



Penile fractures: the successful outcome of immediate surgical intervention

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The data of 60 patients admitted to Mansoura Urology and Nephrology Center with penile fractures and treated by immediate surgical repair were reviewed with respect to their presentation, investigations, operative and post-operative details. Forty-nine patients were followed up regarding penile curvatures, plaques and erectile function. Patients reporting decreased erectile function were further assessed by evaluating their response to intracavernous injection of PGE₁ and by penile color duplex Doppler ultrasonography.

All of our patients had the classic clinical presentation of penile swelling and ecchymosis. Only five patients had accompanying urethral rupture. Penile ultrasonography was used to confirm the diagnosis in 23 patients. Immediate exploration was done using subcoronal circumferential incision in about two-thirds of the cases. All tunica albuginea ruptures were unilateral except one case which was bilateral. Interrupted absorbable sutures were used for repair in most of the patients. Urethral repair was done in five cases. Delayed complications were detected in only six cases (12.2%) in the form of mild penile curvature on erection, plaques and/or mild erectile dysfunction. Intracavernous injection (ICI) of PGE₁ and penile duplex Doppler showed a normal pattern in three patients with erectile dysfunction while the fourth showed incompetent veno-occlusive mechanism. Psychosexual consultation was required for two of these patients while the third was successfully managed by self-ICI of PGE₁.

We conclude that the excellent outcome of our patients parallels other reports of early surgical repair regarding low morbidity, short hospital stay and rapid functional recovery. There is a low incidence and degree of erectile dysfunction among repaired patients; however, it should be thoroughly investigated and properly managed. Ultrasonography is easy and helpful; however, the more invasive cavernosography and/or magnetic resonance imaging are indicated when the case is atypical, or the diagnosis of rupture of tunica is suspicious. *International Journal of Impotence Research* (2000) 12, 273–277.

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Introduction

Penile fractures occur to the erect penis as a result of blunt trauma commonly during coitus or masturbation.^{1–4} The resultant injury is usually a transverse tear in the tunica albuginea of one corporal body. However, involvement of both corpora, corpus spongiosum and urethra had also been reported.^{1,5–7} Rupture of the tunica albuginea occurs due to its marked thinning from a resting thickness of 2 mm down to 0.25–0.5 mm on erection together with the associated marked short-term pressure increases (intracavernous pressures exceeding 450 mm Hg), which approach or exceed the tunica tensile strength during acute abrupt loading or

bending of the erect penis.² Typically the patient reports a snap or cracking sound accompanied by immediate pain and rapid detumescence followed immediately by development of swelling and angulation.^{1,2,8,9} Blood at the meatus or gross hematuria were reported in cases of urethral injury.¹⁰ Obstructive symptoms or urinary retention may develop in the absence of urethral injury, owing to the marked hematoma and edema causing external urethral compression.^{8,11}

Penile ultrasonography, cavernosography and, recently, magnetic resonance imaging (MRI) have been reported to be helpful in establishing the diagnosis and localizing the site of the tear, particularly in the suspicious cases.^{7,12–18} Ascending urethrogram is mandatory whenever urethral injury is suspected. All recent reports favor early surgical repair due to the adequate functional and cosmetic results with minimal complications.^{1,6–8,10,19} This is in contrast to old reports

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favoring conservative management.²⁰ Various surgical approaches have been reported. These included circumferential subcoronal,^{1,9,10,19} longitudinal incision over the hematoma site^{4,21} or, more recently, an inguinoscrotal incision.^{22,23} We now evaluate our own experience with 60 patients with penile fractures who were all managed by early operative intervention.

Patients and methods

Sixty male patients were operated upon in Mansoura Urology and Nephrology Center between March 1981 and August 1999. The age of our patients ranged from 14 to 70 y (mean = 35.1 ± 12.5 y) at time of presentation. Table 1 shows the age distribution of our patients. It shows that 85% of our patients belong to the third, fourth and fifth decades which are the decades of maximal sexual activity. Clinical presentation, investigations, operative and post-operative details were reviewed from the patient charts. Forty-nine patients were followed up. Duration of follow-up ranged from 4 to 140 months (mean = 54.2 ± 39.9 months). They were followed up regarding penile curvatures on erection or the presence of any palpable plaques, and their erectile function. Careful penile examination for palpable plaques was done for all the patients. Patients with erectile dysfunction were evaluated by color duplex Doppler ultrasonography of the penile vascularity together with an assessment of erectile response to intra cavernous injection of $10 \mu\text{g}$ of prostaglandin E₁ (PGE₁).

