Sex-related penile fracture with complete urethral rupture: A case report and review of the literature

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About 20-30% of penile fractures may involve the corpus spongiosum, and only 10% to 20% of penile fractures involve the urethra (4). It usually consists in a disruption of the tunica albuginea of one or both corpus cavernosum due to blunt trauma to the erect penis, during sexual intercourse. It can be accompanied by partial or complete urethral rupture or injury of the dorsal nerve and vessels (6, 7). Tunica albuginea is one of the strongest fascia in the human body. One reason for the increased risk of penile fracture is that the tunica albuginea stretches and thins significantly during erection: in the flaccid state it is up to 2.4 mm thick; during erection it becomes as thin as 0.25 to 0.5 mm. *Bitsch et al.* and *De Rose et al.* proposed that the tunica albuginea can be stretched by an intracorporal pressure of 1500 mmHg or more, that is physiologically reached during erection (8, 9). So the erected penis is much more vulnerable to rupture after trauma than the flaccid penis. Common clinical findings of penile fracture are penile swelling, hematoma, ecchymosis and deformity; suspicion of urethral injury is increased with presence of blood at the external meatus. Regarding the role of imaging studies in the diagnosis of penile fracture still there is controversy. Some studies showed the usefulness of ultrasound, cavernosography and MRI with superiority of MRI in identification of corporal injury (10). However, a recent study showed that MRI is not able to reveal detailed information about extent of corporal and urethral injury over surgical exploration (11).

DISCUSSION

Penile fracture is an extremely uncommon urologic injury. In a review of 183 reports, a total of 1331 penile fracture cases were found between the years 1935 and 2001 (1). To best of our knowledge from 2001 up today, 1839 more cases of penile fracture (with 159 cases of anterior urethral rupture) have been reported, according to 52 studies examined in the present review of literature (Table 1).

Urethral disruptions are generally partial; complete urethral disruption is extremely uncommon, from 1992 up today only 22 cases have been reported in english-written literature and most of them were isolated case reports (10, 12-17). Clinical presentation of penile fracture is represented by a cracking or popping sound, with immediate acute pain and rapid penile detumescence.

Penile swelling, hematoma, pain and penile deformity are common findings in all patients with penile fracture, but they are not specific for diagnosis of urethral injury (10). Although 58% of patients had voiding symptoms and acute urinary retention, however, these findings may appear in the absence of urethral injury, due to the presence of penile deformity, large hematoma and severe edema causing urethral obstruction (18).

However urethral bleeding or hematuria or voiding symptoms suggest associated trauma to the urethra.

Corporal or urethral rupture contained by Buck's fascia leads to dissection of urine and blood along the penile shaft. Rupture through Buck's fascia results in extravasation of blood and urine throw superficial layers (scrotum, suprapubic area, and perineum).

If the extravasation is contained by Colles' fascia it may be shown by a characteristic "*butterfly sign*" in the perineum (19).

El-Assmy et al. reported that vigorous coital trauma was the commonest cause (50%) of penile fracture associated with urethral injury (14). *De Rose et al.* found histopathological abnormalities such as perivascular lymphocyte infiltration and fibrosclerosis in 83% of fractured corpora, which suggests the presence of predisposing factors for penile fracture. They also measured the elasticity of tunica albuginea and proposed an intracorporeal pressure of 1500 mmHg would be necessary in an erect penis to facilitate penile fracture (9).

The anamnesis and physical examination generally could be sufficient to suggest the correct diagnosis of penile rupture; additional tests are rarely required.

In general, a retrograde urethrogram should be performed. When the diagnosis of penile fracture is not clear, several radiographic options can be useful. Cavernosography demonstrates the site of injury in most patients (20). MRI has been used recently to assist in the evaluation of atypical cases of penile fracture presenting with confusing clinical findings. *Fedel et al.* reported on 4 cases that presented with equivocal clinical findings in a cohort of 12 patients with penile fracture. MRI identi-

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Table 1.
Review of literature on penile trauma and anterior urethral rupture: characteristic of studies, population and management.

