

PENILE FRACTURE MANAGEMENT AT PRINCE HUSSEIN UROLOGY AND ORGAN TRANSPLANTATION CENTER (PHUO)

Abdelhakim Alnimate,MD,JBGS,JBU, Ali Zuriqat,MD,JBGS,JBU,MRCs*, Belal Alkhaldeh,MD,JBGS,JBU*, Mohammed Alqudah,MD,JBGS,JBU*, Ali Abuanzeh,MD,JBGS*,Aya,RN**

ABSTRACT

Objective: to describe the etiology, clinical presentation, management and sexual outcome of patients who had surgical exploration for clinical diagnosis of penile fracture (PF) at PHUO.

Methods: this is a retrospective study, were the medical files of all patients, who underwent PF surgical repair at PHUO, between February 13, 2017, and march 10, 2023, 35 patients were included in this is study. The data collected were analyzed regarding etiology, clinical presentation, site of injury, and sexual outcome.

Results: in this study, the affected patients were young, with the patient's age ranged from twenty-two to sixty-five years ($38.3 \pm 12.4, 36.0$ year), the most common cause was injury to the erected penis during Sexual inter-course (48.6%), while Self-inflicted "Taghaandan" (42.9%) was the 2^{ed} most common, in decreasing order of frequency. The vast majority of patient are potent following PF repair (91.4%), while erectile dysfunction ranging in severity from mild to severe were found in (8.6%) of patient.

Conclusion: PF, while is considered a rare diagnosis, is still a urological emergency. In most of cases the diagnosis is straight-forward and made by history (direct trauma to tunica albuginea during sexual-intercourse or by the other causes like self-induced trauma to the erected penis to induce detumescence) and clinical examination (Audible "snapping" sound, immediate loss of erection, pain, and swelling), early surgical repair associated with less complications and fewer erectile dysfunction occurrence.

Key words: tunica albuginea, penile fracture, rupture dorsal vein, erectile dysfunction

JRMS DECE 2024; 31 (3): 10.12816/0062042.

INTRODUCTION

PF is a rare urological emergency resulted from injury to the tunica albuginea of erected penis ⁽¹⁾, the etiology are variables, with trauma to the erected penis during the sexual-intercourse is the commonest, while other causes such as: rolling over the bed, masturbation, direct blunt trauma to the erected penis have been mentioned ⁽²⁾ Arab Abdulkasem al-Zahrawi of Cordoba described the first case of PF > 1000 year ago ⁽³⁾, while the first case of PF in the modern medical literature was reported by Malis et al. in 1924⁽⁴⁾

From the departments of::

*Urology

The typical clinical presentation of PF is a tirade of: Audible “snapping” sound, immediate loss of erection, pain, and swelling, making clinical diagnosis straight forward⁽⁵⁾. during physical examination the classical findings is “eggplant deformity” which is due to penile deformity resulted from hematoma and ecchymosis (figure 1)⁽¹⁾ The golden standard management of PF is immediate surgical exploration of penis involving degloving of the penis, evacuation of hematoma, and tunica albuginea repair. Concomitant urethral injury can be managed either surgically or conservatively depending on the degree of injury⁽⁶⁾.

Delayed repair can cause penile deformity and erectile dysfunction, urethral strictures, and urethro-cutaneous fistula, which can cause severe psychological and functional disability⁽⁷⁾ in this study, we described the clinical presentation, surgical management, operative findings, and the sexual outcomes of immediate PF repair at our urology institute.

MATERIAL AND METHODS

The medical files of thirty-five patients who had penile exploration due to presumptive clinical diagnosis of PF between February 13, 2017, and march 10, 2023, were reviewed retrospectively.

All information was collected and analyzed regarding the age, marital status, mechanism of injury, time to surgical management, operative information, site of injury, and follow-up sexual outcomes.

All patients presented to the emergency department with clinical suspicion of PF where examined by urologist, and once clinical diagnosis was confirmed, and history and clinical examination showed no signs of urethral injury, the patient was admitted to the urology department without any further imaging studies, and prepared for immediate surgical exploration.

