CASE REPORT

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Bilateral fracture of corpora cavernosa with complete rupture of the anterior urethra: Case report and review of recent findings for surgical management

Fractura bilateral de cuerpos cavernosos con sección completa de uretra anterior. Reporte de caso y revisión de conceptos actuales sobre el manejo quirúrgico

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| Abstract |

Introduction: Penile fracture is a rare urological emergency associated in up to 30% of cases with injury to the anterior urethra. Recent data suggest that early surgical intervention is the best treatment strategy. This investigation describes a case of bilateral corpora cavernosa injury associated with complete rupture of the anterior urethra and presents current concepts about its management.

Case presentation: 39-year-old man with bilateral corpora cavernosa injury and complete rupture of the anterior urethra, who received early surgical treatment with satisfactory early clinical outcomes. A literature review was made in PubMed and Embase, limiting the search to scientific articles published in the past 10 years using the MeSH terms "Penile diseases", "Genital diseases, male", "Wounds and injuries". Some references were included given their clinical relevance. In this case, similar to international experiences, early surgical management of corpora cavernosa fractures allowed achieving adequate clinical outcomes in the patient.

Conclusions: The diagnosis of penile fracture is based on clinical findings. Early surgical management should be considered as a therapy of choice. Conservative management has a higher complication rate versus early surgical management. The case described here had an adequate clinical evolution after 3 months of follow-up.

Keywords: Penile Diseases; Genital Diseases, Male; Wounds and injuries; Penis (MeSH).

| Resumen |

Introducción. La fractura de cuerpos cavernosos es una urgencia urológica que se asocia hasta en 30% de los casos a lesión de la uretra anterior. Datos recientes postulan la intervención quirúrgica temprana como la mejor estrategia de tratamiento. La presente investigación describe un caso de lesión bilateral de cuerpos cavernosos asociada a sección completa de uretra anterior y define conceptos actuales sobre su manejo.

Presentación del caso. Hombre de 39 años con fractura bilateral de cuerpos cavernosos y sección completa de uretra anterior, quien recibió tratamiento quirúrgico temprano con resultados clínicos tempranos satisfactorios. Se realizó una revisión de la literatura en PubMed y Embase limitando la búsqueda a artículos científicos publicados en los últimos 10 años y utilizando los términos MeSH "Penile diseases", "Genital diseases, male", "Wounds and injuries". Algunas referencias fueron incluidas dada su relevancia clínica. De forma similar a experiencias internacionales, el manejo quirúrgico temprano de la fractura de cuerpos cavernosos en este caso permitió desenlaces clínicos adecuados en el paciente.

Conclusiones. El diagnóstico de la fractura de pene se basa en hallazgos clínicos; el manejo quirúrgico temprano debe considerarse como la terapia de elección para esta entidad. El tratamiento conservador presenta una mayor tasa de complicaciones versus el manejo quirúrgico temprano. El caso descrito presenta buenos desenlaces post-operatorios a corto plazo.

Palabras clave: Enfermedades del pene; Heridas y lesiones; Enfermedades de los genitales masculinos; Pene (DeCS).

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Introduction

Corpora cavernosa fracture is a urological emergency, generally associated with sexual activity, which requires early surgical intervention to avoid possible functional sequelae in the penis (erectile dysfunction, abnormal curvature, painful erection, fibrotic plaque, among others). Some characteristic clinical findings of this type of fracture include hematoma and edema of the penis; sudden pain and rapid detumescence after trauma; and a "crack" sound at the time of trauma. The literature describes complex cavernous injures associated with urethral injury in up to 38% of cases (1), although there is no general consensus on the management of this type of rupture. This article presents the case of a bilateral fracture of the corpora cavernosa associated with complete rupture of the anterior urethra, and describes the most recent findings in the literature on the management of this entity.

In addition, this clinical case report presents a brief literature review performed in PubMed and Embase, using the MeSH terms "Penile diseases", "Genital diseases, male", "Wounds and injuries", which was limited to scientific articles published in the past 10 years. 119 articles were retrieved, and after reviewing the abstracts, 104 articles were excluded as they were not related to penile fracture. The analysis was carried out in 15 articles. Some references were included given their clinical relevance.

Case presentation

39-year-old man with no relevant medical history, who consulted a tertiary care teaching university hospital in Bogotá D.C., Colombia due to penile trauma during intercourse. During the sexual act, the patient heard a "crack" and felt intense pain of sudden onset with immediate detumescence of the penis. He consulted the emergency service 40 minutes after the event.

Physical examination showed a large hematoma and edema that involved the penis with the characteristic "eggplant deformity", as well as urethral bleeding, which led to immediate surgical exploration due to suspicion of concomitant urethral injury. The patient did not report desire to void and abdominal palpation did not show urinary retention.