Authors	Years	Study	N° patients (total)	N° patients (urethral rupture)	N° patients (complete urethral rupture)	Management
Eke N. (1)	2002	Review (188 studies)	1331	-	-	Immediate surgery in some studies and conservative (183 management in others
Ciciliato S et al. (45)	2002	Case report	1	0	-	Immediate surgery
Kochakarn W et al. (15)	2002	Case series	12	0	-	Immediate surgery
Gontero P et al. (46)	2003	Case series	7	1	-	Immediate surgery
Heng CT et al. (47)	2003	Case report	1	1	-	Immediate surgery
Kiliçarslan H et al. (48)	2003	Case series	23	1	-	Immediate surgery
Muentener M et al. (23)	2004	Case series	29	9	-	12 immediate surgery (3 patients with urethral rupture) and 17 conservative treatment (6 patients with urethral rupture)
Soylu Aet al. (12)	2004	Case report	1	1	3	Immediate surgery
De Lucchi Ret al. (49)	2004	Case series	5	1	-	Immediate surgery
Tanelo M et al. (14)	2005	Case report	1	1	1	Immediate surgery
De Giorgi G et al. (50)	2005	Case series	10	0	-	Immediate surgery
Abolyosr A et al. (32)	2005	Case series	14	2	-	13 Immediate surgery and 1 conservative management
Llarena Ibarguren R et al. (51)	2006	Case series	2	1	-	Immediate surgery
Cavalcanti AG et al. (33)	2006	Case series	77	11	-	3 (total urethral rupture) immediate surgery and 8 (partial urethral rupture) conservative management
Chung CH et al. (34)	2006	Case series	11	2	-	10 immediate surgery and 1 conservative management
Jagodic K et al. (7)	2007	Case report	1	1	1	Immediate surgery
Kulovac B et al. (52)	2007	Case series	23	2	-	Immediate surgery
Ghilan AM et al. (35)	2008	Case series	30	2	-	24 immediate surgery and 6 conservative management
Ateyah A et al. (31)	2008	Case series	33	0	-	30 immediate surgery and 3 conservative management
García Marchiñena P et al. (53)	2008	Case report	1	1	-	Immediate surgery
Maruschke M et al. (54)	2008	Case series	3	0	-	Immediate surgery
Khan RM et al. (55)	2008	Case series	12	-	-	Immediate surgery
Kamdar C et al. (36)	2008	Case series	8	0	-	7 immediate surgery and 1 conservative management
Nale Dj et al. (37)	2008	Case series	32	-	-	11 immediate surgery and 21 conservative management
Strunk T et al. (17)	2008	Case report	1	1	1	Immediate surgery
Roy M et al. (56)	2008	Case report	1	1	-	Immediate surgery
Derouiche A et al. (57)	2008	Case series	312	10	-	Immediate surgery
Zargooshi J. (42)	2009	Case series	352	5	-	Immediate surgery
Yapanoglu T et al. (24)	2009	Case series	42	0	-	37 immediate surgery and 5 conservative management
Ugwu BT et al. (58)	2009	Case series	2	0	-	Immediate surgery
Murtaza B et al. (13)	2009	Case report	1	1	1	Immediate surgery
Agarwal MM et al. (38)	2009	Case series	17	4	-	15 immediate surgery and 2 conservative management
Molimard B et al. (59)	2009	Case report	1	1	-	Immediate surgery
Mazaris EM et al. (60)	2009	Case series	8	1	-	Immediate surgery
Ibrahiem el-HI et al. (26)	2010	Case series	155	14	-	Immediate surgery
Boncher NA et al. (61)	2010	Case report	1	1	-	Immediate surgery
Nawaz H et al. (62)	2010	Case series	137	11	-	Immediate surgery
Patel A et al. (63)	2010	Case report	1	1	-	Immediate surgery
El-Assmy A et al. (64)	2010	Case series	14	14	-	Immediate surgery
De Rose AT et al. (51)	2011	Case series	6	1	-	Immediate surgery
Moreno Sierra J et al. (65)	2011	Case series	15	1	1	Immediate surgery
Gamal WM et al. (39)	2011	Case series	77	3	-	56 immediate surgery and 21 conservative treatment
Gedik A et al. (40)	2011	Case series	107	8	-	101 immediate surgery and 6 conservative management
el-Assmy A et al. (66)	2011	Case series	180	18	-	Immediate surgery
García HG et al. (67)	2011	Case report	1	1	-	Immediate surgery
Hoag NA et al. (16)	2011	Case report	1	1	1	Immediate surgery
Hatzichristodoulou G et al. (68)	2013	Case series	28	7	-	26 immediate surgery
de Carvalho AM et al. (69)	2013	Case report	1	1	-	Immediate surgery
Raheem AA et al. (10)	2014	Case series	12	12	13	Immediate surgery
Yonguc T et al. (70)	2014	Case report	1	0	-	Immediate surgery
Rivas JG et al. (41)	2014	Case series	28	4	-	27 immediate surgery and 1 conservative management
Garofalo M et al.	2015	Case report	1	1	1	Immediate surgery
TOTAL			3171	160	23	

fied rupture of the corpora cavernosa in all 4 cases (21), however this imaging technique is expensive, time-consuming and not available everywhere. Some authors showed a sensitivity of retrograde urethrography in the diagnosis of associated urethral injury was 100%. In contrast, Mydlo found that the sensitivity of this test is only 50% with a possibility of a false negative results (22).
Many studies supported the superiority of surgical treatment over conservative treatment (18, 19). Moreover, excellent long-term results and lower complication rates have been reported with immediate surgical repair (23). Typically, all complete disruptions treated by suprapubic diversion result in a urethral stenosis that will necessitate urethroplasty. On the other hand several authors suggest that treat these injuries by primary realignment could decrease the rate of urethral stricture (24). Surgical repair of penile fracture was first described by *Fetter and Gartman* in 1936 (25). Since the repair reduces the complication of fracture it is now the gold standard for treatment of penile fractures (7).
Studies comparing surgical versus conservative treatment favour immediate surgical exploration and reconstruction (26-30). Immediate intervention has been associated with shorter duration of hospital stay, higher levels of patient satisfaction, and improved outcomes including reduced incidence of erectile dysfunction, stricture and curvature, with better functional outcome such as voiding capability and sexual activity (23-24, 31-41). *Raheem et al.* recently published one of the largest series reported in the literature for long term functional outcomes of 12 patients with penile fracture associated with complete urethral disruption. After immediate surgical repaired lesions, 91% of them showed no voiding difficulties on 72. 6 months of mean follow-up and 91% maintained normal erectile function and sexual activity. Of the long-term complications a palpable fibrosis was found in 27% of patients and slight penile curvature on erection in 18% without affection to their sexual activity (10). A palpable penile fibrosis is a common long-term complication with an incidence ranging from 41% up to 93% (31, 42).

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