

# Iatrogenic Urinary Tract Injury in Major Obstetrics and Gynaecological Surgeries

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## Abstract

**Background:** To determine the prevalence and types of iatrogenic urinary tract injuries during obstetrics and gynaecological procedures and to find out the possible risk factors.

**Methods:** In this cross sectional study all patients undergoing major obstetrics and gynaecological surgeries were included. Variables included the personal data, age of the patient at time of surgery, Indication , type of surgery , location and type of injury and possible risk factors. Surgical approach and cause of injury was determined. Data regarding risk factors was collected on specified proforma. Iatrogenic urinary tract injury was defined as any inadvertent injury to the urinary tract for which additional intervention and observation was required. Major surgery was any surgery with duration more than 30 minutes including opening of peritoneal cavity.

**Results:** Records of 1800 patients was studied. Out of 1900 patients 8(0.44 %) suffered from iatrogenic urinary tract injuries. Median age of patients was 33 years. The procedure in which most urinary tract injuries occurred was peripartum hysterectomy, second most common procedure was total abdominal hysterectomy. Most common injury was injury to urinary bladder. It was injured in 5 (0.27 %) cases. Ureters were damaged in 2 (0.11%) patients. Urethra was damaged during 1( 0.05%) procedure. The main risk factor was previous surgery with resultant adhesions present in 75% of patients having iatrogenic urinary tract injuries. Seven cases of injury were diagnosed at the time of operation and successfully repaired. One case was diagnosed late and developed ureterovaginal fistula.

**Conclusion:** Iatrogenic urinary tract injury is uncommon but carries serious morbidity. Adhesions due to previous surgery were an important risk factor .

**Key Words:** Iatrogenic injury, Urinary tract injury, Gynaecological surgeries ,Obstetric surgeries.

## Introduction

The potential of urinary tract injury is high during gynaecological and obstetric surgeries due to close anatomical approximation of female genital and urinary tract therefore such injuries are known complication of these surgeries.<sup>1</sup> The risk of injuries is increased when there are pelvic adhesions, severe bleeding or altered pelvic anatomy due to certain pathology. Urinary tract injury complicates 0.3 % to 1 % of all gynaecological operations. <sup>2</sup> These are of two types i.e. acute complications like ureteric lacerations, tying of ureters, bladder lacerations or bladder incision. Chronic complications include vesicovaginal fistulas, ureterovaginal fistulas, and ureteric strictures.<sup>3</sup>

Procedures performed by urological surgeons, obstetricians, gynaecologists, and general surgeons account for majority of iatrogenic injuries. <sup>4</sup>The awareness of risk factors is important. Avoiding the risk factors, and if injury does occur early recognition and immediate repair will lead to better prognosis. Lack of recognition at time of injury will require additional procedure at later interval, which can lead to increased morbidity, loss of renal function and even death. <sup>5</sup>

Iatrogenic bladder injuries are not uncommon. Hysterectomy, whether abdominal, vaginal or peripartum, is most commonly implicated in bladder injury. Eighty percent of the injuries are identified intraoperatively. <sup>6</sup> It can be diagnosed by direct visualization, seeing the foley's catheter or urine external to the bladder and sometimes there is collection of air in the foley's catheter or urine bag. Perioperative the bladder injury may present with suprapubic pain, haematuria and oliguria. The patient may suffer from peritonitis and severe sepsis if not treated at proper time.

Due to close proximity of ureters to the pelvic organs, they are highly susceptible to Iatrogenic injuries.<sup>7</sup> Gynaecological surgeries account for more than 50 % of ureter injuries. Mechanism of injury may be inadvertent ligation, partial or complete transection,

crushing or unintentional devascularization, or electro-cauterization. During hysterectomies ureters are mostly injured during ligation of ovarian and uterine vessels. <sup>8</sup>Urethral injury can occur during vaginal hysterectomy and anterior colporrhaphy. Mostly it is recognized at time of surgery, if suspected it can be diagnosed by carefully passing a metallic catheter and tracing its path.

