

Impact of Surgical Treatment of Penile Fracture on Sexual Function



Rodrigo Barros, Alex Schul, Paulo Ornellas, Leandro Koifman, and Luciano A. Favorito

OBJECTIVE	To conduct a comprehensive assessment of sexual function of patients undergoing surgical treatment of penile fracture (PF), covering psychological aspects related to trauma.
METHODS	Patients undergoing surgical treatment of PF from January 2014 to August 2017 were followed-up in our department for at least 6 months. The patients underwent a detailed clinical follow-up, including physical examination and were interviewed about any evidence of erectile dysfunction, penile nodules, or curvature acquired after surgery, besides psychological sexual problems.
RESULTS	A total of 58 patients conducted the follow-up. The mean age was 38.5 years (range: 18-66 years). Eight (13.7%) patients complained of penile curvature after surgery. Postoperative erectile function was recovered after 6 months in 50 (86.2%) cases. After the last evaluation at 18 months, only 1 patient developed persistent erectile dysfunction (ED) and color duplex Doppler ultrasound excluded a vascular etiology. Psycho-sexual evaluations showed that 45 (77.5%) patients feared a new episode of PF. Changes in sexual habits, such as avoiding vigorous sexual intercourse, was reported by 40 (68.9%) patients. Finally, patients with performance anxiety and those who reported a negative impact on sexual life were more susceptible to the development of ED ($P = .0337$ and $P = .0418$, respectively).
CONCLUSION	Sexual complications after surgical treatment of PF are unusual but may occur in the late postoperative period and should be treated. Psychological sequela is very common, causing fear of recurrence and psychogenic ED, resulting in negative impact on the sexual life of these patients, which should be monitored closely. UROLOGY 126: 128–133, 2019. © 2018 Elsevier Inc.

INTRODUCTION

Penile fracture (PF) is a rare urological emergency, with an estimated incidence of 500-600 cases/y in the United States.¹ The etiology may vary according to the different regions of the world, with sexual intercourse being the most common cause in Western countries.² Evidence has shown a trend towards following urgent surgical exploration and primary repair of the tunical defect because it presents significantly superior results to conservative treatment.³ The surgery aims to restore the anatomical and functional integrity of the penis, in order to avoid complications and sexual dysfunctions. Moreover, this approach may also present several long-term complications such as erectile dysfunction (ED), painful erection and penile tortuosity.⁴ In addition, patients with PF can be affected by psychological problems. Anxiety, depression, and high levels of stress from the traumatic experience can also result in sexual difficulties.⁵

We believe that overall sexual satisfaction is promising after surgical treatment of PF, but the psychological impact of the trauma on patients' social and sex life is common.

In this study, we conduct a comprehensive assessment of the sexual function of patients undergoing surgical treatment of PF, covering the psychological aspects related to trauma.

MATERIALS AND METHODS

This study was approved by the ethical committee for human experimentation of our university, and was carried out in accordance with the ethical standards of the hospital's institutional committee on human experimentation no.: 1.836.605.

From January 2014 to August 2017, patients undergoing surgical treatment of PF were included in this study and followed up in our department for at least 6 months. The patients who refused to sign informed consent or those who underwent incomplete follow-up were excluded.

According to the protocol of our institution, patients with high suspicion of PF based on clinical criteria underwent surgery immediately after diagnosis. Penile ultrasound was performed in doubtful cases.

