

ORIGINAL RESEARCH

Erectile function after penile fracture: clinical and predictive insights

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Abstract

Background: This study aimed to identify the clinical and demographic factors associated with postoperative erectile dysfunction in patients undergoing early surgical repair for penile fracture. **Methods:** This retrospective study included patients who underwent surgical treatment for penile fracture between January 2015 and January 2025 at two tertiary care centers. Patients with confirmed tunical rupture during surgery and known preoperative erectile status were included. Erectile function was assessed using the 5-item International Index of Erectile Function (IIEF-5) at baseline and at 6 months postoperatively. Patients with a ≥ 4 -point decrease in IIEF-5 score at month 6 were defined as having developed erectile dysfunction (ED). Associations between clinical/demographic variables and ED development were analyzed statistically. **Results:** A total of 64 patients were included in the study. The mean age of the patients was 43.0 ± 12.2 years. Early surgical exploration was performed in all cases. At 6 months, 21.9% of patients had significant postoperative ED. Univariate analysis revealed that age was the only variable significantly associated with ED ($p = 0.0076$). Receiver Operating Characteristic (ROC) analysis identified ≥ 50 years as the optimal age cut-off for predicting ED (Area Under the Curve (AUC): 0.727; sensitivity: 57.1%; specificity: 82.0%). No other clinical variables were found to be significantly associated with postoperative ED. **Conclusions:** Despite early surgical intervention, a considerable proportion of patients developed ED following penile fracture. Age was the only variable significantly associated with long-term erectile function in our analysis. These findings emphasize the importance of age in both preoperative counseling and postoperative follow-up planning.

Keywords

Penile fracture; Erectile dysfunction; Postoperative complications; Functional outcomes

Función eréctil tras la fractura de pene: perspectivas clínicas y predictivas

Resumen

Antecedentes: Este estudio tuvo como objetivo identificar los factores clínicos y demográficos asociados con la disfunción eréctil postoperatoria en pacientes sometidos a reparación quirúrgica temprana por fractura de pene. **Métodos:** Este estudio retrospectivo incluyó a pacientes sometidos a tratamiento quirúrgico por fractura de pene entre enero de 2015 y enero de 2025 en dos centros de atención terciaria. Se incluyeron pacientes con ruptura túnica confirmada durante la cirugía y con estado eréctil preoperatorio conocido. La función eréctil se evaluó mediante el Índice Internacional de Función Eréctil de 5 ítems (IIEF-5) al inicio y a los 6 meses del postoperatorio. Los pacientes con una disminución de ≥ 4 puntos en la puntuación IIEF-5 al mes 6 fueron definidos como portadores de disfunción eréctil desarrollada. Las asociaciones entre las variables clínicas/demográficas y el desarrollo de disfunción eréctil se analizaron estadísticamente. **Resultados:** Se incluyó un total de 64 pacientes en el estudio. La edad media de los pacientes fue de 43.0 ± 12.2 años. En todos los casos se realizó exploración quirúrgica temprana. A los 6 meses, el 21.9% de los pacientes presentaron disfunción eréctil postoperatoria significativa. El análisis univariante reveló que la edad fue la única variable significativamente asociada con la disfunción eréctil ($p = 0.0076$). El análisis de la curva de características operativas del receptor (ROC) identificó ≥ 50 años como el punto de corte de edad óptimo para predecir la disfunción eréctil (Área bajo la curva (AUC): 0.727; sensibilidad: 57.1%; especificidad: 82.0%). No se encontraron otras variables clínicas significativamente asociadas con la disfunción eréctil postoperatoria. **Conclusiones:** A pesar de la intervención quirúrgica temprana, una proporción considerable de pacientes desarrolló disfunción eréctil tras la fractura de pene. La edad fue la única variable significativamente asociada con la función eréctil a largo plazo en nuestro análisis. Estos hallazgos enfatizan la importancia de la edad tanto en el asesoramiento preoperatorio como en la planificación del seguimiento postoperatorio.

