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Review Article

Penile fracture: immediate surgical intervention and postoperative outcomes

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ABSTRACT

Penile fracture is a rare but urgent urological emergency characterized by rupture of the tunica albuginea, typically following blunt trauma to an erect penis. Clinical features often include an audible crack, sudden detumescence, penile pain, and swelling. Surgical repair within the first 24 hours remains the preferred treatment, associated with improved functional recovery and reduced risk of long-term complications. Delayed presentation increases the likelihood of fibrosis, curvature, erectile dysfunction, and infection. Various surgical techniques are employed depending on the location and extent of injury, with the subcoronal degloving incision offering optimal exposure in most cases. The choice of suture material, thorough evacuation of hematoma, and evaluation of associated urethral injury significantly influence outcomes. Postoperative complications range from minor hematomas and wound infections to more significant sequelae such as penile curvature, palpable plaques, voiding dysfunction, and psychogenic erectile dysfunction. Bilateral corporal rupture and urethral involvement predict poorer recovery and often require more complex surgical intervention. Objective measures such as IIEF scores are commonly used to assess erectile function, but subjective satisfaction often depends on psychological resilience and partner dynamics. Factors such as early intervention, patient age, baseline comorbidities, and extent of injury serve as key predictors of postoperative recovery. Long-term follow-up highlights the importance of not only preserving anatomical integrity but also addressing emotional and sexual health. Patient education, timely diagnosis, and individualized surgical management are central to optimal outcomes in penile fracture care.

Keywords: Penile fracture, Surgical repair, Erectile dysfunction, Urethral injury, Postoperative outcomes

INTRODUCTION

Penile fracture is a rare but alarming urological emergency that typically occurs due to blunt trauma to an erect penis, leading to rupture of the tunica albuginea of the corpus cavernosum. This injury often results from forceful sexual intercourse, aggressive masturbation, or trauma during rolling over in bed, particularly when the penis is erect. The audible cracking sound, immediate detumescence, pain, and penile swelling are considered pathognomonic features, with many patients also presenting with penile deviation or hematoma commonly described as the "eggplant deformity".[1] While the incidence of penile fracture remains low in global urology practices, underreporting due to social embarrassment or cultural stigma may mask the true prevalence. Historically, conservative management was initially favored in some cases, involving analgesia, ice packs,

catheterization, and sexual abstinence. However, the risk of long-term complications such as penile curvature, erectile dysfunction, fibrotic plaque formation, and painful erections with non-surgical approaches has shifted the clinical consensus toward immediate surgical intervention.[1,2] Surgical repair not only provides rapid anatomical correction but also significantly reduces morbidity and facilitates faster recovery of erectile function. The standard surgical approach involves evacuation of the hematoma and repair of the tunical tear, with or without urethral exploration depending on associated injuries.

Timely diagnosis and prompt surgical management are crucial in preserving both sexual and urinary functions. Imaging modalities such as ultrasonography and magnetic resonance imaging (MRI) are useful adjuncts when the clinical presentation is ambiguous, though they are not routinely required in classic presentations. When urethral injury is suspected—indicated by blood at the meatus or voiding difficulty a retrograde urethrogram is usually performed.[3] Despite being a surgical emergency, delays in intervention are still reported in various settings, often due to misdiagnosis or patient hesitancy, leading to increased risk of complications and suboptimal outcomes.

Postoperative recovery is generally favorable when surgery is performed early, with high rates of preserved erectile function and minimal long-term deformity. However, the type and extent of complications vary based on several factors, including timing of surgery, surgical technique, size and location of the tear, and presence of urethral involvement. Erectile dysfunction post-repair is reported in a minority of cases, but the psychological impact of the injury and subsequent anxiety can further influence sexual function recovery. Patient counseling and follow-up play a vital role in long-term satisfaction and quality of life after penile fracture repair.[4]

REVIEW

Penile fracture is most commonly sustained during sexual intercourse, particularly when the penis slips out and is forcefully bent against the perineum or pubic bone. The biomechanics of injury often correlate with the sexual position involved, with certain positions—such as "woman-on-top"—associated with higher rates of fracture and more extensive corporal damage.3 Clinical observations and retrospective analyses have suggested that these positions may leave the penis more vulnerable due to loss of control over thrusting dynamics, increasing the likelihood of axial buckling and tunical rupture.

