. Ureteric damage can shift to substantial patient morbidity including an irreversible loss of renal function leading to chronic renal failure and/or the loss of a kidney. Urinary tract injury has also been reported to be the most common cause of legal action after gynecological surgery in other nations including Saudi Arabia, Denmark and Holland [24, 25]. Ureteric injury is a severe impediment of pelvic surgery with a reported rate for hysterectomies that contrasts from 0.02% to 0.78%. Irrespective of the technique (abdominal, vaginal, or laparoscopic), ureteral injuries are associated with all methods of hysterectomy. A large scale prospective Finnish study reported that the rate of ureteral injury in 5279 total hysterectomies was 0.3%, 0.04%, and 0.3% for the abdominal, vaginal, and laparoscopic approaches, respectively [26, 27]. A systematic review in 2018 reported that with a total 433 studies representing 140,444, gynecologic laparoscopic surgeries for benign indications, reported 458 lower urinary tract injuries for an incidence of 0.33%. Bladder injury (0.24%) was overall three times more common than ureteral injury (0.08%) [28]. In a retrospective study including 3114 hysterectomies, the rate of ureteral injury of robotic hysterectomy (7/1088, 0.64%) was similar to laparoscopic (4/782, 0.51%), vaginal (1/304, 0.33%) and abdominal hysterectomy (5/940, 0.53%) [28]. Another study found a rate of 1 per 1000 gynecologic hysterectomies: 0.4 per 1000 after total abdominal, 13.9 per 1000 after laparoscopic, 0.3 per 1000 after subtotal abdominal, and 0.2 per 1000 after vaginal hysterectomy. Other studies found incidences of 0.27

and 0.9 per 1000 cesarean sections (CS) [29-31]. Considering ureteric injuries as a group, two separate studies in Finland and in the US found that 75% and 50% of ureteric injuries follow gynecologic procedures, respectively. Ureteric injuries during hysterectomies more than doubled (0.29– 0.66%) in a comparison of two 5-year periods in England, attributable to adverse patterns of care [29, 32].

Gilmour et al used intraoperative cystoscopy and diagnosed intraoperatively 47 (89%) of 53 ureteric injuries and 59 (95%) of 62 bladder injuries; however, for surgeries performed without routine intraoperative cystoscopy, they diagnosed intraoperatively 21 (7%) of 305 ureteric injuries and 195 (43%) of 450 bladder injuries. Cystoscopy allows visualization of the ureteric orifices and urine jets, and rules out obstruction, if it is performed after the operation. Insertion of a stent by cystoscopy can reveal the location of an injury and may give an idea of the approximate height of the ligation [27]

Purpose of the study

The main aim and objective of this study was to determine the frequency of ureteric injury among women undergoing abdominal hysterectomy for any indication. Although not uncommon, the ureteric injury carries high morbidity and repeat laparotomy rates if remained undiagnosed per operatively. Standard abdominal hysterectomy (TAH) is routinely performed in our population especially due to dysfunctional uterine bleeding, fibroids and due to heavy load of surgeries, ureteric injuries do occur. The results of this study will be very useful locally as it will be shared with local gynecologists to make them aware about the magnitude of the problem and suggesting future recommendations in light of results of this study. Undiagnosed ureteral injury should be supposed postoperatively if a patient experiences the following signs/symptoms, which should prompt evaluation for urinary tract injury (i.e., leakage of urine from the vagina or abdominal incision, costovertebral angle pain, oliguria or anuria, hematuria, persistent abdominal pain, or distension with or without ileus and fever). The management of ureteric injury depends on its etiology, associated injuries, the length and location of complications, the time of its diagnosis. A delay in diagnosis can be treated with a similar surgical outcome as a direct repair performed at the same time of a surgical procedure. Laparoscopic ureter ureterostomy management should be the gold standard method of ureter repair, and ureterocystostomy should be the second choice if a primary reanastomosis is impossible.

Methods

Study Design and Patient Selection

This study is Descriptive Cross-Sectional study, conducted at the department of Obstetrics and gynecology, Khyber Teaching Hospital, Peshawar. Duration of the study was 06 months, patients were recruited from 07th May, 2014 to 07th Nov, 2014. The study was conducted in accordance with the declaration of Helsinki and approved by the ethics committee of Khyber Teaching Hospital, Peshawar. Oral and written informed consent was obtained from the patients or their close relatives before inclusion into the trail. Moreover, an identification code was used instead of patient´s name to protect the patient´s identity when reporting trial-related data. After the ethical approval from the hospital ethical committee, then the study was initiated. Sample size was 135 using 10% proportion of ureteric injuries after hysterectomy, 95% confidence interval and 5% margin of errors under WHO software for sample size determination. Ureteral injuries like ureteral fistula, ureteral obstructions if occurred during surgery or postoperatively may be taken into account. Methods that could be used for ureteral injuries includes computed tomography with intravenous pyelogram (CT-IVP), cystoscopy and retrograde pyelogram. Management techniques usually are ureteroureterostomy, ureteroneocystostomy, transureteroureterostomy, or a Boari flap are commonly utilized.