Simple strategies can be adopted to prevent these injuries. The surgeon should be familiar with the pelvic anatomy. Preoperative identification of risk factors and if required preoperative IVU or CT scan is advocated along with appropriate planning of surgical technique. Intraoperative screening for this injury will include direct intra operative visual identification of ureters, urinary bladder and urethra depending on type of surgery, this will screen for injury. Confirmatory measures will include palpation, retrograde filling of urinary bladder, intravenous pyelography or retrograde pyelography and cystoscopy. <sup>9</sup>Most minor bladder injuries can be managed with simple catheterization of urinary bladder for 7-10 days and bed rest. <sup>10</sup> Cystogram is performed after specific period, if the laceration, in sealed catheter, is removed for trial of voiding. In case of major injuries second surgery is required. Management of urethral injury is based on type of injury, aim of treatment is to prevent stricture formation and to maintain continence. <sup>11</sup>

### Patients and Methods

This cross sectional study was carried out at Rawal Institute of Health Sciences (RIHS) from January 2012 – December 2016. The study included all patients undergoing major obstetrics and gynaecological surgeries. Variables included the personal data, age of the patient at time of surgery, Indication, type of surgery, location and type of injury and possible risk factors. Surgical approach and cause of injury was determined. Data regarding risk factors was collected on specified proforma. Iatrogenic urinary tract injury was defined as any inadvertent injury to the urinary tract for which additional intervention and observation was required. Major surgery was any surgery with duration more than 30 minutes including opening of peritoneal cavity.

### Results

1800 gynaecological and obstetrical operations were performed in study period. The mean age of the patients was 33 years. Caesarean section was the

commonest surgery performed (Table 1) Total 8 (0.44 %) patients had iatrogenic urinary tract injury. Of these 5 (0.27 %) had urinary bladder injury, 2 (0.11 %) patients had ureteric injury, and 1 (0.05%) patient had urethral injury (Table 2). Viewing the associated risk factors in the surgeries complicated by iatrogenic urinary tract injury, distortion of pelvic anatomy due to different reasons was reported in 4 (50 %) patients (Table 3). Dense adhesions due to previous surgeries or local pathology was seen in 6 (75%) patients. Five (62.5%) surgeries were performed in emergency. Unanticipated change was reported in 4 (50%) surgeries. Massive intraoperative bleeding was reported in 6 (75 %) cases (Table 4). Five (62.5 %) surgeries were being performed by junior surgeons who might have had less experience. Considerable overlapping of risk factors was observed. In the presence of risk factors there was greatest risk of ureteric injury and chance of bladder injury was also increased.

**Table 1: Type of major obstetrical and gynaecological surgeries**

Type of surgery	Number	Percentage
Caesarean section	1549	86%
Total abdominal Hysterectomy	129	7.1%
Laparotomy	80	4.4%
Vaginal hysterectomy	20	1.1%
Myomectomy	13	0.72%
Caesarean Hysterectomy	09	0.5%

**Table 2: Association of surgery with type of injury**

Type of Surgery	Ureteric Injury	Bladder Injury	Urethral Injury
Caesarean section		02(0.11%)	
Total abdominal Hysterectomy			
Laparotomy			
Vaginal hysterectomy		01(0.05%)	01(0.05%)
Myomectomy			
Caesarean Hysterectomy	02(0.11%)	02(0.11%)	

**Table 3. Associated risk factors**

Risk Factors	Caesarean section	Caesarean Hysterectomy	VH	TAH	Total
Distortion of pelvic anatomy	-	1 (12.5%)	1 (12.5%)	2 (25%)	4(50%)
Emergency surgery	2 (25%)	3 (37.5%)	-	-	5 (62.5%)
Previous surgery and adhesions	2 (25%)	2 (25%)	-	2 (25%)	6 (75%)
Unanticipated change of surgery	1 (12.5%)	2 (25%)	-	1 (12.5%)	4 (50%)
Massive blood loss	1 (12.5%)	4 (50%)	-	1	6 (75%)
Junior surgeon	1 (12.5%)	3 (37.5%)	1 (12.5%)	-	5 (62.5%)

