

Urological Injury in Obstetric and Gynecological Surgery: A Retrospective Analysis of Five Years

Anju Kumari Rani¹, Brijesh Singh², Shobhit Kumar³

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¹Senior Consultant, ²Consultant Surgeon, General Hospital, Department of Obstetrics and Gynecology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh 226014, India. ³Student, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

Corresponding Author: Anju Kumari Rani, Senior Consultant, Department of Obstetrics and Gynecology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, Uttar Pradesh, India.

E-mail: skanju02@yahoo.co.in

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Abstract

To determine incidence and nature of urological injuries in obstetric and Gynecological procedures and their complications and mode of management in a tertiary care hospital, Gynecological Services, SGPGIMS, Lucknow.

A retrospective study of all obstetric and Gynecological surgeries over a period of 5 years from January 2014 to December 2018 was carried out at Gynecological Services, SGPGIMS, Lucknow, India. Cases with the documented urological injuries were analyzed further. A total of 1,526 patients underwent obstetric and Gynecological procedures like lower segment cesarean section, various types of hysterectomies, laparotomy were analyzed. Cases with urologic injuries were identified and analyzed for the type of injuries, timing of diagnosis, their management and consequences.

Out of 1,526 patients undergoing various surgeries, 8 (0.52%) patients had bladder injury and 1 (0.06%) patients had ureteric injury. In gynecologic procedures, the incidence of bladder injury was highest in radical hysterectomy (1 out of 35, 2.8%) followed by VH (2 out of 123, 1.62%), laparotomy (1 out of 194, 0.51%) and TAH (2 out of 635, 0.32%). Only 1 ureteric injury was noted in a case of TAH out of total 1094 Gynecological procedures (0.09%).

Statistically, ureteric injuries are less frequent but are responsible for significant morbidity when compared to bladder injuries which are more common

but with less complications as they are diagnosed and managed timely.

Keywords: Obstetrics and Gynecological Surgery; Bladder injury; Ureter injury.

Introduction

Due to close anatomical proximity of urogenital systems, urological injuries involving damage to the urinary bladder and ureter are not uncommon in obstetric and gynecological surgeries. In fact most of iatrogenic urinary tract injuries are due to gynecologic Surgeries.¹ Urinary tract injury complicates an estimated 0.2 to 1% of all gynecologic procedures.^{1,2} Since a very high number of gynecological surgeries are performed throughout the globe, there are relatively few urologic injuries but these urological complications carry a significant amount of morbidity. The cause of these injuries vary depending on the type of gynecologic surgery performed, complexity of surgery, altered pelvic anatomy due to endometriosis, previous surgeries, radiation therapy, cervical or broad ligament fibroids and intra-operative complication like severe bleeding.³ With increased knowledge of these injuries and improvements in surgical techniques, the incidences of these injuries have reduced and they are diagnosed timely and better managed in present day practice. Periodic analysis

of such inadvertently caused injuries will give information about the cause of injury in various surgeries, type of injury (bladder or ureter), the time of diagnosis, their management which helps in future surgery. Therefore, this retrospective analysis of all the urologic injuries caused during various obstetric and gynecological surgeries was carried out.

Materials and Methods

A retrospective analysis of case records of patients who underwent various obstetric and gynecologic surgeries in gynecological Services, SGPGIMS hospital over a period of 5 years from January 2014 to December 2018 was carried out. Gynecological procedures were classified as Total Abdominal Hysterectomy (TAH), Total Abdominal Hysterectomy with bilateral salpingectomy (TAH + B/L Salpingectomy) Non-descent Vaginal Hysterectomy (NDVH), Vaginal Hysterectomy with or without pelvic floor repair (VH), Radical Hysterectomy (RH), Laparotomy (for ovarian cystectomy, salpingectomy, staging laparotomy for ovarian malignancy), Laparoscopic Assisted Vaginal Hysterectomy (LAVH), Diagnostic Hysteroscopy (DHL), Laparoscopic Ovarian Cystectomy, Myomectomy and Vault prolapse / posthysterectomy fallopian tube prolapse. Lower Segment cesarean Section (LSCS), Lower Segment Cesarean Section with bilateral tubal ligation, Cesarean Hysterectomy, Hysterotomy and Ectopic pregnancy were classified as obstetric procedures. Total numbers of surgeries performed in these various subcategories were noted.

