

Urological Injuries in Obstetrics and Gynaecological Surgery

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Abstract

Background: To determine the frequency of urinary tract injury during Obstetrics and Gynaecological surgery in the tertiary care teaching set up.

Methods: In this descriptive study, all the patients who were admitted for obstetrical and gynaecological surgery irrespective of the time of procedure and level of surgical expertise were evaluated. Forty seven patients with bladder injury and six patients with ureteric injury were included. Site of injury, type and nature of surgical procedure, and therapeutic success rate with respect to time of diagnosis and treatment was analyzed. Injury was defined as entry into the urinary tract lumen, crushing, ligation or/and excision of urinary tract, leakage of urine, post operative hydronephrosis, or extravasation of contrast outside the urinary tract with or without renal damage that required surgical intervention.

Results: The injury incidence in obstetrics emergency and elective procedures was 0.69% with urinary bladder the most frequently injured organ (88.67%). No ureteric injury was recorded in obstetrical patients. In gynaecological patients ratio of injuries to bladder and ureter was 4.84%. Most of the ureteric injuries (50%) were encountered in emergency laparotomy, followed by malignant ovarian tumours (33.3%). Most of the injuries were picked and dealt during the same surgical session with 15% of the patients requiring reoperation. Outcome of the management was satisfactory with no renal damage and mortality.

Conclusion: Good knowledge of pelvic anatomy and practicing the visualization of ureteric course in routine patients will be helpful to safeguard it during complicated cases.

Key Words: Gynaecological surgery, Urological injury, cystotomy, Urinary tract injury

Introduction

Embryological close proximity of urogenital systems is an important anatomical factor which maintains continuity in the adult life. This makes the lower

urinary organs especially vulnerable during any surgical procedure done in the pelvis. Traditionally general surgeons, gynaecologists, obstetricians and urologists are involved in such mishaps.^{1, 2} Obstetrical surgeries, performed on the uterus, can increase the risk of collateral injuries.^{2, 3} Generally the causes of urinary tract injury are patient related like obesity, multiparity, previous surgery, emergency or elective nature of procedure, laboring status, endometriosis, active infection, invasive pathology and distortion of anatomy. Expertise of the operating surgeon is important as fifty percent of the ureteric injuries occur in patients without any predetermined risk.^{4, 5} It is therefore, needed that pelvic surgeons should be extremely cautious in identifying the patients with risk factors. It is the thorough and clear concept of pelvic anatomy, an immaculate and meticulous surgical technique, manual dexterity and high index of suspicion that will mitigate this hazardous complication.^{6, 3} The morbidity arising from such injury includes prolonged operating time, increased hospital stay, secondary invasive interventions, reoperation, loss of renal function and deterioration in patient's quality of life.⁷

Management outcome depends on many factors. Early recognition of the injury can save. Urinary tract injuries are divided into two groups i.e., those recognized during surgery like bladder and ureteric lacerations and those presenting in the post operative period mostly as urogenital fistulae, ureteric stricture or/and secondary renal damage.² Five percent patients present very late with hydronephrosis and non-functioning kidney.⁸ Prompt intraoperative identification and appropriate correction decrease morbidity and eliminate mortality.³

Patients and Methods

This descriptive study was performed from January to December 2012 in Gynae/Obs department of Jinnah Hospital Lahore and a private hospital. All the patients who were admitted for obstetrical and gynaecological surgery irrespective of the time of procedure and level of surgical expertise were evaluated. Forty seven patients with bladder injury and six patients with ureteric injury were included.

Site of injury, type and nature of surgical procedure, and therapeutic success rate with respect to time of diagnosis and treatment was analyzed. Injury was defined as entry into the urinary tract lumen, crushing, ligation or/and excision of urinary tract, leakage of urine, post operative hydronephrosis or extravasation of contrast outside the urinary tract with or without renal damage that required surgical intervention .

