

Delayed Surgical Management of Penile Fracture Associated with Urethral Rupture: Functional Outcomes and the Role of Penile Rehabilitation

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Abstract

The authors report a case of penile fracture associated with urethral injury, surgically repaired 72 hours after the initial trauma. The procedure involved penile degloving, hematoma evacuation, tunica albuginea repair, and primary urethroplasty over a catheter. A pharmacological rehabilitation protocol using phosphodiesterase type 5 inhibitors (PDE5i) was initiated postoperatively for three months. Despite the surgical delay, functional outcomes at 12 months were excellent, with an IIEF-5 score of 22/25, no evidence of fibrosis on color Doppler ultrasound, and preserved voiding function. This case highlights the efficacy of meticulous delayed surgery combined with early medical rehabilitation.

Keywords

Penile Fracture, Urethral Rupture, Urethroplasty, Phosphodiesterase Type 5 Inhibitors, Erectile Function, IIEF-5

1. Introduction

We report the successful 12-month functional recovery of a 46-year-old male who presented with a delayed penile fracture and associated urethral tear managed 72 hours post-trauma. Despite the delayed presentation, the patient achieved excellent outcomes following meticulous surgical repair combined with a three-month postoperative penile rehabilitation protocol using daily Tadalafil.

2. Case Presentation

2.1. History and Admission

A 46-year-old male was transferred to the Kinshasa University Clinics for suspected penile fracture complicated by urethrorrhagia. The injury occurred during sexual intercourse in the “cowgirl” (woman-on-top) position, characterized by an audible “cracking” sound followed by acute pain and immediate detumescence. Due to the lack of a specialized urological platform at the referring mission hospital, the patient was transferred 72 hours after the initial trauma.

Before the trauma, the patient reported normal baseline erectile function without the use of phosphodiesterase type 5 inhibitors (PDE5i). He had no history of penile curvature, Peyronie’s disease, or lower urinary tract symptoms (LUTS). Furthermore, he presented with no significant systemic comorbidities, was a non-smoker, and took no regular medications, allowing for an unambiguous interpretation of his 12-month functional recovery.

2.2. Physical Examination and Imaging

Upon admission, physical examination revealed:

- A swollen and deviated penis, with a diffuse scrotal and penile hematoma.
- Active urethrorrhagia at the urinary meatus.
- Vital signs: Stable (BP 130/70 mmHg, Heart Rate 96 bpm).

An emergency color Doppler ultrasound confirmed a loss of continuity in the tunica albuginea of the right cavernosal body and a focal interruption of the urethra, confirming the indication for immediate surgical intervention (**Figure 1**).



Figure 1. Post-traumatic penile deformity secondary to concomitant penile fracture and urethral injury.

2.3. Surgical Technique

Under spinal anesthesia, exploration was conducted according to the following steps:

Surgical Approach: A sub-coronal circular incision was performed, followed by complete degloving of the penis to its base.

Assessment of Injuries: Evacuation of an organized hematoma (blackish blood). Exploration revealed a longitudinal rupture of the right tunica albuginea and a partial ventral urethral tear measuring 2.5 cm in length (**Figure 2**).

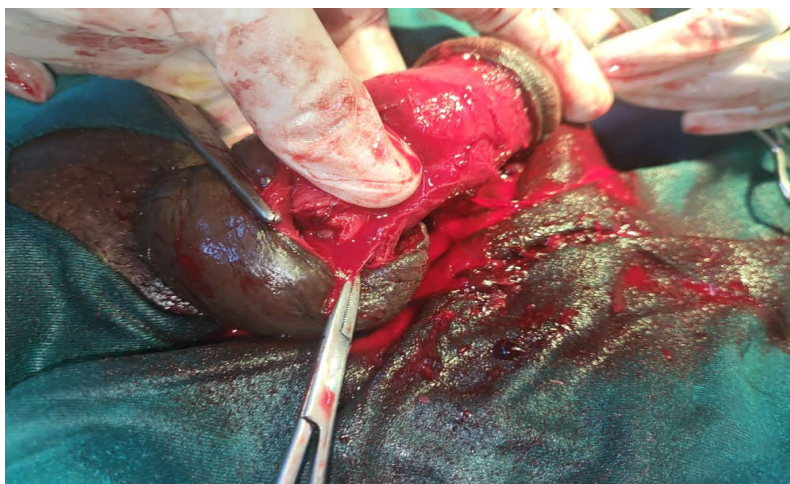


Figure 2. Anatomical mapping of penile injuries involving the tunica albuginea, corpora cavernosa, and urethra.

