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Research Article

CLINICAL RESULTS OF DIAGNOSIS AND TREATMENT OF PENILE FRACTURE: OUR EXPERIENCE OF THE PAST 10 YEARS

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ABSTRACT

Objective: The objective of our study is to evaluate the clinical characteristics, diagnostic methods, surgical outcomes, and post-operative complications of penile fractures, based on extensive clinical experience over the past decade. While penile fracture (PF) is a well-established clinical condition, the originality of this study lies in its detailed analysis of both diagnostic approaches and surgical outcomes.

Materials and Methods: A retrospective review was conducted on 33 patients who underwent surgery for penile fractures between March 2014 and March 2024. Medical records were systematically reviewed to obtain epidemiological data, patient history, clinical presentation, etiology, operative findings, and postoperative complications. Statistical analysis was performed using IBM SPSS Statistics.

Results: The mean age of patients was 41.9 ± 13.17 years. The median time from the injury to presentation at the emergency department was 5 hours (range: 1–24 hours). The most common etiology was sexual intercourse-related trauma, observed in 57.6% of cases. Hematoma was present in all patients upon physical examination. Penile ultrasound was performed in 36.4% of cases, detecting cavernosal rupture in all cases. Surgical repair was performed within 24 hours of injury for all patients, with a median hospitalization of 1 day. No early complications occurred, and none of the patients developed erectile dysfunction and penile curvature during follow-up.

Conclusion: History and physical examination are usually sufficient for diagnosis. In uncertain cases, penile ultrasound by experienced radiologists is valuable. Surgical intervention within 24 hours, including pre-hospital delay, minimizes erectile dysfunction and penile curvature, ensuring better functional outcomes.

Keywords: Circumferential subcoronal incision, Coitus, Penile Fracture, Tunical tear

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INTRODUCTION

A penile fracture (PF) occurs when the tunica albuginea, which surrounds the erectile tissues of the penis, ruptures. Its overall incidence is relatively low, accounting for 1 case per 175000 of the US male population (1).

The causes of penile fracture can vary depending on geographical regions. In Western countries, trauma during sexual intercourse is the most common cause, whereas in the Middle East, a maneuver called "Taghaandan," involving the manual bending of an erect penis, is frequently observed (2). The primary diagnostic method is clinical evaluation, though imaging can help confirm the diagnosis and assess complications such as urethral involvement. Penile Doppler ultrasound (US) and magnetic resonance imaging (MRI) can be used in this purpose (3, 4). Patients often report hearing a cracking sound at the moment of injury, which is immediately followed by a loss of erection and the appearance of a purple-colored swelling resembling an eggplant deformity (5)
The European Association of Urology Guidelines on Urological Trauma recommends early repair for PF to preserve erectile function and reduce the risk of penile curvature and painful erections (6).

The subcoronal penile degloving technique is generally favored for incision, as it provides a clear view of the urethra and corpus cavernosa (7). Due to the thickness of the tunica albuginea, durable and slowly absorbable sutures are recommended for repair (2, 8, 9).

This study aims to share our clinical experiences over the past decade and critically analyze PF in light of current literature. While the topic of PF has been explored previously, this study provides new clinical data and reinforces the importance of early intervention, the role of US in diagnosis, and the effectiveness of a standardized surgical approach, making it an original contribution to the field.

MATERIALS AND METHODS

This study followed the guidelines outlined in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (10), and ethical approval was obtained from our local Ethics Committee.

We conducted a retrospective analysis of data from 38 patients who underwent surgery with a preoperative diagnosis of PF at our tertiary care hospital between March 2014 and March 2024. Patient medical records were systematically reviewed to collect data on demographics, clinical presentation, etiology, surgical details, and postoperative outcomes.

Inclusion criteria included patients who underwent PF repair, as documented in surgical records. Exclusion criteria comprised cases with an unclear history (1 patient), tunical tear repair due to sharp object injuries (1 patient), cavernosal repair for gunshot wounds (1 patient), missing surgical records, or incomplete anamnesis and physical examination notes (2 patient).

Surgical decisions were primarily based on patient's history and physical examination findings (Figure 1, left). Penile Doppler ultrasonography (US) was performed when the diagnosis was uncertain. Preoperative assessment included a complete blood count, electrocardiogram (ECG), and chest X-ray, following a consultation with the anesthesia team. Surgical intervention was performed within 24 hours of presentation, and all patients provided written informed consent before the procedure.

A circumferential subcoronal incision and degloving of the penis was made for accessing on tunical tear (Figure 1, middle). Hematoma evacuation was performed, and tunical tear was sutured using 2-0 polyglactin sutures with a simple interrupted technique (Figure 1, right). In cases with concomitant corpus spongiosum rupture and urethral injury, urethral tears were repaired with 4-0 polyglactin sutures using a similar method.

