Review Article

Management of urinary bladder injuries

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ABSTRACT

Bladder injuries are rare. But when present in cases of polytrauma they pose both a diagnostic as well as surgical challenge to the attending surgeon. Understanding the mechanisms underlying bladder injuries is pivotal in developing a diagnostic algorithm in order to avoid missing of any urologic injury. Once the extent and site of damage is diagnosed then prompt surgical intervention is the mainstay of treatment. The pathophysiology and management of bladder injuries is discussed in this paper.

Keywords: Urinary bladder injuries, Pathophysiology, Diagnosis management

INTRODUCTION

Due to the protected deep seated position of the urinary bladder in the bony pelvis, bladder injuries are quite uncommon.¹ They constitute less than 2% of abdominal injuries necessitating surgical intervention.² The presence of a bladder injury signifies the severity of trauma and is usually associated with serious injuries to various other organ systems. As a result the mortality may be high in these cases.

The article discusses the mechanisms and approaches to bladder injury.

Anatomical implications in bladder injuries

The urinary bladder in empty state occupies a deep extra peritoneal position in the bony pelvis. However when it is distended fully it projects upwards assuming an intraperitoneal position. The organ is fully extra peritoneal being covered by a continuous fold of peritoneum. In males the fold of peritoneum dips posteriorly forming the recto vesical pouch of peritoneum. Anteriorly it is in juxta position to the pelvic

bone. In females the peritoneum dips down anteriorly to form the vesicouterine pouch. As a result the bladder is protected anteriorly from the pubic bone by the uterus in females. Injuries to the bladder are therefore more common in males as compared to females.

The fascial relationships in the deeper portion of the pelvis and extending up to anterior abdominal wall, perineum, scrotum and penis are of great significance in understanding the extent of urinary extravasation in extra peritoneal injuries of the bladder.¹

The bladder if injured in the distended state by blunt abdominal injury or by crushing perforating trauma in distended state usually leads to intraperitoneal rupture.¹

The weak and unsupported portion of urinary bladder which is more prone to injury is the posterior superior aspect of the dome.^{2,3}

Severe injury in an empty state exerts a crushing effect on the bony pelvis causing fractures of the pubic rami. This in turn can cause serious blunt or penetrating injuries to the bladder. Such injuries are usually extra peritoneal in

nature.¹ This may also be associated with injury to urethra as well. Only in rare circumstances such as run over accidents one may encounter a combination of both intra peritoneal and extra peritoneal bladder injury with concomitant urethral injury.

In case of extra peritoneal rupture of bladder, urine usually extravasates giving rise to oedema of local tissues. The extent of urine extravasation is limited by the fascial attachments. Posteriorly the extravasation may extend to the mid perineal point. Anteriorly it may extravasate all around the scrotal wall and shaft of the penis. Inferiorly it may extend about an inch below the inguinal ligament, whereas superiorly it may extend upwards along the anterior abdominal wall.³

Clinical features

Extra peritoneal injuries constitute 80% of bladder injuries.^{3,4} They are usually associated with severe crushing trauma to the pelvic bone. Hence fracture of pelvic bones is a common accompaniment of extra peritoneal bladder injury. Therefore the presence of a fracture of the pelvic bone should always raise the suspicion of extra peritoneal bladder injury.

Blood at urethral meatus is highly suspicious of urethral injury but can be associated with extra peritoneal bladder injury.

The bladder may either be distended or there may be severe extravasation of urine into soft tissues giving rise to crepitus. Pelvic contraction and distraction test suggestive of pelvic fracture is positive in such cases. Haematuria may be an accompaniment of such an injury. Severe haematuria with or without fracture pelvis is typical of intra peritoneal rupture of bladder.

In rare circumstances an isolated intra peritoneal rupture of bladder without any concomitant injuries may be encountered. In such cases a typical history may provide a significant clue which aids in the diagnosis of intra peritoneal rupture.

Investigations

A fixed diagnostic algorithm is essential in cases of urologic trauma (Figure 1). The clinician needs to carry out investigations in a step wise fashion in order to rule out trauma to the various organs of the urinary system.⁴

A patient presenting with blood at the meatus requires an ascending urethrogram to detect the presence of a urethral injury. Having ruled out a urethral injury one then needs to identify the cause for haematuria. With respect to severe haematuria both the kidney and the urinary bladder needs to be studied.

Either CECT or a single plate intravenous pyelography can be performed.^{4,5} It is of utmost most importance to

rule out major kidney injuries before studying the urinary bladder. This can be best done by CT imaging.^{6,7} Having ruled out renal injury one can then concentrate on carrying out investigations for urinary bladder injury.

Figure 1: Diagnostic algorithm for urologic trauma.

Figure 2: Cystogram plate showing intraperitoneal rupture of the bladder with extravasation of urine into the peritoneal cavity marked by black arrows.

Figure 3: Extra peritoneal rupture with extravasation of the urine marked by black arrows.

A CT cystogram or plain cystogram is diagnostic.⁴ A CT scan can give an additional advantage of screening of concomitant other intra-abdominal injuries. However if this injuries are ruled out either clinically or radio logically then a plain cystogram can identify the nature of the bladder injury.

Cystogram film in bladder rupture is diagnostic. In case of intra peritoneal rupture of bladder the peritoneal cavity will be filled with the contrast (Figure 2). This will outline the peritoneal lining with intervening bowel loops.

In severe cases liver will also be outlined. In case of extra peritoneal rupture the leakage of contrast in close proximity to the pubic bones is usually seen (Figure 3). Though a full bladder and post void cystogram plate is advisable yet a single full bladder anteroposterior cystogram plate is sufficient in confirming the diagnosis. Concomitant fracture of pelvic bone is usually seen in extra peritoneal rupture of bladder.^{4,8}

Management

Intra-peritoneal injuries need prompt surgical intervention.⁹ A formal laparotomy is essential. Methylene blue is pushed from the per-urethral catheter. This will leak out into peritoneal cavity enabling the surgeon to identify the rent in the bladder. This rent is then sutured in double layer with an absorbable suture material. The bladder to be kept decompressed for 10 days in order to ensure healing.

For extra peritoneal injuries surgery may not always be indicated unless there is a severe leakage of contrast.^{10,11}

It may not always be possible to identify the rent externally. Hence in such circumstances the bladder needs to be opened, followed by pushing of contrast into the bladder lumen to identify possible sites of leakage externally.¹¹

Smaller rents invariably are missed as they evade recognition. In such circumstances adequate drainage is therapeutic. This includes a suprapubic catheterization accompanied with upper urethral catheterizations. A retro pubic drain is beneficial to drain the extravasated urine.

Follow-up cystogram is done after 10 days. Only after confirmation that complete healing occurs one should commence with clamping of the catheter with a view for removal. If cystogram shows persistent extravasation the drainage of bladder should continue for 21 days followed by a repeat cystogram.¹¹

Complications

Complications are significantly less in patients who have undergone open repair.⁹⁻¹¹

Acute complications consist of clot retention and local infection. While late complications include urethral strictures and bladder dysfunction.

Long term placement of per urethral catheter increases the chances of urethral stricture.

CONCLUSION

Critical analysis of history should raise the suspicion of bladder injury. A diagnostic algorithm needs to be followed in all urological injuries in order to identify injuries extending from the urethra to the kidney. Proper choice of surgical repair depending upon on the merits of the case and expertise of the surgeon can reduce morbidity and mortality associated with bladder injuries.

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