

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 trauma, subtotal vesical necrosis

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Received: 21.06.2020, **Accepted:** 25.01.2021, **Published:** 23.06.2021.

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 bladder and right perinephric hematoma. He presented to us after a month of initial trauma for fever and rising creatinine but passing clear urine. He was febrile and emaciated with suprapubic tenderness. Reports showed hemoglobin of 6 g/dL with a total leukocyte count of 30,000/mL and creatinine of 3.2 mg/mL. Plain CT kidney, ureter, and bladder showed full bladder and full right pelvicalyceal (PCS) with calcification [Figure 1]. Cystoscopy under antibiotic

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How to cite this article: Valsangkar R, Kashypi B, Date J, Shivde S. Subtotal vesical necrosis as a result of infected traumatic bladder hematoma: A rare case with a literature review of bladder necrosis due to hematoma. *Urol Ann* 2021;13:301-4.

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Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/UA.UA_101_20

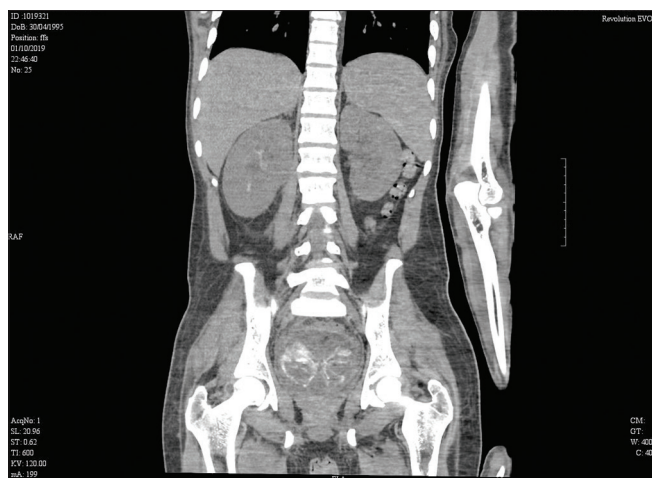


Figure 1: Noncontrast computed tomography showing full right pelvicalyceal system and full bladder with calcification (which we initially believed to be long-standing bladder clot with calcium deposit)

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/1bvzhbSuvKpQld9SP98IqLY4B8qUvdfZc/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].

Exploration with drainage of the abscess, necrotic bladder excision, and suturing of small bladder remnant resulted in the formation of a small capacity bladder [Figure 4a]. Necrotic mucosa popped out of necrotic detrusor and could be sort of enucleated out [Figure 4b-d]. The plan of ileal conduit simultaneously was canceled due to coexisting abscess. Postoperatively left kidney output continued from the pelvic drain as the bladder did not heal in spite of a suprapubic and per urethral drainage. After further 2 weeks, (in which the patient was built up nutritionally) he underwent an ileal conduit with left ureteroileal anastomosis. Native bladder cystectomy was not completed due to dense pelvic adhesions. We had planned right retrograde stenting and right ureteroileal anastomosis at the same time but surprisingly retrograde contrast study (through right

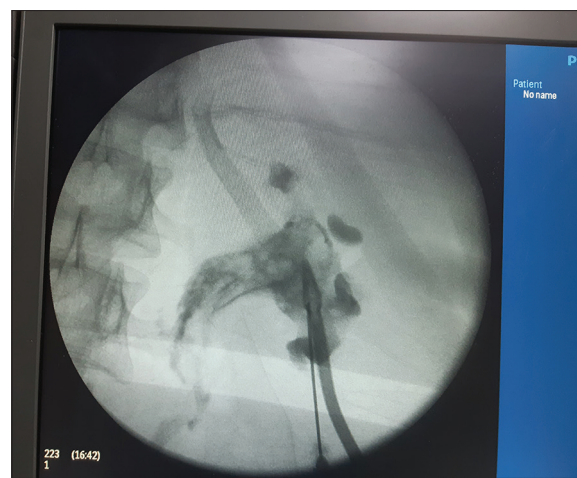


Figure 2: Right percutaneous nephrostomy showing filling defects in right pelvicalyceal system with a ureteric injury below right pelviureteric junction

ureterotomy) showed complete obliteration of the right pelvis. Simultaneous right nephrostogram showed healing of PCS with the disappearance of all filling defects [Figure 5]. This difficult pelviureteric reconstruction was deferred to a later date and right kidney drainage was continued through right nephrostomy. The patient was discharged after an uneventful recovery. He presented after 3 weeks with urosepsis following accidental dislodgment of right PCN tube and required right nephrectomy as a life-saving measure. He is doing well after a period of 8 months with a weight gain of 10 kg and creatinine of 0.97 mg/dL with an estimated glomerular filtration rate of 100 ml/min when he was operated for a brachial plexus injury.