Palabras Clave

Fractura de pene; Disfunción eréctil; Complicaciones postoperatorias; Resultados funcionales

1. Introduction

Penile fracture is a rare but serious urological emergency that requires prompt diagnosis and treatment. It typically results from rupture of the tunica albuginea of the corpus cavernosum during an erection. This condition most commonly occurs during sexual intercourse and, less frequently, as a result of masturbation or blunt trauma [1]. Clinically, patients often report an audible “cracking” sound, sudden detumescence, severe pain, and rapid penile swelling, all of which are highly suggestive of the diagnosis [2]. Although the diagnosis is largely clinical, imaging modalities, such as penile ultrasonography or magnetic resonance imaging, may be helpful in atypical cases or in the evaluation of associated urethral injuries [3].

Prompt surgical exploration and repair have become the gold standard in the treatment of penile fracture. This approach significantly reduces the risk of long-term complications such as erectile dysfunction (ED), penile curvature, palpable fibrotic nodules, and painful erections [4]. Compared with conservative management, surgical intervention yields markedly better outcomes. A meta-analysis published in 2016 reported that patients who underwent immediate surgical repair had significantly lower rates of late complications—particularly ED—compared with those managed with delayed or non-surgical approaches [2].

Despite successful surgical repair, some patients may develop long-term functional sequelae. Therefore, many studies have aimed to identify predictors of poor prognosis. Factors such as older age at presentation, delayed surgery, large or bilateral tunical tears, and concomitant urethral injuries have been implicated as contributors to postoperative complications [5, 6]. In particular, delays in surgical repair beyond 12–

24 hours have been associated with increased complication rates, likely due to a higher risk of fibrosis and impaired tissue healing [7]. Similarly, urethral injuries often require simultaneous surgical repair and may contribute to urinary and sexual dysfunction during follow-up [8].

Age has emerged as a particularly important predictor of postoperative erectile function. Advanced age has been consistently associated with lower postoperative 5-item International Index of Erectile Function (IIEF-5) scores and a higher incidence of ED [1, 9]. In some studies, multivariate analyses have shown that age is the only independent predictor of long-term erectile function, even when controlling for variables such as tear size, surgical delay, and urethral injury [10].

In this study, we aimed to analyze the potential association of clinical and demographic variables with the development of erectile dysfunction in patients who underwent early surgical intervention following penile fracture.

2. Materials and methods

The study cohort was identified through a retrospective database search using International Classification of Diseases, Tenth Revision (ICD-10) codes for penile fracture between January 2015 and January 2025. To ensure a high degree of transparency and a strictly homogenous study group, exclusion criteria were applied as primary filters during the initial data extraction phase. Specifically, patients were automatically excluded at the source if their electronic health records contained diagnostic codes for significant systemic comorbidities known to independently impair vascular and neurological pathways of erectile function, including diabetes mellitus, chronic primary hypertension, chronic ischemic heart disease, stage 3–5 chronic kidney disease, and

congestive heart failure. Additionally, patients with a history of prior penile or urethral surgery, or pre-existing erectile dysfunction were excluded using their respective ICD-10 codes. Consequently, only patients without these pre-defined confounding factors were included for analysis. Furthermore, a manual review of clinical records was performed to identify factors not reliably captured by electronic coding; as a result, 12 additional patients were excluded due to the documented use of phosphodiesterase-5 (PDE5) inhibitors or other medications known to affect erectile performance prior to the injury. Only patients with intraoperatively confirmed tunical rupture and a minimum of 6 months of follow-up were included, resulting in a final study population of 64 patients.

Patient data were retrospectively collected from emergency department, urology clinic, and outpatient records. Demographic variables (age, height, weight, marital status, and education level), trauma etiology, presenting symptoms (cracking sound, penile pain, sudden detumescence, and blood at the urethral meatus/gross hematuria), physical examination findings (eggplant deformity, butterfly shape, and rolling sign), time from injury to surgery, surgical findings (location, direction, laterality, and size of the tunical tear), presence of concomitant urethral injury, length of postoperative hospital stay, and postoperative complications were recorded.

