

# Bladder Injury during Cesarean Section

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## Abstract

Bladder injury during cesarean section is associated with significant morbidity. It can lead to prolonged operative time, urinary tract infection and formation of vesico-uterine or vesico-vaginal fistula. Post cesarean pregnancy, presence of abdominal and or bladder adhesions, emergency cesarean section, placenta previa and/or accrete/increta/percreta, all are significant risk factors for bladder injury during cesarean section. Immediate repair of the bladder injury always yield better result. But the availability of an urologist is not always certain. The obstetrician should better be well conversant with the bladder repair, which is relatively simple technique and can manage the situation effectively.

**Keywords:** Urinary bladder; Cesarean; Injury; Intra-operative

## Introduction

According to the Royal College of Obstetricians and Gynecologists (RCOG), caesarean sections carry a risk of bladder injury 1 in 1000 cases [1]. In Saudi Arabia it is 0.44% [2], Karachi 0.46% [3], 0.67% Mumbai [4].

Conditions prone for intra-operative bladder injury –

1. Prolonged labor with distended bladder.
2. Obstructed labor.
3. Post cesarean pregnancy.
4. Post myomectomy pregnancy.
5. Post laparotomy pregnancy.
6. Cases with possibility of altered anatomy, fibrosis or direct extension of disease process as in cases of chronic pelvic inflammatory disease, endometriosis, and large fibroids especially in the broad ligament, previous pelvic surgery, malignancy, previous irradiation and congenital abnormalities of urogenital system [4].
7. Past history of uterine perforation, septic abortion.

These 3,4,5,6,7 conditions can have dense adhesion between the bladder and lower uterine segment with superior advancement of the bladder over the uterus.

8. In presence of labor, station of the presenting fetal part deeper than or equal to +1, and a large baby were independent risks for a bladder injury during caesarean section [5].
9. Well effacement and dilatation of cervix (uterine incision may fall over vagina and dissection of bladder from vagina is difficult in compare to lower uterine segment).
10. Preterm cesarean section where lower segment is not well formed.
11. During cesarean hysterectomy.

Rupture uterus may also be combined with bladder injuries. Placenta percreta may penetrate the bladder and cause injuries while pushing down utero-vesical fold of peritoneum.

## How the injuries occur

1. Many times bladder injury occurs while entering the peritoneal cavity due to pulling up and adhesion of the bladder
2. In prolonged labor and obstructed labor as the bladder is sometimes become hugely distended accidentally uterine incision may fall on the bladder
3. Cesarean hysterectomy usually is a supra-cervical hysterectomy, but if the surgeon attempts further it may lead to bladder injury. This is especially true for rupture uterus hysterectomy where local anatomy gets distorted
4. Release of bladder adhesion by blunt technique may lead to bladder injury; it is preferable to do sharp dissection [6] to push down the bladder whenever bladder adhesion encountered
5. In cord prolapse if the full bladder technique has been used to elevate the presenting part, then Foley's catheter must be opened just before starting cesarean section, otherwise hurried starting may cause bladder injury.

## Incidence

1. For post cesarean pregnancy – chance of injuries increases 3-fold. (0.6% vs 0.19%; repeat cesarean vs primary cesarean) [7]. In another study repeat cesarean associated with bladder injury in 0.81% cases in compare to primary cesarean 0.27% [2].
2. Risk increases to 1.5% after 4 or more previous uterine incision [8].
3. For patient in labor – 24% vs 16% in elective cesarean (RCOG) [1].
4. Dilatation of cervix – 9-10 cm dilatation 33% vs 0-1 cm dilatation 17% (RCOG) [1].
5. During cesarean hysterectomy - (1-4) % [6].

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## Diagnosis

1. Urine dribbles out in the operative field.
2. Hematuria; 95% of bladder injury have gross hematuria [9]. That's why; it is always advisable to ask the ancillary staff in the OT to check the urine color whenever there is doubt about bladder injury, even if there is no spill of urine in the operative field.
3. If anytime there is any doubt about the bladder injury it can be confirmed by instillation of methylene blue, indigo carmine or sterile milk, 300-400 ml into the bladder.

## Type of bladder rupture

1. Intra-peritoneal (20%) – when there is surgical trauma or trauma on a distended bladder.
2. Extra-peritoneal (80%) – Trauma either penetrating or blunt injury with fracture of pubis or surgical damage.