Management strategies have shifted over time, with early surgical exploration now broadly endorsed. Delayed or conservative management has been linked to a significantly higher incidence of complications including erectile dysfunction, painful erections, penile nodules, and abnormal curvature. These sequelae are not only anatomically disabling but also psychologically distressing. In contrast, prompt surgical repair, ideally within 24 hours of injury, has demonstrated high success rates, with most patients recovering from erectile function and avoiding long-term deformity.[5] Operative repair allows direct visualization of the tear, precise closure of the tunica albuginea, and evacuation of hematoma, significantly reducing fibrosis and preserving cavernosal architecture.

TIMING AND TECHNIQUES OF SURGICAL REPAIR

The timing of surgical intervention in penile fracture is central to minimizing complications and optimizing functional outcomes. Clinical consensus has increasingly aligned toward immediate surgical exploration, with numerous studies demonstrating superior results in erectile function, penile morphology, and patient satisfaction when repair is conducted within the first 24 hours. Delayed presentations, whether due to misdiagnosis, cultural stigma, or patient reluctance, have been associated with increased risk of complications such as penile curvature, painful erections, fibrosis, and prolonged hospitalization.[6] Rapid operative management is considered the gold standard regardless of the presence or absence of associated urethral injury.

Surgical techniques employed for penile fracture typically depend on the size and location of the tunical tear, the extent of hematoma, and whether the urethra is involved. The most commonly used incision is the subcoronal degloving approach, providing comprehensive exposure of the corpora cavernosa and allowing for the identification of both unilateral and bilateral tunical disruptions. Some authors have reported successful outcomes with more localized incisions, particularly in cases where imaging precisely identifies the location of the tear. However, limited approaches carry the risk of missing contralateral injuries or incomplete evacuation of the hematoma.[7]

Repair of the tunica albuginea is generally performed with absorbable or non-absorbable sutures, taking care to avoid excessive tension and ensuring watertight closure. Studies comparing suture materials have not found significant differences in long-term outcomes, but fine absorbable sutures may be preferred due to reduced risk of palpable knots. Hemostasis is critical; inadequate control can lead to hematoma recurrence or infection. Some centers advocate for the use of intraoperative artificial erection tests to verify the integrity of the repair and identify additional defects, though this practice is not universally adopted.[8]

Urethral injuries, though less frequent, require heightened attention due to their implications for voiding function. When urethral rupture is confirmed, confirmed either through clinical signs such as blood at the meatus or via retrograde urethrography, primary repair should be performed concurrently with tunical reconstruction.

Delayed urethroplasty may be necessary in complex disruptions or when primary repair is not feasible due to extensive tissue damage. Even in the absence of urethral involvement, Foley catheterization during the immediate postoperative period is routine to ensure urinary drainage and reduce the risk of wound dehiscence.[9] However, some urologists favor early dissection with complete corporal exposure, while others advocate for a more conservative approach if the hematoma is small and localized. Nevertheless, early surgical management remains widely favored due to lower complication rates, faster return to sexual activity, and significantly reduced likelihood of long-term sequelae.

SHORT- AND LONG-TERM COMPLICATIONS FOLLOWING SURGICAL MANAGEMENT

Postoperative complications in penile fracture cases vary in nature and frequency depending on factors such as timing of intervention, surgical technique, extent of the injury, and patient comorbidities. While the acute phase typically resolves with surgical repair, follow-up studies reveal that patients are at risk of both immediate and delayed complications, some of which carry substantial functional and psychological consequences. Short-term issues primarily include wound infection, hematoma recurrence, and penile edema. Hematoma is most likely when the repair is incomplete or when intraoperative hemostasis is insufficient, particularly in cases involving bilateral corporal injury. Wound dehiscence, although uncommon, may result from poor suturing technique or early resumption of sexual activity. Infection remains rare, especially with prophylactic antibiotics, but can occur in patients with diabetes or poor hygiene. Pain during early erections is another frequent postoperative complaint, often related to suture tension or underlying inflammation rather than structural defect.[10]

