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RESEARCH ARTICLE

Role of urologist in urological injuries in obstetrics and gynecology operation theatre - our experience

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ABSTRACT

Background: Both genital and urinary tracts are anatomically closely related in females. One must be certain to prevent injury to one while operating on the other. Urologic injuries are rare accounting for 0.1% -1.5% of pelvic surgeries. **Objective:** To assess role of Urologists in management of urological injuries during obstetrics and gynaecological procedures. **Materials and methods:** We retrospectively analysed records of urological injuries happened in Obstetrics and Gynaecology operation theatre at tertiary referral centre in Western India between May 2011 to May 2021. Data analysis was done pertaining to clinical presentation, site of injury, etiopathogenesis and success rate with respect to time of diagnosis and treatment of complications. **Results:** A total of 72 urological injuries were seen out of 38296 cases, accounting for 0.18 percent. Most common type of urinary tract injury was bladder injury. Simple abdominal hysterectomy was leading cause of injuries. Intraoperatively, 6 ureteric injuries were diagnosed out of total 16, all 6 underwent ureteroneocystostomy with 100 % success rate. Out of 53 bladder injuries, 43 cases of bladder injury were repaired intraoperatively with 100% success.10 cases underwent modified O Connor repair after 3 months from primary surgery with 100% success. Out of 16 patients of ureteric injury, 14 patients underwent ureteroneocystostomy on DJ stent and 2 underwent ureteroureterostomy. While three cases of ureter and bladder injury were treated with primary bladder repair and ureteroneocystostomy with 100% success. **Conclusions:** Thorough anatomical knowledge with preoperative planning and multidisciplinary approach is key to success in management of urological injuries.

Keywords: Hysterectomy, urological injury, ureteroneocystostomy, ureteroureterostomy.

Both the genital and urinary tracts are anatomically closely related in females. One must be certain to prevent injury to one system while operating on the other [1]. Certain factors have been recognised as increasing the risk, these are an enlarged uterus, previous pelvic surgery, ovarian neoplasms, endometriosis, pelvic adhesions, distorted pelvic anatomy, coexistent bladder injury, massive intraoperative haemorrhage which hampers the intraoperative identification of structures. The close anatomical landmarks of the ureter to the peritoneum make it particularly vulnerable during abdominopelvic surgery [1]. Urologic injuries are rare but among the most disastrous sequelae of obstetrics and gynaecological surgery accounting for a mean of 0.1% - 1.5% of pelvic surgical procedures [2].

Urinary tract injuries related to obstetric and gynaecologic surgery are usually divided into two sub types: acute complications such as bladder laceration or ureter laceration which are identified immediately during the intra operative period, and chronic complications such as vesicovaginal fistula, ureterovaginal fistula, and ureteric stricture [1]. Simple abdominal hysterectomy has proved to be the most common procedure leading to such injuries [3, 4]. Hereby, we are presenting a study assessing the role of Urologists in diagnosis and management of urological injuries occurred during obstetrics and gynaecological procedures.

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Material and methods

We retrospectively analysed hospital records of urological injuries happened in Obstetrics and Gynaecology theatre from May 2011 to May 2021 at Grant Government Medical College and Sir JJ Group of Hospitals, Mumbai, Maharashtra. A descriptive data analysis was done pertaining to clinical presentation, the site of injury, etiopathogenesis and therapeutic success rate with respect to time of diagnosis and treatment of complications.

During above period, the total number of patients who underwent obstetric and gynaecological surgeries was 38296. Out of these, 72 patients with urologic injuries that coincided with obstetrics and gynaecologic surgery were treated, either at the department of Obstetrics and Gynaecology or the department of Urology having age ranging from 20 to 68 years old. Success of the first repair was the criterion for successful treatment.

Patients were followed up in the outpatient clinic at 1, 3, and 6 months with complete urinalyses, routine blood investigations, and urine cultures at each visit. Patients with positive urine cultures received appropriate antibiotic therapy. Patients with bladder injuries were followed up by cystograms after 4 weeks. In the case of ureteric injury, follow-up was done with USG KUB/CT-IVU performed at the end of 3 months along with retrograde pyelography at the time of stent removal.

