http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v8i11.96

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Role of MR digital subtraction Angiogram in the imaging of delayed and atypical presentation of penile fracture

Authors
Dr Shubra Kochar[1], Dr Dipanshu Kakkar[2], Dr Amit Jain[3]
[1,2]Senior Resident, Department of General Surgery, SHKM, Mewat
[3]Associate Professor, Department of General and Plastic Surgery, SHKM, Mewat

Introduction

Penile fracture is a urological emergency. The most common aetiology is due to coital activities and that is the reason it is usually under reported.(1) It is the traumatic rupture of the tunica albuginea in the tumescent state. The usual presentation is acute pain in the penis after sudden popping sound, swelling, and detumescence. On examination, the patient will have penile swelling and discolouration (secondary to the haematoma), termed as "aubergine sign", or 'egg plant deformity (figure 1)(2,3). Additionally, gross evidence of urethral injury may also be present, such as blood at the meatus, haematuria, or difficulty voiding(3). Diagnosis is usually clinical but imaging has a role in atypical or delayed presentation of fracture penis. Historically, cavernosography and urethrography have been tried. However, these investigations have their problems. Others used ultrasonography but it was unhelpful[4]. MRI was used recently to evaluate penile fracture, and was found to be effective[5]. MRI is the most accurate modality in the diagnosis or exclusion of penile fracture. Associated urethral injuries may be found in around a quarter of patients, and can be diagnosed on MRI. In the present study we report our experience in managing penile fracture, using MRI as a noninvasive documentary tool, in addition to its efficacy in depicting the anatomical details of the condition, which not only facilitates surgical intervention but also minimizes its morbidity.

Figure 1: Egg plant deformity in penile fracture

Patients and Methods

Between April 2018 and May 2020, 5 patients with penile fracture were treated in our centre. Mean age of our patients was 45 years (30-65 years). The delay in presentation was 12 hours from injury; all patients reported hearing a cracking sound, followed by rapid detumescence

associated with pain and penile swelling. Two patients had urethral bleeding. On physical examination all patients had different clinical presentations.1 patient presented with penile swelling in the glans and shaft region, while other presented with classical 'egg plant deformity'. 1 patient presented with paraphimosis which was not reduced and on careful examination it was found to be penile fracture. 2 patients presented with urethral injury. Because of penile tenderness and the associated swelling, the definite site of tunical tear could not be adequately palpated in all patients. All patients underwent emergency MRI with digital subtraction Angiogram. A pelvic phased-array coil was used for imaging of the penis. With the patient in the supine position, the penis was taped against the abdominal wall and the surface coil was placed on the penis. Axial T1-weighted spin-echo images and STIR axial, T1W.T2W, STIR coronal, and sagittal T2-weighted fast spin-echo images were obtained. In some cases, additional axial and sagittal T1-weighted images were obtained after intravenous administration of contrast material. Adequate support and proper positioning of the penis under the surface coil were essential for good-quality MR images. All patients required surgical intervention and were explored within 6 hours of presentation. Surgical exploration was by a circum coronal incision and degloving of penis in 2 patients where urethral injury was confirmed by MRI and longitudinal incision in 3 patients rather than complete degloving of penis and identifying site of injury (figure 2,3). The haematoma was evacuated and the tunical tear repaired using continuous interlocking 2–0 polyglactin sutures (figure4). The urethral injury was repaired on a urethral catheter using interrupted 4–0 polyglactin sutures and the catheter was left for 1 month (figure 5). A prophylactic Supra pubic Catheterisation was done to prevent further complications in case of blocking of foley's catheter in patients with urethral injury (figure 6). Patients were discharged from hospital 24 h after surgery; all were instructed to avoid sexual intercourse for 1 month. A cystoscopy was performed in patients with urethral injury who further had urethral stricture which was managed by optical internal urethrotomy.MR findings concerning the size, location, and orientation of tunical tear were confirmed at surgery. Patients' injury and MR findings are as shown in table 1.