In the long term, erectile dysfunction (ED) stands out as one of the most distressing complications for patients. Reported rates of ED post-surgery vary from 10% to 25% depending on the series, but studies emphasize the importance of differentiating organic causes from psychogenic factors. The trauma of the event itself, coupled with anxiety about reinjury or dissatisfaction with penile appearance, may interfere with normal erectile response even in cases with structurally successful repairs. Assessment tools such as the international index of erectile function (IIEF-5) are commonly used to quantify this outcome in follow-up protocols.[11]

Penile curvature and fibrotic plaque formation are structural sequelae observed in some patients months after surgery. These complications are thought to arise from incomplete healing of the tunica albuginea or from scar contraction within the corpus cavernosum. Mild curvature that does not interfere with intercourse often requires no treatment, though more severe deformity may warrant surgical correction. The location of the original injury and the extent of tunical disruption are predictive factors for curvature severity. Fibrosis can also result in palpable nodules, which, while typically benign, can become a source of discomfort or sexual inhibition for some patients.[12]

Urethral stricture, although rare, may develop when urethral injury is missed or improperly repaired during the initial intervention. Even in cases without overt urethral disruption, minor contusions can lead to submucosal scarring. Patients may present weeks or months later with reduced urinary stream, hesitancy, or post-void dribbling. Uroflowmetry and urethroscopy are commonly used to assess stricture development in symptomatic individuals. In some cases, dilation suffices, while others may require formal urethroplasty depending on the length and severity of the stricture.[13]

PREDICTORS OF POSTOPERATIVE OUTCOMES AND PATIENT SATISFACTION

Postoperative outcomes following surgical management of penile fracture are influenced by a complex interaction of clinical, surgical, and psychosocial variables. Although early intervention has been consistently linked to improved results, finer distinctions emerge when evaluating factors that independently predict long-term functional recovery and subjective patient satisfaction. Patient age at the time of injury has demonstrated variable impact on outcomes. Some studies suggest that younger individuals recover erectile function more reliably, potentially due to greater baseline vascular health and tissue elasticity. However, older age has not universally correlated with poorer results when surgery is performed promptly. Instead, preexisting erectile dysfunction and comorbidities such as diabetes mellitus, smoking, or cardiovascular disease exert a stronger influence on healing quality and postoperative sexual performance.[14] These systemic factors can compromise vascular integrity and delay tissue recovery, even in technically successful repairs.

The time elapsed between trauma and surgical repair remains one of the most consistent predictors of postoperative outcome. Surgical intervention within the first 24 hours reduces the risk of fibrosis, curvature, and erectile dysfunction. Delays of more than 36 to 48 hours have been associated with increased complications, particularly when the penile shaft is extensively swollen or when hematoma organization has begun. Late repairs often require more complex dissection, leading to longer operative times and higher risk of inadvertent injury to adjacent structures.[15] These variables also influence the likelihood of complete hematoma evacuation and suture line stability.

Extent and location of tunical injury contribute to functional recovery. Bilateral corporal involvement, proximal shaft ruptures, and associated urethral trauma are all associated with greater postoperative morbidity.

Patients with isolated distal unilateral tears typically resume normal function more quickly and with fewer complications. Moreover, the presence of urethral injury adds complexity to both the procedure and the recovery. Repairs that involve urethral realignment often demand prolonged catheterization and may expose patients to risk of stricture or voiding dysfunction, both of which weigh heavily on overall satisfaction scores during follow-up assessments.[14]

Psychological responses following penile trauma and surgery represent an increasingly recognized component of postoperative satisfaction. Even when erectile function is restored objectively, subjective distress, anxiety over reinjury, or body image concerns can persist. Some patients report avoiding intercourse due to fear or partner hesitation, while others express dissatisfaction due to palpable scar tissue or minor curvature. These outcomes are not always predicted by intraoperative findings, emphasizing the importance of counseling, reassurance, and longer-term follow-up. Tools such as the IIEF and Sexual Health Inventory for Men (SHIM) offer standardized methods to evaluate sexual health, though qualitative measures also contribute meaningfully to gauging patient satisfaction.

CONCLUSION

Immediate surgical intervention in penile fracture remains the standard of care, significantly reducing the risk of long-term complications. Early repair is consistently associated with better functional outcomes, lower rates of erectile dysfunction, and higher patient satisfaction. Predictors such as injury severity, comorbidities, and timing play pivotal roles in recovery. Comprehensive management must also address psychological wellbeing to ensure full postoperative rehabilitation.

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