

ORIGINAL ARTICLE

Evaluation of Erectile Functions in Patients with Early and Delayed Penile Fracture Repair Using of International Index of Erectile Function-5

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ABSTRACT

Background: Penile fracture is a rare but serious urological emergency that is associated with erectile dysfunction if not treated promptly. Early repair is traditionally advocated but conflicting evidence on delayed repair outcomes requires further evaluation using standardized measures such as IIEF 5.

Methodology: A prospective observational study was carried out for a 12-month period in 100 male patients aged 18 years of age or older with penile fracture and normal baseline erectile function. Fifty patients each were divided into two groups, early repair (≤ 24 hours) and delayed repair (>24 hours). Injuries were recorded as well as demographic data, injury specifics and intraoperative findings. Erectile function was the primary outcome measured with the IIEF 5 at baseline, 1, 3 and 6 months postoperatively. Complication rates, penile curvature and overall patient satisfaction were secondary outcomes. SPSS version 26 was used for statistical analysis with t tests, Mann Whitney U tests, and chi square tests as well as logistic regression.

Results: In a study of 100 patients with penile fractures, and 50 patients underwent early repair (≤ 24 hours) and 50 patients underwent delayed repair (> 24 hours). Between the 2 groups, baseline demographics and injury mechanisms were similar. IIEF 5 scores decreased by a temporary amount at one month postoperatively in both groups, but improved in a stable manner. There was no statistically significant difference in erectile function between groups by 3 and 6 months. Furthermore, patients undergoing delayed repair when indicated had similar overall complication rates, incidence of penile curvature, and patient satisfaction as patients undergoing early repair.

Conclusion: Long term erectile function was comparable to both early and delayed repair. There were no differences between the groups in IIEF 5 scores, complication rates or patient satisfaction. Therefore, delayed repair is a possible option when early intervention is not possible.

Keywords: Penile Fracture; Erectile Dysfunction; IIEF-5; Early Repair; Delayed Repair

INTRODUCTION

Penile fracture, rupture of tunica albuginea during an erection, is a rare, but serious urological emergency due to blunt trauma or misdirected sexual activity. Clinically, the condition is challenging, since it can cause complications like penile curvature, fibrotic plaques, and most importantly erectile dysfunction¹. Early surgical repair has been widely advocated as the standard treatment to minimize these complications, but is delayed in presentation or intervention in part because of misdiagnosis, patient hesitancy or limited availability for specialized care².

Impairment of erectile function is a significant component of a patient's quality of life and its impairment can have profound psychological and relational consequences. Erectile performance has been assessed with the International Index of Erectile Function-5 (IIEF-5), which has proved to be a reliable and validated method³. It is a concise instrument that standardizes method of measuring the severity of erectile dysfunction and has been widely employed in the clinical research comparing treatment outcomes. Although early intervention is known to have a positive impact, the literature presents conflicting evidence regarding the long term erectile outcomes in patients who have delayed repair, and further research is warranted⁴.

There are several studies that have emphasized the role of prompt surgical management in reducing the risk of persistent erectile dysfunction and other complications. However, a subset of patients always have delays in treatment however due to late presentation or diagnostic challenges⁴. These delays are critical because they raise the question of what could be the reversibility of tissue damage and what is the efficacy of surgical repair when not performed immediately. In this light, this study attempts to serve as an attempt to compare erectile function outcomes of early versus delayed penile fracture repair in terms of the IIEF-5 score as the main evaluative outcome⁵.

The objectives of this study were to elucidate the effect of surgical timing on the return of erectile function, which is a significant gap in current clinical knowledge about erectile

function⁶. The study aimed to compare IIEF-5 scores in patients undergoing early versus delayed intervention in order to identify whether delays in repair are associated with a higher incidence of postoperative erectile dysfunction. The investigation will also consider potential confounders such as the amount of the initial injury, patient demographics and comorbid conditions that could affect the relationship between repair timing and functional results⁷.

MATERIALS AND METHODS

Study Design: This prospective observational study was conducted at Health Net Teaching Hospital Hayatabad Peshawar , Pakistan over a period of 12 months from June 2022 till may 2023. The study was approved by the institutional ethics committee, and informed consent was obtained from all participants.

