

## Intraoperative Management of Urological Injuries in Obstetrics and Gynaecological Surgeries: 1 Year Experience in A Tertiary Care Centre.

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**Abstract:***Introduction:*Gynaecological and obstetric surgeries, potentially lead urological injuries due to close embryological and anatomical approximation of female genital and urinary tract. Acute complications like ureteric lacerations, tying of ureters, bladder lacerations and bladder incision are common.

*Methods and material:* We have collected data retrospectively from departmental registry of Department of urology, NRS Medical College And hospital. In nine patients who had iatrogenic injury to bladder and ureter, urologist help was called for .

*Results :* 9 cases of urological injuries from April 2017 to March 2018 who underwent hysterectomy or caesarean section were retrospectively reviewed of which 5 (55.55%) involving urinary bladder and 4 (44.45%) involving lower ureters. All 5 cases of bladder injuries occur during LSCS procedure and all 4 cases of ureteric injuries occur during abdominal hysterectomy procedure. 3 out of 5 patients having bladder injuries occur in patients with a previous history of LSCS. 4 cases of bladder injuries are stage 3 type . One patient had complete transection at dome of bladder

*Conclusion:* A thorough understanding of the anatomy of the pelvis is necessary in order to prevent and manage lower urinary tract misadventures

**Key Word:**urological injury, bladder injury, ureteric injury, neocystoureterostomy

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### I. Introduction

Urological injuries are rare but sometimes unavoidable during major pelvic surgeries. Gynaecological surgeries comprise the major chunk of surgeries causing iatrogenic urological injuries and most of these complications occur during surgeries via abdominal route compared to vaginal route.<sup>1</sup>Gynaecological and obstetric surgeries, potentially lead urological injuries due to close embryological and anatomical approximation of female genital and urinary tract.<sup>2</sup>

Urinary tract injuries occur in 0.3 % to 1 % of all gynaecological operations.<sup>3</sup>Two types of complications commonly occur. Acute complications like ureteric lacerations, transection of ureter, tying of ureters, bladder lacerations and unrecognized cystotomy are common. Chronic complications include vesicovaginal fistulas, ureterovaginal fistulas, and ureteric strictures.

At the time of identification of lower uterine segment urinary bladder injury can occur during the adhesiolysis if the patient had a previous history of LSCS. Whenever bladder adhesion is encountered it is preferable to do sharp dissection than blunt dissection.<sup>4</sup> Accidentally incision intended upon uterus may fall on hugely distended bladder as sometimes observed in prolonged and obstructed labor. Many a times in cases of cord prolapse a full bladder technique is used to elevate the presenting part, in such scenario when Cesarean section is planned bladder should be emptied to avoid any inadvertent injury. Bladder injury is also associated positively with attempted vaginal delivery after caesarean section. Iatrogenic bladder injuries can be of extra peritoneal or intraperitoneal type, the later accounts the most.

In a study of 29 patients who underwent various gynaecological procedures. Berkmen *et al* found that ureteral injury occurs most frequently in the lower third of the ureter (51 %), followed by the upper third (30%) and middle third (19%)<sup>5</sup>. The most common sites of ureteral injury are lateral to the uterine vessels, in the tunnel of the cardinal ligament, base of the infundibulo-pelvic ligament as the ureters cross the pelvic brim at the ovarian fossa and on the lateral pelvic wall just above the uterosacral ligament. Therefore meticulous attention should be paid while dealing with these sites. Long term sequel of ureteric injuries are urogenital fistulae and these are considered the most debilitating sequel as it affects the physical, mental and social health of the

patient. The operating surgeons are liable to face serious litigations in such misadventures hence early detection, repair and pre and post-surgery counselling is important in performing complex procedures<sup>6</sup>.

Other risk factors that contribute to urological injuries in gynecological surgeries are active infection, endometriosis, enlarged uterus, ovarian neoplasms, distorted pelvic anatomy, and uterine fibroids. We have studied retrospectively 9 cases of urological injuries in various obstetrics and gynecological surgeries along with their intra operative management from April 2017 to March 2018.

## **II. Methods**

We have collected data retrospectively from departmental registry of Department of urology, NRS medical College And hospital. In nine patients who had iatrogenic injury to bladder or ureter, urologist help was called for. The record of all the patients who suffered urological injury during these procedures was studied and analyzed including full clinical history, physical examination findings, and investigations especially the pelvic and abdominal ultrasound, operative details, timing of recognition of injury, how the injuries were recognized. Postoperative follow-up, including physical examination and investigations were noted.

Bladder and ureteric injuries are staged according to the American Association for the Surgery of Trauma injury scale.