Table 1: Incidence of urologic injuries in various types of surgeries.

Operation	Total number of cases	Bladder injury N (%)	Ureteric Injury N (%)
Total abdominal Hysterectomy	635	2 (0.31%)	1 (0.16 %)
Non-decent vaginal hysterectomy	15	0	-
Vaginal hysterectomy	123	2 (1.63%)	-
LAVH	5	-	-
Laparoscopy diagnostic/ovarian cystectomy	15	-	-
Radical hysterectomy	35	1 (2.86%)	-
Laparotomy	194	1 (0.52%)	-
Myomectomy	77	-	-
Vault prolapse / fallopian tube prolapse	5	-	-
Total Gynecological procedures	1,094	6 (0.55%)	1 (0.09%)
LSCS	402	2 (0.50%)	-
LSCS +Bilateral tubectomy	17	-	-
Obstetric hysterectomy	1	-	-
Hysterotomy	2	-	-
Ectopic pregnancy	10	-	-
Total obstetric procedures	432	2 (0.46%)	0

LAVH: Laparoscopic assisted Vaginal Hysterectomy; LSCS: Lower Segment Cesarean Section.

Any accidental urological injuries during the operative procedures were noted in the operation theater record book and patient file at the same time. We noted that 9 patients had urological injuries during various obstetric and gynecologic surgeries, as noted in the O.T. record book. The case details of these patients were retrieved and were analyzed for Gynecological and obstetrical surgeries during which the urologic injury occurred, indications for these surgeries, type of urological injuries (bladder or ureter), time of diagnosis (intraoperative or post-operative), treatment modality and complications.

Results

Total of 1,526 patients had undergone various surgeries during the five years, of which 1,094 were gynecologic surgeries and 432 obstetric surgeries. Out of 1,526 patients undergoing various surgeries, 8 (0.52%) patients had bladder injury and 1 (0.06%) patients had ureteric injury (Table 1). During this period 402 LSCS and 17 cases of LSCS with bilateral abdominal tubectomies done, there were 2 cases of bladder injury; both were having previous Cesarean sections. There was no bladder injury in any other obstetrical cases performed. There was no ureteric injury in any of the obstetric surgeries. Both bladder injury in obstetric surgeries were identified intraoperatively and primary repair was done by closing urinary bladder in two layers using vicryl 2-0 suture (Table 2). Every patient was put on indwelling bladder catheter (Foley's Catheter) for at least 14 days.

Table 2: Analysis of cases involving urologic injuries.

Gynecological surgery in which injury occurred (N)	Time of identification	Treatment modality	Duration of hospital stay	Blood transfusion
Bladder injuries				
TAH (2)	Intraop	Primary repair	10-14 days	Nil
VH (2)	Intraop	Primary repair	10 days	Nil
Laparotomy (1)	Intraop	Primary repair	14 days	Nil
Radical Hysterectomy (1)	Intraop	Primary repair	14 days	Nil
LSCS (2)	Intraop	Primary repair	14 days	1
Ureteric injury				
TAH (1)	postop	Delayed repair	12 days Readmission 14 days	Nil