Results

A total of 72 urological injury was seen out of total 38296 cases, accounting for a rate of 0.18 percent. The most common type of urinary tract injury was bladder injury, including bladder laceration and vesicovaginal fistula. Of the 72 patients, 53 (73.6%) had bladder injury, 16 (22.2%) had ureteral injury, and 3 had both bladder and ureteral injury (4.1%) (table 1). The indications for pelvic surgery in the bladder injury patients were uterine leiomyoma (24 cases) 45% followed by caesarean section (10 cases) 18%. Most common primary pathology associated with ureteric injury was cervical cancer (8 cases) 50% followed by uterine myoma (6 cases) 37.5%. Combined bladder and uterine injuries were seen in 2 cases having uterine leiomyoma and 1 case of caesarean section (table 1).

Simple abdominal hysterectomy was the leading cause of injuries, comprising 23 cases out of a total of 72 cases of urological injury. A total of 741 simple abdominal hysterectomies were recorded with a complication rate of 3.1% percent. Out of these cases, 626 cases were taken as either elective or emergency LSCS while 115 were planned as simple abdominal hysterectomy for benign pathology. Radical hysterectomy accounted for 2.6% and vaginal hysterectomy for 2.00% with emergency LSCS having 0.04% associated urological injury (table 2).

Table 1: Distribution of type and primary pathology of injury

Primary pathology	Bladder injury	Ureteric injury	Bladder + Ureteric injury
Uterine leiomyoma	24 (45%)	6 (37.5%)	2 (67%)
Caesarean section	10 (18%)	-	1 (33%)
Adenomyosis	5 (9%)	-	-
Cervical cancer	2 (3.7%)	8 (50%)	-
Uterine prolapse	8 (15%)	-	-
Endometriosis	-	2 (12.5%)	-
Others	4 (7%)	-	-
Total - 72	53 (Intra-op diagnosed 43 and Post-op 10)	16 (Intra-op diagnosed 6 and Post-op 10)	3 (Intra-op 3)

Table 2: Distribution of injuries and associated surgeries

Operative procedures	Total no. of procedures (No of injury seen)
Elective LSCS -	21992 (9)
a) Converted to simple hysterectomy	229 (6)
b) Not converted	21763 (3)
Emergency LSCS -	11932 (11)
a) Converted to simple hysterectomy	397 (9)
b) Not converted	11535 (2)
Simple abdominal hysterectomy	741 (23)
a) Converted from LSCS	626 (15)
b) Planned	115 (8)
Vaginal hysterectomy	478(10)
Radical hysterectomy	501 (13)
Others (Prolapse surgery/ Colposuspension/ Dilatation and Curettage etc)	2652 (6)
Total	38296 (72)

Out of 53 bladder injuries, 43 cases of bladder injury that were diagnosed and repaired intraoperatively with a 100% success rate. In 10 cases opinion of Urologists was soughted after discharge (within 4 weeks) underwent modified O Connor repair after a period of 3 months from primary surgery with a 100% success rate. In all patients per urethral catheter and a suprapubic catheter were used as a method of diversion and which were removed after 14 days and 4 weeks, respectively, after a cystographic confirmation. Ten of 16 patients had left ureteral injuries and six had right ureteral injuries. No patients had bilateral injuries. The most common site of injury was within the distal 3 cm of the ureter, the other sites of injury were seen at the level of infundibulopelvic ligament, near the pelvic brim. Intraoperatively, 6 ureteric injuries were diagnosed out of total 16, all 6 of them underwent ureteroneocystostomy with 100 % success rate. All patients received a DJ stent, which was removed only after 3 months, after confirming the absence of extravasation/stricture on RGP.

Three out of four cases of ureteric injury that were diagnosed within 4 weeks of primary surgery had lacerations and were considered for DJ stenting. Out of them, 1 patient developed a ureterovaginal fistula after DJ stenting while in the other 2 cases DJ stenting was not possible. All three cases underwent open repair (ureteroneocystostomy) with a 100% success rate, while 1 patient out of four, with a solitary functioning kidney developed uraemia and anuria postureteric ligation within 24 hours post surgery and was repaired by re-exploration and ureteric reimplantation over a DJ stent.