Results

Patients presented to the emergency room 2–24 h (mean = 11.8 ± 7.8 h) after occurrence of the penile fractures. All the patients came complaining of penile swelling and ecchymosis (Figure 1) and 53 patients (88.3%) reported hearing a snap sound. Only five patients (8.3%) complained of urethral bleeding. Table 2 lists the causes of penile fractures in the current series.

Table 1 Age distribution of patients with penile fracture

Age interval (y)	No. of patients	%
< 20	3	5
20–30	26	43.3
31–40	13	21.7
41–50	12	20
51–60	4	6.7
61–70	2	3.3
Total	60	100



Figure 1 A case of penile fracture showing the classic hematoma and angulation deformity.

Table 2 Causes of penile fracture in the current series

Cause of fracture	No. of patients	%
1 Sexual intercourse	36	60
2 Manual manipulations	9	15
3 Rolling over in bed	10	16.7
4 Hitting of the penis against hard object	5	8.3

Characteristic clinical presentation was diagnostic in all the patients, and we verified the diagnosis by penile sonography in 23 patients (38.3%) and cavernosography in four (6.7%). MRI was performed in the other two cases (3.3%). An ascending urethrogram showed evidence of associated urethral injury in five patients (8.3%). In 38 patients (63.3%), subcoronal circumferential incision was utilized for penile degloving and exposure of the site of rupture of tunica albuginea, while in 22 patients (36.7%) longitudinal incision over the expected rupture site was applied. Table 3 summarizes the operative findings in our patients. On exploration of the corpora, a tunical tear was found in the right corpus cavernosum in 35 patients (58.3%), in the left corpus in 20 (33.3%), and bilateral in one case (1.7%) (Figure 2). In four cases (6.7%) exploration revealed intact tunica with bleeding from the torn superficial vein that was ligated. The site of tunical

Table 3 Operative findings in patients with penile fractures

Site of tear*	No. of patients	%
Right corpus	35	58.3
Left corpus	20	33.3
Both corpora	1	1.7
No tear (ruptured superficial vein)	4	6.7

*Concomitant urethral injury was seen in five cases.



Figure 2 Intra-operative photograph showing the site of tear of the tunica albuginea (arrow).

tear was in the distal shaft of the penis in 36 patients (60%) and in the proximal shaft in 20 patients (33.3%). Repair was done using absorbable (polydioxanone or polyglycolic acid) interrupted sutures in most of the cases. Urethral resection and reanastomosis was required in two cases while the other three cases required simple repair of the partial urethral tear.

No significant early post-operative morbidity was encountered except for two cases (3.3%) of mild wound infection. The hospital stay was short (mean = 2.3 ± 1.9 d) ranging from 1 to 12 d. Moreover, the hospital stay of patients without urethral repair (2 ± 1 d) was much shorter than that of patients with concomitant urethral repair (5.2 ± 4.1 d). The urethral catheter was fixed routinely at the start of operation and left in position for 1 d. In cases of urethral repair, the urethral catheter was left in for two weeks.

Normal sexual function was reported by 45 cases (91.8%) and all patients had a normal urinary stream. Not one of our patients reported abnormal penile sensations or numbness. Six patients (12.2%) have long-term complications. Palpable fibrous plaques were felt in all of them. Three patients (6.1%) had mild curvature on erection which did not interfere with intercourse. Four patients (8.2%) had erectile dysfunction (including one with penile curvature). Three patients showed good response to PGE₁ intracavernous injection together with normal penile duplex findings. The fourth patient showed tumescence with PGE₁ injection with high end-diastolic velocity on penile duplex ultrasonography suggestive of incompetent veno-occlusive mechanism. Of the first three patients two required psychosexual help due to a deep phobia of recurrence of the fracture and one refused treatment while the fourth patient was successfully managed with 20 µg PGE₁ intracavernous self-injection.

Discussion

Penile fractures are not an uncommon urologic emergency. In contrast to the limited number of cases (180) reviewed in the literature by Tsany and Demy in 1992²⁴ we could calculate 250 cases in reports from countries of the Middle East area only (including our series).^{4,9,25–30} Furthermore, more than 150 other cases could be found in the literature from other areas all over the world since the Tsany and Demy report in early 1992.^{2,7,9,13,16–19,22,23,28–30} Our series is one of the largest reported in the literature. Asgari and his associates reported on 68 patients but followed up only 32 of them.⁹

Forty-nine patients with repaired penile fractures were followed in our center for a mean period of 54.2 ± 39.9 months. Our patients gave the characteristic history of snap sound, sudden detumescence followed by the development of swelling and penile deformity. More than half of our patients developed this kind of trauma during sexual intercourse which agrees with published data (range 33–60%).^{1,24} Manual manipulations and rolling over in bed constituted one third of the occasions causing penile fracture compared to the abnormally high incidence of 78% reported in the series of Asgari and his associates.⁹

Complete transection of the urethra and corpus spongiosum is rarely reported in the literature, in contrast to the many partial urethral injuries.^{1,24} Only five (8.3%) of the patients had associated urethral injuries which is close to the 10–20% range reported in the literature.^{1,10,24} Three of these injuries in the current series were incomplete and required simple repair. The other two urethral injuries required resection and reanastomosis.