In gynecologic procedures, the incidence of bladder injury was highest in radical hysterectomy (1 out of 35, 2.86%) followed by vaginal hysterectomy (2 out of 123, 1.63%), Laparotomy (1 out of 194, 0.52%), TAH (2 out of 635, 0.31%). We observed only 1 ureteric injury in a case of TAH. There were no urologic injuries noted in myomectomy, surgery for vault prolapse or fallopian tube prolapse, NDVH and laparoscopic or radical hysterectomy surgeries. Most urinary bladder injuries occurred in patients with previous cesarean section or laparotomy, where bladder was adherent to anterior uterine wall and sometimes at anterior abdominal wall. In such cases plane of dissection was lost due to dense adhesion. All urinary bladder injuries in gynecological procedures were identified intra-operatively and primary repair was done. In 1 case of radical hysterectomy for malignant melanoma of cervix, while doing upper vaginectomy (as this was stage IIa) bladder was injured and primary repair was done in 2 layers but subsequently in 8-10 weeks patient developed vesico-vaginal fistula due to local invasion by malignancy. Urinary diversion was planned but patient lost to follow up.

Only 1 case of ureter injury was identified 8-10 days post-operatively in case of total abdominal hysterectomy with bilateral salpingectomy for fibroid uterus. Patient presented with only complain of vaginal discharge of clear fluid. Ureteric fistula was suspected, confirmed with contrast CT KUB & pelvis ureteric stenting tried but could not negotiated, PCNL was done for 6-8 weeks followed by a second surgery for ureteric re-implantation with ureteric stenting for 4-6 weeks after which the patient recovered without any further complications.

Discussion

In our study incidence of bladder injury and ureteric injuries in gynaecologic surgeries was

0.55% and 0.09% respectively, whereas in obstetric procedures the incidence of bladder and ureteric injuries was 0.46% and 0% respectively. This is lower than the overall incidence of urological injuries reported as varying from 0.5-1.5%.^[4,5] Desai and colleague quoted an incidence of bladder and ureteric injuries in gynaecologic surgeries as 0.2% and 0.02% respectively patients undergoing various surgeries, whereas in obstetric procedures incidence of bladder injury was reported as 0.10% and ureteric injury as 0.0%^[6]. Carley and associates noted that the incidence of bladder and ureteric injuries was 0.58% and 0.36% respectively in abdominal hysterectomy, 1.86% and 0% in vaginal hysterectomy.^[7]

Difficulty in identifying anatomy due to presence of blood in the surgical field is a primary risk factor followed by thin lower uterine segment with adherent bladder in obstetrical cases. In our study, radical hysterectomy was associated with highest incidence of urological injuries (2.86%), which fairly correlates well with the incidence reported in literature (2.78%).^[8] High incidence in such surgery can be attributed to wide dissection and microinvasion of malignant cells in gynaecologic cancer cases. In surgeries for benign conditions, vaginal hysterectomy has highest incidence (1.63%) followed by TAH (leiomyoma being most common cause) incidence (0.31%) of urinary injuries. Studies suggest laparoscopic surgeries have increased the incidence of urologic injuries to some extent, although with achievement of the learning curve, the frequency of bladder injury has declined but that of ureteric injury is still high.

There were 8 bladder injuries (together in obstetric and gynaecological surgeries) and all of them were identified intra-operatively. Primary repair of bladder heals well without much late complications. Hence, it is important to identify bladder injuries intra-operatively and perform

primary repair to minimise morbidity. We noted only 1 ureteric injury which happened in a case of TAH. Previous studies also have shown higher incidence of ureteric injuries in simple hysterectomies. Contrary to urinary bladder injuries, ureteric injuries were usually not diagnosed intra-operatively, as in our study ureteric injury diagnosed 2nd week postsurgery. This concurs with other studies, which also states ureteric injuries are rarely diagnosed intraoperatively.^[9]

Intra-operatively recognised injuries are usually more easily repaired and show good results as compared to delayed diagnosis and treatment. The delay in the diagnosis leads to increase in morbidity, prolonged hospital stay and repeat surgery. With the improvement in endo-urologic procedure, most of these can be managed by stenting. With the advent of ureteric reimplantation and nephrostomy even complete transections which are diagnosed late postoperatively were also managed effectively.^[10] Since ureteric injuries are not always easy to identify, high index of suspicion must be there in patients with unexplained haematuria, fever, abdominal or flank pain, poor urine output and per vaginal clear fluid leak. Regardless of the aetiology of urological damage, prompt radiological investigation in the form of intravenous urography or contrast-enhanced computed tomography is ultimately required for diagnosis to prevent delay in treatment. There was 1 case of ureter injury presenting as ureterovaginal fistula (UVF) after TAH for fibroid uterus. The cases presented about 8-10 days postoperatively as per vaginal urine leak. This cases needed secondary repair, with assistance from urologists. Incidence of UVF in our series is comparable with other studies.