Patients underwent either spinal or general anesthesia, after draping and scrubbing of the patient, a 16 fr Foleys catheter is inserted under aseptic technique, in all patients the sub-coronal approach has been used. All patients had been circumscised during their childhood, following proper dissection, the hematoma is exposed and evacuated and the urethra is assessed for any suspicious injury through visual inspection. Closure of the tunica albuginea was done in an interrupted fashion using absorbable vicryl 3-0 or 2-0 sutures (figure 2). If no tunic injury is found, penile tumescence was induced by looping a small Foleys catheter around the base of the penis and securing it with a clamp, then, a normal saline was injected into one corporal body using a 22 G butterfly needle, to exclude any missed injury. The patient is discharge home in the 2^{ed} day post operation, and recommend abstinence from sexual intercourse of 4–6 weeks, patient is followed in the urology outpatient clinic at 2, and 6 weeks post operation, were sexual outcomes and complications post-surgical intervention is evaluated.

Sexual outcome was assessed at 6 weeks, 12 weeks, and six months post-operative repair by the use of the International Index of Erectile Function (IIEF-5)⁽⁸⁾. the scores for the IIEF-5 range from 5 to 25, and erectile dysfunction was categorized into five groups:

1. Group I: severe (5-7)
2. Group II: moderate (8-11)
3. Group III: mild to moderate (12-16)
4. Group IV: mild (17-21)
5. Group V: no ED (22-25)

Patients informed consent regarding photos use for publication was given, in addition to the Royal medical services ethical committee approval.

Descriptive statistics indices in term of frequency, and percentages, mean and median were used to represent the categorical and scale data, and SPSS software V28 was used to analyze the data.

RESULTS

In this study a thirty-five patients who had clinical diagnosis of PF underwent penile exploration, the patient's age ranged from twenty-two to sixty-five years ($38.3 \pm 12.4, 36.0$ year). PF was twice common on unmarried patients (23 patient, 66 %) in comparison with married one (12 patient, 34%).

Trauma to the erected penis during sexual intercourse was responsible for about half of the cases, followed in order of frequency by self-induced trauma to the erected penis to induce detumescence, in which patient was forcefully bending the penis to achieve detumescence, a practice that first reported in Iran and called "Taghaandan" ⁽¹⁾. table (1)

Table 1: Penile fracture cause

Etiology	Number of patient (%)
Sexual inter-course	17 (48.6 %)
Self-inflicted	15 (42.9%)
Denied ant history of trauma	2 (5.7 %)
Blunt trauma due to traffic accident	1 (2.8%)

All patients presented to the emergency department has the classical findings of ecchymosis, detumescence, and penile swelling and pain, with only two third of patient report audible snapping sound in their history. no patient had symptoms or clinical findings suggestive of urethral injury.

The time between the beginning of the symptoms and hospital admission ranged from one hour to seventy-two hour (median 5 hours), where delayed seeking medical treatment was attributed to patient embarrassment.

Regarding intra-operative findings, the most common was hematoma at the site of the injury, most of the injury was affecting the right side in the ventro-lateral aspect, while in less than one third of the patients no tunica albuginea defect was found, and the hematoma was due either to dorsal vein rupture or non-specific dartos bleeding by the same mechanism of trauma in both with and without tunica injury. Table (2)

Table (2) trend of sexual outcome enhancement using Cochran's Q test

Pairwise comparisons	Test Statistic	Std. Error	*Adj. Sig.
Six weeks –twelve weeks	-.143-	.062	.021
Six weeks –six months	-.200-	.062	.001
Twelve weeks –six months	-.057-	.062	.355

*Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table 2: penile fracture, intraoperative findings

Site of injury	Number of patient (%)
Right ventrolateral defect	21 (60%)
Dorsal vein rupture	7 (20%)
Left ventrolateral (2 defects)	1 (2.9%)
2 defects (Left ventrolateral & medial)	1 (2.9%)
Left ventrolateral defect	1 (2.9%)
No defect, on-specific, dartos bleeding	4 (11%)