We found that the classic presentation of penile fracture is good enough for exploration, however, the simplicity and good experience with ultrasonography made its use routine to confirm the diagnosis in the last 23 patients of our series. Although non-invasive sonography depends on the observers' skill and can miss the site of the tunical tear if it is too small or it is full with a clot that renders it indistinguishable from the surrounding normal tunica albuginea.^{12,13} On the other hand, some authors recommend cavernosography for the diagnosis of tunical rupture.^{7,14,15} However, this has been opposed by others who consider it an invasive procedure with risks of infection, priapism and allergy to iodides.^{1,12,13} More recently MRI has been advocated when the diagnosis is uncertain.^{16–18} In four of our cases, there was misdiagnosis of tunical injury and on exploration only the ruptured superficial vein was ligated. Therefore, we stressed the necessity of penile ultrasonography and started recently to consider the more invasive cavernosography and/or the more costly MRI as adjunctive diagnostic modalities in atypical cases.

Subcoronal circumferential incision has been applied in 38 cases (63.3%) due to the excellent exposure of the three corpora which avoids accidental missing of a urethral injury or multiple injuries of the tunica (one of our cases showed bilateral corporal injuries).^{1,9,10,19} In the other cases, when the picture was very clear with palpable tunical defect under anaesthesia and no evidence of urethral injury longitudinal incision over the expected site was applied (in 36.7% of cases). We could not explain why the incidence of right corporal rupture is nearly double that of the left one in the cases of our study. Interrupted absorbable sutures were favored for repair of the ruptured tunica albuginea.

No significant early post-operative complications were encountered. Only two cases had mild wound infection. The hospital stay was short (2.3 ± 2.9 days). Patients who stayed longer in hospital were those with urethral repair. Long-term follow-up showed good functional results in terms of maintained normal sexual function and absent penile curvature or plaques in 87.8% of the followed cases. Only six patients (12.2%) had long-term complications in the form of palpable fibrous plaques (six patients), mild penile curvature on erection (three patients) and/or erectile dysfunction (four patients). These six patients shared the problem of delayed presentation and subsequent repair (24 h delay). Non-absorbable sutures were used in three of them. Some authors considered the previous two factors to be responsible for fibrosis, curvature or Peyronie's plaques complicating their cases of penile fractures.^{1,9,32} Pryor and his associates, reported 18 cases of Peyronie's disease complicating unrepaired blunt penile trauma in 22 patients. They also found that 8% of their 222 Peyronie's disease patients were due to penile trauma.³² A third risk factor which could be responsible for the development of such fibrous plaque is the presence of associated cavernous tissue trauma. Such trauma may predispose to more severe fibrosis and subsequent development of dense plaque and possible loss of erectile capacity.³² This incidence of complications in the range of 10% agrees with similar low figures of complications reported, with early surgical repair in different series^{1,9,10,19} and contrasts with high rates of complications reported with conservative management (up to 53%).^{1,10,31,32}

Out of the four patients with erectile dysfunction only one was proved to have an objective underlying hemodynamic abnormality on PGE₁ intracavernous testing and duplex penile ultrasonography which was incompetent veno-occlusive mechanism. Intracavernous injection of PGE₁ showed rigid erection with good color duplex penile indices precluding vascular problems in the other three patients. Psychogenic element had to be eliminated by psychosexologist as two of them reported that their sexual acts are currently performed with extreme

fear of recurrence of such trauma which may interrupt spontaneity and normality of the act. In contrast to our findings, Penson and his associates, on studying erectile dysfunction in 19 patients with history of blunt trauma to the erect penis, found that the most common underlying hemodynamic abnormality was site-specific corporal veno-occlusive dysfunction (79%) followed by cavernous artery insufficiency (37%). However, among their cases, only five had the full picture of penile fracture and only one of them had been subjected to surgical repair. Also five of their patients had Peyronie's plaques, a condition usually associated with site-specific leak.²

In conclusion, this series supports the excellent outcome obtained by immediate operative repair in other studies in terms of low morbidity, short hospital stay and good functional results. The majority of the patients maintained their erectile ability without any penile angulation or deformity. Atypically presented cases with suspicious diagnosis should be investigated by the non-invasive sonography and if it is still suspicious, by cavernosography or MRI. Erectile dysfunction, although of low incidence in these patients, has to be carefully evaluated and investigated.

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