Role of Penile Doppler as a Diagnostic Tool in Penile Fracture

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Abstract

Penile fracture is defined as a traumatic rupture of either corpus cavernosum or the tunica albuginea; sometimes it can be both. It may be caused by exotic masturbation acts, sexual intercourse, or other trauma to this area. This can be accompanied by injury to the urethra, which is the cause of hematuria as a symptom for some patients. Typically, diagnosis of penile rupture or fracture depends on clinical examination and history told by the patients. We are stating the importance of medical imaging in the diagnosis of patients with penile fracture by presenting a case of patient suffered from penile fracture after a fall on his penis where it affected the erection of two-third of his penis. In which, the proper diagnosis by imaging studies and taking actions accordingly can save the patients from unnecessary surgeries that indeed increase the bill of the medical care directly and indirectly. Therefore, most patients can be diagnosed cost-effectively and treated surgically without a need to delay surgery, which is often the case if one was to resort to other investigations. Investigations such as retrograde urethrography for suspected urethral injury should only be used when the diagnosis of penile fracture is in doubt.

Keywords: Case report, imaging studies, penile fracture, ultrasonography

INTRODUCTION

Men can get penile injuries by several causes such as penile amputation, penile fracture, or penile soft-tissue injury, all of which are considered as emergency cases that need prompt medical intervention.

Penile fracture is defined as a traumatic rupture of either corpus cavernosum or the tunica albuginea; sometimes it can be both. This may be caused by exotic masturbation acts or sexual intercourse.1 This can be accompanied by injury to the urethra, which is the cause of hematuria as a symptom for some patients. Treatment should be directed to preserve the erectile function and length of the penis, also, to maintain the ability to urinate while standing.2,3 Typically, diagnosis of penile rupture or fracture depends on clinical examination and history told by the patients.

Taking possibility of urethral injury into consideration, this demands the retrograde urethrographic studies to be done. Nonetheless, assessing the penile fracture using imaging studies such as medical imaging such magnetic resonance imaging (MRI) or cavernosography is discouraged by many clinicians, claiming that it should not be a common practice since it delays the prompt actions that need to be done, and also, it will cost the patients and insurance agencies. Although the physical and clinical examinations are used solely to diagnose patients in most cases, considering imaging studies when the physical examination is not enough to diagnose the patients. In obscure cases, there is a need for surgical investigation to properly diagnose and to assess the injury, which where they gain the ability to do surgical intervention if warranted.4,5

Here, in our case report, we are presenting the importance of medical imaging in the diagnosis of patients with penile fracture, where rendering medical images for its limitation of delaying the surgical interventions is used as an excuse to pass the imaging studies into the surgical interventions directly. Proper diagnosis by imaging studies and taking actions accordingly can save the patients from unnecessary surgeries, this increases the bill of the medical care, directly and indirectly.

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CASE REPORT

MDMR, a 15-year-old male patient was presented to urology outpatient clinic about 2 weeks after alleged fall. The patient claimed that he has fallen due to a slippery floor at his school. Unfortunately, his penis hit the edges of staircase nearby. Following that, he sustained bruises at the base of the penis which slowly increased in size and associated with pain. After day 4 of the fall, he noticed he had no morning erection, apart from that, he could pass urine as usual with no history of passing out hematuria and no dysuria.

During initial examination, circumferential hematoma at the base of penis, nontender, and no obvious defect along the penile shaft was noted. Three weeks post-trauma, he was again followed up in the outpatient clinic and at that time the swelling remained the same. The patient reported that he had morning erection, but only proximal 1/3 was hardened and distal 2/3 of the penis was flaccid. Penile examination then showed small firm-to-hard swelling at the base of the penis, size about 1 cm × 1 cm, and there was no scrotal swelling. Following examination, the patient was subjected to Doppler ultrasonography (USG) of penis followed by an urgent MRI of the penis after that in view of late presentation and clinical examination findings.

