IATROGENIC INJURIES OF THE URINARY TRACT IN WOMEN UNDERGOING PELVIC SURGERIES
Padmasri R1, Jnaneswari T.L2, Rupa S. Iyengar3, Urvashi Bhatara4, Priyadarshini B5

ABSTRACT: Iatrogenic injury to the urinary tract during Obstetric and Gynaecologic surgery can be a source of significant morbidity. Urologic injury during pelvic surgery is primarily a matter of prevention; should it occur however prompt recognition and appropriate management are essential. The most commonly injured organs are the bladder, ureter and urethra. Whenever anticipated, prior delineation of the course of the pelvic ureter by exposing its course and frequent visualisation throughout the surgery prevents most of the injuries. Three different cases of iatrogenic injuries at different sites in the urinary tract are presented here and their preventive and treatment aspects are discussed.

KEY WORDS: Urinary tract, trauma, stent, cystoscopy

INTRODUCTION: Few complications of gynaecologic surgery create more anxiety and medico-legal concerns than lower urinary tract injuries. The anatomic proximity of the reproductive and lower urinary tracts predisposes them to iatrogenic trauma during obstetric and gynaecological surgery. Bladder is the most common urologic organ injured during surgery. An incidence of 1.8% of bladder injuries during LSCS has been reported [1]. Though incidence of ureteral injuries is almost similar in abdominal and vaginal hysterectomy, hardly one third of them are recognised intra operatively. This leads to renal damage in 25% of such cases resulting in morbidity and mortality. Obstetrics and Gynaecologic surgeries account for more than 60% of urologic injuries, higher than the urologist or the general surgeon. To decrease the rate of morbidity, the gynaecologist surgeon must be able to anticipate the potential apparition of a specific urologic lesion, based on the risk factors of the patient, so that he/she can then prevent the iatrogenic trauma [2]. A series of three cases with urologic injuries is discussed below.

CASE 1: A 42 year old parous lady presented with symptoms of dysmenorrhoea, increased frequency of micturition and occasional retention of urine. She was found to have a large posterior wall cervical fibroid (10x8x6 cm) indenting the posterior bladder wall. She was posted for total abdominal hysterectomy. During surgery, uterus was highly vascular, leading to lot of haemorrhage, resulting in blind clamping. There was difficulty in clamping lower pedicles, with clamps being applied lateral to the tumour. After hysterectomy, it was found that the ureter on the left side had been transected with urine spurting out. Cystoscopy revealed that the ureter on the right side was included in the last ligature. Both ureters were stented and end to end anastomosis of the ureters was done. [Fig 1]

CASE 2: A 17 year old girl with primary amenorrhoea was diagnosed as having vaginal agenesis. She was posted for reconstructive surgery of the vagina. Dissection during surgery resulted in...
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inadvertent injury to the trigone of the bladder. The injury was closed with cystoscopic visualisation and temporary ureteral stenting.

CASE 3: A 37 year old multigravida with term pregnancy presented with severe pregnancy induced hypertension with intrauterine foetal death. She had a previous caesarean section. She was induced with prostaglandin gel and then augmented with oxytocin. When uterus suddenly relaxed she was suspected of having a uterine rupture. During surgery, the bladder was found to be densely adherent. The baby was extracted with help of a single forceps blade (vectis) resulting in a tear in the fundus of the bladder. [Fig 2] Vesicorrhaphy was done. Continuous bladder drainage was kept for 14 days.

DISCUSSION: Although most cases of ureteral injury occur in patients without significant risk factors, the incidence of urinary tract injuries increases in patients with prior pelvic operations, extensive endometriosis, inflammatory bowel disease, pelvic inflammatory disease, and in patients with extensive neoplasms causing distortion of normal surgical planes [3]. Mechanisms of injury to the ureter include crushing, ligation, transection (partial/complete), angulation, ischaemia and resection [4]. Ureteric injuries usually involve the pelvic ureter. The common sites of injury are ovarian vascular pedicile at infundibulo-pelvic ligament, the ureteric relation with the uterine artery, where it crosses under the artery, cardinal ligament tunnel, dorsal to the infundibulo -pelvic ligament near or at the pelvic brim, vaginal fornices and lateral rectal pedicles. An excretory urogram in difficult cases such as pelvic adhesions, endometriosis, large pelvic tumours and radical surgeries is a primary preventive measure. This along with preliminary finger dissection and identification of ureter, per operative ureteral catheterization and a voiding blind clamping during surgery help to reduce injuries. Ureter identification during a surgical procedure has been reported to range from an invasive procedure to a very minimal surgical procedure. Prophylactic ureteral catheterization may reduce the chance of a ureter injury. Until recently, ureter identification would consist of placement of catheters that could only be detected by palpation either by hand or laparoscopic instrument. Then came the use of visual identification of the ureters with lighted ureteral stents during gynaecologic procedures. As it causes transient haematuria and infrequent reflux anuria, it’s not used nowadays [5]. Ureteral stent placement to localize the ureters during operations is an invasive procedure. The non invasive novel technique of gamma probe localization of the ureters by using technetium Tc 99m-labeled diethylenetriaminepentaacetic acid ((99m) Tc-DTPA) administered intravenously before localization is being considered by some [6]. Ureteral imaging using Methylene blue near infrared (MB NIR) fluorescence provides sensitive, real-time, intraoperative identification of the ureters during open and laparoscopic surgeries[7]. Post hysterectomy cystoscopy done routinely, especially in difficult cases, with the identification of the ureteric jets of urine help in recognising most of the ureteric injuries other than thermal injuries which take about seven days to manifest. Recognition of ureteral injury during surgery and immediate repair is ideal and a secondary preventive measure. Usually an ureteroureterostomy in upper one third injuries or an ureteroneocystostomy with a Boari flap or psoas hitch, if required, for a tension free anastomosis, in middle third and lower one third, respectively, is carried out. [8]