There are many possible causes for these urological injuries. In 50% cases of bladder injury, patients had previous LSCS scar which poses difficulty in dissection caused by the adhesion. Scarring from previous surgery obliterates the proper surgical plane, thus making the dissection difficult. Sharp dissection close to the uterus avoids inadvertent opening of bladder. Gynaecologic carcinomas, cervical fibroid and uterovaginal prolapse were other risk factors noted in our study. Previous studies have shown higher incidence of urologic injuries in surgery for prolapse and procidentia.^[11] Single ureteric injuries happened in our study has involved lower third of ureter and most likely were caused by thermal injury by monopolar cautery. This in accord with other studies which have noted the most common sites of ureteral injury during hysterectomy were near isthmus in the

cardinal ligament where the uterine artery crosses the ureter, the area of uretero-vesical junction, and the base of infundibulopelvic ligament.^[12] Thorough knowledge of pelvic anatomy, ureteric course, being close to the uterus, careful use of cautery and dissecting ureter throughout its course in difficult cases are recommended as measures to avoid ureteric injuries. Operating surgeons experience is one of the contributing factors for complications.^[13] We expect surgeon experience to be one of the determinants of complication rate. 1 of the 9 patients needed blood transfusion, which is relatively high incidence of blood transfusion for such surgeries. The average hospital stay was also higher than anticipated for the respective category of the surgery. This higher incidence of transfusion was due to PPH in obstetrical case and longer hospital stay can be attributed to urologic injury.

Technique and follow up of bladder repair : All identified full-thickness bladder injuries larger than 1 cm should be primarily repaired. Bladder repair may be done in one or two layers; most cystotomies larger than 2 cm require two layers for watertight repair. Although there is wide variation in closure techniques, we often employ an initial running, nonlocked layer to incorporate the bladder mucosa and muscularis. The second layer may consist of running or interrupted suture; bladder serosa should be incorporated in an imbricating fashion to add integrity. Occasionally, larger or more complicated injuries may require additional layers of repair or coverage with an omental flap.^[14] In all our bladder injury cases repair done in 2 layers with vicryle 3/0 suture and put omental flap behind the bladder repair in most of cases.

Absorbable synthetic suture such as polyglactin or poliglecaprone are often used for bladder repair. Studies have shown that bladder tissue regains its tensile strength approximately 3 weeks after cystotomy repair, making absorbable suture ideal. Permanent suture such as silk should never be used in cystotomy repair, as its presence in contact with the urine can precipitate stone formation.^[15] Recent case series suggest that the use of a single layer of barbed absorbable suture may provide adequate tension-free cystotomy repair without any additional complications^[16]. Continuous catheter drainage should be performed following any cystotomy repair for 14 days at least. After bladder repair, patients may develop discomfort or bladder spasm due to the temporary presence of suture and indwelling Foley catheter. This can be managed with anticholinergic agents such as oxybutynin or belladonna-opium suppositories.

Studies in the trauma literature have revealed a low incidence of leakage at the time of cystogram after bladder injury repair and no overall effect of the cystogram on management¹⁷.

We recommend follow-up imaging prior to Foley catheter removal in any large or complex repair, and consideration of this option for simpler repairs.

Conclusion

Even though urological injuries statistically occur less frequently, they are responsible for significant morbidity. Bladder injuries are more common but are easy to manage with earlier diagnosis. Ureteric injuries which are usually diagnosed late and hence cause more morbidity than bladder injuries. Being more cautious and high degree of suspicion can help early diagnosis and avoid the sequelae.

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