Urethral Repair: An 18 French silicone urinary catheter was placed. Primary urethroplasty was performed using interrupted 4-0 Vicryl sutures with mucosal inversion to ensure a watertight and non-stenotic repair (**Figure 3**).

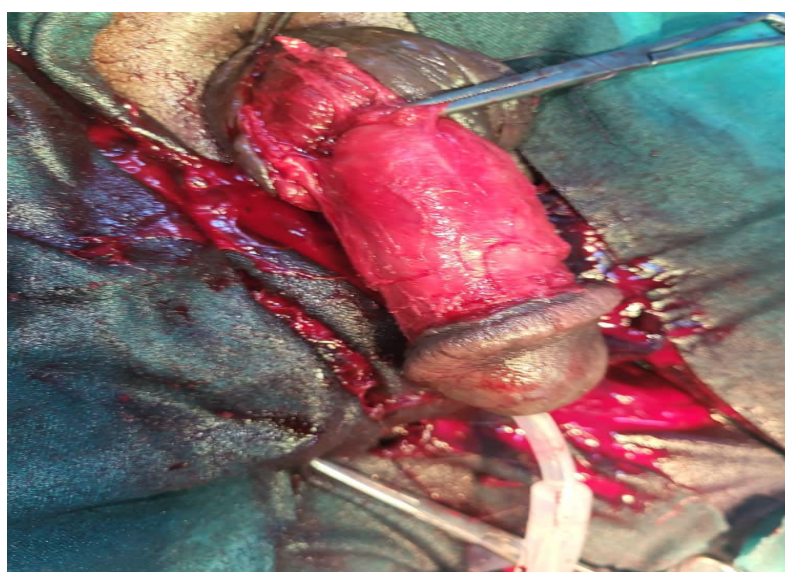


Figure 3. Transurethral catheterization during penile fracture repair: Pre-closure view.

Corporal Repair: The albuginea defect was closed using interrupted “U-shaped” (mattress) 3-0 Vicryl sutures (**Figure 4**).

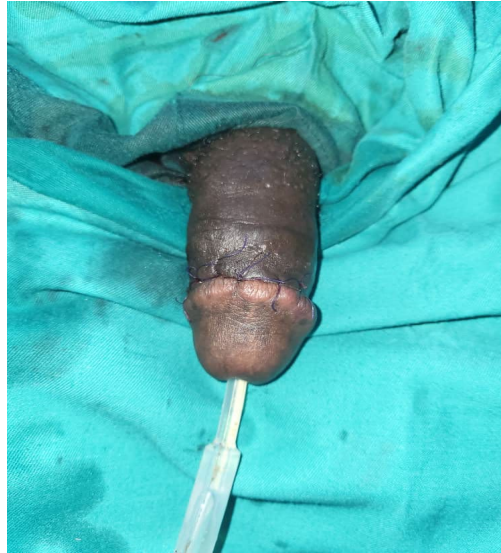


Figure 4. Postoperative aspect after repair of penile fracture and urethral injury.

2.4. Follow-Up and Results

2.4.1. Postoperative Management and Rehabilitation

Postoperative management included a targeted regimen to prevent infection and control tissue healing:

Antibiotic Therapy: Ciprofloxacin was administered orally at a dose of 500 mg twice daily for 7 days.

Nocturnal Erection Suppression: Cyproterone acetate (50 mg daily) was prescribed for 14 days to suppress nocturnal erections and protect the suture lines during the early inflammatory phase.

