

Penile fracture: role of ultrasound

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Abstract: Penile fracture is a rare surgical emergency which requires prompt diagnosis and immediate surgical repair. In most cases the diagnosis is clinical however, in equivocal cases ultrasound examination can help in establishing the diagnosis by demonstrating the site and extent of tunica albuginea disruption. In this article, we are presenting sonographic findings in two cases of penile fractures.

Keywords: Penile fracture; ultrasound; surgical emergency

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Introduction

Penile fracture is an infrequent urological emergency which usually results from blunt trauma to erect penis and accounts for approximately 1 in 175,000 hospital admissions (1). Fracture of penis occurs when corpora cavernosa rupture with disruption of overlying fascial covering known as tunica albuginea. The most common cause of penile fracture is bending of penis during intercourse when the erect penis slips from the vagina striking the partner's extra-vaginal sites (perineum, symphysis) (2). Penile fracture can also occur during masturbation, bending the erect penis to achieve detumescence and rolling over in bed (3). Due to rarity of this condition many ultrasound technicians may not familiar with sonographic appearance of penile fractures. Point of care ultrasound examination by emergency physician can help in prompt diagnosis and timely surgical repair of the fractured penis.

Case presentation

Case 1

A 54-year-old male presented to our hospital emergency department (ED) with penile swelling and pain for few hours. Patient's symptoms started after he attempted to pull

his erect penis down to urinate when he felt a snap followed by mid-shaft pain. The patient denied any difficulty in urination or hematuria following the injury. Emergency ultrasound was performed which demonstrated disruption of the ventral tunica albuginea and left corpora cavernosa. There was an associated complex echogenic collection in the subcutaneous plane along the left side of penile shaft (*Figure 1*). The patient underwent urgent surgical intervention which demonstrated significant hematoma at the left penile base (corresponding to the collection seen on ultrasound) and a horizontal left corporal fracture. The hematoma was evacuated and corporal fracture was repaired. The urethra was dissected and was found to be not involved.

Case 2

A 47-year-old male presented to ED with pain, swelling and fullness of the right side of penis for 4 days. The patient experienced sudden onset of sharp pain and swelling on the right side of penile shaft after he pushed down his erect penis. Patient denied any urinary complains. On examination, there was swelling and tenderness at the right penile base with mild leftward deviation of penile shaft. Ultrasound demonstrated discontinuity of tunica albuginea and right corpora cavernosa with adjacent hypoechoic

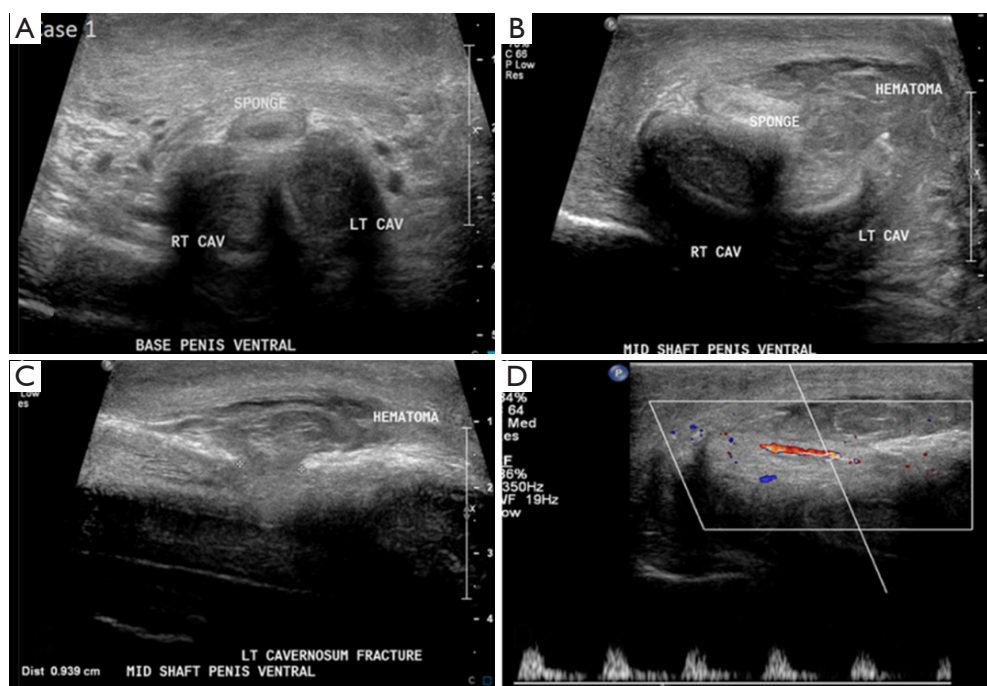


Figure 1 Ultrasound images of 54-year-old male with penile fracture. Note normal morphology of the bilateral dorsolateral corpora cavernosa and ventral corpus spongiosum at the base of penis (A), however, there is defect of 9.4 mm in the mid shaft echogenic tunica albuginea overlying the left corpora cavernosa with an adjacent hematoma (B,C). Normal arterial flow in left cavernosal artery on color Doppler ultrasound (D), rule out vascular injury.

