CASE REPORT

Penile fracture: 4 cases managed at referral hospitals in Rwanda

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East Cent Afr J Surg.
Published 2 September 2022

Abstract

Penile fracture is an underreported yet increasingly recognized urological emergency, predominantly diagnosed clinically. Prompt surgical intervention is pivotal for favourable outcomes. This report details 4 cases of penile fracture effectively managed in low-income environments. Over a period of 16 consecutive months, 4 individuals presented with penile fractures at 3 referral hospitals in Kigali, Rwanda. Their ages varied from 28 to 48 years. In 3 patients, the fractures occurred during sexual intercourse; the other fracture occurred during masturbation. The diagnoses were established clinically, with 2 instances involving concurrent urethral injuries. Postoperatively, all patients regained normal sexual and urinary function. Enhanced access to healthcare and urological services in Rwanda may lead to an increase in diagnosed penile fractures. Effective clinical evaluation was crucial for diagnosis. Prompt consultation, anticipation of potential associated injuries, and the adoption of suitable surgical methods were instrumental in achieving favourable outcomes. Penile fracture is a rare yet critical urological emergency. Public awareness should be raised, and clinicians in Rwanda and the surrounding region must be prepared for timely diagnosis and management of this condition.

Keywords: penile fracture, tunica albuginea, corpora cavernosa, urethral injury, Rwanda

Introduction

Penile fracture is an underreported yet significant urological emergency characterized by the rupture of the tunica albuginea and 1 or both corpora cavernosa of an erect penis.[1],[2] The injury typically occurs during vigorous sexual intercourse or penile manipulation.[1],[3] Penile fracture is strongly associated with urethral injury.[3],[4] Diagnosis is predominantly clinical, but imaging plays a crucial role, particularly in uncertain cases or when additional injuries are present.[3],[5] Immediate surgical exploration and repair are recommended to minimize complication rates.[6],[7] Reports of penile fracture are rare in sub-Saharan Africa, particularly in East Africa.[3] We recount 4 consecutive cases of penile fracture successfully managed at 3 referral hospitals in 2019 and 2020, aiming to increase awareness for early diagnosis and intervention within the country and region.

Representative case presentation

During a COVID-19 lockdown in March 2020, a 48-year-old man was referred to Rwanda Military Hospital with penile pain and swelling sustained during sexual intercourse. He was engaging in intercourse in the doggy-style position 20 hours before reaching the hospital. He described feeling a sudden, painful crack when his erect penis inadvertently failed to penetrate and missed the vaginal orifice. He reported that there had been immediate penile detumescence and swelling, with minimal urethral bleeding. On examination, he had a tender swelling on the right side of his penis, which was deviated to the left, with clotted blood at the meatus (Figure 1). Ultrasonography revealed a right-sided subcutaneous penile haematoma with a gap in the tunica albuginea. A diagnosis of penile fracture with a high suspicion of urethral injury was made, and emergency surgery was carried out. Through a subcoronal degloving incision, a 1.5-cm rupture in the right corpus cavernosum was identified after haematoma evacuation. An adjacent near-total circumferential urethral rupture was seen and repaired. The corporeal defect was repaired with Vicryl 2-0 interrupted sutures. The urethral ends were mobilized, spatulated, and anastomosed with 4-0 Monocryl suture around a 16F urethral catheter in a tension-free manner. The catheter was kept in situ for 3 weeks, and the patient was allowed to resume

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Figure 1. Typical eggplant deformity associated with penile fracture (Patient 3 in Table 1 and Table 2)

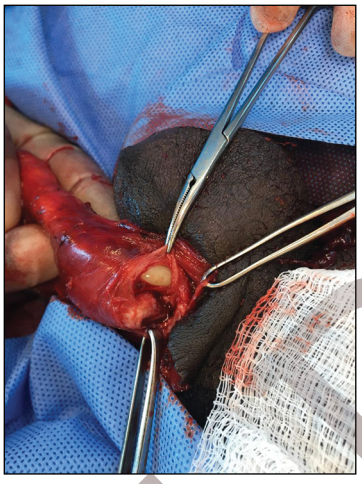

Figure 2. Penile fracture associated with partial urethral injury (Patient 4 in Table 1 and Table 2)

There is a gap in the right corpus cavernosum, as well as a urethral catheter running through the disrupted corpus spongiosum and urethra

sexual intercourse after 6 postoperative weeks. At 3 postoperative months, both sexual and voiding functions had returned to preinjury levels.