Activity Restrictions: Strict pelvic rest was advised, including a complete prohibition of strenuous physical activity, heavy lifting, and sexual intercourse for 6 weeks.

Catheter Management and Urethral Assessment: The silicone urinary catheter was removed on postoperative day 21. Notably, a routine control retrograde urethrocytography was not performed at this stage due to technical limitations; catheter removal and urethral patency were assessed based solely on clinical evaluation and patient tolerance, which represents a limitation of our protocol.

2.4.2. Penile Rehabilitation Protocol

A penile rehabilitation protocol using PDE5 inhibitors was initiated on postoperative day 22 (immediately following catheter removal). The patient received Tadalafil at a dose of 5 mg daily for three months. Given its long half-life of 17.5 hours, daily administration ensures a steady-state plasma concentration, promoting nocturnal erections and continuous penile oxygenation to mitigate post-traumatic fibrosis.

12-Month Outcomes

Follow-up at 12 months demonstrated:

Erectile Function: An IIEF-5 score of 22/25, indicating high confidence, firm erections suitable for penetration, and satisfactory maintenance.

Imaging: Color Doppler ultrasound confirmed a normal scarring zone without plaque formation, fibrosis, herniation, or aneurysm. Intra-arterial blood flow and spectral waveforms were symmetric and physiological.

Voiding Function: Excellent urinary stream quality with no clinical signs of urethral stricture.

3. Discussion

Management of a penile fracture associated with a urethral injury constitutes an absolute surgical emergency. The primary objective is to prevent fibrotic complications arising from post-traumatic tissue remodeling. Early intervention aims to avert erectile dysfunction (ED) and the development of acquired penile curvature, which can mimic Peyronie's disease [1].

According to the literature, urethral involvement occurs in approximately 3% to 20% of penile fractures, a factor historically linked in some cohorts to an increased risk of long-term erectile complications. However, contemporary data nuance this perspective; recent studies and specific clinical evaluations demonstrate that a concomitant urethral tear, when managed through precise and prompt anatomical reapproximation, does not necessarily compromise the ultimate functional outcome. Although the healing process begins immediately following the trauma, pathological fibrosis develops progressively [2] [3].

During the early phase (approximately 1 to 4 months), prevention relies on the complete evacuation of the hematoma. This is followed by a maturation phase of 3 to 6 months, during which a contractile fibrous plaque may form. Physiologically, this fibrosis leads to a loss of elasticity and decreased compliance of the erectile tissue. This impaired distensibility prevents effective compression of the subtunical veins, resulting in venous leak (corporo-veno-occlusive dysfunction). Furthermore, the resulting anatomical curvature may cause a deformity during erection (chordee), making intromission difficult and leading to functional ED [4].

The architecture of the sinusoidal spaces is altered by the invasion of fibrous tissue. The replacement of specialized erectile tissue by dense collagen (Types I and III) reduces the overall rigidity of the penis. Urethral injury leading to urinary extravasation into the peri-urethral and cavernous tissues further exacerbates this condition. Due to its chemical composition, urine induces an acute caustic inflammation that excessively stimulates fibroblasts. This synergy between urinary chemical aggression and the traumatic scarring process establishes the mechanism for erectile dysfunction, combining venous leakage with a deviating mass effect [5].

Rationale of Surgical Timing: Therapeutic Window and Biochemical Factors of Healing

While surgical intervention performed within the optimal timeframe (within the first 6 to 12 hours following trauma, and no later than 24 hours) remains the gold standard to prevent local inflammatory reactions and anatomical distortion, delayed presentations still benefit from rigorous intervention:

Control of the Inflammatory Phase and Cytokines: Immediately following rupture, the coagulation cascade releases growth factors (PDGF, TGF-beta, VEGF). Early suture aligns tissue edges before excessive chronic inflammation sets in, whereas delayed management risks overexpressing TGF-beta and promoting fibrosis [6].