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Demographic data, etiology, and clinical presentation, as well as operative findings were documented. Corpora cavernosa lesions were classified as unilateral or bilateral. Urethral injuries were divided into partial or complete. After 6 months of surgery, patients were questioned about libido and ejaculatory function. Those who complained of premature ejaculation answered the Portuguese version of the premature ejaculation diagnostic tool (PEDT).⁶ The patients who reported having acquired curvature underwent penile erection or were subjected to a drug-induced erection test using alprostadil 10 mcg, to evaluate the exact type and degree of curvature. The evaluation of the postoperative erectile function was performed by completing the Portuguese version of the International Index of Erectile Function (IIEF-5).⁷ All patients with ED received oral phosphodiesterase type 5 inhibitor (IPDE-5) treatment and were re-evaluated with and without medication after 12 and 18 months. Penile color duplex Doppler ultrasound (CDDU) was performed for those who had persistent ED to obtain a precise etiological diagnosis. The penile evaluation was performed with the penis in the flaccid state and after the intracavernosal injection of Alprostadil 10 mcg. Arterial insufficiency was diagnosed when the peak systolic velocity of the cavernous artery was less than 25 cm/s.

Finally, to cover psychological and emotional aspects, the patients answered a psycho-sexual interview in which they were asked about the fear of having a new episode of PF and if it disturbed their sex life, leading to performance anxiety or any change in sexual habits, such as avoiding certain sexual positions.

Results of statistical analyses of the data are presented as means, standard deviations, medians, standard errors as well as frequencies and percentages. Correlations between target events were assessed using Pearson's correlation coefficient. Chi-squared or Fisher's exact test, when appropriate, was employed for contingency table analyses. *P* value <.05 was considered significant.

RESULTS

Of the 79 patients who underwent surgical treatment of PF in our department, 58 met the inclusion criteria of this study and were followed. The mean age was 38.5 years (range: 18-66 years). Half of the patients were married and the other half were single. Of the married patients, 7 (24.1%) were in an extramarital relationship at the time of the trauma. Four (6.8%) patients reported homosexual intercourse.

Coital etiology was observed in 46 (79.3%) cases and noncoital (masturbation or penile manipulation) in 12 (20.6%). Of the 46 cases with coital etiology, intercourse was vaginal in 41 (89.1%) cases and anal in only 5 (10.8%). The sexual position at the time of injury varied, with 14 fractures (30.4%) occurring in the "man-on-top" position, 28 (60.8%) in the "doggy style" position and 4 (8.6%) in the "woman-on-top" position. The 4 patients

who identified themselves as homosexuals reported that the partner was in a "doggy style" position.

A total of 36 patients (62%) reported hearing a snapping sound at the moment of the injury, and 51 (87.9%) complained of rapid detumescence. All patients presented with marked swelling and hematoma of the penis. Blood at the meatus or hematuria was observed in 15 (25.8%) patients.

The time between trauma and surgery varied from 2 to 168 hours (mean, 25 hours). Penile ultrasound was the only complementary exam performed at the time of injury in 6 (10.3%) suspected cases. The operative findings were unilateral lesions in 40 (68.9%) cases and bilateral in 18 (31%). Urethral injuries were observed in 17 (29.3%) patients, including 13 (76.4%) partial and 4 (23.5%) complete injuries. All cases of urethral injury were associated with bilateral lesions of the corpora cavernosa, except 2 (11.7%) cases of partial injury. Of the 58 patients enrolled in the study, 13 (22.4%) patients returned to sexual activity 30 days after surgery, 28 (48.2%) between 30 and 60 days, and 17 (29.3%) after 60 days.

Only 1 patient had ED before the trauma. The duration of follow-up ranged from 6 to 48 months (mean: 11.4). Five (8.6%) patients had low libido, 1 (1.7%) patient reported delayed ejaculation and 5 (8.6%) developed acquired premature ejaculation after the trauma according to PEDT. Eight (13.7%) patients complained of penile curvature after surgery. However, intracavernosal injection test showed deviation <30° in all cases and these patients not said bothered. Penile fibrotic nodule was found in 44 (75.8%) patients and painful erections in 16 (27.5%) cases. Five (8.6%) patients complained of a decrease in the size of the penis in the postoperative period.