Table 1 and Table 2 summarize all 4 cases of penile fracture managed at 3 referral hospitals during the aforementioned 16-month period.

Discussion

Penile fracture is a relatively uncommon injury.[8] In his extensive review 2 decades ago, Eke[3] reported 1331 cases of penile fracture. He noted an underreporting and a rising incidence, with 56% of patients originating from the Mediterranean Muslim region and Turkey.[3] Subsequently, numerous authors have documented substantial numbers of penile fractures in the United States,[4],[9] Brazil,[5],[10] and Europe.[7] Reported cases in East Africa, including Rwanda, are rare. Remarkably, to our knowledge, no documented instance of penile fracture encountered in Rwanda exists on the scientific record. In 2019 and 2020, 4 patients presented at 3 different referral hospitals in Kigali within a span of 16 months. It is presumed that additional cases of penile fracture occurred previously, but patients did not present owing to a lack of awareness or sociocultural constraints. Additionally, limited urological services might have led to the misdiagnosis of such injuries.

Penile fracture involves a rupture of the tunica albuginea of either or both corpora cavernosa of the penis following a sudden bending of the erect organ. The tunica albuginea, thinning from 2 mm in a flaccid state to between 0.5 and 0.25 mm when the penis is erect, becomes susceptible to forceful impact.[11] Excessive pressure (≥1500 mmHg) can cause the engorged corpora cavernosa to rupture.[12] Following the rupture of a tunica albuginea, blood escapes from the cavernosal sinusoids. This bleeding typically results in a haematoma contained beneath Buck's fascia. However, if Buck's fascia also gives way, the haematoma may spread to the scrotum, perineum, and even the suprapubic area.[13]

The causes of penile fracture vary by geographic location among published reports.[3] Vigorous sexual intercourse is the predominant mechanism of injury in series from Europe (82.5%),[7] the United States (82%),[14] South America (ranging from 66.7%-00%),[5],[10],[15] and sub-Saharan Africa (66.7%).[16] Among penile fractures incurred during sexual intercourse, Reis et al.[15] found the woman-on-top position to be the most commonly associated position, while Barros et al.[10] identified the doggy-style position as the riskiest coital position. Fracture typically occurs when an erect penis misses the vagina and strikes the perineum or the pubic symphysis. Stressful situations—such as extramarital affairs and unconventional, unfamiliar locations—may increase the risk of penile fracture during sexual intercourse.[17]

In North Africa and the Middle East, the most common cause of penile fracture is penile manipulation, including practices such as *taqaandan* (or *taghaandan*), which involves forceful manual manipulation of the penis in various directions to achieve detumescence.[3],[18] Geographical variations in sexual norms may account for the diverse aetiologic patterns globally.[3]

Penile fracture is typically diagnosed clinically. An audible cracking sound followed by penile detumescence and pain is the classic manifestation.[3] Physical examination often reveals a swollen and deviated penis—the characteristic eggplant deformity—with ecchymosis at the site of the fracture.[3] Imaging techniques like ultrasonography, magnetic resonance imaging, and cavernosography are advised in ambiguous cases to confirm the diagnosis or ascertain the exact location of the injury.[19],[20] Nevertheless, imaging should not postpone treatment in clear-cut cases.