Collagen Turnover and Cross-linking: The tunica albuginea relies on orderly type I and III collagen fibers. Precise anatomical reapproximation allows fibroblasts to synthesize a functional extracellular matrix restoring mechanical strength [7].

Oxygen Metabolism and Microcirculation: Rapid hematoma evacuation relieves ischemia and restores oxygen tension, ensuring proper activity of lysyl oxidase—the copper- and vitamin C-dependent key enzyme catalyzing intermolecular collagen cross-links for scar strength.

Challenges of Penile Fracture Management in Sub-Saharan Africa: A Kinshasa Perspective

In Kinshasa, as in many major sub-Saharan African metropolises, the surgical management of penile fracture frequently suffers from therapeutic delay, with interventions often occurring well beyond the optimal 6-to-12-hour window. This delay is driven by specific sociocultural, structural, and economic barriers:

Taboo and Secrecy: Feelings of shame, guilt, and the fear of social judgment prompt patients to conceal the injury and attempt ineffective self-treatment at home.

Therapeutic Itinerancy: Initial recourse to traditional healers or non-specialized peripheral health structures exacerbates tissue damage and delays proper referral to a urologist.

Financial Barriers: The lack of universal health coverage and reliance on an out-of-pocket payment system require patients to urgently gather funds, prolonging the pre-surgical interval.

Logistical Constraints: Chronic traffic congestion in Kinshasa and the saturation of major referral centers hinder rapid access to specialized care.

Bridging the Gap: The Role of Delayed Repair Combined with Penile Rehabilitation

In the present case, despite a delayed presentation of 72 hours post-trauma, complete evacuation of the hematoma combined with meticulous suturing of both the urethra and the tunica albuginea successfully curbed the fibrotic process and limited the progression of ED. This demonstrates that while a delay complicates anatomical restoration, it does not preclude favorable functional recovery when surgical execution is meticulous and complemented by supportive therapeutic strategies [8].

To contextualize the recovery achieved despite the delayed window, it is helpful to examine the proposed cellular and molecular dynamics of corporal tissue protection. Mechanistically, postponed surgical intervention and prolonged micro-environmental hypoxia are hypothesized to upregulate hypoxia-inducible factor 1-alpha (HIF-alpha), which subsequently drives excessive transforming growth factor beta (TGF-beta) signaling and extracellular matrix protein deposition.

Within this framework, the daily administration of Tadalafil 5 mg for three months was introduced as a plausible contributory factor to the patient's recovery, serving to mitigate fibrotic remodeling. While preclinical and clinical data in other urological contexts (such as post-prostatectomy rehabilitation or Peyronie's disease) suggest that phosphodiesterase type 5 inhibitors exert anti-fibrotic, anti-apoptotic, and antioxidant effects—and recognizing that specific clinical data regarding PDE5i use explicitly following penile fracture remain scarce—daily low-dose administration is hypothesized to maintain a steady-state plasma concentration, improve tissue oxygenation, and support nocturnal erections [9].

These nocturnal events theoretically provide mechanical stretching to prevent micro-adhesions and maintain sinusoidal perfusion. However, because this report describes a single isolated case, direct cause-and-effect efficacy of the rehabilitation protocol cannot be independently established.

Clinical evaluation via the IIEF-5 score (22/25) and Color Doppler Ultrasound confirms a favorable clinical outcome, though further prospective studies incorporating advanced functional evaluations (such as cavernosography or uroflowmetry) are necessary to substantiate these mechanistic hypotheses and help establish standardized international rehabilitation algorithms for delayed penile trauma cases [10].

4. Conclusion

Post-traumatic erectile dysfunction in this clinical setting stems from a cascade of intertwined events where trauma-induced fibrosis and urinary extravasation act as powerful catalysts for pathological tissue remodeling. This case highlights that a comprehensive strategy—integrating meticulous delayed surgical repair of both the tunica and the urethra alongside proactive pharmacological prophylaxis with PDE5 inhibitors—is highly effective in limiting scar density, counteracting delayed ischemic damage, and preserving long-term erectile and voiding function.