collection (*Figure 2*). The patient refused surgical repair and was treated conservatively.

Discussion

Typically, penile fracture occurs when there is blunt injury to erect penis as there is stretching and thinning of tunica albuginea during erection. In general, it is up to 2.4 mm thick in flaccid state however during erection it can be as thin as 0.25–0.5 mm (4). Most cases are clinically apparent but in some patients it may be difficult to differentiate penile fracture from other causes of penile pain and swelling such as dorsal penile vessel rupture/thrombosis and intra-cavernous hematoma. Classic presenting features of penile fracture include a cracking sound followed by pain, rapid de-tumescence, swelling, and ecchymosis. The penis will often be deformed and bent in the direction of the uninjured corpora cavernosa (5). If Buck's fascia is torn, the extravasation of blood and/or urine may extend to the scrotum, suprapubic region, and perineum, giving rise to the “butterfly” pattern of ecchymosis (6). Usually one corpora cavernosa is torn, but bilateral cavernosal injuries may

occur simultaneously. Potential coexisting injuries include those to the penile urethra, corpus spongiosum, or dorsal vein of the penis (5). Reported frequencies of concomitant urethral injury are within the range of 9–20% (7,8). However, high association of urethral injuries has been observed and should be looked for whenever bilateral corporeal rupture presents (8).

Role of various modalities such as cavernosography and MRI have been described in literature (9,10). However, cavernosography is invasive and MRI is expensive and time consuming and may not be available in emergency setting at many centers. Ultrasound is readily available and non-invasive modality which can be performed in ED. It can accurately delineate the exact site and extent of tunica albuginea rupture, which may be useful for better surgical planning (11).

In both of the presented cases the ultrasound examination clearly demonstrated penile fracture as defect in the tunica albuginea with adjacent hematoma. The Doppler examination in both cases ruled out vascular injury by demonstrating intact corporal arteries (*Figure 1D,2D*). These findings can be compared to normal sonographic appearance of penis (*Figure 3*) which demonstrate normal