Postoperative erectile function was recovered after 6 months in 50 (86.2%) cases. Eight (13.7%) patients developed ED (5 mild and 3 mild-moderate) with 5 patients needing oral treatment with IPDE-5. All 5 patients responded to treatment with IPDE-5 after 6 months of follow-up and 4 of them reported improvement of erection, with no need for medication, on reevaluation after 12 months. [Table 1](#) shows the risk factors and the improvement of IIEF-5 score during the follow-up. The only patient with persistent ED was responsive to IPDE-5 in the last evaluation at 18 months. He was subjected to the CDDU that excluded the possibility of a vascular etiology. The only case of prior ED had no change in erectile function.

Psycho-sexual evaluations showed that 45 (77.5%) patients feared a new episode of PF. Changes in sexual habits, such as avoiding vigorous sexual intercourse, was reported by 40 (68.9%) patients. Among 18 (31%) patients who reported a negative impact on sexual life, performance anxiety was performed by 17 (29.3%) of them. Of the 46 sexual etiology cases, 17 (36.9%) patients reported avoiding the position or cause that led to the trauma. The [Table 2](#) shows the long-term sexual complications observed in our sample during the follow-up.

Table 1. Risk factors and IIEF-5 score of patients with ED after surgery

Patient	Age (Years)	COMORB	Etiology		Coitus	IIEF PRE-OP	TIME (h)	Lesion CC	UI	Ret. Sex Life (d)	ANXIETY PERFOR	NISL	IIEF-5 6 mo	IIEF-5 12 mo	IIEF-5 18 mo
			Sexual/ Non-Sexual	Position/ Cause											
1	44	Hypertension Diabetes Dyslipidemiasmoker	Sexual	"man-on-top"	Vaginal	25	2	Unilateral	Partial	30-60	Yes	Yes	19	19	22
2	39	-	Sexual	"doggystyle"	Vaginal	25	16	Unilateral	Partial	30-60	Yes	Yes	20	25	25
3	29	-	Non-sexual	Penile manipulation	-	25	24	Unilateral	-	30-60	No	No	17	25	25
4	66	-	Non-sexual	Penile manipulation	-	25	84	Unilateral	-	>60	No	No	15	15	22
5	46	Ex-smoker	Non-sexual	Penile manipulation	-	25	6	Unilateral	-	30-60	No	Yes	21	25	25
6	37	-	Sexual	"doggystyle"	Anal	25	14	Unilateral	-	>60	No	No	14	25	25
7	28	-	Sexual	"women-on-top"	Vaginal	25	48	Unilateral	-	>60	Yes	Yes	21	21	22
8	36	Smoker	Sexual	"doggystyle"	Vaginal	25	30	Unilateral	Partial	30-60	No	No	14	19	21

CC, corpora cavernosa; COMORB, comorbidities; TIME, time between trauma-surgery; UI, urethral injury; ANXIETY PERFOR, anxiety performance; NISL, negative impact on sexual life. IIEF-5 scoring: 22-25: no erectile dysfunction; 17-21: mild erectile dysfunction; 12-16: mild to moderate erectile dysfunction; 8-11: moderate erectile dysfunction; 5-7: severe erectile dysfunction.

Table 2. The table shows the long term sexual complications in the 58 patients with penile fracture studied

Outcomes	Cases (%)
Penile nodule	44 (75.8%)
Penile pain	16 (27.5%)
Erectile dysfunction	08 (13.7%)
Penile curvature	08 (13.7%)
Premature ejaculation	05 (8.6%)
Delayed ejaculation	01 (1.7%)
Low libido	05 (8.6%)
Decrease in penis size	05 (8.6%)
Aesthetic dissatisfaction	07 (12%)
Fear of recurrence	45 (77.5%)
Change in sexual habit	40 (68.9%)
Anxiety performance	17 (29.3%)
Negative impact on sexual life	18 (31%)
Avoiding the position or cause which led trauma	17 (36.9%)
Total	58 (100%)

After performing the tests to evaluate the relationship between ED and the other variables, it was observed that patients with performance anxiety and those who reported a negative impact on sexual life were more susceptible to the development of ED ($P = .0337$ and $P = .0418$, respectively). On the other hand, there was no significant correlation between penile curvature and the other variables. Our data also did not identify a statistical difference between the time of PF repair and ED or penile curvature rates, even when the cases were stratified into early (<24 hours) and late (>24 hours) repair.