Consent for Publication and Ethical Approval

Written informed consent was obtained from the patient for the publication of this case report and any accompanying clinical images, and the study protocol was conducted in accordance with the ethical standards of the institutional review board of the Cliniques Universitaires de Kinshasa.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] De Luca, F., Garaffa, G., Falcone, M., Raheem, A., Zacharakis, E., Shabbir, M., *et al.* (2017) Functional Outcomes Following Immediate Repair of Penile Fracture: A Tertiary Referral Centre Experience with 76 Consecutive Patients. *Scandinavian Journal of Urology*, **51**, 170-175. <https://doi.org/10.1080/21681805.2017.1280532>
- [2] Yilmaz, H., Avci, I.E., Cinar, N.B., Akdas, E.M., Unal, M., Baynal, E.A., *et al.* (2023) Urethral Rupture Concomitant with Penile Fracture Does Not Adversely Affect Functional Outcomes. *Urologia Journal*, **90**, 553-558. <https://doi.org/10.1177/03915603221141171>
- [3] Shebl, S.E. (2023) The Presentation and Outcomes of Penile Fracture with Associated Urethral Injury: A Systematic Literature Review. *Archivio Italiano di Urologia e Andrologia*, **95**, Article No. 11082. <https://doi.org/10.4081/aiua.2023.11082>
- [4] Barros, R., Ribeiro, J.G.A., Silva, H.A.M.d., Sá, F.R.d., Fosse Júnior, A.M. and Favorito, L.A. (2020) Urethral Injury in Penile Fracture: A Narrative Review. *International Brazilian Journal of Urology*, **46**, 152-157. <https://doi.org/10.1590/s1677-5538.ibju.2020.99.02>
- [5] Gentile, V., Modesti, A., LA Pera, G., Vasaturo, F., Modica, A., Prigiotti, G., *et al.* (1996) Ultrastructural and Immunohistochemical Characterization of the Tunica Albuginea in Peyronie's Disease and Venous Occlusive Dysfunction. *Journal of Andrology*, **17**, 96-103. <https://doi.org/10.1002/j.1939-4640.1996.tb01757.x>
- [6] Girgin, R., Çeker, G., Turan, I., Kutu, F., Elma, Y. and Yılmaz Can, E. (2024) The Effects of Topical Aloe Vera on an Experimentally Designed Penile Fracture Model in Rats. *Turkish Journal of Trauma and Emergency Surgery*, **30**, 147-154. <https://doi.org/10.14744/tjtes.2024.26425>
- [7] Durrani, K., Corey, Z., Birk, A. and MacDonald, S.M. (2024) Atypical Presentation of a Penile Fracture with Unilateral Corpora Cavernosa and Urethral Injury. *Cureus*, **16**, e67816. <https://doi.org/10.7759/cureus.67816>
- [8] Krishnani, H., Anjankar, A., Kakar, G., Sharma, S. and Kumar, A. (2022) Penile Fracture with Urethral Bleeding: A Urological Emergency. *Cureus*, **14**, e31373. <https://doi.org/10.7759/cureus.31373>
- [9] Peng, J., Yuan, Y.M., Zhang, Z.C., Hong, Q., Cui, W.S., Gao, B., Song, W.D. and Xin, Z.C. (2013) Daily Low-Dose Tadalafil for Erectile Dysfunction Induced by Pelvic Fracture Urethral Disruption. *National Journal of Andrology*, **19**, 443-445. (In Chinese)
- [10] Iblher, N., Fritsche, H.M., Katzenwadel, A., Penna, V., Eisenhardt, S.U., Stark, G.B., *et al.* (2012) Refinements in Reconstruction of Penile Skin Loss Using Intra-Operative Prostaglandin Injections, Postoperative Tadalafil Application and Negative Pressure Dressings. *Journal of Plastic, Reconstructive & Aesthetic Surgery*, **65**, 1377-1383. <https://doi.org/10.1016/j.bjps.2012.04.020>