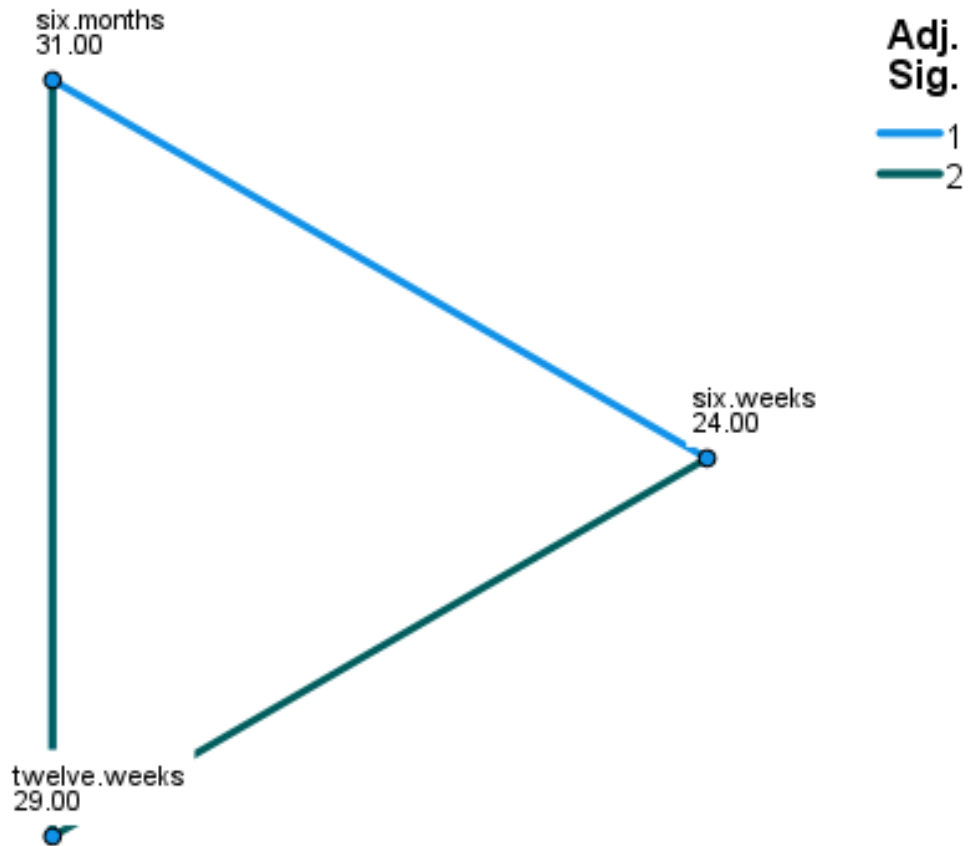
During exploration one patient found to have simple penile urethral injury, detected by visual inspection of urethra, the injury was repaired by 3/0 absorbable suture over 16 fr Foleys catheter, and Foley's is removed after 3 weeks, and patient is followed by The International Prostate Symptom Score (IPSS), urine flow rate (FR), and ascending urethrogram and show normal healing.

Almost all patients had uneventful postoperative course, except for two patients, who found to have a simple wound infection during the first postoperative visit, they have been treated with oral antibiotic, topical antibiotic, and dressing, with follow-up showed complete resolution of infection.

Sexual outcome assessment was carried out at six weeks, twelve weeks, and six months by the IIEF-5, after 6 months thirty-one patients (88.5%) had good erection (Group V), while four patients (11.5%) who had erectile dysfunction (one patient had Group III and other three had Group IV), found to have medical comorbidities such as: Diabetes Miletus (DM), Hypertension (HTN), and ischemic heart disease (IHD), although their ages were above fifty-three year with elapsed time from the beginning of the symptoms to hospital admission, more than 24 hours, three patients responded well to phosphodiesterase inhibitor's medication, while the non-responder one underwent penile duplex study which showed arterio-genic and venous leak as a cause of his erectile dysfunction and offer penile prosthesis implantation.

The trend of enhancement in sexual outcome was tracked using Cochran's Q test. The results in table (2) and figure (3) have shown that the enhancement of sexual function was statistically significant between six weeks and 12 weeks, $P=0.021$, moreover a statistically significant differences were found between six weeks and 6 months $P=0.004$. while the differences of sexual function enhancement were not statistically significant different between twelve weeks and 6months $P=0.355$

Pairwise Comparisons



Each node shows the sample number of successes.