Results

Age of the patients ranged from 25 to 50 years. Most common finding was bladder injury (88.67%) (Table 1). Ureter was damaged in 11.33% (Table 2). Surgical procedure which resulted in this damage maximally was caesarean section (78.72%). Emergency caesarean section resulted in a major number of injuries 42.55% but the ratio of the injury was higher (i.e., 2% as compared to 1.14%) in elective cases (Table 3). Difficult vaginal birth with forceps was also responsible for 10.63% bladder injuries, with procedure to injury ratio of 0.16%. No ureteric injury was noted in obstetrical patients (Table 2). Ten bladder injuries and all six ureteric injuries were encountered in gynaecological patients. Hysterectomy was the leading cause in bladder injury followed by laparotomy for ovarian cancer. On the other hand five out of six ureteric injuries were recorded in laparotomy and only one patient sustained ureteric injury during TAH (Table 2). Bladder injuries were found in 89.7% and two layer repair was carried out. Urinary catheter drainage was maintained for 10 days, with uneventful recovery. Five patients (10.6%) were diagnosed during immediate post operative period due to leakage of urine into the peritoneal cavity. These patients with features of peritonitis were re-operated and bladder was repaired with satisfactory outcome. Equal number of patients had right and left sided injury. No bilateral injury in these patients was recorded. Malignant ovarian tumours with distortion of anatomy due to local invasion was the cause in 33.3%. In emergency cases laparotomy was performed in these patients, for re-exploration to deal with bleeding complications, uterine rupture and induced septic abortion causing broad ligament haematoma. Crushing of the ureter in two cases and ligation in one case was recognized peroperatively. Urinary leakage through the drain was the presentation in fourth patient that was dealt in the same admission. Remaining two patients reported back after being sent home. One had pyrexia, generalized ill health, abdominal distension and serous vaginal discharge that proved to be urine.

Ureteric laceration (partial) was found on reopening the abdomen and the last patient in the series had persistent drainage having almost the same amount of drain fluid as urine passed per urethra. Patient was otherwise afebrile. IVP was diagnostic for the ureteric injury. Ureteric stenting and ureteroneocystostomy were the procedures done in these patients. Renal damage as well as mortality was averted.

Table 1: Bladder injuries

Causes	No	%
Obstetrical causes		
Emergency cesarean section	20	42.55 %
Elective cesarean section with previous 3-4 operations	12	25.53 %
Vaginal birth (Forceps delivery)	5	10.63 %
Total	37	78.72 %
Gynaecological causes		
Total abdominal hysterectomy (TAH) (PID & Endometriosis)	4	8.51 %
Vaginal Hysterectomy (VH)	2	4.25 %
Cesarean Hysterectomy	1	2.12 %
Laparotomy for Malignant ovarian tumours	3	6.38 %
Total	10	21.27 %
Grand total	47	100 %

Table 2: Ureteric injuries

Type of procedure	No.	%
Obstetrical causes	Nil	0
Gynaecological causes		
Emergency laparotomy	3	50
Laparotomy for Malignant ovarian tumour	2	33.3
Total abdominal hysterectomy (TAH)	1	16.7
Total	6	100

Discussion

All surgical procedures carry an inherent risk of injury to adjacent structures. Lower urinary tract (LUT) has been reported to be implicated in almost every obstetrics and gynaecological procedure.⁹ Long association of urinary incontinence in young girls after prolonged labour is a well documented consequence of early marriages, younger age at delivery, lack of skilled birth attendance, good size fetus etc.¹⁰ Out of 200 million pregnant mothers 500,000 die of the complications of pregnancy or child birth every year.¹¹

Table 3:Incidence of urinary tract injury in relation to the type of procedure

Nature of the procedure	Procedure	Emergency or elective	Number of patients	Bladder injuries	Ureter injuries	Total	Percent age
Obstetrical procedures	Normal Vaginal births		2977	5	Nil	5	0.16%
	Cesarean section	Emergency	1742	20	Nil	20	1.14%
		Elective	586	12	Nil	12	2.0%
Total			5305	37	0	37	0.69%
Gynaecological procedures	Hysterectomy						
	TAH		125	4	1	5	4%
	VH		39	2	Nil	2	5.1%
	Cesarean Hysterectomy		21	1	Nil	1	4.76%
		Sub total	185	7	1	8	4.32%
	Laparotomy						
		Emergency	69	0	3	3	4.34%
		Elective	76	3	2	5	6.57%
		Sub total	145	3	5	8	5.50%
	Total			330	10	6	16
Grand total			5635	47	6	53	0.94%