Functional evaluation was performed using the 5-item short form of the IIEF-5, which has been validated in Turkish. IIEF-5 scores were assessed preoperatively and at 6 months postoperatively. Functional outcome was based on the difference between the preoperative and postoperative 6th-month IIEF-5 scores (Δ IIEF-5). Patients who experienced a ≥ 4 -point decrease in IIEF-5 score at 6 months were classified as having developed erectile dysfunction.

2.1 Surgical technique

In all patients, a circumferential incision was made just proximal to the coronal sulcus to expose the tunica albuginea, and the penis was fully degloved. After evacuation of the cavernosal hematoma, the length of the tunical defect was measured using a disposable surgical ruler, and the defect was primarily repaired with interrupted absorbable polyglactin sutures. An artificial erection test was performed to assess the adequacy of the repair and to rule out any overlooked cavernosal tears. During this procedure, a Penrose drain was placed around the base of the penis as a tourniquet using a clamp, and saline was injected into the lateral corporal body via a 22G butterfly needle.

Before tunical repair, the spongy portion of the urethra was carefully examined for possible urethral injury associated with penile trauma. In cases of suspected urethral damage, intraoperative cystoscopy was performed, and if a lesion was detected, simultaneous surgical repair was carried out. In these cases, a Foley catheter was inserted postoperatively and left in place for 7–10 days.

At the end of surgery, all patients received a compressive dressing, which was removed on the first postoperative day. After discharge, patients were advised to take oral antibiotics for one week and nonsteroidal anti-inflammatory drugs (NSAIDs) for two weeks. In patients who underwent ure-

thral repair, antibiotic therapy was continued throughout the catheterization period, which lasted approximately 2–3 weeks. All patients were advised to abstain from sexual activity for six weeks following surgery.

2.2 Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics software (version 25.0, Armonk, NY, USA). The distribution of the data was assessed using the Shapiro-Wilk test. For group comparisons of continuous variables, the non-parametric Mann-Whitney U test was applied. Categorical variables were compared using the Chi-square test or Fisher's Exact test, as appropriate. Patients were divided into two groups according to the change in their IIEF-5 score at the 6th postoperative month: those who developed erectile dysfunction and those who did not. Univariable analyses were conducted to evaluate the associations between clinical and demographic variables and erectile dysfunction. Since only age reached statistical significance in univariate analysis, a multivariable regression model was not constructed, as building such a model on a single significant predictor would not be statistically appropriate. Additionally, Receiver Operating Characteristic (ROC) analysis was used to determine the optimal cut-off value for age. A *p*-value of < 0.05 was considered statistically significant.

3. Results

A total of 86 patients who underwent surgical repair for penile fracture were evaluated during the study period. Of these, 22 were excluded based on the predefined exclusion criteria. The remaining 64 patients with a postoperative follow-up period of at least 6 months were included in the final analysis. The mean age of the patients was 43.0 ± 12.2 years (median: 43.5; Q1–Q3: 18–69), and the mean body mass index (BMI) was calculated as 25.8 ± 2.6 kg/m². Among the participants, 71.9% were married, and 87.5% had completed at least secondary school. The most common cause of trauma was sexual intercourse (54.7%), followed by forced bending of the erect penis (18.8%) and blunt trauma (15.6%). Fractures were most frequently located on the left side (51.6%), on the ventral surface (79.7%), and at the mid-shaft level (51.6%). Sudden detumescence was reported in 98.4% of patients, while a cracking sound was described in 70.3%. The median time from trauma to surgery was 4 hours (Q1–Q3: 2–8 hours). The relationship between changes in preoperative and 6-month postoperative IIEF-5 scores and all demographic and clinical variables was analyzed. A statistically significant association was observed only between age and IIEF change ($p = 0.019$). No significant differences were found between IIEF change and any of the other variables ($p > 0.05$) (Table 1).