Figure III pairwise comparisons of sexual enhancement over three periods of observation

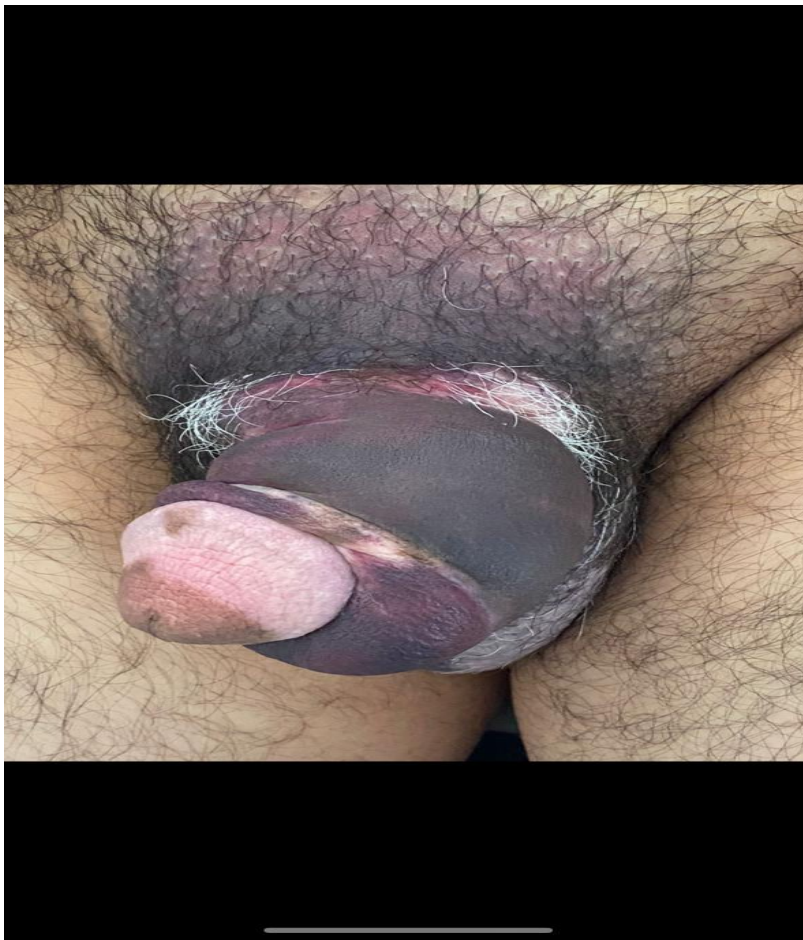


Figure I: penile fracture showing the classical clinical findings of penile ecchymosis, swelling and deformity “eggplant appearance “.

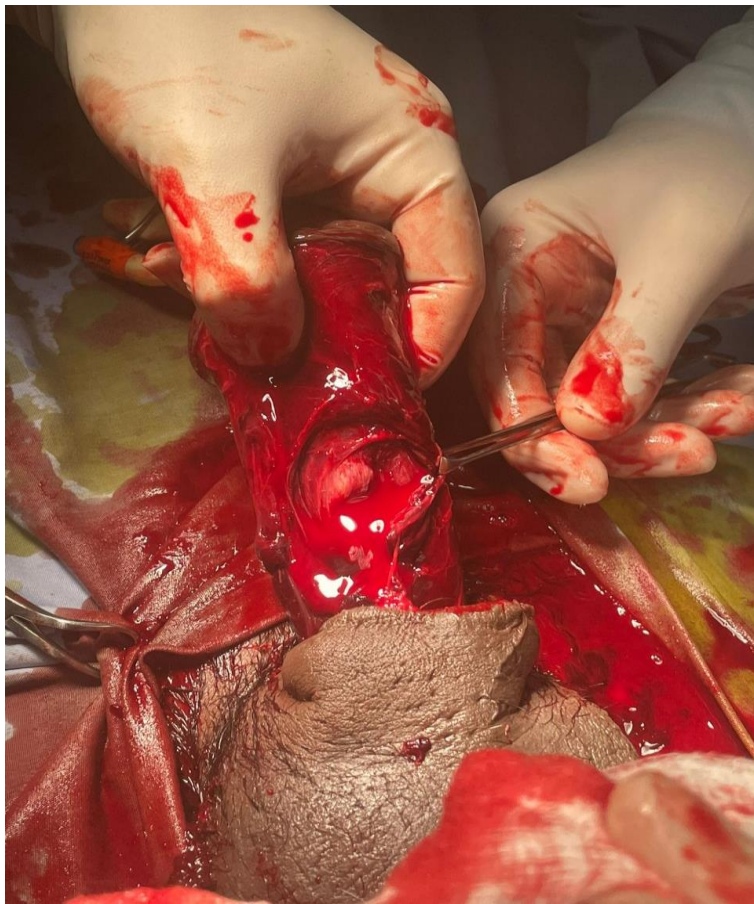


Figure II: penile exploration, with subconical incision, evacuation of hematoma, and identification of the tunica albuginea injury site.