Iatrogenic injuries to the bladder are staged as:<sup>7</sup>

Grade I: contusion, intramural hematoma or partial thickness laceration

Grade II: extraperitoneal bladder wall laceration <2 cm

Grade III: extraperitoneal >2 cm or intraperitoneal <2 cm

Grade IV: intraperitoneal bladder wall laceration >2 cm

Grade V: intra- or extraperitoneal bladder wall laceration involving the trigone or bladder neck.

Iatrogenic ureteric injuries are staged as:<sup>7</sup>

Grade I: Contusion or hematoma without devascularization.

Grade II: < 50% transection

Grade III: ≥ 50% transection

Grade IV: Complete transection with < 2cm devascularization

Grade V: Avulsion with > 2cm of devascularization

## **III. Result**

9 cases of urological injuries from April 2017 to March 2018 who underwent hysterectomy or caesarean section were retrospectively reviewed. Out of 9 urological injuries 5 (55.55%) injuries involve the urinary bladder and rest 4 (44.45%) injuries involve ureter. All 5 cases of bladder injuries occur during Caesarean Section procedure and all 4 cases of ureteric injuries occur during abdominal hysterectomy procedure. Three out of 5 patients having bladder injuries occur in patients with a previous history of LSCS. 4 cases of bladder injuries are stage IV type. One patient had complete transection at dome of bladder.

Out of 9 cases 4 patients had prior history of PID of which 3 had bladder injuries and 1 had ureteric injury. Abdominal hysterectomy was done in 3 cases for CA cervix and in 1 case for fibroid uterus.

Intraoperative diagnosis was made after visualization of bulb of Foley's catheter. Intraoperative management was done by closing bladder with 2.0 vicryl in 2 layers with omental transposition in the vesico uterine pouch. Water tightness is checked by instilling diluted povidone iodine per urethally. Before removal of per urethral catheter a digital cystogram was done on post-operative day 14 in all bladder injury repair to confirm that there is no leakage.

We want to share our experience of one bladder injury case for which urologist help was called for. Twenty eight years old lady with history of previous lower uterine caesarean section without any living issue presented to department of obstetrics with diagnosis of term pregnancy with placenta percreta invading the bladder. Preoperatively plan was done to deliver the baby by abdominal route and abdominal hysterectomy if post partum haemorrhage occurs. Accordingly midline incision was made. Bladder was adhered to anterior wall of uterus. Grade IV Injury to the dome of bladder occurs while doing adhesiolysis. Baby was delivered by a vertical incision on uterus. Placenta was tried to be removed by curettage. Profuse bleeding occurs at that time. Bilateral internal iliac arteries were clamped and ligated as well as the posterior wall of uterus was resected as a life saving procedure. Anterior wall of uterus could not be resected out as it was grossly adhered with anterior wall of bladder. Bilateral ureteric orifice identified and confirmed by passing 5 Fr feeding tube. Bladder closed

in 2 layers. Plication of anterior wall of uterus was done over the posterior wall of bladder to control the hemorrhage. Wound closed in layers after putting drain.

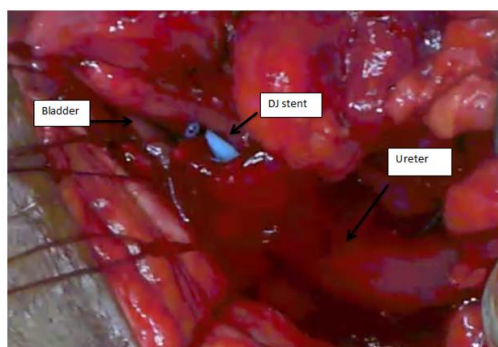
All the ureteric injuries were unilateral and involves the lower ureter in 3 cases and mid ureter in 1 case. All cases of ureteric injuries are of grade IV type and identified on suspicion due to profuse leakage in the operative field. Lich Gregoirextravesicalneocystoureterostomy along with Psoas hitch was done in 3 cases and uretero ureterostomy was done in 1 case. DJ stent were placed in all case of ureteric injuries during repair and removed after 6 weeks .

The types of injury, their intraoperative management and number of patient in each group is shown in Table 1

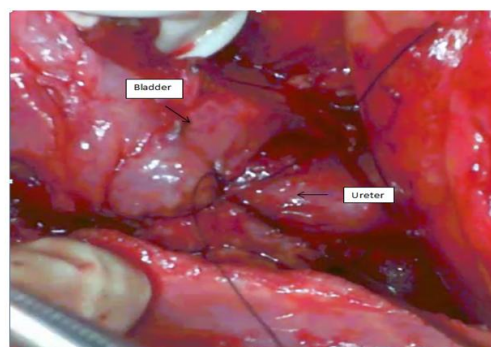
**Table 1**

Types of injuries	Management	No of patients
Bladder injuries Grade 4	Repair in 2 layers	4
Complete transection of dome of bladder	Repair in 2 layers	1
Lower ureteric injuries	Lichgregoirextravesicalneocystoureterostomy	3
Mid ureteric injuries	Ureteroureterostomy	1

All patients were prescribed anticholinergics post operatively .Follow up with IVU was done at 3 months in all cases of ureteric injury to confirm if there is any stenosis at the anastomotic site. All 4 patients had anastomotic patency at 3 month follow up.



