

When Should Surgery be Performed in Case of Penile Fracture to Prevent Erectile Dysfunction?

Penil Fraktüre Bağlı Erektile Disfonksiyonu Önlemek İçin Cerrahi Ne Zaman Yapılmalıdır?

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ABSTRACT Objective: To analyze the outcomes of the patients who underwent surgical treatment of penile fracture especially emphasizing the effects of the time of surgery on erectile function of the patients. **Material and Methods:** Between 2007 and 2019, 31 patients who were consulted with the complaints and suspicion of penile fracture to the Emergency Department of Pamukkale University Hospitals were evaluated retrospectively. Erectile functions both prior to the surgery and at postoperative 3rd month were evaluated. The patients who had an International Index of Erectile Function-5 (IIEF-5) decrease in the follow-up before the procedure and the patients who received medical treatment and no change in IIEF were divided into two groups. Compatibility of variables to normal distribution was evaluated with the Kolmogorov Smirnov test. The results were expressed in 95% confidence interval and $p < 0.05$ was considered statistically significant. **Results:** In the study conducted on the etiology of a decrease in IIEF and the need for treatment after surgery, it was found that the rate of application to the emergency room within the first 6 hours statistically decreased the rate significantly. In addition, it has been found that the surgical application in the first 12 hours decreases both IIEF and the need for treatment in the IIEF. **Conclusion:** Penile fracture is a rare urological emergency. Erectile dysfunction which can be seen after penile fracture, is significantly reduced with early application of penile fracture within 6 hours to the hospital and surgical repair within the first 12 hours.

Keywords: Erectile dysfunction; emergency treatment; urologic surgical procedures, male

ÖZET Amaç: Penil fraktür cerrahisi uygulanan hastaların özellikle cerrahi zamanının, tedavi sonrası erektil fonksiyonlar üzerindeki etkilerini vurgulayan sonuçları analiz etmek. **Gereç ve Yöntemler:** 2007 ve 2019 yılları arasında Pamukkale Üniversitesi Hastanesi Acil Servisi'ne penil fraktür şüphesi ile başvuran 31 hasta retrospektif olarak değerlendirildi. Ameliyat öncesi ve ameliyat sonrası 3. ayda erektil fonksiyonları değerlendirildi. Hastalar takiplerinde Uluslararası Erektile Fonksiyon İndeksi-5 (IIEF-5) skorlarında düşme olup bunun için tedavi alan ve IIEF-5 skor değişikliği olmayan 2 gruba ayrıldı. Değişkenlerin normal dağılıma uygunluğu Kolmogorov Smirnov testi ile değerlendirildi. Sonuçlar %95 güven aralığında ifade edildi ve $p < 0,05$ istatistiksel olarak anlamlı kabul edildi. **Bulgular:** IIEF'de azalma etyolojisi ve tedavi ihtiyacı etyolojisi azaltılmak için yapılan çalışmada, hastaların ilk 6 saat içinde acil servise başvurusu ile istatistiksel olarak anlamlı şekilde azaldığı bulundu. Ek olarak, ilk 12 saatte yapılan cerrahi uygulamanın hem IIEF'yi hem de IIEF'de tedavi ihtiyacını azalttığı bulunmuştur. **Sonuç:** Penil fraktür nadir görülen bir ürolojik acil durumdur. Penil fraktür tedavisi sonrası görülebilen sertleşme bozukluğu, hastaneye 6 saat içinde erken başvuruda bulunulması ve ilk 12 saat içinde de cerrahi onarım ile önemli ölçüde azalır.

Anahtar Kelimeler: Sertleşme bozukluğu ; acil tedavi ; ürolojik cerrahi işlemler, erkek

Traumatic injuries are not common due to the mobile structure of the penis. It is one of the rarest urological emergencies with an incidence between 1/175000 and 1-9.9/100.000 on average, and urologists

encounter 1 patient every 3.5 months.^{1,2} The incidences reported in the literature are believed to be much higher because a large number of patients do not seek emergency medical help due to embarrassment.^{3,4}

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Blunt trauma resulting in the rupture of the tunica albuginea is usually seen in the erected penis, where the risk increases with certain sexual positions.⁵ Other reasons include penis twisting, penis bending for detumescence, and external blunt trauma when the penis is erect.⁶ Forceful manipulation in the Middle East, the Gulf Region, and North Africa are reported as the most common cause of penile fracture with a rate of 65%.⁷ In a meta-analysis conducted by Amer et al. including 1948 patients, the most common cause of penile fracture was found as sexual intercourse (46%) followed by forced flexion (21%).⁸ In the United States, the rate is estimated to be around 500-600 of new cases each year.⁹ Patients usually present with a cracking sound caused by the rupture of the tunica albuginea during sexual intercourse, followed by rapid deterioration of tumescence with pain. Thereafter hematoma becomes apparent due to subcutaneous bleeding known as “eggplant deformity”. In the past, the penile fracture was followed conservatively, but due to morbidities such as erectile dysfunction (ED), plaque formation, painful erection, curvature, and infected hematoma up to 30% ratio, early surgical exploration and the repair of tunical defect are performed today.⁸ Early surgical repair also shortens the time for the patient to return normal sexual activity. In general, the history of the patient and the physical examination are sufficient to reach a diagnosis of penile fracture. Magnetic resonance (MR), ultrasonography, cavernosography or retrograde urethrography (when there is suspicion of urethral injury) can be used for further confirmation of the diagnosis.

In this study we aimed to analyze the outcome of the patients who underwent surgical treatment of penile fracture especially emphasizing the effects of the time of surgery on erectile function of the patients.