Prophylactic broad-spectrum antibiotics were administered 30 minutes before surgery. A foley catheter was inserted in all patients to aid in urethral identification.

To ensure repair integrity, a saline-induced erection test was performed. Postoperatively, light-pressure elastic bandages were applied. Foley catheters were removed immediately in patients with dorsal vein rupture without tunical tears, while those with isolated tunical tear repair had their catheters removed the following day. The single patient with urethral repair had the catheter left in place for five days.

Early postoperative complications, including hematoma, pain, and fever, were assessed during hospitalization. Long-term outcomes, such as erectile function and penile curvature, were evaluated at six weeks and six months post-surgery. Erectile dysfunction and penile curvature

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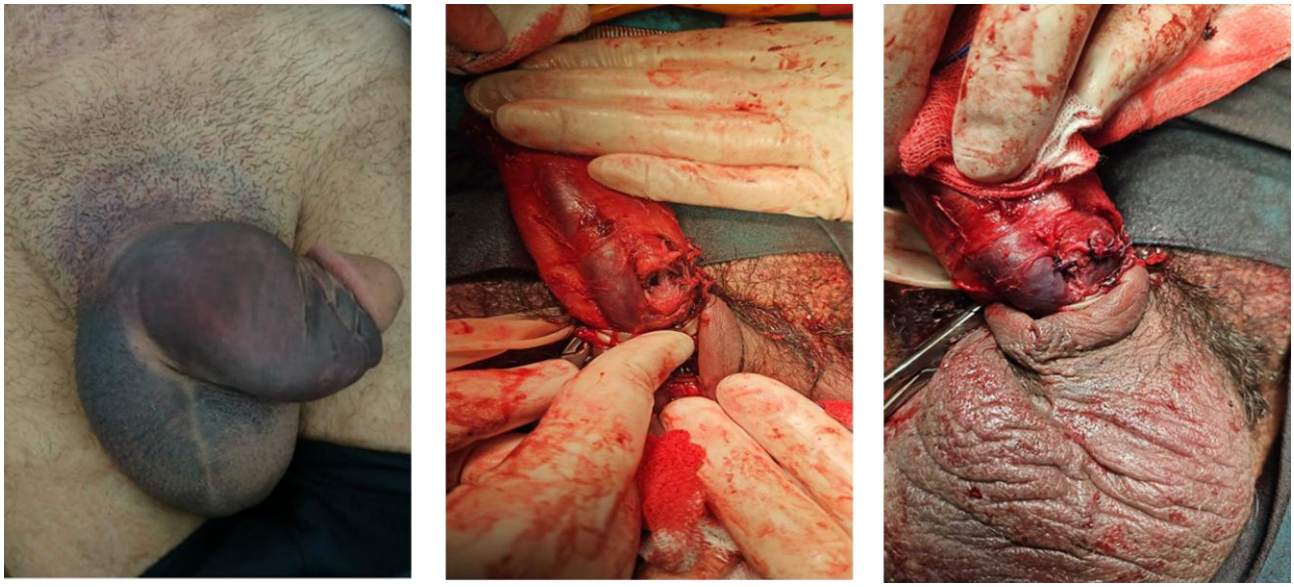

Figure 1. Clinical Presentation of Penile Fracture on Physical Examination (Left), Tunical Tear Appearance After Penile Subcoronal Incision and Degloving (Middle), Repair of Tunical Tear (Right).

were assessed through patient anamnesis and physical examination. As no patients reported complaints or showed pathological findings, erectile dysfunction questionnaires were not completed, and further evaluation was deemed unnecessary. Long-term complications were assessed during outpatient visits at six weeks postoperatively and through follow-up phone calls at six months.

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 25.0. Continuous variables were reported as mean ± standard deviation (SD), and categorical variables were reported as frequencies and percentages.

RESULTS

This study included 33 patients who underwent surgery for PF. The patients' average age was 41.9 years, with a standard deviation of 13.17 years. Sexual intercourse was the leading cause of PF, accounting for 57.6% of cases. The median time from injury to presentation at the emergency department was 5 hours, ranging from 1 to 24 hours. Hematoma was the most common symptom, observed in all patients. Penile ultrasound (US) was performed in 36.4% of the patients in the emergency department, and cavernosal rupture was detected in all cases that underwent the procedure. Demographic data and clinical findings are presented in Table 1.

A subcoronal degloving incision was performed in all patients. Among the 33 cases, 4 had dorsal vein rupture without tunical tears, requiring only hematoma evacuation. The remaining 29 patients underwent tunical defect repair. The urethral catheters were promptly discontinued after surgery in patients who did not have cavernosal defects. Foley catheters were removed on the first postoperative day in 96.5% of cases. The patient with urethral repair had the catheter removed on postoperative day five. No early complications were observed during hospitalization. The median length of hospitalization was 1 day (range: 1-3 days).