Figure 2: Shows hematoma formation below tunica albuginea

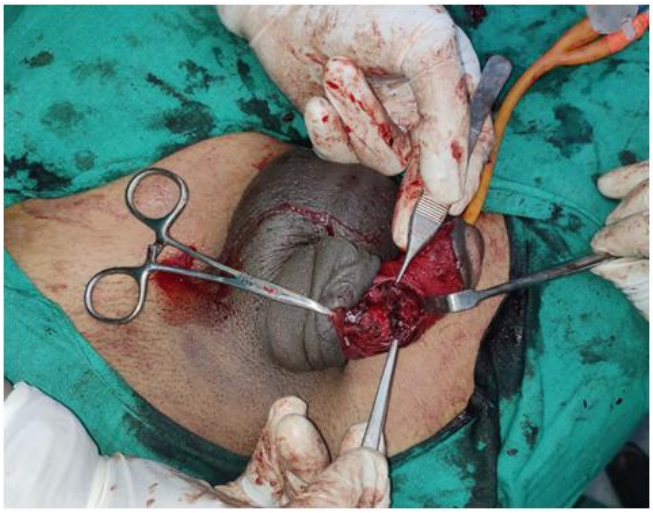

Figure 3: Shows tear in corpora cavernosa

Figure 4 Repair of corpora cavernosa and tunica albuginea with vicryl 2-0 in a transverse fashion

Figure 5 Shows injury in corpora cavernosa and corpora spongiosa along with injury in urethra

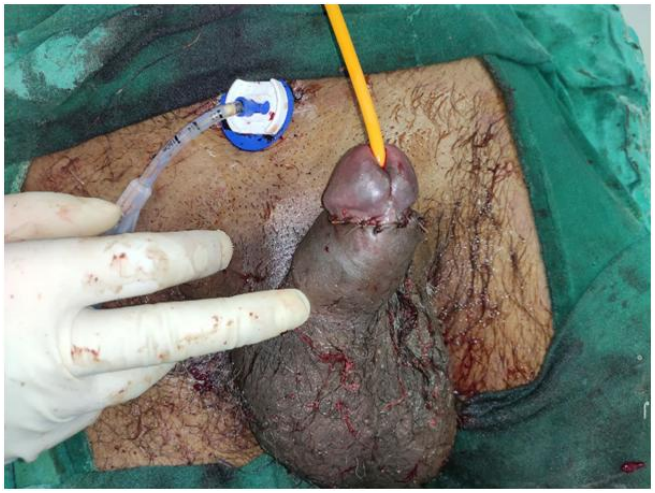

Figure 6 Final picture after Suprapubic Catheterisation and repair

Table 1: A comparison of MRI findings in different patients

Patient	Age	Location of injury (cm from coronal sulcus)	Size of tear (in mm)	Associated injuries
1	65	5.5	12	None
2	34	6	15	Urethral injury
3	44	4.5	8	None
4	38	5	10	Intracavernous hematoma
5	59	6	14	Urethral injury

Table 2: A comparison of time of presentation, surgery and post operative complications

Patient	Age	Time of presentation	Surgery	Post operative complications
1	65	48 hours	Repair of corpora cavernosa	None
2	34	18 hours	Repair of corpora cavernosa with urethral repair with spc	Mild urethral stricture managed with oiu
3	44	36 hours	Repair of corpora cavernosa	None
4	38	72 hours	Repair of corpora cavernosa	None
5	59	16 hours	Repair of corpora cavernosa with urethral repair with spc	Mild urethral stricture managed with oiu

Spc : suprapubic catheterisation
Oiu: optical internal urethrotomy

Results and Imaging findings

MRI detected that the tunical tear involved in the right corpus cavernosa in 2 men and the left in 2. MRI also detected injury in corpora spongiosa in 2 patients who had urethral injury. One patient had injury to both corpora cavernosa and spongiosa which was detected on MRI. MRI data on tear size, site and associated injuries are shown in Table 1 and Figs 5-10. The tear appeared as discontinuity of the low-signal-intensity tunica albuginea (Figure 6).