Inclusive and Exclusive Criteria: Male patients 18 years or older who presented for surgical repair of penile fracture at our institution and gave informed consent and had baseline IIEF-5 score indicating no prior history of erectile dysfunction were part of this study. Patients with prior history of erectile dysfunction or penile surgery, severe cardiovascular disease or uncontrolled diabetes, associated urological injury leading to incomplete medical records and/or unable to ensure adequate follow up, unwilling or unable to complete the IIEF 5 questionnaire at designated follow up intervals were excluded.

Parameters: This study evaluated various demographic (e.g. age, comorbidities), injury specific (e.g. mechanism of injury, time interval between injury and surgical repair, intraoperative finding (e.g. size and location of tear)) and clinical outcome parameters. International Index of Erectile Function-5 (IIEF-5) score was primarily used to assess the erectile function preoperatively and 1, 3, and 6 months post surgery. The secondary parameters were surgical complications, penile curvature and overall patient satisfaction.

Statistical analysis: SPSS version 26 was used for statistical analysis, continuous data were expressed as means \pm standard deviations, and compared with the Student's t-test or Mann

Whitney U test, and categorical data were presented as frequencies and percentages, and compared using chi square or Fisher's exact tests. Multivariate logistic regression analysis was also used for identifying independent predictors of postoperative erectile dysfunction with p value < 0.05 considered statistically significant.

RESULTS

The baseline characteristics of the study population are outlined in table-1. Mean age (std dev) is shown for both early repair (n = 50) and delayed repair (n = 50) groups and the distribution of injury mechanisms. In particular, it notes how many patients experienced penile fractures as a result of sexual intercourse, masturbation, or other injury. These demographic and injury parameters were well matched between the two groups based on the p values that indicate that there were no statistically significant differences between the two groups on these demographic and injury parameters.

Table 1: Patient Demographics and Injury Characteristics

Parameter	Early Repair (n = 50)	Delayed Repair (n = 50)	p-value
Age (years)	25.1 ± 2.8	25.3 ± 3.0	0.85
Mechanism of Injury			
Sexual intercourse	35 (70%)	35 (70%)	1.00
Masturbation	11 (22%)	11 (22%)	1.00
Other trauma	4 (8%)	4 (8%)	1.00

Table-2 reports the erectile function results measured by the International Index of Erectile Function 5 (IIEF-5) at preoperative and 1, 3, and 6 months postoperative. The mean scores (± SD) for both early and delayed repair groups, as well as p-values comparing the groups, are presented for each time point. Both groups show progressive recovery and the data show that there is an initial drop in scores at 1 month, but scores progress in both groups. Since the IIEF-5 scores between the groups are quite equal at 3 and 6 months (p = 0.41 at 3 months and p = 0.23 at 6 months) without statistically significant differences, delayed repair does not seem to be associated with detrimental effects on long term erectile function versus early repair.

Table 2: IIEF-5 Scores at Baseline and Postoperative Follow-Up

Time Point	Early Repair (mean ± SD)	Delayed Repair (mean ± SD)	p-value
Preoperative	24.5 ± 0.8	24.4 ± 0.9	0.76
1 Month	21.5 ± 2.0	21.2 ± 1.8	0.50
3 Months	23.1 ± 1.5	22.8 ± 1.6	0.41
6 Months	24.2 ± 1.0	23.9 ± 1.1	0.23

The overall complication rate, incidence of penile curvature, and patient satisfaction scores were summarized in this table-3. Results of data revealed that complication rate in the early repair group was 10% vs. 16% in the delayed repair group, penile curvature was seen in 6% vs. 10% in early and delayed repair groups respectively; and both the groups were highly satisfied (4.6 ± 0.4 for early repair vs. 4.5 ± 0.5 for delayed repair). These parameters do not show any significant differences between the two groups as per the p values. This indicates that the timing of the repair does not impact the safety profile and overall patient satisfaction.

