Subtotal vesical necrosis as a result of infected traumatic bladder hematoma: A rare case with a literature review of bladder necrosis due to hematoma

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Abstract
Subtotal bladder necrosis following bladder hematoma is rare. We report such a case following blunt abdominal injury. The urologic presentation was delayed hematuria which settled with conservative management but was followed by the development of urosepsis. Computed tomography scan showed full bladder due to long-standing liquified bladder hematoma. Suprapubic exploration revealed a bladder wall abscess which was drained (secondarily infected hematoma). Excision of the subtotal necrotic bladder and ileal conduit with left ureteroileal anastomosis was done later. The patient also had a simultaneous right renal and ureteric injury as an independent simultaneous event which required initial nephrostomy placement. It later healed with complete obliteration of the right renal pelvis which was managed by right nephrectomy later. A literature review of cases of vesical necrosis caused by hematomas (of different locations and etiology) is discussed.

Keywords: Bladder hematoma, blunt abdominal traumata, subtotal vesical necrosis

INTRODUCTION

Subtotal necrosis of the bladder is rare with 33 cases reported in 75 years.[1] We present for the first time a case of extensive bladder necrosis following infected traumatic bladder hematoma and a short review of bladder necrosis secondary to hematomas of various causes.

CASE REPORT

A 24-year-old male was admitted elsewhere for a traumatic left brachial plexus injury following a fall from a motorbike. He had no urinary complaints initially but developed gross hematuria after 2 weeks that settled with bladder irrigation over the next 2 weeks. Computed tomography (CT) scan report (at time of trauma) reported full bladder due to long-standing liquified bladder hematoma. Suprapubic exploration revealed a bladder wall abscess which was drained (secondarily infected hematoma). Excision of the subtotal necrotic bladder and ileal conduit with left ureteroileal anastomosis was done later. The patient also had a simultaneous right renal and ureteric injury as an independent simultaneous event which required initial nephrostomy placement. It later healed with complete obliteration of the right renal pelvis which was managed by right nephrectomy later. A literature review of cases of vesical necrosis caused by hematomas (of different locations and etiology) is discussed.

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cover revealed necrotic yellowish bladder mucosa with calcification with the subtotal extent with only viable mucosa at trigone and bladder neck (video link at https://drive.google.com/file/d/1bvzhbSuvKpQId9SP98LsY4B8qUvdfZc/view?usp=sharing). Suprapubic exploration surprisingly revealed liquified bladder wall abscess which was drained along with placement of suprapubic cystostomy tube, per urethral catheter, and pelvic drain. Sepsis settled only to restart after a week, when he required right percutaneous nephrostomy for obstructed right kidney. Nephrostogram showed filling defects in right PCS and streaky right ureter but antegrade stenting could not be done [Figure 2]. The patient settled from sepsis after nephrostomy. Contrast CT scan after normalization of creatinine confirmed the filling defects in right PCS with good contrast excretion [Figure 3a] along with the reappearance of the full bladder due to reformation of bladder abscess[Figure 3b].

DISCUSSION

Different mechanisms can cause vesical necrosis (partial or full thickness) which are summarized in Table 1.

Pressure necrosis (by hematoma) with superadded infection with abscess formation (undrained for a month) led to subtotal necrosis in our case. Of course, bladder necrosis following bladder/pelvic hematoma is rare with few cases reported and does not change the standard advice of conservative management of bladder hematoma.[6]

Literature review of bladder necrosis/perforation cases secondary to hematomas (of different location and etiology) is summarized in Table 2.

This is the first case of traumatic bladder hematoma causing extensive bladder necrosis to the best of our knowledge. Despite such extensive necrosis, surprisingly patient could pass urine well. Preoperatively we attributed the appearance of the full bladder in noncontrast CT to
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Table 1: Mechanisms of bladder necrosis

| Mechanism | Causes | Example |
|-----------|--------|---------|
| Mucosa/detrusor pressure ischemia | Raised intravesical pressure | Overdistended bladder \(^{(2)}\) |
| | Extrinsic pressure on the bladder | Following hydrodistension \(^{(3)}\) |
| | | Pelvic hematoma \(^{(4)}\) |
| | | Obstructed labor \(^{(5)}\) |
| Direct cut off the vascular supply | Angioembolization of pelvic vessels | Control of intractable pelvic malignancies with bleeding |
| Direct mucosal toxicity | Radiation | |
| | Severe bladder infection | |
| | Chemotherapy agents | |

bladder clot (due to a history of hematuria that required irrigation). Instead, it was due to a liquified hematoma with abscess formation, walled off by necrotic detrusor, which never healed once opened. Small perforations can heal and infected hematomas can also drain with prolonged catheterization \(^{(9‑11)}\). Even with extensive necrosis, complete healing of the bladder (in a case of subtotal necrosis) after repeated cystoscopic necrotic material removal is reported. \(^{(7)}\) This may be possible if mucosa has necrosed completely but detrusor is partially viable acting as scaffolding for the mucosa to regenerate. Retrospectively could cystoscopic drainage have been successful open to debate, even more, controversial will be if the bladder can regenerate following subtotal necrosis. With full-thickness subtotal necrosis which was seen after excision we feel it was less likely.

With subtotal necrosis, excision and repair result in the formation of a small capacity bladder. Options for reconstruction are bladder augmentation, neobladder, or ileal conduit. \(^{(5)}\) Considering the brachial plexus injury of the patient and social circumstances (unavailability of attendants round the clock for self-catheterization, stay at a remote place) and poor nutritional status we opted for conduit instead of bladder augmentation.

Complete obliteration of the right renal pelvis and upper ureter was an additional independent associated event which made ureteropelvic anastomosis technically difficult. Thick lower polar parenchyma made ureterocalicostomy a difficult proposition.
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Table 2: PubMed review of cases of hematomas causing bladder necrosis

| Author            | Summary of case                                                                 | Treatment                                                                 |
|-------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Lane et al.[4]    | Pelvic hematoma following a femoral arterial puncture. Bladder neck small perforation | Exploration with perforation repair                                        |
| Love and Notley[7] | Pelvic fracture pelvic hematoma with prolonged hypotension causing subtotal vesical necrosis | Repeated endoscopic slough removal with complete bladder regeneration        |
| Almannie and Alkhamis[8] | Rectus sheath hematoma following enoxaparin injection                              | Exploration with the closure of the perforation                            |
| Eyal et al.[9]    | Retroperitoneal hematoma following the injury to the external iliac artery branch. Later development of bladder perforation with drainage of infected hematoma into the bladder | Prolonged catheterization                                                   |
| Ada et al.[10]    | Rectus sheath hematoma causing bladder perforation                               | Cystoscopy, indwelling catheter for 6 weeks                                 |
| Sandoval and Kinkead[11] | 2 cases of rectus sheath hematoma fistulizing into the bladder and causing hematuria |                                                                           |

Figure 5: Healed right pelvicalyceal system with the disappearance of clots but complete obliteration of right renal pelvis

CONCLUSION

To summarize, bladder hematomas can rarely cause extensive bladder necrosis. A trial of conservative management can be attempted but excision and bladder replacement with bowel be necessary if necrosis is subtotal.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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