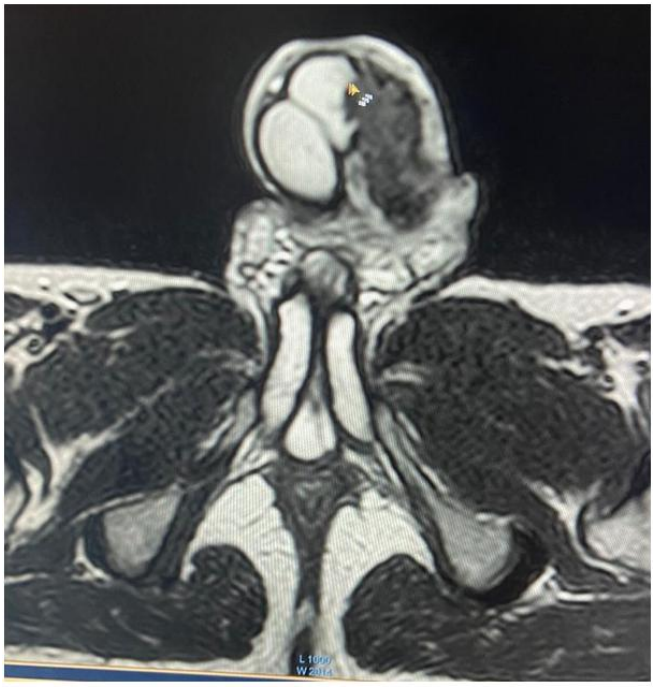

Figure 7 Showing soft tissue defect (fracture) extending through left corpora cavernosa (arrow) with large associated hematoma (55x35 mm) under buck's fascia

MR findings concerning the size, location, and orientation of tunical tear were confirmed at surgery. The tear was considered to be transversely oriented when its transverse dimension exceeded its longitudinal dimension; otherwise, it was considered to be longitudinally oriented.

Tunical tear was located in the ventral portion of the corpus cavernosum in 2 of the 5 patients who underwent surgery and in the lateral portion in the remaining patient. The tear was located in the proximal shaft in 1 patient and in the midshaft in four patients. No tear was found in the dorsal portion or distal shaft. The orientation of the tear was transverse in all patients (Figure 7). The size of the tear ranged from 8 to 15 mm.

Figure 8 Defect in the corpora cavernosa and underlying hematoma. The fracture is situated 7.5 cm away from the tip of glans

The presence of urethral or spongiosal involvement is of great importance because it necessitates urgent surgical intervention and is associated with a higher rate of complications. In our series, urethral rupture was seen at MR imaging in 2 patients. Corpus spongiosal rupture was correctly diagnosed at MR imaging in two patients (Figure 8), one of whom had hematuria.

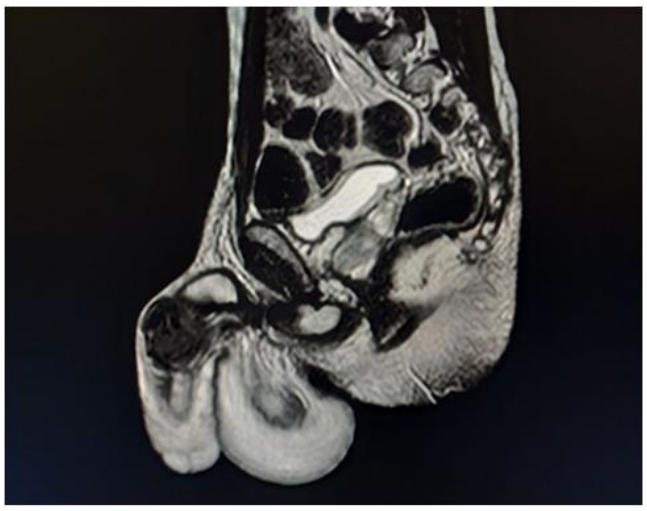

Figure 9 Shows intracavernosal hematoma formation under tunica albuginea

A digital subtraction angiogram was also performed in all the patients to rule out penile artery injury. It showed hematoma formation and no contrast blush in 3 out of the 5 patients (Figure 10). None of the patients reported injury to superficial dorsal vein, deep dorsal vein, dorsal artery of penis or cavernosal arteries as no patient reported any evidence of vascular injury on digital subtraction angiogram.