Subcoronal incision with penile denudation was performed and the tunica albuginea was ruptured bilaterally on the ventral side of the corpora cavernosa, with complete rupture at the junction of the proximal-middle third of the penile urethra (Figure 1).

Figure 1. Intraoperative findings. A) Buck's Fascia hematoma; B) complete rupture in anterior urethra; C) rupture line in tunic albuginea.
Source: Own elaboration.

The hematoma surrounding the injury was evacuated and the tunica albuginea was continuously sutured with 3/0 resorbable material. A Foley 18 Fr probe was placed to perform urethral anastomosis, and the devitalised edges were resected. Tension-free urethral anastomosis was constructed with a four-quadrant excisional approach and spatulated ends, using vicryl 5/0. Suture was performed by quadrants in the spongy body using vicryl 4/0 and, finally, a circumcision was performed following the dorsal slit-sleeve technique. The patient was discharged 48 hours after the intervention and the urethral catheter remained for 21 days. After 3 months of follow-up, the subject did not present complications, de novo urinary obstructive symptoms, abnormal curvature of the penis or deficiency in the quality of his erections (Figure 2).

Figure 2. Appearance 2 weeks after surgery.
Source: Own elaboration.

Discussion

Penile fracture is a rare urological entity, with an incidence close to 1 case per 175 000 inhabitants; between 2006 and 2007, 1 043 cases were reported in the USA. (2) This entity is associated in most cases with sexual activity and requires early therapeutic measures; however, scientific production in Latin America is quite limited: only two scientific works are available in Colombia (3-4) and some descriptive works in Latin America have been conducted, which include reports of associated urethral injury. (5-8)

Pavan *et al.* (9) reported that clinical diagnosis is achieved in 90% of cases. The most common signs and symptoms in their series of 41 patients were penile hematoma (82.6%), detumescence (82.6%) and pain (60.9%). They also described urethral involvement (25%) and bilateral fracture of the corpora cavernosa (20%). Within the group that received early surgical treatment, 36.8% presented some complication, while all patients who received late management presented complications, being the most frequent abnormal curvature of the penis (77.8%), palpable plaques/nodules (44.4%) and erectile dysfunction (33.3%). The findings of these researchers, in terms of complications in the conservative management group, are similar to those described by Yapanoglu *et al.* (10), who reported a general complication rate of 80% in patients treated with this approach.

Estimates are that up to 16% of patients with a history of fracture of the corpora cavernosa have erectile dysfunction. In this regard, El-Assmy *et al.* (11) described age >50 years and bilateral involvement

of the corpora cavernosa as risk factors for erectile dysfunction after penile fracture.

Swanson *et al.* (12) report 18.5% urethral involvement and a general posttraumatic erectile dysfunction rate of 29.2%, which decreases to 20% in patients undergoing early surgical correction. They also state that the use of complementary images is not mandatory to diagnose penile fracture. These data contrast with Nason *et al.* (13), who described difficulties to maintain an erection in only 12.5% of the patients included in their series.

Pariser *et al.* (14) performed a 9-year retrospective analysis and found an annual incidence of 459 cases per year in the USA, which occurred mostly in summer and on weekends, a higher probability of urethral injury as age increases (age >41 years OR: 2.25, 95%CI: 1.25-4.05, p=0.07), and increased risk of concomitant urethral injury in patients with urethral bleeding (OR: 17.03, 95%CI: 3.2-90.5, p=0.01). On the other hand, Kramer (15) described penile fracture as a more frequent event in patients who have sexual intercourse under stress (extramarital relationships and in places other than beds). Barros *et al.* (16) associated the risk of penile fracture during intercourse with position: 41% "doggy style", 25% male-superior position and 10% female-superior position.

Koifman *et al.* (17) presented one of the most significant experiences in Latin America: in their series of 150 cases, they used complementary diagnostic images in 39.3% of the patients, being ultrasound the most used study (24.6%); the use of nuclear magnetic resonance was reserved only for 0.6% of patients. In their casuistry, they described the use of retrograde urethrography in all cases with suspected urethral injury (14% of cases). According to clinical findings, the researchers classified the cases as high vs. low probability of penile fracture; in all low probability cases (absence of early detumescence after trauma, edema and mild-moderate hematoma and palpation of the corpora cavernosa without pathological findings), they used ultrasonography as a complementary test, while complementary imaging tests were used only in 9.6% of cases with high probability of fracture of the corpora cavernosa.