DISCUSSION

The tunica albuginea is considered one of the strongest fascial layers of the body. During erection the tunica albuginea become thin and less elastic, in the flaccid state the thickness of tunica albuginea is about 2 mm, and decreases to 0.25-0.50 mm in tumescence phase. In erected penis the average arterial pressure is 100 mmHg, while in penile fracture cases, the pressure found to be around 1500 mmHg, making the tunical layer more susceptible to sudden bending injury. Initially following fracture, hematoma is formed, and if the hematoma is contained within the buck's fascia, only the penile shaft will be affected by ecchymosis, ecchymosis will involve the scrotum, perineum, and lower abdominal wall if fascia have been disrupted, and this will give the classical appearance of "butterfly". The injury is commonly involved the right ventrolateral aspect of the proximal penile shaft^(9,10) which are similar to our study findings, penile fracture was observed on the right ventro-lateral side in 60% of patients.

PF is most often affecting the young age group, Mahapatra et al. reported that 40% of PF occurred in the age group of 21–30 years of age⁽⁷⁾, while in our study, 60% of penile fracture were in the age group of 22–40 years of age. Regarding PF etiology, while the sexual-intercourse is the most common cause in the western countries⁽¹¹⁾, self-induced penile fracture “Taghaandan” is responsible for high number of penile fractures in eastern countries⁽¹⁾, in our study sexual-intercourse is the most common cause, followed in order of frequency by Taghaandan practice. The diagnosis is usually straight forward, made only by history and clinical examination, and in the vast majority of cases there are no need for further investigations⁽¹²⁾, during clinical examination swelling (43%) and ecchymosis (33%), causing the typical appearance of eggplant are the most encountered finding signs⁽¹³⁾. hematuria was seen in 5.6% of patients, but confirmed urethral injury was present in less than 6%⁽¹⁴⁾, in our study only one patient found to have confirmed urethral injury, and Complete urethral injury is almost always occurred in bilateral injury⁽¹²⁾ While PF diagnosis is made in more than ninety five percent of cases by clinical examination, different modalities have been used in doubtful cases, such as ultrasonography, cavernogram, magnetic resonance imaging, and retrograde urethrogram⁽¹⁵⁾.

Delayed presentation is usually due to patient embarrassment, Salako et al (2018) reported that about half of patient presented to hospital early within six hours⁽³⁾, in our study the median time was five hours.

PF conservative management was the treatment of choice long time ago, which include : cold compressors applications, urinary bladder catheterization, non-steroidal anti-inflammatory medications (NSAID’S), and in case of urethral injury, suprapubic diversion and delayed urethral repair⁽¹⁶⁾, this treatment now is fall out of favor, due to high risk of complications, and currently is replaced by early penile exploration and repair ,which is considered now the golden standard treatment of penile fracture⁽¹⁷⁾.

PF exploration and repair surgery was first reported in 1936, and due to less complications associated with surgical repair vs conservative management, this approach has gained more acceptance⁽¹⁸⁾. And nowadays, the AUA and EUA recommended early surgical repair to decrease the likelihood of long-term complications especially Erectile dysfunction.

Al Ansari et al⁽¹⁹⁾ reported less erectile dysfunction 4.1% in patient who underwent surgical Intervention within 24 hours, while it was (18%) in patients who received delayed management > 24 hours, additionally, meta-analysis study showed similar erectile dysfunction rate between patient receiving immediate vs delayed repair, but early intervention was associated with fewer patient penile deformity and pain⁽¹⁴⁾.