In the second phase of the study, patients were categorized according to changes in their IIEF-5 scores: those with a ≥ 4 -point decrease were classified as the “erectile dysfunction” group (ED group, $n = 14$, 21.9%), and the remaining patients as the “non-ED” group ($n = 50$, 78.1%). Among the variables compared between the groups, only age showed a statistically significant difference (50.6 ± 12.1 years vs. 40.9 ± 11.5 years;

TABLE 1. Demographic and clinical characteristics of patients and their association with postoperative 6th-month IIEF-5 score change.

Variables		<i>p</i> value
Age (yr; mean ± sd)	43.0 ± 12.2	0.019^a
BMI (mean ± sd)	25.8 ± 2.6	0.187 ^a
Marital status (n, %)		
Single	18 (28.1%)	0.649 ^b
Married	46 (71.9%)	
Educational status (n, %)		
Primary school	8 (12.5%)	0.115 ^c
Secondary school	30 (46.9%)	
University	26 (40.6%)	
Etiology (n, %)		
Intercourse	35 (54.7%)	0.919 ^c
Forceful bending of the erect penis	12 (18.8%)	
Non-penetrating trauma	10 (15.6%)	
During sleep	6 (9.4%)	
Masturbation	1 (1.6%)	
Fracture location 1 (n, %)		
Right	22 (34.4%)	0.337 ^c
Left	33 (51.6%)	
Bilateral	9 (14.1%)	
Fracture location 2 (n, %)		
Dorsal	13 (20.3%)	0.993 ^b
Ventral	51 (79.7%)	
Fracture location 3 (n, %)		
Proximal	9 (14.1%)	0.667 ^c
Mid	33 (51.6%)	
Distal	22 (34.4%)	
Cracking sound (n, %)	45 (70.3%)	0.438 ^b
Penile pain (n, %)	58 (90.6%)	0.288 ^b
Blood at the urethral meatus/gross hematuria (n, %)	7 (10.9%)	0.973 ^b
Sudden detumescence (n, %)	63 (98.4%)	0.475 ^b
Eggplant deformity (n, %)	54 (84.4%)	0.111 ^b
Butterfly shape (n, %)	18 (28.1%)	0.682 ^b
Rolling sign (n, %)	45 (70.3%)	0.665 ^b
Time from trauma to surgery (h; median, Q1–Q3)	4 (2–8)	0.400 ^a
Microscopic hematuria (n, %)	11 (17.2%)	0.312 ^b
Tunica tear length (mm; median, Q1–Q3)	11.5 (10–17.2)	0.081 ^a
Urethral injury (n, %)	7 (10.9%)	0.835 ^b
Dorsal vein injury (n, %)	6 (9.4%)	0.513 ^b
Preoperative IIEF-5 score (median, Q1–Q3)*	22 (20–23.75)	0.690 ^a
Postoperative 6th-month IIEF score (median, Q1–Q3)*	20 (16.25–22)	<0.001 ^a
Length of hospital stay (d; median, Q1–Q3)	2 (2–3)	0.213 ^a
Postoperative complications (n, %)	4 (6.25%)	0.318 ^b

*Superscript letters indicate the type of statistical test used: ^aSpearman correlation, ^bMann-Whitney U test, ^cKruskal-Wallis test. *p* < 0.05 values are considered statistically significant and are shown in bold. *Presented for descriptive purposes only; excluded from predictive analyses as it constitutes part of the outcome definition.*

sd: Standard Deviation; IIEF-5: 5-item International Index of Erectile Function; BMI: Body Mass Index.

$p = 0.0076$). No significant associations were found between ED development and the other variables (Table 2).

ROC analysis was performed to determine the optimal age threshold for predicting postoperative erectile dysfunction. The analysis identified ≥ 50 years as the optimal cut-off value, with a sensitivity of 57.1%, a specificity of 82.0%, and an area under the curve (AUC) of 0.727, indicating moderate discriminatory ability. Patients aged ≥ 50 years were significantly more likely to develop postoperative ED compared with younger patients (Fig. 1).