Figure 10 MR Digital Subtraction Angiography shows no evidence of vascular injury (superficial and deep dorsal vein of penis, dorsal artery and cavernosal artery).

The 5 patients in our series were followed up for 6 months after trauma. All 5patients resumed normal erectile function.

There were no significant complications during or soon after surgery except for mild stricture formation in patients with urethral injury which was managed later by optical internal urethrotomy. The patients were followed for 6 months and all reported subjectively good erectile function, with neither penile curvature nor pain during erection.

Discussion

Penile fracture is a rare condition that is easy to diagnose clinically; immediate surgical repair is recommended to avoid the complications of conservative management, i.e. penile curvature and deformity, fibrosis and sexual dysfunction. Moreover conservative treatment requires a prolonged hospital stay[6-8]. Locating the tunical tear site and associated urethral injury before surgery is important to make a correct incision for the repair. Although the tear can be palpated manually, it may be obscured by the swelling and haematoma even if the examination is under anaesthesia. Some authors advocated the use of cavernosography to locate the tear site, but this requires manipulation of the tender and swollen penis. Cavernosography also cannot be used in patients allergic to contrast material. Moreover, it can give false-negative results[6-8].

Recently MRI was used to evaluate penile fractures, where it was highly accurate in identifying the tunical tear and associated urethral injury. MRI with digital subtraction angiogram is useful to determine the site and size of the tear and associated urethral injury. In the present series the tear site was 4–7 cm from the penile coronal sulcus. Our localized approach in 3 patients was easy and provided a ‘skin window’ directly over the tear, allowing an adequate repair of the tunica and the urethral injury. Although there was not much difference in the hospital stay, as all of the patients were discharged 24 h after surgery. MRI was successful in identifying urethral injury in 1 patient who did not presented with hematuria, thus providing the need for early intervention and not managing the patient conservatively. MR Angiogram is also successful in identifying any vascular injury although in our series we did not report any vascular injury in any of our patients. Penile fracture carries a risk of erectile dysfunction; it is not infrequent that the patient (after surgical repair) claims that they have de novo erectile dysfunction as a result of faulty surgery. Thus before surgery MRI is an effective measure providing objective documentation of the

condition for such medicolegal purposes. Moreover, MR images can be used for teaching purposes and for comparing results from different centres. Notably, MRI can also be used for follow up investigations in penile fracture patients. In conclusion, MRI is an easy and informative investigation for evaluating and documenting penile fracture; it also improves the management plan. However, MRI is expensive and needs available apparatus and an expert operator.

Conclusions

MR imaging is an excellent modality for evaluating patients with acute penile trauma. It can accurately demonstrate the integrity of the tunica albuginea as well as the extent and location of a tunical tear and of associated injuries to the corpus spongiosum and urethra. MR imaging is also particularly helpful in determining the necessity for surgical intervention. MR Digital Subtraction Angiogram is required to rule out any injury to the major vessels of the penis.

References

1. Taha SA, Sharayah A, Kamal BA, et al. Fracture of the penis: surgical management. Int Surg 1988;73:63-4
2. Hartman R. Penile Fracture. (2015) NEJM. 372;11. doi:10.1056/nejmicm1404224
3. Persaud S, Persaud M, Naraynsingh, V., 2019. Fracture of the Penis: A Review. EMJ Urology. (2019) 7 (1): 83-88.
4. Koga S, Saito Y, Arakaki Y et al. Sonography in fracture of the penis. Br J Urol 1993; 72: 228–9
5. Uder M, Gohl D, Takahashi M et al. MRI of penile fracture: diagnosis and therapeutic follow-up. Eur Radiol 2002; 12: 113–20
6. Dever DP, Saraf PG, Catanese RP, Feinstein MJ, Davis RS. Penile fracture. operative management and cavernosography. Urology 1983; 22: 394
7. Kalash SS, Young JD Jr. Fracture of penis: Controversy of surgical versus conservative treatment. Urology 1984; 24: 21–4
8. Farah RN, Stiles R, Cerny JC. Surgical treatment of deformity and coital difficulty in healed traumatic rupture of the corpora cavernosa. J Urol 1978; 120: 118–20.