Intra-operative bladder injury usually leads to intra-peritoneal variety.

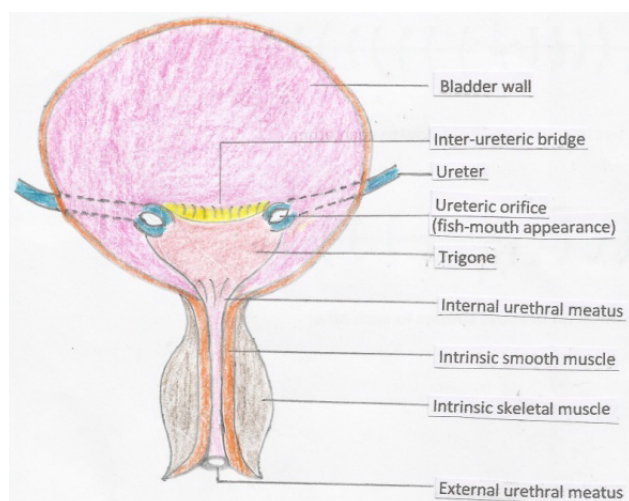


Figure 1: Urinary bladder and urethra (Coronal section).

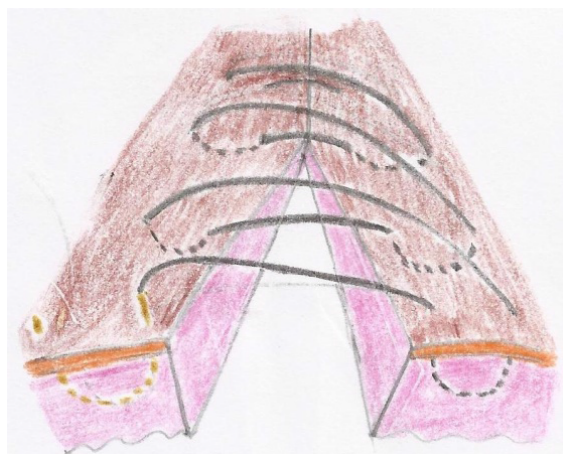


Figure 2: Lembert suture.

Bladder injury also to be categorised according to the area of involvement –

1. Dome of the bladder (usually this variety occurs).
2. Trigonal injury (Figure 1).

Trigone is the area bounded by the 3 openings – 1) 2 ureteric orifices in the upper part and 2) 1 internal urethral opening at lower part. Ureteric openings look like fish mouth. Mild elevation in between the 2 ureteric opening is known as inter ureteric bridge.

## When to do the repair

Immediately; even for caesarean hysterectomy it is been said that once the bladder injury is diagnosed it should be repaired immediately before completing the rest of the hysterectomy [10]. Exception to the immediate repair - some cases of placenta percreta, with intractable hemorrhage, are repaired in stages with the bladder left open until the second surgery (usually within 24-48 hours).

## Who can do the repair

If the injury does not involve the trigonal area, then the operating obstetrician herself/himself can do the repair. Once the trigone involve then it would be better to take the help of urologist or urogynecologist who are conversant with the ureteric evaluation and trigonal repair.

## Technique of bladder repair

1. Repair of the bladder can be done simply by 2 layers closure [6,8,11].
2. It is 2 layers continuous running sutures [6,8].
3. Though some advocates single layer closure [12].
4. Suture materials could be vicryl [6,11] could be other absorbable suture [8,12], needle should be small in size.
5. Size of the suture should be 2-0, 3-0 [6,8,12].
6. The authors had applied 2-0 chromic catgut with a small needle (no 4242) which was readily available in their OT setup.
7. For rupture uterus with bladder injury, the rent margins are trimmed and repaired [12].
8. The first bite can incorporate all layers including bladder mucosa, although many surgeons attempt to omit the bladder mucosa and include only the submucosa and muscularis layers [8].
9. The second imbricating layer may be either a parallel Lembert or a perpendicular Connell stitch [8].
10. Authors had applied both the technique – either inclusion of whole layer in first layer of stitch or include whole layer only in both angles and omit the mucosa in rest of the first layer. Both the repairs healed well, without any subsequent complication. First layer was continuous simple stitch and second layer was continuous interlocking stitch.
11. Injuries involving ureteric orifices and trigonal area may require ureteric stenting, ureteroneocystostomy etc.