Table 1.The demographic and clinical data of penile fracture

Complaint Regarding Application n, (%)	Hematoma	33 (100)
	Detumesans	25 (75.8)
	Snapping sound	22 (66.7)
	Pain	13 (39.4)
Etiology n, (%)	Coitus	19 (57.6)
	Penil manipulation	5 (15.2)
	Rolling in bed	4 (12.0)
	Falling on erect penis	5 (15.2)
Side of the lesion n, (%)	No tunical defect	4 (12.1)
	Right cavernosum	20 (60.6)
	Left cavernosum	7 (21.2)
	Both corpora cavernosa	2 (6.1)
Emergency service application period n, (%)	≤ 6 hours	22 (66.7)
	>6-12 hours	3 (9.1)
	≥ 12-24 hours	8 (24.2)
Radiology n, (%)	Penil USG	12 (36.4)

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Table 2. Surgical Findings and Outcomes Repair of penile fracture

Incision techniques, n (%)	Sub-coronal degloving	33 (100)
Penile fracture, n	Tunical tear	29 (87.7)
	Dorsal vein rupture	4 (12.3)
Localization of the lesion	Proximal corpus cavernosum	16 (55.2)
	Mid corpus cavernosum	12 (41.4)
	Distal corpus cavernosum	1 (3.4)
Length of rupture	<1 cm	5 (17.2)
	1-2 cm	16 (55.2)
	2-2,5 cm	8 (27.6)

During the follow-up period, 65.5% (n=19) of the patients with tunical repair attended their six-week follow-up visit. All retained erectile function without penile curvature, as confirmed by medical history and physical examination. The same cohort was re-assessed six months postoperatively, and no long-term complications were observed. Details regarding defect localization, size, side, as well as the suture types used, are shown in Table 2.

DISCUSSION

This study's purpose is to present in detail the clinical characteristics and surgical findings during the treatment process of rarely encountered PF cases in urological emergencies in the light of current literature.

When the penis is in a flaccid state, the thickness of the tunica albuginea is 2.4 mm. In an erect state, the tunica albuginea thins by 5-10 times. In an erect penis, high pressure occurs within the corpus cavernosum, which may lead to cavernosal injury in the case of trauma. The primary etiological factor for PF is trauma occurring during sexual intercourse. In a meta-analysis by Amer et al., PF was reported in 46% of patients, while a meta-analysis by Falcone et al. found that approximately 80% of patients experienced PF during sexual intercourse (2, 11). Other injury mechanisms include penile manipulation (8%- 78%) (2, 11-13), rolling in bed (18.2%, and 21.5%) (13, 14), and falling onto an erect penis (2.8%- 19.2%) (13-15). In our study, sexual intercourse was the most common etiological factor for PF, consistent with the findings of Amer et al. and Falcone et al., while other mechanisms, such as penile manipulation and rolling in bed, were less frequently observed. These data indicate that PF mostly occurs during physical activities, and transient traumas, such as sexual intercourse, are prominent risk factors.

In anamnesis, the typical presentation involves the development of penile detumescence and sudden edematous swelling of the penis following the audible cracking sound during erection (5). In a meta-analysis by Falcone et al., the most commonly observed finding was penile hematoma, which occurred in 97.5% of cases. Other detectable findings included detumescence (79%), penile swelling (86%), a cracking sound (69%), and penile pain (79%). Additionally, urethral bleeding was identified in 14% of cases, and acute urinary retention was noted in 7% (2). A study evaluating the emergency department presentations of PF patients in our country found hematoma in 87%, detumescence in 39.1%, cracking sound in 30.4%, and pain in 10.4% (12). In the study by Barros et al., sharing their 20 years of experience, hematoma was observed in all cases (100%), while detumescence was found in 82.6%, cracking sound in 76.3%, pain in 66.3%, urethral bleeding in 12.8%, and acute urinary retention in 0.3% (7). The rate of accompanying urethral injury ranges from 3% to 38% (5). Our findings are consistent with the literature regarding the incidence of concomitant urethral injury, although no cases of acute urinary retention were observed in our study.

Although clinical diagnosis is considered the gold standard in the diagnosis of PF, radiological imaging may be required to confirm the diagnosis in some patients. In this context, penile doppler ultrasound (US) can be utilized (4, 16-18). The use of US in the literature varies between 0% and 100% (4, 16, 18, 19). In our study, the rate of US usage was found to be 36.4%. US is a useful tool for confirming the location of tears in the tunica albuginea and determining the presence of concomitant urethral injury. However, its operator dependency is a major drawback. In the study by De Luca et al., preoperative US was able to detect the exact localization of the tunica albuginea tear in all patients, while in the study by Koga et al., the success rate for detecting small tears was found to be 86% (4, 20). According to the study conducted by Küçüker et al., the success rate of US was determined to be 39.1%. (12). In our study, the 100% success rate of US in detecting the defect in all patients is consistent with the findings of De Luca et al., while differing from the lower success rates reported by Koga et al., Küçüker et al., Pavan et al., and Philips et al. This difference may be related to operator experience.