Several authors (18-20) state that the diagnosis of penile fracture is clinical and support early surgical management when there is clinical diagnostic suspicion, especially if the patient presents urethral bleeding as a warning sign considering possible urethral involvement. In general terms, they support early surgical approach due to the good clinical outcomes obtained and the lower percentage of long-term complications.

Kozacioglu *et al.* (21) found no significant differences in erectile dysfunction and abnormal curvature of the penis rates in patients who were taken to early surgical correction of penile fracture compared to those who were taken to delayed surgery 11.3±8.5 hours after the onset of the trauma. Ibrahiem *et al.* (22) found a greater proportion of palpable scar/fibrosis (71.4%) in patients who underwent tunica albuginea defect repair with non-absorbable material (p=0.01).

A recent meta-analysis (23), which included 58 studies with 3 213 patients, revealed that 46% of penile fractures occurred during intercourse, 18% due to masturbation, and 8.2% to rolling over in bed. No statistically significant relationship was found between the position during the sexual act and the relative risk of suffering penile fracture (5 studies, n=76, p=0.53, I2=42%); 95.4% of patients with penile fracture received surgical management, while only 4.6% underwent conservative management. The percentage of complications was higher in patients with conservative management (46% vs. 20.6% surgical management), and the most common were: erectile dysfunction (37%), palpable plaques/nodules (33%) and abnormal curvature of the penis (23%). Complications in the surgical treatment group were palpable plaque/nodule (13.9%), abnormal curvature of the penis (2.7%) and erectile dysfunction (1.94%). Only 6.1% of patients with a fracture of the corpora cavernosa presented concomitant urethral involvement (23).

When comparing early and late surgical management, the former presented a lower rate of general complications (p<0.00001) and abnormal curvature of the penis (p<0.0004). No results were obtained with statistical significance for erectile dysfunction and the presence of palpable plaques/nodules, and no significant differences in clinical outcomes were observed in patients who underwent surgical correction of the tunica albuginea with resorbable suture versus non-resorbable suture. However, a greater possibility of painful fibrotic plaque with non-absorbable suture was considered (23).

Falcone *et al.* (24), in their most recent systematic review, found that the use of diagnostic imaging is not mandatory; however, such aids (ultrasound and nuclear magnetic resonance) can help the surgeon to choose the type of surgical approach: subcoronal with denudation of the penis for exploration or incision in the area with cavernous or urethral involvement. The authors did not find relevant clinical differences between the use of absorbable sutures versus nonabsorbable sutures, although, similar to Amer *et al.* (23), they describe a greater possibility of postoperative pain in the area of injury with the use of nonabsorbable sutures.

Wong *et al.* (25) conducted a systematic review to evaluate the outcomes of patients undergoing early surgical management (<24 hours) versus patients undergoing deferred surgical management (>24 hours). The results showed erectile dysfunction in 6.6% vs. 4.5% (OR: 0.58, 95%CI: 0.24-1.37, p=0.213), palpable scar 5.4% vs. 4.5% (OR: 0.59, 95%CI: 0.18-1.98, p=0.393), and abnormal curvature of the penis 1.8% vs. 4.5% (OR: 0.33, 95%CI: 0.12-0.92, p=0.034). These results did not show significant differences in the occurrence of erectile dysfunction and symptomatic scars, but they support early surgical management as the line that generates a lower percentage of abnormal curvature of the penis.

According to the data described in the literature, it can be inferred that the standard management for penile fracture is surgical and that early intervention produces fewer complications. Currently, there are no data available that show significant statistical weight to establish differences between the types of sutures and the types of surgical knots to be used. Although the use of diagnostic imaging is not mandatory, it can help to define the type of surgical approach or, in cases of low clinical probability of penile fracture, to rule out the diagnosis.

Post-operative functional results in the described case are correlated with the aforementioned global experiences. After receiving early surgical management, the patient did not present any type of complication at 3 months of follow-up.

Conclusions

Penile fracture is a rare entity and, to date, there are no estimates of its incidence in Latin America. The diagnosis of this entity is clinical and it is only necessary to resort to diagnostic images in cases of low probability of fracture of the corpora cavernosa; however, the use of these diagnostic aids should not delay surgical exploration. Early surgical management is the current standard treatment, since it has a lower incidence of complications compared to long-term deferred or conservative management. The case presented here had a good post-operative evolution in the short term.

Ethical considerations

This manuscript complies with the principles established in Resolution 8430 of 1993 issued by the Colombian Ministry of Health (26) and,

according to said principles, it can be considered as non-risk research. Furthermore, this study was approved by the Subcommittee on Ethics of the Urology Unit of the Faculty of Medicine of Universidad Nacional de Colombia.

Conflicts of interest

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