His blood investigations which were taken earlier were in normal range. His USG penile results revealed that focal discontinuity of proximal tunica albuginea suggestive of a penile fracture. The discontinuation was measure 0.9 cm in length; there was heterogeneous lesion suggestive hematoma of the left corpus cavernosum of penis adjacent to penile fracture measures 0.5 cm × 1.1 cm. As shown in the Figures 1-3.

However, his penile MRI result showed no spongiosum tear; however, there was a small left corpus cavernosum discontinuity with small hematoma and with final MRI diagnosis was penile hematoma in view of intact circumferential enhancement of tunica albuginea. Illustrated in Figures 4-7.

He was following up again in urology clinic after 6 weeks posttrauma, the swelling already resolved and was able to have a full erection. Clinical examination showed no obvious abnormality along the penis.

DISCUSSION

Fracture of the penis is relatively uncommon because of the well-protected location on the body and a high degree of genital mobility. Even though it is uncommon, if it happens it needs an urgent surgical attention and management. Penile fracture is the term used to describe a traumatic rupture of the tunica albuginea of the corpora cavernosa affecting the erect penis.[1-6] This injury may be accompanied by urethral damage. It results when blunt trauma to the erect penis results in a rapid buildup of pressure in the engorged corpus cavernosum, which overwhelsm the tensile strength of the tunica albuginea; this often follows trauma during coitus, masturbation, or self-manipulation to hide or suppress an erection.[2,7] The patient reports a sudden pain in the penis and rapid detumescence. Patient and partner may even hear a snapping or cracking sound at the moment of injury. A large penile hematoma then develops around the flaccid corpora. If a urethral injury is also sustained, blood may be seen at the external meatus or the patient may have voiding difficulties.

The exact role of diagnostic investigations remains a challenge if the patient presents late to seek treatment. Several reports have cast doubts on the value of diagnostic investigations, with some asserting that penile fracture is a clinical diagnosis and others concluding that the investigations add to treatment costs and delays to surgery. A clinical diagnosis can often be easily made with the typical history and physical examination findings described. The patient may, however, present atypically, reporting no preceding traumatic events and or no pain, no popping sounds or swellings, and physical examination findings may be unremarkable or confusing. Patients with urethral injury may additionally give a history of bleeding per urethra, difficulty with or inability to micturate and in those presenting late, signs of urinary extravasation may be observed.[9]
Radiologic evaluations have been described for patients with penile fracture and these include retrograde urethrography (RUG), cavernosography, MRI, penile ultrasound, and sonourethrography. RUG and cavernosography are invasive, and significant false-negative findings have been reported while MRI is an excellent imaging modality but expensive and not widely available.\[8\]

Penile ultrasound (USG) is simple, noninvasive, and useful in detecting the site and side of rupture in the tunica albuginea and the associated hematoma while sonourethrography may show a hematoma of the corpus spongiosum and/or extravasation of fluid media (used in distending the urethra), which are indicative of urethral injury. However, similar to cavernosography, USG is highly operator dependent and requires specific expertise.\[9\] The rarity of penile fracture often precludes wide experience and accurate diagnosis, and small albuginea disruptions or the presence of clots at the “fracture” site may make diagnosis difficult. Therefore, false-negative findings are common. From a study by Mayank et al., 2009, they found penile USG was not very sensitive.\[5\] It had a high-negative predictive value and it did not change the management in any of the patients, suggesting that it has limited clinical utility.\[10\]

The use of penile cavernosography remains controversial. Although some authors recommend routine cavernosography for all patients with suspected penile fracture, most suggest reserving it for unusual cases, such as those with delayed presentation or discrepancies in clinical findings.\[11\] There is a significant incidence of false-negative results (due to early sealing of the defect by a clot) as well as a risk of tissue reactions to contrast material and increased liability to corporal fibrosis. Therefore, even in doubtful cases, the clinical utility of cavernosography remains limited.\[6,10\]