Table 3: Distribution of Injury specific type of repair and its outcome

Type of injury	Type of repair	No. of cases (72)	Outcome
Bladder injury			
Immediate	Primary repair	43	100 % success rate
Delayed	Modified O Connors	10	100 % success rate
Ureteric injury			
Intra-op	Ureteroneocystostomy	6	100 % success rate
Delayed (Post – op)			
<4 weeks	DJ stenting	1	Failed (Underwent ureteroneocystomy)
	DJ stenting not possible (Ureteroneocystosotmy)	3	100 % success rate
> 4 weeks	Ureterouretrostomy	2	100 % success rate
	Ureteroneocystostomy	4	100 % success rate
Bladder + Ureter injury	Primary repair + Ureteroneocystostomy	3	100 % success rate

Of the six cases that were diagnosed after a span of more than four weeks, two of them had ligation and four had complete transection. Out of them, 2 patients had hyponatremia on evaluation which was corrected accordingly.

Uretero-uretrostomy was done in 2 cases having midureteric injuries (L5-S2 level) and 4 cases underwent ureteroneocystostomy with injuries at the level of VUJ, with both having a 100% success rate (table 3).

Out of 16 patients of ureteric injury, 14 patients underwent ureteroneocystostomy on DJ stent and 2 underwent ureteroureterostomy. Patients were followed up after 3 months for DJ removal with RGP, and if there was no extravasation, stricture, contrast draining well, and no dilated pelvicalyceal system, DJ stents were removed and patients were to be followed up after 3 months with routine investigations, USG KUB/CT- IVU. While three cases of ureter and bladder injury were identified simultaneously and treated with primary bladder repair and ureteroneocystostomy with a 100% success rate.

Discussion

Urogynaecological injuries are any laceration, transection, or ligation of genitourinary tract during surgery or hydronephrosis and leakage of contrast media, ureteric stricture or fistula post surgery requiring intervention [5]. Ozdemir E et al found 63 urological injuries out of 25998 obstetric and gynaecological surgeries (0.24%) [6]. Bai SW et al, stated 0.15 % overall incidence for lower urinary tract injury in obstetrics and gynecology operations [7]. Our study showed 0.18% (72 urological injuries out of 38296 total cases) as ours being tertiary referral center, procedures are done under supervision of experienced surgeons.

Lee et al stated, most common injury was bladder injury seen in 69 cases out of 97(71.1%) followed by ureteric injury in 23 cases (23.9%). This is due to anatomy of bladder, positioned anterior to vagina, cervix and lower uterine segment, which gets injured during adhesiolysis [5]. In our study, most common type of injury was bladder injury (53 cases out of 72 cases) (73.6 %), followed by ureteric injuries in 16 out of 72 cases (22.2%) and both ureteric and bladder injuries in 4.01%.

Lee et al stated, uterine leiomyoma is most common pathology in bladder injury contributing 35 cases out of 69(50.6%) while in ureter injury, cervical cancer was commonest seen in 8 cases out of 23(34.8%) [5]. This is due to difficult dissection of bladder in cases of myoma and anatomical proximity of ureter with cervix. In our study, uterine leiomyoma was most commonly associated pathology in bladder injury seen in 24 out of 53 cases (45%) while in ureteric injury, cervical cancer was leading pathology causing injury in 8 cases out of 16(50%).

As per Rani et al, most common site of ureteric injury is at infundibulopelvic ligament where ureter runs just medial and inferior to ovarian vessels. This anatomical course predisposes ureter to getting injured distally [8]. Aronson et al mentioned that most ureteral injuries in pelvic surgery occur in distal 3 cm of ureter [9]. In our study, most common site of injury was in distal 3 cm of ureter, seen in 14 out of 16 cases (87.5%). According to Chalya et al, ureteric injuries are more common on left (59.8%), as seen in our study (62.5%) due to its greater proximity to cervix, thus more liable to injury during dissection.