In the second case the preventive aspect focuses on imaging modalities. Imaging assists in identifying the distances between vagina, rectum and bladder. Trans rectal ultrasonography
provides an accurate map of the pelvic organs showing the precise distances between the urethra and bladder anteriorly, rectum posteriorly, retrohymenal fovea caudally, and pelvic peritoneum cranially. Transrectal ultrasonography produces a picture that corresponded perfectly with the real anatomical situation [9]. Transperineal sonography is used to determine the length of a low lying obstruction. The distance between the perineal surface and the caudal aspect of the distended vagina can be measured with electronic callipers on the transperineal sonograms. This information is useful when planning reconstructive surgeries [10]. Transperineal or translabial sonography can be used where vaginal access is difficult. Sonocolpography is another technique for preoperative assessment, using a vaginal balloon and transabdominal ultrasonography. This is done by pushing the balloon maximally inward and determining the ability of the echoes of the vaginal pouch to accommodate the balloon to stretch and to cross over the defect. This cross-over test can also anticipate the need for surgery [11]. Magnetic resonance imaging (MRI) is the diagnostic tool in partial or complete vaginal agenesis. It’s advisable to take time for pre-operative assessment during vaginal surgeries since injuries usually involve the base of bladder with trigone and ureters. Whenever the trigone of the bladder is injured, prophylactic ureteral stenting must be done to prevent fistula formation, as was done in our case.

With liberalization of indications for caesarean section it is now the most common surgical procedure performed on women worldwide. Hence, the incidence of bladder injuries during caesarean section has risen. Bladder injury during caesarean section may occur by failure to empty the bladder pre op, inadequate bladder flap reflection or extension of the incision into vagina [12]. Previous caesarean section, stage of labour and station of the head being other aetiological factors. Techniques of caesarean section continue to be revised. A recent evidence based study says the creation of bladder flap during the surgery is not required [13]. If the uterine incision is made slightly above the vesicouterine peritoneal fold, the loose connective tissue between the uterus and the urinary bladder allows spontaneous descent of the bladder [14]. This could be a double edged sword, inadvertently increasing the risk of injury. The single blade of forceps, used as a vectis, for extraction of foetal head, as in this case, can cause lateral and vertical extensions and bladder injury. Fundal, anterior wall and intraperitoneal injuries should be surgically repaired on identification. Extra peritoneal injuries of bladder need not be repaired and tend to heal by themselves. The altered colour of the urine in the urobag is a significant sign in identifying ureteric injuries. Posterior wall of bladder should always be checked for integrity of trigone and proximity of ureters. Since in our case it was a tear in fundus of bladder, repair was done by primary surgeon, as there was no ureteric injury. Cystoscopy, retrograde cystography or computed tomographic (CT) cystography will aid in identification of site of injury, CT being the gold standard in delayed identification [15]. Cystotomy when adequately repaired is not associated with any complications.

CONCLUSION: The proximity of the female genital and lower urinary tracts naturally results in a degree of structural and functional interdependence. Traditional boundaries between some areas of surgical specialisation need to be reduced with cross boundary training like cystoscopy. The technology exists today to essentially prevent injuries to the lower urinary tract and should be used in any surgical procedure where the potential for lower urinary tract injury exists. A surgeon with no complications is the one who doesn’t operate! Despite such precautions injuries do occur and
immediate recognition and prompt treatment goes a long way in reducing the morbidity. The Gynaecologists need to be “ureter conscious” and “bladder savvy”.

REFERENCES:
AUTHORS:
1. Padmasri R.
2. Jnaneswari T.L.
3. Rupa S. Iyengar
4. Urvashi Bhatara
5. Priyadarshini B.

PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Obstetrics & Gynaecology, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore.
2. Assistant Professor, Department of Obstetrics & Gynaecology, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore.
3. Professor and HOD, Department of Obstetrics & Gynaecology, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore.
4. Assistant Professor, Department of Obstetrics & Gynaecology, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore.
5. Assistant Professor, Department of Obstetrics & Gynaecology, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Padmasri R.,
No. 3, Flat No. 002, “Renaissance Nest”, 17th A Cross,
11th Main, Malleshwaram, Bangalore – 560055, Karnataka State, India.
Email - drpadmasuraj@gmail.com

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