Some authors have recommended that RUG to be used for all patients with suspected penile fracture, whereas others recommend a more selective approach. Agarwal et al. recommend that RUG should be performed in all patients with suspected penile fracture. Similarly, Miller and McAninch recommend that “only in the setting of an unremarkable urinalysis and the complete lack of voiding complaint should one forego urethrography. This should be considered an exception rather than standard practice.”\[6\] However, most authors disagree with this statement and reserve this investigation for patients with a high suspicion of urethral injury, for example, patients with blood at the meatus or an inability to void. Therefore, they conclude that clinical...
utility of RUG is limited because it is easy to recognize urethral injury intraoperatively. Intraoperative identification of such injury may further be facilitated by retrograde saline instillation into the urethra to look for any leakage from the urethra.[11]

MRI is the most accurate diagnostic and localizing procedure in cases of penile fracture, owing to its multiplanar capabilities and good spatial and tissue contrast resolution. It undoubtedly gives high-quality images and has been reported to improve the surgical plan by limiting the incision to a localized longitudinal one rather than the standard degloving one. However, MRI has severe limitations including time, availability, and significant cost.[10] A typical case of penile fracture can generally be fairly accurately diagnosed clinically; adding MRI is not cost-effective and can delay patient treatment. Moreover, localized incision, which is considered the most significant clinical advantage of MRI, has been associated with poor cosmesis. However, MRI may be justified in atypical or equivocal cases when diagnoses other than fracture are being considered.[5]

The management of penile fracture has been changing within time, treatment was from a completely conservative approach to a selective surgical approach, and later to a delayed surgical approach until the currently acceptable immediate surgical exploration that is done for most patients. Based on study by Mayank et al. 2009, with the series of patients and a review of literature, we cannot overemphasize that even in the era of advanced radiological technology, a clinical history, and patient examination are the most important tools in the diagnosis of penile fracture and are generally sufficient to make the diagnosis. Therefore, most patients can be diagnosed cost-effectively and treated surgically without a need to delay surgery, which is often the case if one was to resort to other investigations. Investigations such as RUG for suspected urethral injury should only be used when the diagnosis of penile fracture is in doubt.[10]

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.

REFERENCES
1. Eke N. Fracture of the penis. Br J Surg 2002;89:555-65.
2. Haas CA, Brown SL, Spirnak JP. Penile fracture and testicular rupture. World J Urol 1999;17:101-6.
3. Jack GS, Garraway I, Reznichek R, Rajfer J. Current treatment options for penile fractures. Rev Urol 2004;6:114-20.
4. Bali RS, Rashid A, Mushtaque M, Nabi S, Thakur SA, Bhat RA, et al. Penile fracture: Experience from a third world country. Adv Urol 2013;2013:708362.
5. Agarwal MM, Singh SK, Sharma DK, Ranjan P, Kumar S, Chandramohan V, et al. Fracture of the penis: A radiological or clinical diagnosis? A case series and literature review. Can J Urol 2009;16:4568-75.
6. Kamil N, Hisham AN, Abdullah M, Khaireullah A. Fracture of the penis. Med J Malaysia 1993;48:373-6.
7. Reis LO, Cartapatti M, Marmiroli R, de Oliveira Júnior EJ, Saade RD, Fregonesi A, et al. Mechanisms predisposing penile fracture and long-term outcomes on erectile and voiding functions. Adv Urol 2014;2014:768158.
8. Zargooshi J. Penile fracture in Kermanshah, Iran: Report of 172 cases. J Urol 2000;164:364-6.
9. Koga S, Saito Y, Arakaki Y, Nakamura N, Matsuoka M, Saita H, et al. Sonography in fracture of the penis. Br J Urol 1993;72:228-9.
10. Bello JO. Synergism of clinical evaluation and penile sonographic imaging in diagnosis of penile fracture: A case report. J Med Case Rep 2012;6:321.
11. Morris SB, Miller MA, Anson K. Management of penile fracture. J R Soc Med 1998;91:427-8.