Inclusion Criteria

1. All women undergoing abdominal hysterectomy for postmenopausal bleeding.
2. Fibroid Uterus
3. Age group (35 years and above).
4. Adequate uterine mobility
5. Abnormal uterine bleeding (AUB)

Exclusion Criteria

1. Uterine size more than 12 weeks of gravid uterus.
2. Restricted uterine mobility.
3. Prolapsed uterus.
4. Previous history of any type of surgery on genital/urinary tract.

Patients' comorbidities, BMI, history of any previous pelvic surgeries was also considered before the start of procedures. These factors may also influence the risk of ureteral injuries.

Data Collection Procedure

The study was conducted after approval from hospitals research and ethical board. All women planned to be subjected to total abdominal hysterectomy and meeting the inclusion criteria were enrolled in the study through OPD. The purpose and benefits of the study were explained to the patients and they were assured that the study is done purely for data publication and research purpose and their confidentiality were maintained, a written informed consent was obtained from all patients. After taking patient disease history and clinical examination, patients were subjected to routine investigations which included urine analysis, ultra sound of abdomen and pelvis, complete hierogram, blood grouping and Rh typing, RBS, blood urea, serum creatinine, LFTs, Chest X-ray, ECG, HIV, HBsAg and pap smear. Patients included into the study according to exclusion and inclusion criteria. Operating time for TAH was calculated from incision on the abdomen to closure of skin incision.

All women were subjected to complete history taking and detailed physical and gynecological examination to detect and exclude confounders to exclude bias from the study results. All the included women were subjected to TAH by senior consultant gynecologist fellow of CPSP and having minimum of 5 years of post-graduate experience. Before closing the peritoneum, the ureter was carefully examined on both sides to detect any transaction. If found, standard surgical protocols were practiced to manage the transacted ureter. After that the abdomen was closed as per RCOG guidelines and all women were shifted to ward for further in patient care. All the women were followed again on 5th and 7th post-operative day in hospital. Follow up period after hospital discharge was 3 months. If any injury is found, it was managed again according to RCOG guidelines. All the surgeries and follow up assessments were done by same surgeon fellow of CPSP and having 5 years of post-graduate experience. All the above-mentioned information including name, age, and address were recorded in a predesigned proforma.

Data Interpretation (Analysis)

All data were stored and analyzed in SPSS version 10.0. Mean + SD were calculated for quantitative variables like age. Frequencies and Percentages were calculated for categorical variables like ureteral injury. Ureteric injury was stratified among age to see the effect modification. All results were presented in the form of tables and graphs.

Results

Table 1: Age wise distribution of the patients

Age Groups	Frequency	% Age	Cumulative %
1st Group: <=40	28	20.7	20.7
2nd Group: 41-45	38	28.1	48.9
3rd Group: 46-50	27	20.1	68.9
4th Group: 50 +	42	31.1	100.0
Total	135	100.0	238.5

The total of 135 women undergoing total abdominal hysterectomy for any indication were observed and included in the study. Average age of the patients in our study was 47.53 years +7.2SD (range 35-60) compared to TAH with a mean age of 46.12. The average duration of surgery observed was 80 minutes. Post-surgery pain was measured using the visual analogue scale on day 1, 2 and 3, which reduces day by day. Complications like febrile morbidity, wound infection, burst abdomen, wound gape, Paralytic IIeus were also more in TAH but held no statistical significance have been demonstrated. Average hospital stay was also noted for patients which was 9.14 days.

Patient's age was divided in four categories, out of which most common age group for patients of total abdominal hysterectomy was more than 50 years.

- First group of 28 patients (20.7 %) were of the age less than 40 years.
- Second group, 38 patients (28.1 %) were in the age range of 41-45 years,
- Third group 27 patients (20.1 %) were of age range 46-50 years and
- Fourth group 42 patients (31.1 %) presented at age more than 50 years of age.

(Table 1) Ureteric injury (ureteral obstruction, ureteral fistula) wise distribution after total abdominal hysterectomy shows that ureteric injury (ureteral obstruction) was observed in 5 patients

(3.7%) while 130 patients (96.30%) were found free of ureteric injury. Fig 1 Age wise distribution of ureteric injury among women undergoing total abdominal hysterectomy shows that ureteric injury in old age was little bit high as that of younger age. The patients having age less than or equal to 40 years of age have no ureteric injury (100%), age group 41-45 years contain 2.6% ureteric injury and 97.4% shows no ureteric injury, age group of 46-50 years gave 3.7% ureteric injury and about 96.3% patients showed no ureteric injury and patients having more than 50 years of age have 7.1% ureteric injury while 92.9% have non-acute ureteric injury in patients after total abdominal hysterectomy. Table 2.