Necrosis of the operative wound was observed in 2 (3.4%) cases. These patients progressed satisfactorily with local care and secondary wound healing. Seven (12%) patients said they were dissatisfied with the aesthetic result of the surgery.

DISCUSSION

In the 1970s, most patients with PF were treated conservatively through methods such as urethral catheterization, ice pack, compression bandages, and medications including sedatives, analgesics, and antibiotics.^{8,9} However, due to the high morbidity, with an occurrence of long-term complications close to 80%,^{10,11} the current treatment tend for emergency surgical exploration.³ However, the surgical approach is not without complications. Perhaps the most feared complication for patients suffering from PF is ED. El Atat et al¹² described their experience with 300 cases of PF and observed complications in 40 patients (13.3%). Of these, ED was observed in only 2 cases (0.6%). In agreement, Reis et al¹³ also found ED in only 2 (4.8%) cases, requiring drug treatment in 1 case and penile prosthesis in another. More recently, De Luca et al¹⁴ evaluated the sexual function in 76 patients operated on for PF, and 12 months postoperatively, only 5% of them reported worsening of erection. In contrast, Hatzichristodoulou et al¹⁵ reported an impact on erectile function in 7 (53.8%) and 3 (23.1%) patients

needing oral medication to improve erection after evaluating 13 patients with PF undergoing surgical treatment. Despite the small number of cases, the author describes a larger percentage of ED as a complication of PF. The different methodologies used by the authors could possibly justify this discrepancy in the incidence of ED found in these studies. El Atat et al¹² did a detailed clinical follow-up, including at least 1 physical examination for all patients. Reis et al¹³ evaluated their patients via telephone contact by asking a single question about erectile function with 2 possible responses: normal and abnormal. According to De Luca et al,¹⁴ the patients answered questionnaires, which were validated face-to-face after 12 months of follow-up. Hatzichristodoulou et al¹⁵ performed the follow-up through e-mail, in which the patients answered the attached questionnaires. In our study, all patients were personally interviewed and answered a validated questionnaire on the evaluation of erectile function (IIEF-5). In this way, we observed the appearance of ED after PF surgery in 8 (13.7%) cases.

CDDU emerged as the main minimally invasive evaluation in the etiological diagnosis of ED, as well as for differentiation between psychogenic and organic ED with high precision.¹⁶ El-Assmy et al¹⁷ conducted a study to determine underlying vascular abnormalities among surgically treated patients with PF. Among the 11 patients with ED in the study, CDDU revealed normal indices in 4 (36.4%) cases, veno-occlusive dysfunction in 4 (36.4%) and arterial insufficiency in the other 3 (27.2%). Nane et al¹⁸ evaluated the vascular systems of 15 patients (9 potent and 6 impotent) using CDDU. Of the impotent patients, vascular abnormalities were observed in 4 (66%), and the other 2 (33%) were considered for psychogenic etiology since the examination revealed no alterations in these cases. In our study, 8 patients developed ED 6 months after surgery. Despite this, all of them reported a complete response to treatment with IPDE-5. In a second 12-month follow-up, 4 patients reported persistent ED required IPDE-5 therapy. After 18 months, only 1 patient remained with mild ED complaints without medication. This patient was subjected to CDDU that ruled out diagnostic criteria for vascular pathologies. In addition, he was afraid of recurrence, suggesting psychogenic ED. Furthermore, statistical analysis inferred that patients with performance anxiety and who reported a negative impact on sexual life were more susceptible to the development of ED ($P = .0337$ and $P = .0418$, respectively). From these results, we believe that patients who develop ED after the surgical treatment of PF are affected psychologically, but usually improve with time.