In previous years, the treatment of penile fractures, including both surgical and conservative approaches, was a subject of debate. In the study by Özorak A. et al.

published in 2014, which compared surgical and conservative treatments, no complications were observed in the early surgical group. In contrast, in the conservative group, 20% (2/10) of patients experienced erectile dysfunction, 20% (2/8) reported painful erections, and 20% (2/8) developed penile curvature (21). Today, the most common method for treating penile fractures is early surgical intervention. Additionally, the current European Association of Urology Guidelines on Urological Trauma recommend early repair of PFs (6). The definition of early repair is the performance of surgical repair within 24 hours of the patient's presentation (22). In several studies, the average time between the trauma and the patient's presentation at the hospital varied. One study reported a mean time of 13.9 ± 14.6 hours (23), and another found the mean time to be 6 ± 4 hours, with a range from 1 to 24 hours (13). In a third study, the time ranged from 2 to 504 hours, with an average of 18.5 hours (7). Kozacıoğlu et al. classified patients into three groups based on the time from initial trauma to surgery: one group for patients treated within 6 hours, a second group for those treated between 6 and 12 hours, and a third group for those treated between 12 and 24 hours. After an average follow-up of 44.9 months, no significant differences in deformity or erectile dysfunction (ED) were observed between the three groups (24). In similar studies, early surgery is recommended in the treatment of PF due to its association with better ED and a lower incidence of complications such as penile curvature and painful erection (25, 26). In the study by Hatzichristodoulou et al., data for approximately half of the patients who underwent PF repair were obtained during follow-up, and ED was detected in 53.8% of these patients (mean follow-up was 45.6 months) (3). In our study, all patients presented to the hospital within 24 hours. All patients underwent early surgical repair. No early complications were observed during hospitalization. During the follow-up period, 65.5% of the patients attended their follow-up visits within the first 6 weeks after surgery, and none of these patients reported experiencing ED, painful erections, or penile curvature in their results anamnesis. These findings align with the literature on the benefits of early surgical repair. However, longer follow-up is needed to assess long-term outcomes.

Although the postoperative hospitalization period for PF patients is generally short, the most important factors determining the length of hospital stay are early complications and severe urethral injuries. According to Bozzini, the median length of stay is 3 days (range: 1-21 days, with one patient staying 21 days due to an open wound) (27). In the study by Gedik et al., the average length of stay was 1-2 days, while in the study by El-Bahnasawy, the average length of stay was found to be 2.3 ± 1.9 days (range: 1-12 days) (13, 25). In the 170 patients who underwent PF repair by Zargooshi et al., no significant complications occurred during or immediately after surgery, and the patients were discharged on the first day after surgery (28). In our series, patients were mostly discharged on the first postoperative day. The shorter length of stay in our study compared to many other studies in the literature is attributed to factors such as all patients being operated on within the first 24 hours, the absence of concomitant urethral injuries (except for one patient), and the lack of early postoperative complications.

Strengths of our study include providing valuable insights into the outcomes of penile fracture repair, with a detailed analysis based on patient data from a specific cohort. This focused approach enhances our understanding of the treatment and recovery process, contributing meaningful data to the existing literature. However, the limitations of our study stem from its retrospective design, which inherently limits the ability to establish causality. Additionally, the absence of patient groups who underwent delayed penile fracture repair or those managed with conservative follow-up prevents us from making comparisons between these treatment approaches, which could have further enriched the findings and conclusions of our work.

CONCLUSION

In the diagnosis of penile fracture, history and physical examination are usually sufficient. In cases with diagnostic uncertainty, penile ultrasound performed by experienced radiologists can be an effective diagnostic tool. Prompt surgical intervention, within 24 hours of injury, including the time elapsed before hospital presentation, significantly reduces the risk of erectile dysfunction and penile curvature, leading to better functional outcomes in these patients.

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None

Authorship contributions
Conceptualization, TB; Methodology, TB; Data collection, BG, and OA; Analysis, BG and OA; Literature Search, TB, BG, and OA; Writing – Original Draft, BG, OA, and TB; Supervision, TB

Data availibity statement
The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request

Declaration of competing interest
The authors declared no conflict of interest.

Ethics
Ethical approval was obtained from the Adnan Menderes University Non-Interventional Clinical Research Ethics Committee (Protocol Number: 2024/181).

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