A report of urethral bleeding, haematuria, or blood clots at the meatus raises the suspicion of an associated urethral injury, which should be evaluated preoperatively via urethrography or

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Table 1. Demographics and clinical history of 4 patients operated on for penile fractures at 3 referral hospitals in Kigali, Rwanda, from 2019-2020

Patient	Hospital	Age, years	Mechanism of injury	Time from injury to presentation, hours
1	CHUK	28	Coitus (missionary position[a])	96 hours
2	RMH	48	Coitus (doggy style[b])	20 hours
3	CHUK	29	Masturbation	19 hours
4	KFH	37	Coitus (variant of doggy style)	2 hours

[a]Heterosexual vaginal intercourse with the partners face to face and the man on top • [b]Heterosexual vaginal intercourse with the woman on hands and knees and the man penetrating from behind

CHUK, University Teaching Hospital of Kigali; KFH, King Faisal Hospital, Rwanda; RMH, Rwanda Military Hospital

Table 2. Clinical signs, operative characteristics, and postoperative characteristics of 4 patients operated on for penile fractures at 3 referral hospitals in Kigali, Rwanda, from 2019-2020

Patient	Key clinical signs	Investigations	Final diagnosis	Surgical procedure	Outcome at 4 weeks
1	Eggplant deformity	Penile ultrasound	Unilateral cavernosal fracture	Tunical repair	Normal erection
2	Eggplant deformity and blood at the meatus	Penile ultrasound	Unilateral cavernosal fracture and urethral rupture	Tunical repair and anastomotic urethroplasty	Normal erection and voiding
3	Eggplant deformity	Penile ultrasound	Unilateral cavernosal fracture	Tunical repair	Normal erection
4	Eggplant deformity and frank haematuria	Penile ultrasound, flexible urethrocystoscopy	Unilateral cavernosal fracture and partial urethral injury	Tunical repair and urethral oversewing	Normal erection and voiding

intraoperatively via urethrocystoscopy.[8] In a large population-based study in the United States, Pariser et al.[4] observed that most urethral injuries were identified intraoperatively, without prior formal urethral evaluation; urethral injury was diagnosed in association with 21% of the penile fractures. A higher association (38%) was determined by Eke[3] but in a small series. A markedly lower association (1%) was noted in Iran, where the mechanism of injury was most commonly *taqaandan*.[21] Penile fracture involves both corpora cavernosa in up to 14% of cases.[5] Conditions that mimic penile fracture include vascular rupture of any of the dorsal penile vessels and the cavernosal artery, Mondor's disease, and penile lymphangitis. However, the latter 2 are exceedingly rare and typically manifest subsequent to underlying penile trauma.[3]

The standard of care for penile fracture is emergency surgical exploration and repair of the tunical tear.[6] Early repair prevents erectile dysfunction and penile curvature that might result from diminished penile elasticity due to fibrous tissue formation.[22] There is no universally ideal surgical incision for all situations.[3] However, a ventral vertical penoscrotal incision and a subcoronal circumferential degloving incision allow exposure of both corpora cavernosa and the corpus spongiosum, facilitating the identification of multiple cavernosal ruptures or associated urethral injury.[10],[15],[23] Small lateral incisions are employed for palpable haematoma stemming from tunical defects.[24] The disrupted tunica is sutured with 2-0 or 3-0 resorbable sutures following haematoma evacuation, minimal debridement of erectile tissue, and haemostasis.[3] Minor partial urethral injuries are sutured directly. Complete injuries are anastomosed in a tension-free manner or repaired using a buccal mucosa graft around a urethral catheter, which is retained for 2 to 3 weeks.[25] Sexual activity may be resumed after 1 month. The most common postoperative complications include erectile dysfunction, tunical scars, painful erections, and curvature in general;[6] urethral stricture and urethrocutaneous fistula are seen in patients with concomitant urethral injury.[3]

In our series, 3 out of 4 patients presented within 24 hours of injury, and penile ultrasonography did not delay surgery. We postulate that early management contributed to the favourable outcomes. Two patients sustained associated urethral injuries. In one patient, a preoperative cystourethrogram was not captured, as it was deemed time-consuming, and urethrocystoscopy equipment was not immediately available. The alternative was to employ a surgical approach that exposed all 3 corpora; therefore, a degloving incision was used. This approach enabled the successful identification and repair of the injury. Penile fracture is a relatively rare injury without universal guidelines. We adhered to standards of care extrapolated from large series. These standards include thorough clinical history and examination, cost-effective and rapid investigations, evaluation for urethral injury, emergency surgery with an approach that allows for comprehensive exploration, repair of the tunica and any associated urethral

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injuries, removal of the urethral catheter after 2 to 3 postoperative weeks, and follow-up at 4 to 6 weeks.