4. Discussion

Penile fracture is a rare but potentially serious urological emergency. Although the true incidence of this traumatic injury remains unclear, published estimates range from 0.29 to 3.1 cases per 100,000 men annually [11]. These data highlight that while penile fracture is uncommon, it often results from trauma during sexual activity and requires urgent surgical intervention. Classical symptoms, such as sudden detumescence, pain, and penile hematoma, facilitate rapid clinical diagnosis. Surgical exploration and repair of the tunica albuginea are widely accepted as the gold standard for reducing the risk of long-term complications [4, 12]. In our study, all patients underwent surgery within the first 24 hours, with an average operative time of 2.2 ± 1.1 hours. Previous studies have similarly shown that early surgical repair is associated with significantly lower complication rates [2, 13]. Nevertheless, the feasibility of delayed repair remains a subject of debate. Gazzah *et al.* [14] reported a case of successful surgical repair with full recovery of erectile function following a 36-hour delay in presentation, suggesting that delayed repair may yield acceptable outcomes in selected patients, particularly younger individuals without urethral involvement. The early intervention in our cohort may have contributed to the low rate of complications observed.

In the literature, erectile function following penile fracture is commonly evaluated at the 6-month postoperative mark, which is considered an appropriate time point given the completion of physical recovery and the resumption of sexual activity [5, 15]. In line with this, our study also assessed erectile function using the IIEF-5 questionnaire at 6 months postoperatively. Moreover, in a study by Keskin *et al.* [16], IIEF scores assessed at 3, 6, and 12 months postoperatively in penile fracture patients revealed that functional impairment observed at 6 months did not significantly improve by 12 months. These findings support the use of 6-month data as a reliable reflection of long-term erectile function. In our study, patients with a ≥ 4 -point decrease in IIEF-5 score at 6 months were classified as having developed erectile dysfunction. This threshold was based on the study by Rosen *et al.* [17], which defined a 4-point decrease in the IIEF-EF domain as the minimal clinically important difference. This approach ensures that clinically meaningful changes are captured alongside statistical significance.

In our cohort, 21.9% of patients were found to have significant ED at the 6-month follow-up. This rate is consistent with the existing literature, where reported rates range from 11% to 46% [4, 18, 19]. For example, El-Assmy *et al.* [1] reported

a 20% incidence of ED following surgery, while Sharma *et al.* [5] found a rate of 11.3%. Barros *et al.* [18], in their 20-year clinical experience, reported a 14.7% rate of ED. These discrepancies may be attributed to differences in sample sizes, diagnostic criteria, assessment tools, and follow-up durations.

Our analysis demonstrated a statistically significant association between age and the development of ED, with patients aged ≥ 50 having a higher rate of ED ($p = 0.0076$). Since age was the only variable significantly associated with ED in univariate analysis, no multivariable model was constructed, and ROC analysis was performed to determine the optimal age threshold. These findings suggest that age may be an independent predictor of ED, although confirmation in larger samples is warranted. Notably, our results align with prior studies that have identified a relationship between age and erectile outcomes [1, 5, 9]. A recent systematic review and meta-analysis by Abdelrasheed *et al.* [20] encompassing 24 studies and 3213 patients confirmed that age was a consistent risk factor across all studies examined, with patients over 50 years demonstrating a 2.7- to 5.9-fold increased risk of ED, likely reflecting age-related vascular changes and reduced tissue healing capacity.

The role of fracture location, direction, and severity in ED development remains debated. In our study, the most frequent findings were left-sided (51.6%), ventral (79.7%), and distal (34.4%) injuries. No significant association was observed between fracture localization and ED. However, prior reports have suggested that bilateral corporal injuries, large tunical tears, and concomitant urethral trauma may reflect more severe injury and increase the risk of ED [6, 9]. Ortac *et al.* [9] found that larger tunical tears were associated with greater reductions in IIEF-5 scores, while Bulbul *et al.* [6] also linked tear size with higher complication rates. In contrast, our analysis did not identify tunical tear size or urethral injury as significant factors, reinforcing the central role of age in recovery dynamics. This is further supported by a large-scale multicenter machine learning analysis by Geyik *et al.* [21] involving 547 patients across 23 centers, in which age emerged as the most influential predictor of severe ED, while tunical tear length, time to surgery, and fracture location demonstrated only moderate predictive impact.