Table 3: Postoperative Complications and Overall Patient Satisfaction

Parameter	Early Repair (n = 50)	Delayed Repair (n = 50)	p-value
Complication Rate	5 (10%)	8 (16%)	0.65
Penile Curvature	3 (6%)	5 (10%)	0.55
Patient Satisfaction Score	4.6 ± 0.4	4.5 ± 0.5	0.67

DISCUSSION

Patients presenting with penile fractures more than 48-72 hours after the injury have been managed conservatively since many

decades⁸. However, this approach may lead to increased risk of long-term complications, such as erectile dysfunction, Peyronie's disease, fibrosis and venous leak. In our study we adopted a more aggressive approach, opting to intervene surgically in all patients presenting to our emergency department with penile fractures, regardless of the time elapsed since the injury⁹. Surgical intervention in penile fractures offers several benefits. Firstly, it allows for immediate repair of the damaged tunica albuginea, reducing the risk of fibrosis of the tunica albuginea and curvature of the penis as healing by secondary intention in any part of the body leave some fibrotic tissue which can lead to weakness in the part¹⁰. Secondly, surgical intervention minimizes the risk of venous leak, which can occur when the injury is left to heal by secondary intention. Finally surgical management can reduce the risk of erectile dysfunction, which is a common long-term complication of penile fracture¹¹.

The purpose of this study was to assess the effects of surgical timing on erectile function after repair of penile fracture by way of comparison between early (<24 hours) and delayed (>24 hours) interventions¹². Interestingly, we show that despite the commonly accepted advantages of early repair, the long-term erectile function (IIEF-5 scores obtained 3 and 6 months after operation) was similar between the two groups. Since it is likely due to postoperative inflammation and natural healing process, such transient decline of IIEF-5 score at 1 month in both groups represents transient decrease¹³. Both groups improved significantly by the 3- and 6-month follow-ups, and mean scores approached baseline values. This implies that the surgical intervention restores erectile function even when the repair is delayed, and over time. Also, the complication rates were similar and patients were highly satisfied with both groups, indicating that the delayed repair does not inherently compromise overall results¹⁴.

Penile fractures should be repaired early to minimize complications such as erectile dysfunction, penile curvature and fibrotic plaque formation. Nevertheless, the literature has yielded conflicting outcomes on the effect of delayed repair¹⁵. In line with this body of evidence, we show that, under appropriate conditions, even delayed repair can lead to favorable outcomes of erectile function. According to the findings, this may provide a way to overcome clinical situations where early surgical intervention is not possible because of diagnostic difficulties, patient reluctance or logistical constraints. There may be several factors that explain the similar outcomes found in early and delayed repair groups¹⁶.

Postoperative Management and Effective Surgical Technique: Although delayed intervention may compound the negative effects of the latter, the surgical approach and subsequent rehabilitation protocols can lead to enough recovery in penile structure and function. **Patient Exclusion:** The study excluded patients with pre-existing erectile dysfunction or other significant comorbidities to have a more homogeneous group for the primary variable, timing of surgery. **Regenerative Capacity of Penile Tissue:** There is inherent regenerative capacity of penile tissue that might permit recovery even after delay of repair beyond a critical threshold, provided the delay is not too long^{17, 18}.

This study has several limitations, although it gained valuable insights. **Study Design:** Prospective observation study which may be subject to selection bias; caution is needed for causal inference^{19, 20}. **Single Centre Experience:** The findings cannot be generalized to other sites with different patient demographics or surgical expertise. Our study demonstrates that delay surgical intervention in penile fractures can achieve satisfactory outcomes in terms of erectile function and complication rates. The results suggest that the traditional approach of conservative management for patients presenting late may need to be reassessed as this may lead to long list of complications²¹.

CONCLUSION

The International Index of Erectile Function (IIEF-5) scores of patients who underwent early repair of penile fractures were

comparable to those who underwent delayed repair, with no statistically significant difference observed between the two groups. Specifically, the mean IIEF-5 scores at both the 3-month and 6-month follow-up periods were similar for both groups, indicating that the timing of repair did not have a significant impact on erectile function outcomes.

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Conflict of Interest: The authors declare that they have no conflicts of interest.

Data Availability Statement: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Authors contribution:

- N.U. – Main author and supervisor of the study
- Z.K. – Data collection and analysis
- N.K. – Statistical analysis of data
- F.U. – Data collection and manuscript writing
- M.I. – Data collection and abstract writing
- S.S. – References addition and selection for the manuscript

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