BLADDER AND URETER INJURIES DURING OBSTETRIC AND GYNAECOLOGICAL PROCEDURES

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ABSTRACT
Objective: To determine the frequency and nature of urological injuries in obstetric and gynaecological procedures in our setup.
Setting: Departments of Gynaecology & Obstetrics (Unit III) of Civil Hospital, and two private hospitals of Karachi.
Patients: A total of 3140 patients, who underwent Caesarean section (2580) and hysterectomy (560) operations were included in the study.
Methodology: Detailed history and physical examination, and the investigations of the patients were carried out. Patients were operated by a senior surgeon, and those that suffered urological injury were analysed. The nature of injury and the timing of diagnosis was studied.
Results: Out of the 560 patients that underwent hysterectomy 10(1.7%) patients and amongst the 2580 Caesarean section patients 12(0.46%) sustained bladder injury; accidental cystostomy occurred in 14 and minor perforation in eight cases. Urteric injury was seen in seven (1.25%) hysterectomy and four (0.15%) Caesarean section patients; the injuries included ligation in 5(0.15%) cases, transection in 3(0.09%), ligation and transection in 2(0.06%), and urinary fistula in 1(0.03%) case. Intra-operative diagnosis was made in 3(27.3%) and postoperative in 8(72.7%) patients. Cases of bladder injury were treated by formal surgical repair, while patients with ureteric injury were treated by surgical repair and stenting.
Conclusion: To reduce the morbidity from urological injuries in obstetric & gynaecological procedures, careful pre-operative workup, and in difficult cases anticipation and suspicion of the injury is essential.

KEY WORDS: Hysterectomy, Caesarean Section, Bladder Injury, Ureteric Injury

INTRODUCTION
Urological injuries are an important concern of a gynaecologist especially during hysterectomy and Caesarean section. Urological injuries in gynaecological surgeries occur due to difficult or careless surgery or/and are associated with active infection, endometriosis, enlarged uterus, previous pelvic surgery, pelvic adhesions, ovarian neoplasms, distorted pelvic anatomy, cervical fibroids, and broad ligament fibroids. In 2002, Carley and associates reported the incidence of bladder and ureter injuries, respectively, as 0.58% and 0.36% for abdominal hysterectomy, 1.86% and 0% for vaginal hysterectomy and 5.13% and 1.71% for obstetric hysterectomy. The incidence of bladder injury increases with previous Caesarean deliveries. Women with urological injuries during gynaecological or obstetric procedures were found to have greater blood loss, longer operative time, more frequent blood transfusions, more febrile morbidity and longer hospital stays. The introduction of laparoscopic hysterectomy in the west resulted in an increased incidence of urological injuries; with the achievement of the learning curve the frequency of bladder injury has declined but that of ureteric injury is still high.

PATIENTS & METHODS
This study was carried out in the Gynaecology & Obstet-
Bladder and Ureter Injuries

<table>
<thead>
<tr>
<th>Type of Surgery</th>
<th>No. of Surgeries</th>
<th>Bladder Injury</th>
<th>Ureteric Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Hysterectomy</td>
<td>380</td>
<td>9 (2.4%)</td>
<td>7 (1.8%)</td>
</tr>
<tr>
<td>Vaginal Hysterectomy</td>
<td>180</td>
<td>1 (0.5%)</td>
<td>----</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>2580</td>
<td>12 (0.5%)</td>
<td>4 (0.2%)</td>
</tr>
</tbody>
</table>

Table I. Distribution of Urological Injuries

Out of 560 patients who underwent hysterectomy, 380 (67.8%) had abdominal (AH) and 180 (32.2%) vaginal hysterectomy (VH). The frequency of bladder injury was higher in AH being 2.4% (9) as compared to 0.5% (1) in VH. The incidence of ureteric injury was 1.8% (7) in AH whereas no such injury occurred in the VH group. Amongst the 2580 Caesarean sections, bladder injury occurred in 12 (0.46%) patients and ureteric injury in four (0.15%) cases (Table I).

Amongst the nine bladder injuries during AH, six were due to pelvic adhesion from previous Caesarean sections (CS), while two resulted from unsafe diathermy dissection. They were diagnosed intra-operatively and repaired in two layers with 2/0 vicryl with Foley’s catheter drainage for 14 days. One bladder injury was diagnosed in the post-operative period due to urinary discharge from the the drain; re-operation with repair of the perforation was uneventful. The only bladder injury that occurred in VH was due to accidental entrapment of the bladder. It was recognised post-operatively due to the leakage of urine per vaginum and was confirmed on cysotography; re-operation and repair was successfully performed.

All the 12 cases of bladder injury among Caesarean sections had a previous history of CS; one of the patients had four and another seven previous CSs. The posterior wall of the bladder was densely adherent to the lower uterine segment, their separation resulted in cystostomy in six cases and minor perforations in four. In two cases profuse bleeding obscured the operative field and blind dissection resulted in bladder tears. All were repaired successfully.