Other common late complications include penile curvature, fibrotic nodules, and paresthesia. In our study, penile curvature and nodules were each detected in 6.3% of patients. These rates are lower than those reported in the literature. For instance, Falcone *et al.*'s [12] systematic review reported rates of 13% for curvature and 25% for palpable scars. The relatively low rates in our cohort may reflect the consistent implementation of early surgical repair.

Despite the limited sample size, our findings support previous studies emphasizing the predictive role of age. In a recent study by Avci *et al.* [10], age was the only significant predictor of ED and functional complications in multivariate analysis. Furthermore, the effect of age on ED was shown to persist independently of chronological aging, as confirmed by analysis of variance (ANOVA) testing. In our data, age ≥ 50 years was identified as the most appropriate cut-off value for predicting ED in ROC analysis (AUC: 0.727; sensitivity: 57.1%; specificity: 82.0), suggesting that age may serve as a

TABLE 2. Comparison of clinical and demographic variables between ED groups.

Variables	No ED	ED	p value
	n = 50 (78.1%)	n = 14 (21.9%)	
Age (yr; mean \pm sd)	40.9 \pm 11.5	50.6 \pm 12.1	0.0076^a
BMI (mean \pm sd)	25.5 \pm 2.5	27.0 \pm 2.6	0.0531 ^a
Marital status (n, %)			
Single	15 (30.0%)	3 (21.4%)	0.7393 ^a
Married	35 (70.0%)	11 (78.6%)	
Educational status (n, %)			
Primary school	5 (10.0%)	3 (21.4%)	0.2048 ^b
Secondary school	22 (44.0%)	8 (57.1%)	
University	23 (46.0%)	3 (21.4%)	
Etiology (n, %)			
Intercourse	26 (52.0%)	9 (64.3%)	0.6715 ^b
Forceful bending of the erect penis	9 (18.0%)	3 (21.4%)	
Non-penetrating trauma	8 (16.0%)	2 (14.3%)	
During sleep	6 (12.0%)	0 (0.0%)	
Masturbation	1 (2.0%)	0 (0.0%)	
Fracture location 1 (n, %)			
Right	15 (30.0%)	7 (50.0%)	0.3419 ^b
Left	28 (56.0%)	5 (35.7%)	
Bilateral	7 (14.0%)	2 (14.3%)	
Fracture location 2 (n, %)			
Dorsal	11 (22.0%)	2 (14.3%)	0.7154 ^a
Ventral	39 (78.0%)	12 (85.7%)	
Fracture location 3 (n, %)			
Proximal	8 (16.0%)	1 (7.1%)	0.6084 ^b
Mid	26 (52.0%)	7 (50.0%)	
Distal	16 (32.0%)	6 (42.9%)	
Cracking sound (n, %)	36 (72.0%)	9 (64.3%)	0.7416 ^a
Penile pain (n, %)	46 (92.0%)	12 (85.7%)	0.6044 ^a
Blood at the urethral meatus/gross hematuria (n, %)	6 (12.0%)	1 (7.1%)	1.000 ^a
Sudden detumescence (n, %)	49 (98.0%)	14 (100.0%)	1.000 ^a
Eggplant deformity (n, %)	44 (88.0%)	10 (71.4%)	0.2059 ^a
Butterfly shape (n, %)	13 (26.0%)	5 (35.7%)	0.5119 ^a
Rolling sign (n, %)	37 (74.0%)	8 (57.1%)	0.3208 ^a
Time from trauma to surgery (h; median, Q1–Q3)	4.0 (2.0–7.8)	3.0 (2.0–7.0)	0.3554 ^a
Microscopic hematuria (n, %)	9 (18.0%)	2 (14.3%)	1.000 ^a
Tunical tear length (mm; median, Q1–Q3)	11.0 (9.2–16.8)	13.5 (10.0–17.5)	0.3677 ^a
Urethral injury (n, %)	6 (12.0%)	1 (7.1%)	1.000 ^a
Dorsal vein injury (n, %)	4 (8.0%)	2 (14.3%)	0.6044 ^a
Preoperative IIEF-5 score (median, Q1–Q3)	23.0 (21.0–24)	20.5 (17.75–23.25)	0.0930 ^a
Postoperative 6th-month IIEF score (median, Q1–Q3)	21.0 (19.0–23)	15.5 (12.5–18)	<0.001^a
Length of hospital stay (d; median, Q1–Q3)	2.0 (2.0–3.0)	2.0 (2.0–3.0)	0.8565 ^a
Postoperative complications (n, %)	2 (4.0%)	2 (14.2%)	0.2060 ^a