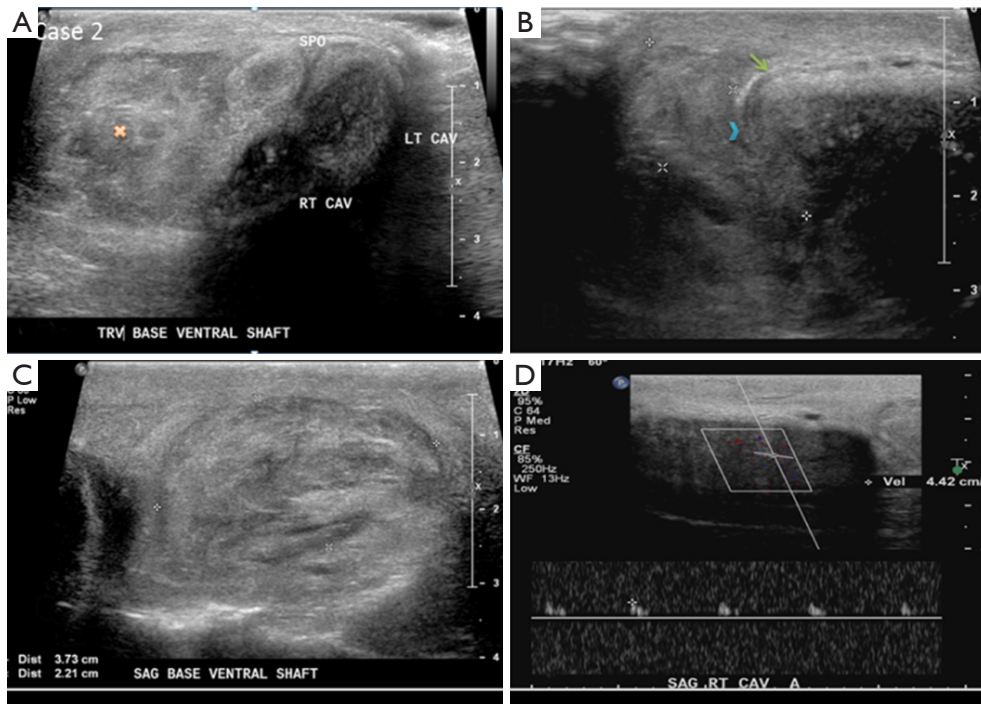


Figure 2 Ultrasound images of 47-year-old male with penile fracture. (A) Increased echogenicity of the right corpus cavernosum with adjacent echogenic hematoma (yellow cross); (B) disruption of the right dorso-lateral inseparable echogenic tunica albuginea and buck's fascia (blue chevron) overlying right corpus cavernosa with normal echogenic tunica albuginea/buck's fascia ventral to the site of disruption (green arrow); (C) a 3.7 cm x 2.2 cm hematoma at base of penile shaft; (D) detectable right cavernosal arterial flow rule out vascular injury. Note diminished flow suggests.

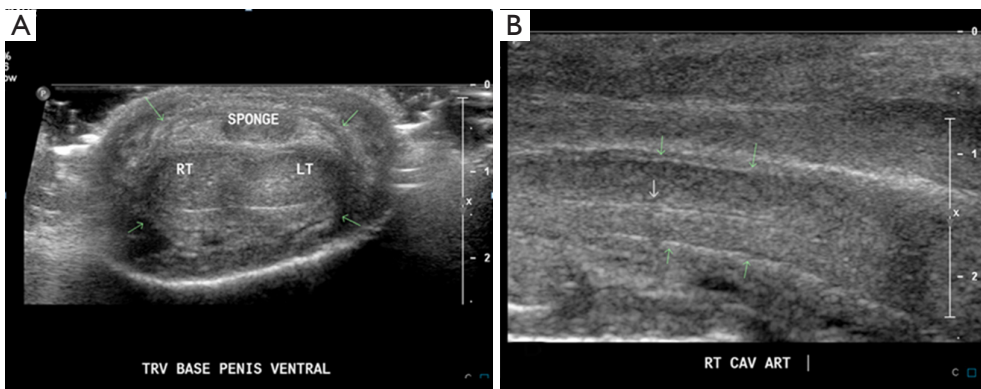


Figure 3 Normal sonographic appearance of penis. (A) Transverse scan demonstrating, the paired dorsolateral corpora cavernosa appear as symmetric, homogenous, midlevel echoes, circular structures and midline ventral corpus spongiosum, all are surrounded by an echogenic line representing the inseparable tunica albuginea and Buck's fascia (green arrows); (B) longitudinal scan through right corpus cavernosum, demonstrating tubular structure with echogenic walls in the center of the corpus cavernosum, which represents the cavernosal artery (white arrow).

arrangement of the three erectile structures, paired corpora cavernosa (right and left) and one corpus spongiosum (central) and surrounding tunica albuginea and Buck's fascia which are inseparable and together appear as a thin echogenic line covering the three corpora.

Two major differential diagnosis of penile fracture as mentioned above include rupture or thrombosis of a dorsal vein of the penis and intra-cavernosal hematoma. Clinically the swelling secondary to rupture or thrombosis of a dorsal vein of the penis can mimic a penile fracture, but deformation and immediate de-tumescence do not occur because of the intact tunica albuginea (12). Moreover, sonography demonstrates hematoma with intact tunica albuginea in cases with rupture or thrombosis of a dorsal vein of the penis. Intra-cavernosal hematomas occurs secondary to injury to the sub-tunica venous plexus or to the smooth muscle trabeculae in the absence of complete tunica disruption (13).

Immediate surgical repair is the treatment of choice for penile fracture. Surgical exploration preferably within 24 hours is advocated by recent studies (14-16). More serious cases such as associated with urethral injury require immediate surgical correction by re-anastomosis or suture (15). One study compared surgical and conservative treatments and reported success rates of 92% and 59%, respectively (17). Several long-term follow up studies have reported that conservatively treated patients with penile fracture, experienced complications such as penile pain, penile curvature, arteriovenous fistulas, and erectile dysfunction, at the rate of 10–53% (18-20).

Conclusions

Penile fracture is a rare surgical emergency. Ultrasound is readily available in most EDs. Point of care ultrasound by emergency physicians can provide prompt, cost effective, non-invasive and accurate diagnosis of penile fracture. Misdiagnosis can lead to delay in surgery with significant long term sequelae.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patients for publication of this case report and any accompanying images.

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