Preoperatively, if no urethral injury is suspected, then the Foleys catheter is inserted in the operating room, and this will help in identification of urethra and avoid trauma resulted from surgical intervention, and if no urethral injury is found, then the Foleys can be removed after PF repair⁽²⁰⁾

Two surgical approaches have been used in the management of PF, the sub-coronal approach with degloving, which the most commonly used, and it gives the advantage of maximum and complete exposure of the corporal bodies, and this is necessary when no preoperative imaging studies were done. The disadvantages of this approach are: skin loss, paresthesia, swelling, and infection which is related to the extensive dissection⁽²¹⁾. The other is the penoscrotal approach, and is usually used for localized proximal unilateral injury and in uncircumscribed patient, and the site of injury can be confirmed by imaging study, this approach can avoid unnecessary dissection and morbidity associated with the former technique, and now are increasingly being used⁽²²⁾.

The average postoperative hospitalization range between one day to one week. While those who managed conservatively stayed on average about 5.6 day more than surgically managed patients. urologist recommended that sexual intercourse to be avoided for one to two months post PF repair⁽²³⁾, but early intercourse (7-25 days) after surgical repair of PF found to be safe⁽¹⁾.

About 12 % of patients with PF suffered from mild erectile dysfunction, while 9 % will have severe erectile dysfunction ⁽²⁴⁾, while in our study (88.5% had good erection including those who did not have tunical injury, (11.5%) had erectile dysfunction). In the other hand, the rate of erectile dysfunction ranging from 0-30 % was reported by other meta-analysis studies ⁽¹⁴⁾. The rate of erectile dysfunction is lower in patient managed surgically. Large tuncial defect and increase age found to be a risk factor for erectile dysfunction following surgical repair ⁽²⁵⁾. also, anxiety and fear of trauma from the event play a role in erectile dysfunction etiology ⁽²⁶⁾. significant penile deformity developed in about half of patients, while urethral stricture occurred in 3 % of patients with urethral injury. Additionally, urethral fistula is a rare complication ⁽²⁷⁾.

CONCLUSION

PF is a urological emergency with rare occurrence, and in the vast majority of cases the diagnosis is made by history (direct trauma to tunica albuginea during sexual-intercourse or by the other causes like self-induced trauma to the erected penis to induce detumescence) and clinical examination (Audible “snapping” sound, immediate loss of erection, pain, and swelling), while imaging studies such as US and MRI maybe helpful in doubtful and atypical presentation, urethral injury should be suspected in every case, especially on those with bilateral injury. early surgical repair decreases the rate of complications, especially erectile dysfunction and psychological disorders.

REFERENCES

1. Zargooshi J. Penile fracture in Kermanshah, Iran: Report of 172 cases. *J Urol*. 2000; 164:364–6
2. Morey AF, Dugi DD., 3rd. Genital and lower urinary tract trauma. In: Wein AJ, Kavoussi LR, Partin AW, Nowick AC, editors. *Campbell-Walsh Urology*. 10th ed. Philadelphia: Elsevier-Saunders, Co; 2012. pp. 2507–2520
3. A.A. Salako, T.A. Badmus, R.A. David, A.A. Aremu, A. Laoye, G.A. Oyeniya, I.A. Akinbola, M.C. Igbokwe, C.I. Onyeze, R.N. Babalola. Pattern of presentation and surgical management of