Regarding the psychological aspects that involve PF, the few studies that have been conducted on the subject presented contradictory results regarding the possibility of emotional sequelae. Penbegul et al¹⁹ evaluated 32 patients subjected to surgical treatment of PF and compared them with a control group composed of 30 men. According to the author, levels of anxiety, depression, and sexual dissatisfaction were similar in the operated patients and the

control group, demonstrating that the immediate surgical repair of PF does not present any psychological sequela in these patients. On the other hand, Pavan et al.²⁰ observed several complications in the psychological sphere of patients surgically treated for PF. In our study, 17 (29.3%) patients reported sexual performance anxiety and the majority (77.5%) had a fear of recurrence of PF, demonstrating that emotional sequela may affect such patients.

The development of penile curvature may also impact sexual function in men undergoing surgical treatment for PF. Ibrahim et al²¹ reported only 5 (3.2%) cases of curvature after surgery. Similarly, Zargooshi¹¹ observed curvature in only 4 patients in his study of 352 cases. However, other authors have described higher rates of penile curvature. Hatzichristodoulou et al¹⁵ reported penile curvature rates of 27.4% and 30.8%, respectively, but without interfering with the sexual life. Comparing immediate and late treatments, Pavan et al²⁰ observed penile curvature in only patient operated on early, whereas in the group treated late, curvature was observed in 14 cases. Likewise, Amer et al,³ demonstrated through meta-analysis that penile curvature rates are lower in early surgery compared to those for the late approach. We observed penile curvature in only 8 (13.7%) patients with deviation $<30^\circ$ in all cases. Moreover, we could not find a significant correlation between penile curvature and the other variables.

The rupture of the corpora cavernosa resulting from PF can evolve with fibrosis and penile nodule formation. In Zargooshi's study,¹¹ almost all patients (93.7%) developed a fibrotic penile nodule postoperatively. On the other hand, El Atat et al¹² observed only 10 cases of penile nodules in their study of 300 cases. In our study, we found penile fibrosis during physical examination in 44 (75.8%) cases.

Circumcision during the surgical procedure for PF is recommended by some authors to facilitate local hygiene, prevent the formation of phimosis after surgery, and provide a better aesthetic result.² However, Tang et al²² reported a case of extensive necrosis of the foreskin requiring reconstruction by plastic surgery 3 months after the circumcision with penile degloving. In our study, we observed necrosis of the surgical wound in 2 (3.4%) cases. The patients progressed satisfactorily with local care and secondary wound healing. Of the 58, 7 (12%) patients said they were dissatisfied with the aesthetic result of the surgery.

Five (8.6%) patients complained of postoperative penis size decrease, although none of them knew the actual penile length prior to PF. The development of fibrosis after trauma could be the justification for these findings. However, most of our patients developed fibrotic nodulation after PF and still did not complain about a reduction in penile size. In addition, it is impossible to obtain an objective and adequate measurement of the penile size before the trauma, because it is an emergency situation and causes genital deformity. Thus, a comparative evaluation becomes impractical in order to establish a relationship between PF, surgical treatment, and a possible

decrease in penile length. Perhaps a distorted view of the body image after the traumatic event and the removal of the foreskin may justify these findings in our study.

No definite consensus was reached regarding the ideal time for surgical repair. Although immediate surgical repair is recommended, several studies published to date state that there is no effect on long-term outcomes when the late approach is performed.¹⁷ In our study, all patients underwent surgery immediately after diagnosis. Despite this, the mean time between trauma and surgery was 25 hours and no statistical difference was observed between the time of FP repair and ED rates, as well as the development of penile curvature.

Although there is no standardized period of sexual abstinence to be recommended for patients operated on to treat PF, most authors advised at least 6 weeks, which is the time at which collagen deposition is completed. El-Assmy et al¹⁷ advised their patients to maintain abstinence for 6 weeks after PF surgery. Similarly, a consensus published recently by the British Association of Urological Surgeons for the management of male genital emergencies, recommended that patients avoid intercourse for 6 weeks after surgery.²³ All patients in our study were instructed to avoid intercourse for at least 8 weeks. However, 13 (22.4%) returned to sexual life within less than 30 days, 28 (48.2%) between 30 and 60 days, and 17 (29.3%) after more than 60 days and the abstinence did not correlate with rates of sexual complications.