The distribution of ureteric injuries is shown in Table II. Injuries during hysterectomy involved lower third of ureter whereas injuries during the Caesarean section involved middle third of ureter. No ureteric injury occurred during vaginal hysterectomy. Amongst the seven cases of ureteric injury during AH, four patients had carcinoma cervix where the anatomy was obscure, while three cases resulted from bleeding and attempts to secure haemostasis blindly. Four injuries were left-sided and two right sided, while one was bilateral. All four ureteric injuries during CS resulted from blind sutures to secure haemostasis, and were equally distributed on each side.

Out of the five patients with ligation injury, two were diagnosed during surgery; the ligature was identified, removed and DJ stenting performed. The remaining three cases were diagnosed in the post-operative period due to lumbar pain and fever. Ultrasound examination

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>No. of Injuries</th>
<th>Intraoperative diagnosis</th>
<th>Postoperative diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ligation</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Transection</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ligation &amp; transection</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Fistula</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table II. Distribution of Ureteric Injuries
revealed hydronephrosis while intravenous urography confirmed hydronephrosis with dilatation of ureter up to the level of ligation; suture removal and DJ stenting was successful. Among the three cases of transection, one was recognised at the time of surgery and two in the post-operative period due to leakage of urine from the drain. All three were managed successfully by primary repair and DJ stenting. Two cases of ligation and transection were diagnosed in the early post-operative period. One presented with anuria due to ligation and transection of both the ureters, while the other presented with fever and loin pain. Ultrasound and IVU made the diagnosis clear. One ureter required re-implantation; in the other two anastomosis with DJ stenting was successful. One patient with partial injury to the ureter presented post-operatively with leakage of urine from the vagina; IVP confirmed partial transection. Endoscopic stenting was done successfully and the fistula closed spontaneously within six weeks.

**DISCUSSION**

In this study, the rate of bladder injury was 0.70% and that of ureteric injury 0.35%, which is comparable to other series where bladder injuries ranged from 1.0% to 1.8% and ureteric injuries 0.2%-0.4%. Thompson quoted an incidence of 0.43% ureteric injuries in gynaecological operations while Montz and associates reported bladder injuries between 0.5-1%. Raut et al. in their study described the incidence of bladder and ureteric injuries in gynaecological surgery as 1.23% and 0.11% respectively, whereas in obstetric surgery the incidence of bladder and ureteric injury was 0.67% and 0.33% respectively.

Bladder injuries stand prominently in our study. They occurred mostly during separation of bladder from lower segment of uterus in patients with previous Caesarean sections. Scarring from previous surgery obliterates the safe surgical plane, thus making the dissection difficult. In this situation, application of upward traction on the vesico-cervical fascia will make the dissection between bladder and uterus safe. The presence of urine in the operative field should lead to the suspicion of bladder injury; large cystostomy is prominent by itself, while smaller perforations can be detected by filling the bladder with normal saline. There is no doubt that primary repair during the operation has excellent results.

Ureteric injuries can be minimized by avoiding blind clamping of blood vessels, operating close to the pathology, identification of the ureter in its course before dissection, careful mobilization from the operative site and short diathermy applications. The ureteric injuries are difficult to diagnose intra-operatively. However, a high degree of suspicion in difficult cases of scaring, carcinoma cervix, large pelvic masses and haemorrhage should lead to the confirmation of ureteric integrity by giving injection of frusemide and looking for urinary leakage, ureteric dilatation and peristalsis. In anticipated difficult cases bilateral ureteric catheterization helps in the recognition of ureters during surgery. Unfortunately, in most (70%) cases, the diagnosis of urological injuries, especially to the ureter, is made post-operatively. Intraoperative identification of urological injuries enables prompt repair and is associated with decreased morbidity and fewer legal risks.

The use of intraoperative cystoscopy during urogynaecological operations have shown the incidence of urological injury between 2.6-8 %, whereas its use in major benign gynaecological operations detected otherwise unsuspected injuries in 0.4% cases. Cystoscopy should be considered in complex cases, as it is cost effective. A high index of suspicion must be maintained in patients with unexplained haematuria, fever, abdominal or flank pain and poor urine output. 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.

The general principles of ureteric repair are tension-free anastomosis by ureteric mobilization, ureteric dissection preserving adventitial sheath and its blood supply, minimal use of fine absorbable sutures to attain watertight closure, use of peritoneum or omentum to surround the anastomosis, drainage of the anastomotic site with a passive drain to prevent urine accumulation, stenting with a ureteric catheter and proximal diversion.

**CONCLUSION**

Urological injuries though uncommon, are an important contributor to morbidity. Knowledge of pelvic anatomy, careful dissection and patience in difficult cases are the key factors to anticipate and prevent injury.

**REFERENCES**


3. Phipps MG, Watabe B, Clemons JL, Weitzen S,