4. J. Malis, K. Zur Der fracture penis *Arch Klin Chir*, 129 (1924), p. 651
5. Ozen HA, Erkan I, Alkibay T, Kendi S, Remzi D. Fracture of the penis and long-term results of surgical treatment. *Br J Urol*. 1986; 58:551–2
6. Eke, N. (2002). Fracture of the penis. *British journal of surgery*, 89(5), 555-565.
7. Mahapatra RK, Ray RP, Mishra S, Pal DK. Urethrocutaneous fistula following fracture penis. *Urol Ann* 2014; 6:392–394.
8. Rhoden EL, Telöken C, Sogari PR, Vargas Souto CA. The use of the simplified International Index of Erectile Function (IIEF-5) as a diagnostic tool to study the prevalence of erectile dysfunction. *Int J Impot Res*. 2002 Aug;14(4):245-50. doi: 10.1038/sj.ijir.3900859. PMID: 12152112
9. Sant GR. Rupture of the corpus cavernosum of the penis. *Arch Surg* 1981; 116: 1176-8.
10. . Kursat F., Sam E., Sefa M., et al. American Journal of Emergency Medicine Surgical results in penile fracture: our single center experience. *Am. J. Emerg. Med.* 2020; xxxx:8–10. doi: 10.1016/j.ajem.2020.08.073
11. Koifman L, Barros R, Júnior RA, Cavalcanti AG, Favorito LA. Penile fracture: diagnosis, treatment and outcomes of 150 patients. *Urology*. 2010; 76:1488-92
12. Barros R, Hampl D, Cavalcanti AG, Favorito LA, Koifman L. Lessons learned after 20 years' experience with penile fracture. *Int Braz J Urol*. 2020 May-Jun;46(3):409-416. doi: 10.1590/S1677-5538.IBJU.2019.0367. PMID: 32167705; PMCID: PMC7088490
13. Chung CH, Szeto YK, Lai KK: 'Fracture' of the penis: a case series. *Hong Kong Med J* 2006; 12:197-200
14. Amer T, Wilson R, Chlosta P, AlBuheissi S, Qazi H, Fraser M, Aboumarzouk OM. Penile Fracture: A Meta-Analysis. *Urol Int*. 2016;96(3):315-29. doi: 10.1159/000444884. Epub 2016 Mar 9. PMID: 26953932.
15. Mahapatra RS, Kundu AK, Pal DK. Penile Fracture: Our Experience in a Tertiary Care Hospital. *World J Mens Health*. 2015 Aug;33(2):95-102. doi: 10.5534/wjmh.2015.33.2.95. Epub 2015 Aug 19. PMID: 26331126; PMCID: PMC4550602
16. Fetter TR, Gartman E. Traumatic rupture of penis. Case report. *Am J Surg*. 1936; 32:371–2. doi: 10.1016/S0002-9610(36)90167-8.
17. Summerton DJ, Campbell A, Minhas S, Ralph DJ. Reconstructive surgery in penile trauma and cancer. *Nat Clin Pract Urol*. 2005; 2:391–7. doi: 10.1038/ncpuro0261

18. Al-Shaiji TF, Amann J, Brock GB. Fractured penis: diagnosis and management. *The Journal of Sexual Medicine*. 2009; 6: 3231–3241
19. Ansari AA, Shamsodini A, Fadil E, Malik E, Yassin A. Penile Fracture: Treatment Outcomes of 26 Cases. *Journal of Men's Health*. 2009; 3: 260
20. Kamdar C, Mooppan UMM, Kim H, Gulmi FA. Penile fracture: preoperative evaluation and surgical technique for optimal patient outcome. *BJU International*. 2008; 102: 1640–1644.
21. EI-Bahnasawy M, Gomha M. Penile fractures: the successful outcome of immediate surgical intervention. *International Journal of Impotence Research*. 2000; 12: 273–277
22. De Luca F, Garaffa G, Falcone M, Raheem A, Zacharakis E, Shabbir M, et al. Functional outcomes following immediate repair of penile fracture: a tertiary referral centre experience with 76 consecutive patients. *Scandinavian Journal of Urology*. 2017; 51: 170–175.
23. Kaminsky H, Beebe S, Shah N, Jenkins LC. Surgical reconstruction for penile fracture: a systematic review. *International Journal of Impotence Research*. 2020; 32: 75–80
24. Tang Z, Yang L, Wei Q, Wang F, Liu LR, Tan P, et al. Management and outcomes of penile fracture: a retrospective analysis of 62 cases with long-term assessment. *Asian Journal of Andrology*. 2018; 20: 412–413
25. Ortac M, Özgör F, Caglar U, Esmeray A, Savun M, Sarılar Ö. Older age and a large tunical tear may be predictors of increased erectile dysfunction rates following penile fracture surgery. *International Journal of Impotence Research*. 2020; 32: 226–231.
26. Barros R, Schul A, Ornellas P, Koifman L, Favorito LA. Impact of Surgical Treatment of Penile Fracture on Sexual Function. *Urology*. 2019; 126: 128–133
27. Falcone M, Garaffa G, Castiglione F, Ralph DJ. Current Management of Penile Fracture: an up-to-Date Systematic Review. *Sexual Medicine Reviews*. 2018; 6: 253–260