Lembert suture – All bite partial thickness bite → First bite is taken a little away from the margin and needle is directed towards the margin → needle came out nearer to the margin but through the intact superior surface, not through the cut area → now suture crossed to other side →

bite is taken nearer to the margin through the intact superior surface, not through the cut area and came out little away from the margin → return to the opposite site → same procedure repeated (Figure 2).

Connell stitch – All full thickness bite → first one simple knot one side → now take bite from outside to inside → next bite on the same side 3 mm from previous bite, inside to outside → cross to the other side → now take bite outside to inside → again pierce same side 3 mm from the just previous bite, inside to outside → continue like this. Start suturing from each angle separately and then unite the two ends at the middle, outside (Figure 3).

Before starting repair it is advisable to become ensured that ureteric orifices and other parts of trigone are not involved. This we may come across in tear of posterior wall adherent to post cesarean scar.

If there is any doubt about the integrity of the ureters, cystoscopy should be performed postoperatively, preferably having given intravenous indigo carmine 10-15 minutes before to highlight the efflux of dye-stained urine from the ureters. If no cystoscope is available, a diagnostic hysteroscope can be used [6].

In placenta previa percreta with invasion of bladder wall – depending on the area of bladder involvement it can be opened and an ellipse of the posterior bladder wall containing the percreta can be excised and bladder sutured. Other alternative is to retain that portion of the uterine wall that is adherent to the bladder and perform hysterectomy, leaving that area with over-sewing on the uterine side to achieve hemostasis of the remnant of uterine wall. Cases of percreta with bladder involvement are among the most suitable one in which to consider conservative management [13].

## Post operative management

**Continuous bladder drainage:** Urologist prefers to keep both the suprapubic catheter and urethral catheter, whereas gynecologist prefers to keep only urethral catheter. So long bladder is remaining continuously compressed post operatively, both the methods are correct. Authors has applied only urethral catheter and there was no problem till now regarding continuous bladder drainage. Size of the catheter - suprapubic catheter (28 -24) Fr and Foley's catheter (16-18) Fr. Another dictum can be followed - for large ruptures, after repair, a suprapubic tube recommended, but a large urethral catheter would be sufficient for smaller injuries [14].

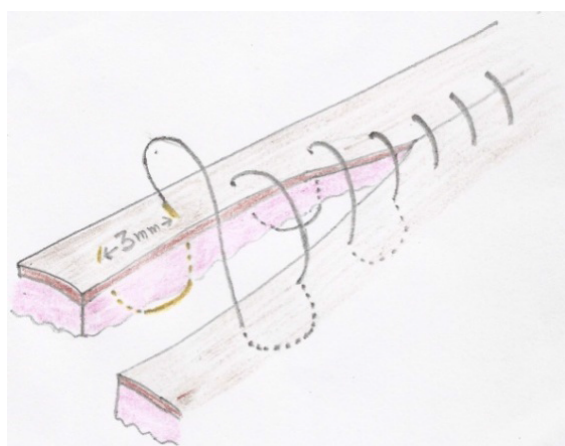


Figure 3: Connell stitch.

How long indwelling catheter is to be kept –

1. Safe practice is to keep an indwelling urethral catheter for 10 days – 2 weeks to keep the bladder compressed [11].
2. If suprapubic catheter is also inserted, then one safe guideline could be to start clamping of the suprapubic catheter on 10th day and remove it on 12th day. Urethral Foley's catheter is to be removed on 14<sup>th</sup> day.
3. Some people said to keep the suprapubic and urethral catheter are for 7 days [12].

It is advisable to send urine for culture & sensitivity every 3<sup>rd</sup> day during the catheter days.

## Medico-legal aspect

From a medico-legal point of view, it is wise to include a description of the identification of the bladder and ureters in the operation record [6].

1. If the bladder injury sustained during dissection of adhesion it may be defensible.
2. If the bladder is in an abnormal position – for example, high up over the uterus – then injury is much more likely to occur. In such cases, the damage caused to the bladder would not be negligent [1].
3. If there is no abnormal anatomy but the bladder is still injured – it may invite penalty.
4. If the intra-operative injury is not recognized during operation – it may invite penalty.

Hence, to avoid these medico-legal problems it is wise to discuss about these bladder injury problems during the counseling while preparing for cesarean section of those predisposing patients and keep a written evidence of it.

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