**Fig: 1 (A)**



**Fig: 1(B)**

**Fig:1:**(A)- Bladder , ureter with DJ stent as seen during extravesical Lich Gregoir neocystoureterostomy. (B)- After completion of Lich Gregoir procedure in the same pateint.

#### **IV. Discussion**

Bladder injuries were most common urologic injuries in our study. Separation of bladder from lower segment of uterus in patients with previous cesarean sections accounts for the bladder injury in most of the cases as scarring from previous surgery obliterates the safe surgical plane and makes the dissection difficult. In such circumstances a upward traction on the vesico-cervical fascia will make the dissection between bladder and uterus safe. Presence of urine leakage in the operative field or hematuria in the urine bag indicates bladder injury; however a large cystotomy is easily detected while on suspicion smaller tears can be detected by filling the bladder with normal saline or methylene blue <sup>8</sup>. There is no doubt that primary repair during the operation has excellent results. In our study, the majority of bladder injuries were easily detected by the operating gynaecologist and obstetrician which can be explained by the easier accessibility of the urinary bladder for assessment intra-operatively. In a case-control study among 14,757 deliveries who underwent cesarean delivery Phipps *et al.* found 42 bladder injuries were out of which 28 bladder inuries occur in repeat cesarean section and showed that the adjusted risk for bladder injury associated with prior cesarean delivery was 3.82 <sup>9</sup>. In our study we have too seen that 3 out of 5 bladder injuries ( 60% of bladder injuries in our study ) occur in during repeat Cesarean Section.

Iatrogenic ureteral injuries are a potential complication of any pelvic operation. In a 20 year study from 1972 to 1992 by Selzman AA *et al* , among 156 iatrogenic ureteral injuries gynaecological procedure stands second to endourological procedures accounting for as many as 56 (34%) injuries in his study).<sup>10</sup> Selzman AA *et al* also found that of all injuries 91% occurred in the lower third, 7% in the middle third and 2% in the upper third of the ureter, respectively. In our study we have seen that 3 out 4 injuries occurs in lower

ureter. Anatomically ureter can be divided into three portions. The upper ureter is the segment extending from ureteropelvic junction to the area where it crosses the sacroiliac joint, the middle ureter is the segment that courses over the bony pelvis and iliac vessels, and the lower ureter is the segment that extends from iliac vessels to the bladder.<sup>11</sup>

The ureter is injured during approximately 2.2% of all hysterectomies and routine gynecological pelvic operations<sup>12</sup>. In a prospective study by Ibeanu OA et al, among 839 patients the incidence of urinary tract injury associated with hysterectomy for benign disease was found to be 4.3% (39 of 839 cases).<sup>13</sup> In our study we have found that all 4 ureteric injuries occur during abdominal hysterectomy procedure. In our study one ureteric injury occur in abdominal hysterectomy done for benign disease ( Fibroid uterus).

Majority of bladder injuries are diagnosed intra-operatively and majority of ureteric injuries are diagnosed post-operatively. Mann W J et al reported that around 70% of ureteric injuries are diagnosed postoperatively<sup>14</sup>. Each and every attempt should be made to find the location, grade of ureteric injury if suspected so as intraoperative identification of injuries enables prompt repair and is associated with decreased morbidity<sup>15</sup>. The use of intraoperative cystoscopy to assess urine efflux from the ureteral orifices, with or without ureteral catheterization, may be helpful but negative cystoscopy should not be solely relied on to rule out ureteral injury, as cases with partial obstruction and ureteral patency can be missed<sup>16</sup>. Ibeanu and associates found that universal intraoperative cystoscopy detected 97.4% of ureteral injuries (817 of 839 cases).<sup>13</sup> However, as cystoscopy is cost-effective, hence, should be considered in complex cases. In certain instances, intraoperative fluoroscopy with urography using a radio-opaque contrast agent may also be useful to characterize ureteral stricture, obstruction, or leak.

Conclusion. In any pelvic surgery in order to prevent and manage lower urinary tract misadventures thorough understanding of anatomy is necessary. Intraoperative management is better in terms of morbidity and therefore if suspicion occurs efforts should be made to identify the injury. Conditions that increase the likelihood of lower urinary tract injuries like endometriosis, retroperitoneal fibrosis, and pelvic inflammatory disease should be kept in mind while operating in pelvis to avoid any urological mishap.

#### Abbreviations:

LSCS: Lower segment caesarean section

DJ stent: Double J stent

PID: Pelvic inflammatory disease

CA: carcinoma

IVU: Intravenous urogram

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