^aindicates Mann-Whitney U test or Fisher's exact test; ^bindicates Kruskal-Wallis test; p < 0.05 values are considered statistically significant and are shown in bold.

sd: Standard Deviation; IIEF-5: 5-item International Index of Erectile Function; BMI: Body Mass Index; ED: erectile dysfunction.

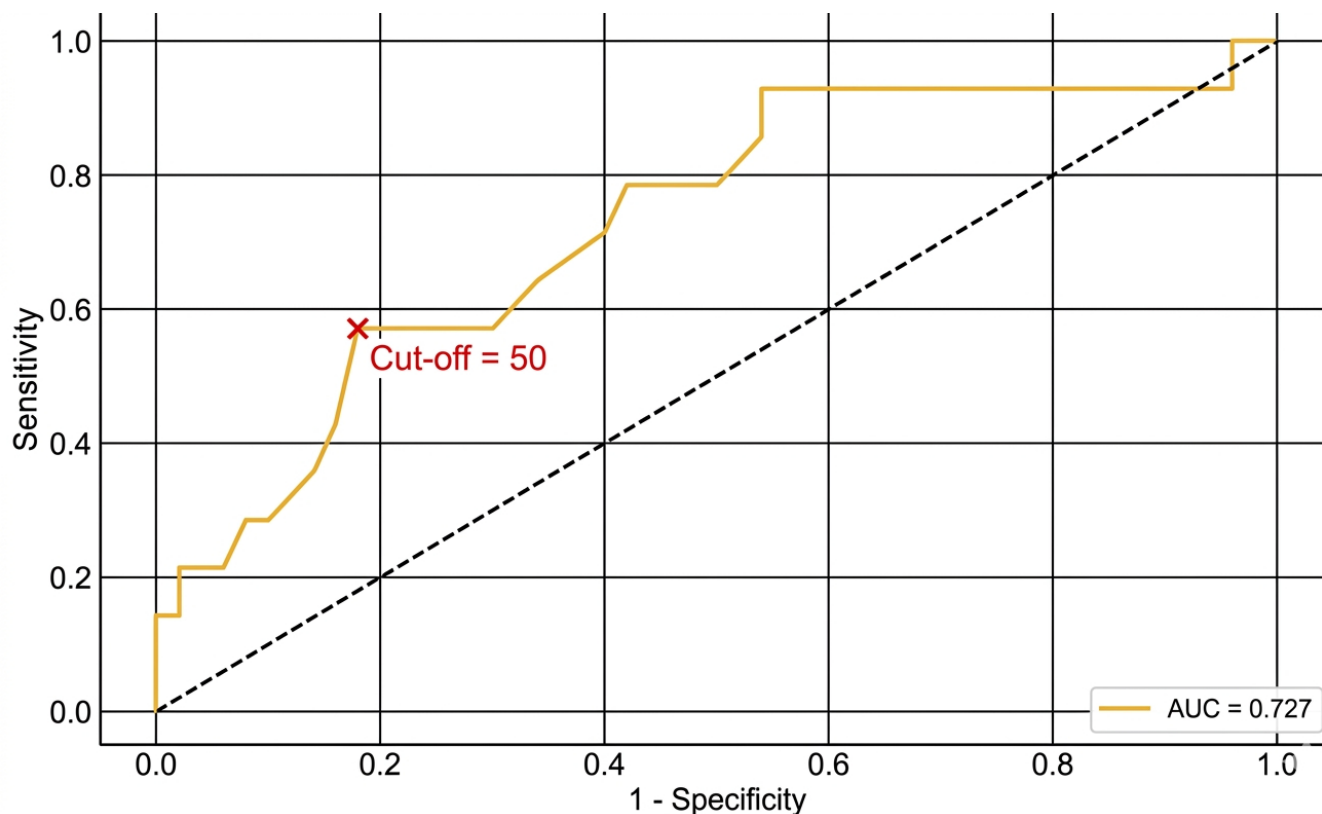


FIGURE 1. ROC curve analysis of age for predicting postoperative erectile dysfunction. AUC: area under the curve.

strong predictor. This may be explained by the preservation of vascular integrity and healing capacity in younger patients, whereas age-related endothelial dysfunction may impair tissue recovery even after successful repair [22].

This study has several limitations. Its retrospective design limited the standardization of certain clinical variables and precluded the establishment of causal relationships. As penile fracture is an acute urological emergency, prospective collection of preoperative IIEF-5 scores is not clinically feasible. Therefore, baseline erectile function was assessed retrospectively, with patients asked to recall and report their erectile status prior to the injury. Although these scores were included in the analysis, this self-reporting approach may be subject to recall bias and should be interpreted accordingly. Although the inclusion criteria aimed to minimize confounding by excluding patients with prior use of phosphodiesterase type 5 inhibitors or known comorbidities, the potential influence of unmeasured psychological or relational factors on erectile function cannot be entirely ruled out.

Moreover, although the 6-month postoperative assessment is commonly used in the literature, it may not fully capture longer-term recovery trajectories. The relatively small sample size may limit the generalizability of the findings, and the absence of an a priori power analysis may have affected the robustness of subgroup and ROC analyses. Furthermore, the age cut-off identified by ROC analysis was derived from the study data itself, presenting a potential risk of overfitting. Additionally, since only age showed a significant association with ED in the univariate analysis, a multivariable regression model could not be constructed. Nevertheless, selection of variables based on clinical relevance, rather than solely on