Conclusions

Penile fracture is a rare urologic emergency. The main causes are missed penetration during coitus and excessive manipulation of an erect penis. The diagnosis is mainly clinical, though imaging may be helpful. The presence of multiple corporeal injuries and associated urethral injuries should be ruled out. The standard of care is prompt surgical repair to minimize the risk of long-term complications.

References

1. Bella AJ, Shamloul R. Addressing the barriers to optimal management of penile fracture. *Can Urol Assoc J*. 2013;7(7-8):258-259. doi:10.5489/cuaj.1560 [View Article] [PubMed]
2. Hatzichristodoulou G, Dorstewitz A, Gschwend JE, Herkommer K, Zantl N. Surgical management of penile fracture and long-term outcome on erectile function and voiding. *J Sex Med*. 2013;10(5):1424-1430. doi:10.1111/jsm.12107 [View Article] [PubMed]
3. Eke N. Fracture of the penis. *Br J Surg*. 2002;89(5):555-565. doi:10.1046/j.1365-2168.2002.02075.x View Article] [PubMed]
4. Pariser JJ, Pearce SM, Patel SG, Bales GT. National patterns of urethral evaluation and risk factors for urethral injury in patients with penile fracture. *Urology*. 2015;86(1):181-185. doi:10.1016/j.urology.2015.03.039 [View Article] [PubMed]
5. Koifman L, Barros R, Júnior RA, Cavalcanti AG, Favorito LA. Penile fracture: diagnosis, treatment and outcomes of 150 patients. *Urology*. 2010;76(6):1488-1492. doi:10.1016/j.urology.2010.05.043 [View Article] [PubMed]
6. Wong NC, Dason S, Bansal RK, Davies TO, Braga LH. Can it wait? a systematic review of immediate vs. delayed surgical repair of penile fractures. *Can Urol Assoc J*. 2017;11(1-2):53-60. doi:10.5489/cuaj.4032 [View Article] [PubMed]
7. Bozzini G, Albersen M, Otero JR, et al. Delaying surgical treatment of penile fracture results in poor functional outcomes: results from a large retrospective multicenter European study. *Eur Urol Focus*. 2018;4(1):106-110. doi:10.1016/j.euf.2016.02.012 [View Article] [PubMed]
8. Kamdar C, Mooppan UM, Kim H, Gulmi FA. Penile fracture: preoperative evaluation and surgical technique for optimal patient outcome. *BJU Int*. 2008;102(11):1640-1644. doi:10.1111/j.1464-410X.2008.07902.x [View Article] [PubMed]
9. Rodriguez D, Li K, Apoj M, Munarriz R. Epidemiology of penile fractures in United States emergency departments: access to care disparities may lead to suboptimal outcomes. *J Sex Med*. 2019;16(2):248-256. doi:10.1016/j.jsxm.2018.12.009 [View Article] [PubMed]
10. Barros R, Silva M, Antonucci V, Schulze L, Koifman L, Favorito LA. Primary urethral reconstruction results in penile fracture. *Ann R Coll Surg Engl*. 2018;100(1):21-25. doi:10.1308/rcsann.2017.0098 [View Article] [PubMed]
11. Metzler IS, Reed-Maldonado AB, Lue TF. Suspected penile fracture: to operate or not to operate? *Transl Androl Urol*. 2017;6(5):981-986. doi:10.21037/tau.2017.07.25 [View Article] [PubMed]
12. Asgari MA, Hosseini SY, Safarinejad MR, Samadzadeh B, Bardideh AR. Penile fractures: evaluation, therapeutic approaches and long-term results. *J Urol*. 1996;155(1):148-149. doi:10.1016/s0022-5347(01)66578-9 [View Article] [PubMed]
13. Sawh SL, O'Leary MP, Ferreira MD, Berry AM, Maharaj D. Fractured penis: a review. *Int J Impot Res*. 2008;20(4):366-369. doi:10.1038/ijir.2008.12 [View Article] [PubMed]