**Table 4. Associated risk factors with type of surgery**

	Distorted Pelvic Anatomy	Previous surgery & Adhesions	Emergency Surgery	Unanticipated change during surgery	Previous surgery & Adhesions	Massive blood loss	Senior surgeon	Junior surgeon
Ureteric Injury	yes	yes	yes	no	yes	yes	yes	no
Bladder Injury	no	No	yes	no	yes	yes	no	yes
Urethral Injury	yes	No	no	no	no	no	no	yes

## Discussion

Urinary tract injury can occur during gynaecological and surgical operations particularly hysterectomy, regardless of the surgical approach. In comparison to other studies the average age incidence of iatrogenic urinary tract injury was found to be 33 years. Iatrogenic injury to bladder is the most common complication of abdominopelvic surgeries. Iatrogenic bladder injury can occur during abdominal or vaginal hysterectomy.<sup>12</sup>

Patients at high risk of iatrogenic urinary bladder injuries include those undergoing emergency surgeries, those having previous pelvic surgeries resulting in adhesion formation, or distortion of pelvic anatomy. A meta-analysis by Xu Y et al reported similar findings.<sup>13</sup> Surgeon's experience is also an important factor.<sup>14,15</sup> In our series, gross pelvic adhesions were reported to be risk factors for iatrogenic urinary tract injury in 75 % cases. Massive blood loss was also a significant risk factor responsible for 75% of injuries. 62.5% surgeries complicated by iatrogenic urinary tract injuries were being performed by junior doctors. Similar observation was reported by

study at Tanzania hospital.<sup>14</sup> Study performed at Tufts University School of Medicine (TUSM) also stated that risk factors for bladder injury were previous surgery, inflammation and malignancy.<sup>16</sup> In agreement with other studies, Caesarean hysterectomy was the leading cause for bladder injury (0.27%) followed by ureteric injury (0.11%).

The ureters are at increased risk of injury during gynecological procedures due to their location in pelvis, ureters are lying close to the uterine arteries near cervix. Injuries, may be almost unavoidable in some situations like distorted pelvic anatomy, dense adhesions or massive hemorrhage. Iatrogenic injury to the ureters ranges from < 1 % to 10 % depending on complexity of the procedure.<sup>17</sup> Pelvic ureters was the segment most commonly injured during gynaecological procedures. The segment that is difficult to identify is the portion between the intersection with the uterine arteries and the bladder.<sup>9</sup> In our studied cases there were two ureteric injuries both occurred during caesarean hysterectomies. But, in a study conducting at Ayub Medical College, abdominal hysterectomy was the commonest cause of ureteric injury.<sup>18</sup> The injury involved inadvertent ligation of ureters. One case was identified during surgery as the surgeon screened for ureteric injury after hysterectomy. The ligature was opened and the patient did not suffer from any complication. The second case was a difficult caesarean hysterectomy following lower segment caesarean section secondary to abnormally adherent placenta praevia. Haemostasis was secured with great difficulty and ligation of right ureter was not diagnosed at time of surgery. Patient presented three weeks later with continuous dribbling of urine, due to uretero-vaginal fistula and second surgery was required for fistula repair.

The injury to urethra was least common of the iatrogenic injuries. It occurred in 1 (0.05 %) surgery which was being performed by a junior surgeon and immediate repair performed by the urologist and no further complications were reported. High risk cases need to be operated after full evaluation and in the presence of consultant. If required, urologist should be involved early. Unanticipated change during surgery should be resorted to after consultation and ideally in the presence of a senior consultant. If indicated bladder should be adequately drained with foley's catheter. In case of previous surgery the peritoneal cavity should be entered at the superior aspect of abdominal incision. In presence of dense pelvic adhesions and distorted anatomy careful sharp dissection is performed for better visualization. In case

of heavy bleeding blind haemostatic sutures should be avoided. It is advisable to perform intra operative screening for ureteric injury and early involvement of urologist.

### Conclusion

1. Iatrogenic urinary tract injury is rare but carries serious morbidity.
2. The primary approach to prevention is knowledge of the position of urinary tract structures within the surgical field and careful surgical approach.
3. All obstetricians and gynaecologists must maintain awareness regarding presenting symptoms, signs and diagnostic options of iatrogenic urinary tract injury .
4. Prompt diagnosis and treatment can reduce morbidity ,save kidney function and prevent long term complications.

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