Lee et al stated, radical hysterectomy (2.78%) is most common surgery associated with urological injuries seen in 15 cases out of 539 radical hysterectomies [5]. In our study, simple abdominal hysterectomy was leading cause (3.19%) seen in 23 cases out of 741 while radical hysterectomy accounted for 2.6% seen in 13 cases out of 501 radical hysterectomies. This difference might be due to major proportion of LSCS being performed in our centre (18787 cases, including both elective and emergency), which if complicated, ended up in simple abdominal hysterectomy (741 cases). Moreover, majority of malignancy cases are being referred to dedicated oncological centres, so radical hysterectomy is performed in fewer cases (501 cases).

As per Selzman et al, recognition and repair of ureteric injury intra-op or within a week gives better results and fewer complications[11]. Delayed repair in postoperative period can usually be done but is troubled by adhesions encroaching upon injured tissue, associated with systemic inflammatory response syndrome, but settling of inflammation, edema might be helping hand during delayed repair. Our study showed that 6 cases which were repaired in intra-op period had 100% success rate, and cases which were diagnosed later, either within 4 weeks or more than 4 weeks underwent open repair (ureteroureterostomy /ureteroneocystostomy) with 100% success rate. Henceforth, timing of repair of ureteric injury does not impact outcome. Ureteric injuries should be repaired whenever they are diagnosed after failed DJ stenting.

Jha Swati et al stated, patients must be evaluated to rule out hydronephrosis and to evaluate continuity of ureter [12, 13]. In our study, during postoperative period, 12 out of 20 patients (60%) had fever followed by leakage through vaginal route with or without fever seen in 6 patients (30%). The patients were then evaluated and subsequently diagnosed to have urinary tract injury.

As per study done by Walter AJ et al, serum creatinine also depends on factors other than ureteric obstruction. These include intraoperative blood loss and use of potentially nephrotoxic drugs. Postoperative uraemia occurs when ureteric injury causes total urinary obstruction either in bilateral ureteric injury or from a unilateral injury in solitary functioning kidney (seen in 1 in 16 cases). Anuria is only immediate sign of imminent uraemia, and women with anuria need immediate intervention to save their renal function. Renal deterioration is ineluctable unless urinary inflow is restored in ureteric injury [14]. In our study also, 1 patient having solitary functioning kidney developed anuria, which was relieved after repair.

It is routine practise to place DJ stent prior to pelvic surgery when there is suspicion of pelvic adhesion. This makes identification of ureter easier. However, its reported cost-effectiveness is lower than expected [5]. In our study no case had preoperative DJ stent, however placing DJ stent preoperatively helps in identifying ureteric injury.

Harrison KA et al stated, VVF more commonly seen in gynaecological surgeries, causing high lying fistulas for which transabdominal O Connor approach for repair is preferred [15], which is corroborating with our experience.

As per T Wijaya et al, ureter stenting is choice in ureter laceration. In failed DJ stenting patients, reimplantation is preferred. Approximately 50% who had successful stenting ultimately required laparoscopic repair [16]. In our study, 3 out of 4 ureteric injury diagnosed within 4 weeks of primary surgery were considered for DJ stenting. Out of which 3 patients had failed DJ stenting attempt (75%), repaired by ureteroneocystostomy while in 1 case which had successful DJ stenting, ultimately led to ureterovaginal fistula and underwent ureteric reimplantation with 100% success.

Sakellariou P et al, stated that Ureteric injuries occurring at level of pelvic brim should be managed with an end-to-end anastomosis over ureteric stent. While ureteric reimplantation is procedure of choice in cases having short distal segment [17]. In our study, tension free ureteroureterostomy was performed in 2 cases having injury above pelvic brim, while in rest cases having injury in distal 3 cm of ureter, ureteroneocystostomy was done.

Gild P et al showed that ureteroneocystostomy has promising long term results, reaching up to 97% success rates at 4.5 years of follow-up [18]. In our study both, ureteroureterostomy (performed in 2 cases) and uretero-neocystostomy (done in 4 cases) in delayed postoperative group had 100 % success rate. Moreover, overall success rate of ureteroneocystostomy in ureteric injury in intraoperative, early postoperative period (< 4 weeks) and delayed postoperative period (>4 weeks of primary surgery) was 100%.