14. Phillips EA, Esposito AJ, Munarriz R. Acute penile trauma and associated morbidity: 9-year experience at a tertiary care center. *Andrology*. 2015;3(3):632-636. doi:10.1111/andr.12043 [View Article] [PubMed]
15. Reis LO, Cartapatti M, Marmiroli R, de Oliveira Júnior EJ, Saade RD, Fregonesi A. Mechanisms predisposing penile fracture and long-term outcomes on erectile and voiding functions. *Adv Urol*. 2014;2014:768158. doi:10.1155/2014/768158 [View Article] [PubMed]
16. Omisanjo OA, Bioku MJ, Ikuerowo SO, Sule GA, Esho JO. A prospective analysis of the presentation and management of penile fracture at the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. *Afr J Urol*. 2015;21(1):52-56. doi:10.1016/j.afju.2014.07.001 [View Article]
17. Kramer AC. Penile fracture seems more likely during sex under stressful situations. *J Sex Med*. 2011;8(12):3414-3417. doi:10.1111/j.1743-6109.2011.02461.x [View Article] [PubMed]
18. El Atat R, Sfaxi M, Benslama MR, et al. Fracture of the penis: management and long-term results of surgical treatment: experience in 300 cases. *J Trauma*. 2008;64(1):121-125. doi:10.1097/TA.0b013e31803428b3 [View Article] [PubMed]
19. Kervancioglu S, Ozkur A, Bayram MM. Color Doppler sonographic findings in penile fracture. *J Clin Ultrasound*. 2005;33(1):38-42. doi:10.1002/jcu.20078 [View Article] [PubMed]
20. Beysel M, Tekin A, Gürdal M, Yücebaş E, Sengör F. Evaluation and treatment of penile fractures: accuracy of clinical diagnosis and the value of corpus cavernosography. *Urology*. 2002;60(3):492-496. doi:10.1016/s0090-4295(02)01813-7 [View Article] [PubMed]
21. Zargooshi J. Penile fracture in Kermanshah, Iran: report of 172 cases. *J Urol*. 2000;164(2):364-366. doi:10.1016/S0022-5347(05)67361-2 [View Article] [PubMed]
22. Morey AF, Brandes S, Dugi DD III, et al. Urotrauma: AUA guideline. *J Urol*. 2014;192(2):327-335. doi:10.1016/j.juro.2014.05.004 [View Article] [PubMed]
23. Mercado-Olivares F, Grandez-Urbina JA, Farfan-Daza G, Pacheco-Sauñe J, Nuñez-Bragayrac L. Case report: double penile fracture. *F1000Res*. 2018;7:1828. doi:10.12688/f1000research.16452.2 [View Article] [PubMed]
24. Falcone M, Garaffa G, Castiglione F, Ralph DJ. Current management of penile fracture: an up-to-date systematic review. *Sex Med Rev*. 2018;6(2):253-260. doi:10.1016/j.sxmr.2017.07.009 [View Article] [PubMed]
25. Acimovic M, Zivkovic M, Georgescu AV, Matei IR, Bumbasirevic U. Repair of urethral injury associated with penile fracture using buccal mucosa graft: A novel therapeutic approach for complex cases. *Injury*. 2020;51 Suppl 4:S114-S116. doi:10.1016/j.injury.2020.02.116 [View Article] [PubMed]

Peer reviewed

Competing interests: E.R. is a member of the *East and Central African Journal of Surgery* editorial board but was not involved in the processing or peer review of this article, and he did not have any influence on the decision to accept this article for publication. The other authors declare that they have no competing interests related to this work.

Received: 18 Oct 2021 • **Revised:** 14 May 2022

Accepted: 29 Jun 2022 • **Published:** 2 Sep 2022

Cite this article as: Ngendahayo E, Muhawenimana E, Umugwaneza N, et al. Penile fracture: 4 cases managed at referral hospitals in Rwanda. *East Cent Afr J Surg*. Published online September 2, 2022. doi:10.4314/ecajs.v27i3.6

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