WHO recommends that labor should be monitored with a partograph (an instrument on which the labor events are recorded) and interpreted for decision making during labour.¹² Delay in intervention increases the time of compression of the mother’s soft pelvic organs (i.e., bladder and rectum) between the fetal presenting part (i.e., the fetal head) and the mother’s pelvic bones, leading to uterine rupture, obstetric fistula, and fetal death.¹⁰ The United Nations Population Fund estimates that there are about 2 million women living with vesico vaginal fistula (VVF).¹³ Spontaneous intra peritoneal rupture of bladder after a normal vaginal birth has been reported.^{14,15} In our investigation there were five bladder injuries in patients having vaginal birth where instrumentation i.e., forceps application was required along with prolonged duration of labor. This was 0.16% of all the vaginal births and 0.09% of all the obstetrical cases. The cause of these bladder lacerations was poor tissue recognition due to deficient expert supervision. The paradigm shifted especially in areas with better health facility due to diverting the route of delivery with the help of cesarean section. Most common causative procedure for non endoscopic or external injury to urinary bladder remains cesarean section and hysterectomy.¹ Chances rise with increasing number of cesarean sections.^{16,17} A four fold increased bladder injury incidence in subsequent cesarean delivery has been documented.^{18,6} This is especially peaked during cesarean delivery performed after failed trial of vaginal birth after cesarean (VBAC).¹⁹ In our study incidence of urological injury

is 0.69% in obstetrical patients and 4.84% in gynaecological patients higher than the published data.²⁰ It could be because of small sample size and unauthorized patient handling before they reach the health facility. Incidence of these injuries was higher during emergency surgery (54.71%) compared with elective procedures (45.28%). Inadequate preoperative preparations, unusual hurry, non availability of competent hands at odd hours all preclude meticulous performance of the procedures hence, the mishaps take place.⁷

All the ureteric injuries in our study took place in gynaecological surgery and that too in emergency laparotomy. This is contrary to most of the published series where TAH has been the most frequent cause.^{7, 8} It can be attributed to nature of patients included. Distal third of ureter is most commonly injured part accounting for 91% of injuries, with maximum chances of damage at the pelvic brim and where it is crossed by uterine artery about 2 cm lateral to vagina at the base of infundibulopelvic ligament.^{4,2,21} Difficulty in visualization because of distorted anatomy, excessive haemorrhage at the time of surgery and rarely congenital abnormalities i.e. duplication of ureter are the usual causes of inadvertent injury.⁴ Irrespective of the cause of injury preoperative or early post operative recognition of injury averts morbidity. Per operative cystoscopy, intravenous injection of methylene blue or indigo carmine and frusemide and observing for leakage of blue tinged urine have all been recommended.^{4, 6} Perioperative ureteric catheterization or stent placement have been touted but have failed to

prove significant usefulness.^{22, 23} Visualization of the ureter during the procedure is reliable and cost effective.^{7,21-25} In case of urinary bladder injury direct inspection, methylene blue or indigo carmine diluted with 200–300 ml of sterile normal saline instilled through a foleys' catheter and observing for leakage, intentional cystotomy for internal bladder inspection in case of doubt and cystoscopy are beneficial.²⁰ In post operative patients ultrasonography, ascending cystography are helpful but CT cystography including post drainage images after filling the bladder with at least 350 ml of diluted contrast, is the gold standard.^{4,26}

Standard treatment consists of one or two layer closure of urinary bladder and a tension free water tight anastomosis of ureter by mobilizing the ureter, preserving the adventitious layer, using fine absorbable suture material over a stent. A retropubic and perianastomotic passive drain is helpful to prevent accumulation of urine and sepsis at the surgical site.²⁴ In chronic complicated patients a delayed repair has been advocated as readily perceivable tissue viability prevents unnecessary tissue excision, reduces suture tension and minimizes bleeding complications.² A vigilant follow up for renal damage should be carried out every three months for the year following the removal of stents.

Conclusion

Given the increasing rate of caesarean deliveries and growing trend for more optimistic minimal invasive access, the residency training programs should be structured to make the service providers cognizant of the potential complications and principles of management of urological injuries in obstetrics and gynaecological surgeries .

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