This study has some limitations. Some data provided by patients during admission interviews (such as etiology, orientation, and sexual position) and follow-up (as erectile function and curvature) may be false, due to embarrassment while reporting their problems to doctors. The tools for assessing sexual problems used in this study, such as IIEF-5 and PEDT, have not been validated in homosexual patients which could have led to measurement bias. Thus, these tools needed to be adapted to approach the homosexual patients present in our sample.

CONCLUSION

Surgical treatment of PF provides satisfactory results with adequate recovery of sexual function, even in the long-term follow-up. Most patients preserve erectile function without the development of penile curvature or deformity. However, sexual complications such as ED, decreased libido, ejaculatory dysfunctions, curvature, and penile nodule may occur in the late postoperative period and should be treated. Psychological sequela is very common, causing fear of recurrence and psychogenic ED, resulting in negative impact on the sexual life of these patients which should be monitored closely.

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EDITORIAL COMMENT



This study highlights penile fracture, an important event in some men's lives. Not rare but relatively uncommon in Western countries, penile fracture usually occurs during sexual activity in young men with normal erections. Because the magnitude of the force needed to cause penile fracture is great, the injury is dramatic with sudden brief pain followed by penile swelling and ecchymosis. The authors supply further evidence supporting the value of early surgical treatment of these injuries.

Less dramatic coital injuries occur more frequently in men whose erections are still good enough for penetrative sex, but not rigid enough to avoid delaminating injuries to the tunica albuginea of the corpora.¹ These injuries are often silent, may be recurrent, and tend to occur not at the penile base as usually seen in penile fracture but more distally. Healing occurs without treatment. The scar that results is usually palpable and causes penile shortening as well as erectile deformity. Peyronie's disease (PD), as this condition is known, is far more prevalent than penile fractures occurring in as many as 8.9% of men between the ages of 40 and 75.²

Erectile dysfunction (ED) is defined as the inability to attain or maintain an erection sufficient for satisfactory intercourse on more than 50 % of attempts.³ Men with secondary ED usually have underlying organic causes. Unless secondary ED occurs after trauma or pelvic surgery, it is usually preceded by a period when erections have decreased rigidity but still allow penetrative sex. Normal thrusting during coitus in men with decreased penile rigidity may cause injuries which result in PD. I have suggested that we call this prodromal phase of ED erectile insufficiency.⁴ If one accepts this, then it is clear that erectile insufficiency together with ED are the cause and not the result of PD. This understanding can allow us to institute measures to prevent PD or its recurrence as well as to provide better treatment for men with this common disorder.⁴

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AUTHOR REPLY



We appreciated the valuable comments on our recently published article in *Urology* and agree with them. Peyronie's disease and erectile dysfunction (ED) can occur after trauma, such as penile fracture (PF), especially in patients treated conservatively, with high rates of long-term complications.^{1,2}

In our study, all patients underwent surgery immediately after diagnosis and we observed the appearance of ED in 8 (13.7%) cases. Moreover, most patients who develop ED are affected psychologically, but usually improve with time.

A recent meta-analysis demonstrated that penile curvature rates are lower in early surgery compared to those for the late approach.³ We observed penile curvature in only 8 (13.7%) patients with deviation <30° in all cases. Besides this, the rupture of the corpora cavernosa resulting from PF can often evolve to fibrosis and penile nodule formation.² In our study, we found penile fibrosis during physical examination in 44 (75.8%) cases.

Therefore, sexual complications such as ED, curvature and penile nodule may occur in the late postoperative period of PF. This should be born in mind and treated by healthcare practitioners.

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