Conclusion

Thorough knowledge of anatomy with proper preoperative planning, anticipation, and multidisciplinary approach is the key to success in the management of urological injuries in obstetrics and gynaecological surgery.

Conflict of interest: None. **Disclaimer:** Nil.

References

1. Bai SW, Huh EH, Jung DJ, Park JH, Rha KH, Kim SK, et al. Urinary tract injuries during pelvic surgery: incidence rates and predisposing factors. Int Urogynecol J Pelvic Floor Dysfunct. 2006 Jun; 17(4): 360-4.
2. Kuntz J. Urologic complications in gynecologic surgery and radioisotopes. Contrib Gynecol Obstet. 1984; 11: 1-133.
3. Dowling RA, Corriere JN Jr, Sandler CM. Iatrogenic ureteral injury. J Urol. 1986; 135: 912–15.
4. Mann WJ. Intentional and unintentional ureteral surgical treatment in gynecologic procedures. Surg Gynecol Obstet.1991; 172: 453 - 6.
5. Lee JS, Choe JH, Lee HS, Seo JT. Urologic complications following obstetric and gynecologic surgery. Korean J Urol. 2012; 53(11): 795-99.
6. Ozdemir E, Ozturk U, Celen S, Sucak A, Gunel M, Guney G, et al. Urinary complications of gynecologic surgery: iatrogenic urinary tract system injuries in obstetrics and gynecology operations. Clinical and Experimental Obstetrics and Gynaecology. 2011 Jan 1; 38(3): 217.
7. Bai SW, Huh EH, Jung DJ, Park JH, Rha KH, et al. Urinary tract injuries during pelvic surgery: incidence rates and predisposing factors. Int Urogynecol J Pelvic Floor Dysfunct. 2006 Jun; 17(4): 360-4.
8. Aronson MP, Bose TM. Urinary tract injury in pelvic surgery. Clin Obstet Gynecol. 2002; 45: 428 - 38.
9. Rani AK, Singh B, Kumar S. Urological injuries in gynecological surgery: A review. Int J Clin Obstet Gynaecol. 2020; 4(2): 409-12.
10. Chalya PL, Massinde AN, Kihunrwa A, Simbila S. Iatrogenic ureteric injuries following abdomino - pelvic operations: A 10-year tertiary care hospital experience in Tanzania. World journal of emergency surgery. 2015 Mar 12:10:17.
11. Selzman AA, Spirnak JP. Iatrogenic ureteral injuries: a 20-year experience in treating 165 injuries. J Urol. 1996; 155: 878 - 81.
12. Sharfi AR, Ibrahim F. Ureteric injuries during gynaecological surgery. Int Urol Nephrol. 1994; 26: 277 - 81.
13. Jha S, Coomarasamy A, Kiong C. Ureteric injury in obstetric and gynaecological surgery. The Obstetrician & Gynaecologist. 2011; 6: 203 - 8.
14. Walter AJ, Magtibay PM, Morse AN, Hammer RA, Hentz JG, Magrina JF. Perioperative changes in serum creatinine after gynecologic surgery. Am J Obstet Gynecol. 2002; 186: 1315 - 19.
15. Harrison KA. Child-bearing, health and social priorities: a survey of 22 774 consecutive hospital births in Zaria, Northern Nigeria. Br J Obstet Gynaecol. 1985; 92 Suppl 5:1-119.
16. Wijaya T, Lo TS, Jaili SB, Wu PY. The diagnosis and management on ureteric injury after laparoscopy. Gynecology and Minimally Invasive Therapy. 2015; 4(2): 29-32.
17. Sakellariou P, Protopapas AG, Voulgaris Z, et al. Management of ureteric injuries during gynecological operations: 10 years experience. Eur J Obstet Gynecol Reprod Biol. 2002; 101(2): 179 - 84.
18. Gild P, Kluth LA, Vetterlein MW, Engel O, Chun FK, Fisch M. Adult iatrogenic ureteral injury and strictureeincidence and treatment strategies. Asian Journal of Urology. 2018 Feb 17; 5(2):101 – 6.

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