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

Table 1: Mechanisms of bladder necrosis

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

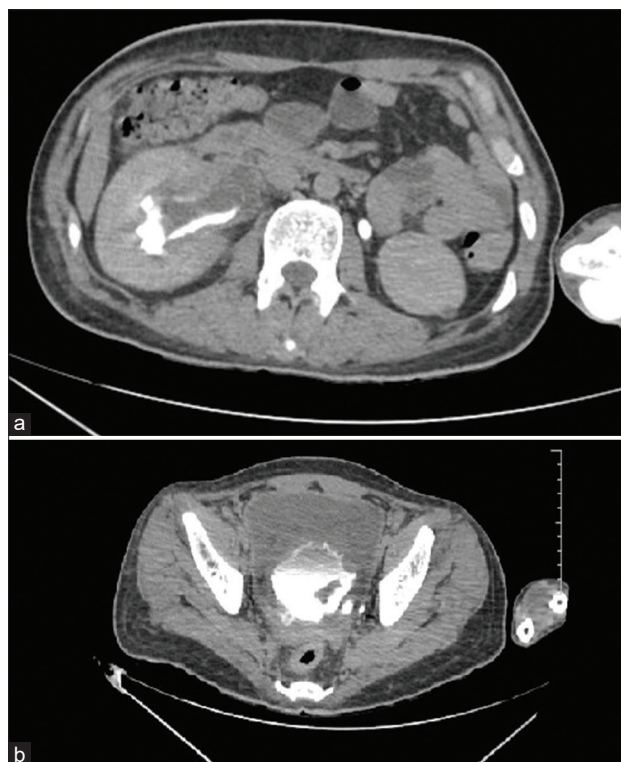


Figure 3: (a) Contrast computed tomography showing good contrast excretion in right kidney with filling defects in right pelvicalyceal. (b) Full bladder post bladder abscess drainage due to reformation of the abscess. The rim of calcification on the mucosal aspect due to calcium deposit on the necrotic mucosa seen

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 remains open to debate, even more, controversial will be if the bladder can regenerate following subtotal necrosis. With full-thickness subtotal

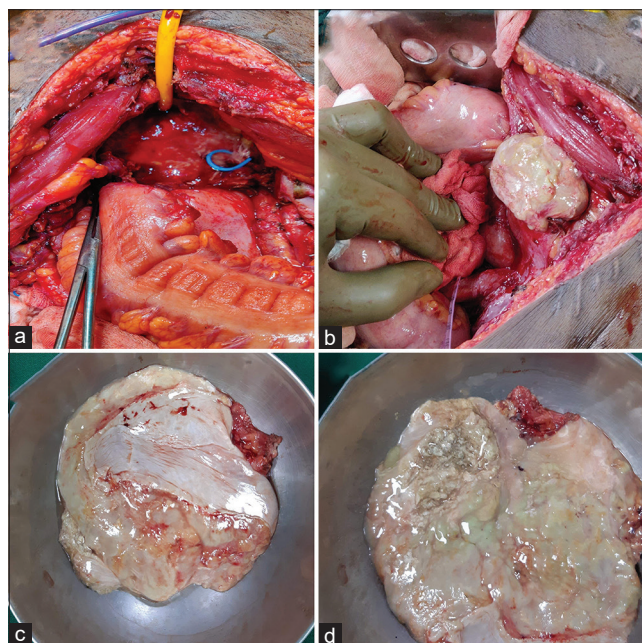


Figure 4: (a) Small bladder remnant after abscess drainage and excision of necrotic mucosa. The stent was placed for better identification of ureteric orifices during excision. (b) The entire necrotic mucosa popped out of the necrotic detrusor after the bladder wall abscess was drained. (c) The serosal aspect of the enucleated necrotic bladder mucosa. (d) The mucosal aspect of the enucleated bladder mucosa with calcium deposits. A similar picture was seen during cystoscopy initially

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.

Table 2: PubMed review of cases of hematomas causing bladder necrosis

Author	Summary of case	Treatment
Lane <i>et al.</i> ^[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 Prolonged catheterization
Eyal <i>et al.</i> ^[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 <i>et al.</i> ^[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	

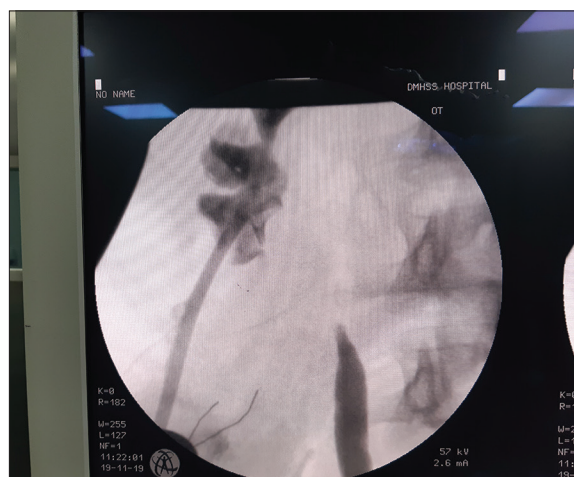


Figure 5: Healed right pelvicalyceal system with the disappearance of clots but complete obliteration of right renal pelvis

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.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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