univariate statistical significance, may also represent an alternative approach for future studies with larger sample sizes. This limitation precludes the definitive classification of age as an independent predictor. External or internal validation of this threshold was not feasible given the retrospective design and limited sample size, and should be addressed in future larger-scale studies. Taken together, these limitations highlight the need for future large-scale, prospective, multicenter studies with standardized baseline assessments and longer follow-up periods.

5. Conclusions

In conclusion, a substantial proportion of patients undergoing surgical repair for penile fracture developed postoperative erectile dysfunction. Age appears to be a significant clinical indicator associated with this complication. Variables such as fracture site, direction, and time to surgery were not significantly associated with ED. Accordingly, age should be considered not only as a predictor of postoperative complications, but also as a key factor in patient counseling and individualized follow-up planning.

AVAILABILITY OF DATA AND MATERIALS

The datasets used during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

MY—Conceptualization, methodology, writing—review and editing. AS—Writing—original draft. BYE—Data curation, formal analysis. EH—Data curation, formal analysis. KS—Writing—original draft, supervision. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The present study was approved by the Ethics Committee of the Ankara Etlik City Hospital (Date: 27 May 2025, Approval No: AEŞH-BADEK2-2025-259) and is performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. As the medical records used in this study were obtained from previous diagnoses and treatments, the necessity of informed consent was waived by the Ethics Committee of the Ankara Etlik City Hospital. Details that might reveal the study subjects' identities were excluded.

ACKNOWLEDGMENT

The authors thank the administrative and technical staff of the Department of Urology for their logistical support during the preparation of this manuscript.

FUNDING

The authors received no financial support for the research, authorship, and/or publication of this article.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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How to cite this article: Metin Yiğman, Adem Sancı, Berk Yasin Ekenci, Emre Hepşen, Kubilay Sarıkaya. Erectile function after penile fracture: clinical and predictive insights. *Revista Internacional de Andrología*. 2026; 24(2): 50-57. doi: 10.22514/j.androl.2026.018.