Table 2: Age wise distribution of ureteric injury.

Age Groups (Range)	Ureteral Injury (Ureteral Obstruction)		Total
	Yes	No	
First Group: <=40	0 (0%)	28 (100.0%)	28 (100.0%)
2nd Group: 41-45	1 (2.6%)	37 (97.4%)	38 (100.0%)
3rd Group: 46-50	1 (3.7%)	26 (96.3%)	27 (100.0%)
4th Group: 50+	3 (7.1%)	39 (92.9%)	42 (100.0%)
Total	**5 (3.7%)**	**130 (96.3%)**	**135 (100.0%)**

Discussion

Hysterectomy is the most frequently performed major surgical procedure in gynecology [33-35]. In Health statistics, between 1981 and 1997 the hysterectomy rate decreased from 937 to 628 per 100,000 women over age 35 [36]. Rates of complications associated with hysterectomy range from 0.5 percent to 43 percent [37, 38]. Post-operative fever and infection are responsible for the majority of minor complications. Routinely collected administrative data is of limited utility for determining the frequency of complications [39, 40]. The reported incidence of complications varies widely. In the four meta-analyses of laparoscopic hysterectomy series published between 1989 and 1995, the major complication rate was three to four percent, the total complication rate was 11.6 to 15.6 percent, and the mortality rate was zero to six per 100,000 cases. Major complications were defined as injuries to other organs or reoperations[41]. In a series of 13,885 hysterectomies,[41] the incidence of ureteral injuries is highest with the laparoscopic approach (2.2%) and lowest with the vaginal hysterectomy (0.04%). Ureteral injuries are one of the most serious complications of hysterectomy because of subsequent renal impairment. Such injury is uncommon occurring in 0.1-1.5% of all gynecological surgeries. Because of close anatomical relationship of the bladder uterus and upper vagina, the bladder is the segment of the lower urinary tract that is most vulnerable to injury. The incidence of ureteral injury is 1-2%[42]. Small bowels are the most common intestinal injuries in gynecological surgery. Bowel injuries often are associated with performance of posterior colpoperineorraphy and are usual confined to the rectum. It occurs in around 0.3% of vaginal and abdominal hysterectomy[43]. In this study operative complications were in the form of hemorrhage and anesthesia related complications[44-46]. Postoperative complications included infections like ureteral infections, fistula, chest infection, wound infections and pyrexia [47]. The commonest complication was infection which can be due to poor resistance and long-lasting anemia due to heavy menstrual bleeding, poverty in our population, nonuse of prophylactic antibiotics and obesity[48-51]. Ureteral injuries are uncommon occurrence but when they occurred, they have serious implications in term of morbidity and litigation. The prevalence of ureteral injuries observed in our study is comparable to previous reported international series [52-54]. Ureteral and bladder injury remained the most common visceral injury in this study as reported in literature. The ureteral bladder injury occurred in five patients. Two patients were with previous 3 and 5 scars and had extensive adhesions due to previous surgeries. These were only mucosal /serosal damage and there was no full thickness bladder injury. There was no case of ureteric / bowel injury. In all patient's catheter was retained for 24 hours only in above cases of bladder injury where catheter was retained for 3 days. Febrile morbidity due to urinary tract infection was noted in 6 patients and all those occurred in which catheter was retained for longer period of time. This incidence correlates with other study by Ahmed F in their study of abdominal hysterectomy[55]. Johnson, Moll and Post [56] noted an incidence of postoperative morbidity of 48% of abdominal hysterectomy cases and of 53.4% of those subjected to vaginal hysterectomy. Cron, Stauffer and Paegel [57]

reported a series of 500 abdominal and vaginal hysterectomies in which the incidence of postoperative morbidity was 38% and 42%, respectively. Leventhal and Lazarus[58] noted an incidence of 27.3% following abdominal hysterectomy and 38.8% following vaginal hysterectomy. Pratt et al.,[59] at the Mayo Clinic, reported an incidence of 27.7% following abdominal hysterectomy, and Hawks worth and Roux, at the Oxford Hospitals, an incidence of postoperative morbidity of 32.3% in 1000 consecutive vaginal hysterectomies.

Conclusion

It was found that frequency of complications in scarred uterus was higher especially ureteral injuries than that for non-scarred uterus because of adhesions due to previous surgeries. With proper assessment of high-risk cases, especially with history of previous surgeries and previous history of Endometriosis in time diagnosis and with provision of experienced surgeons these complications can be reduced.

Declarations

Conflict of Interest

The contributing authors of this article declare no conflict of Interest.

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