MATERIAL AND METHODS

Between 2007 and 2019, 31 patients who were consulted with the complaints and suspicion of penile fracture to the Emergency Department of Pamukkale University Hospitals were evaluated retrospectively. The patients with gunshot wounds and penile traumas with sharp objects, the patients in whom corpus cavernosum injury was not observed during surgery,

preoperative erectile dysfunction and patients with mental retardation who did not specify clinical history were not included in the study. Local ethics committee approval (Reg. No. 60116787-020/88343) was obtained for the study and the study was implemented in accordance with the principles of the Helsinki Declaration Principles.

Written informed consent was obtained from the patients prior to the surgical procedure. Complete blood count, electrocardiogram and chest x-ray (if necessary) were performed for preoperative evaluation to reveal the risks for anesthesia. Penile Doppler ultrasonography and MRI were performed when necessary. Age, the cause of admission to the hospital, physical examination findings, the time of admission to the emergency room, radiological imaging procedures, surgical findings, accompanying urethral injury and postoperative erectile function of patients were evaluated.

The location of the fracture was recorded and compared with the findings reported during radiological investigations. Erectile functions both prior to the surgery and at postoperative 3rd month were evaluated. According to both preoperative and postoperative erectile functions that were classified according to IIEF-5 scores, patients were divided into two groups. Group 1 included the patients who had a decrease in IIEF-5 scores and needed medical treatment for ED and Group 2 included the patients who had no loss of significant erectile function and not demanded or needed any treatment. We also investigated the time of the admission to emergency department and the time until the surgery. Patients applying to the emergency room were divided into 2 groups (within the first 6 hours and more than 6 hours) according to the duration of their application and 2 groups (proceeding with surgery in the first 12 hours and > 12 hours) according to the time of surgery.

We grouped these findings as; admission within less than or more than 6 hours and the time until surgical procedure less than or more than 12 hours.

For statistical analyses, IBM SPSS version 22.0 for Windows was used. Compatibility of variables to normal distribution was evaluated with the kolmogorov smirnov test. Descriptive statistics of the

data are presented with categorical variables n (%) and continuous variables are presented with the median (minimum-maximum) since they do not conform to the normal distribution. Categorical variables were evaluated by Fisher exact test. The results were expressed in 95% confidence interval and $p < 0.05$ was considered statistically significant.

RESULTS

A total of 31 patients were included in our study. The median age of the patients was 38.0 (minimum age 14- maximum age 69). The etiology of the fracture was bending/forcing the penis during the sexual intercourse in 19 (61.29%) patients, jamming the penis in the door or sleeping on it in 8 (25.80%) patients, and voluntary bending or cracking the penis in 4 (12.90%). Clinical examination revealed hematoma in 87.09% of these patients (83.87% in the penile shaft and 16.12% in the root of the penis + perineal/scrotal hematoma). When asked, 35.48% of the patients reported a cracking sound originating from penis and 45.16% had sudden detumescence. The urethra was included in the penile fracture in only 2 cases. The rate of fractures in the right and left lateral regions was 64.52% and in the dorsal or ventral regions was 35.48%.

Eighteen (58.06%) patients applied to the emergency department within the first 6 hours and 13 (41.94%) patients applied to the emergency department within > 6 hours (5 (16.13%), between 6-24 hours, 5 (16.13%), between 1 day and 1 week, and 3 (9.68%) after a week or more). The period from the emergency application to the operation was examined; 18 (58.06%) patients were operated in the first 12 hours and 13 (41.94%) patients were operated in >12 hours. The rate of the patients who had a decrease in IIEF scores and/or needed treatment after surgery was 25.80%. The rate of the patients who had no loss of significant erectile function and not demanded or needed any treatment after surgery was 74.20% (Table 1).

When we investigated the factors contributing to the decrease in IIEF and the need for further treatment for ED, we have found that admission to the emergency room within the first 6 hours significantly prevented the decrease in IIEF and further need for

TABLE 1: Clinical findings of penile fracture.

		n (%)
Patients applied to the emergency service	< 6 hours	18 (58.06)
	6-24 hours	5 (16.13)
	1 day-1 week	5 (16.13)
	> 1 week	3 (9.68)
Surgical application time	<12 hours	18 (58.06)
	>12 hours	13 (41.94)
Penile fracture location	Lateral	20 (64.52)
	Dorsal or Ventral	11 (35.48)
Etiology of Penile Fracture	Sexual Intercourse	19 (61.29)
	Nonsexual Intercourse	12 (38.71)
Penile Fracture with Urethral Injury	Yes	2 (6.45)
	No	29 (93.55)
Decrease in IIEF and Needed Treatment	Yes	8 (25.80)
	No	23 (74.20)

ED treatment, as well ($p=0.043$). In addition, proceeding with surgery in the first 12 hours also provided similar outcomes in means of both IIEF decrease and the need for treatment ($p=0.043$). The presentation to the emergency department, clinical symptoms and the site of penile fracture were not found to have a statistically significant effect on the IIEF scores and the need for treatment for ED (Table 2).

DISCUSSION

In this study, we have investigated the different aspects of penile fracture with the factors affecting the loss of erectile function after the treatment. We found that sexual intercourse was the most common cause in the etiology of penile fracture. Bozzini et al.¹⁰ investigated the causes of penile fracture in a multi-center study and found sexual intercourse (82.5%), masturbation (11.7%), and trauma (5.8%) as the most common causes. Similarly, sexual intercourse was the most common cause in other studies.^{11,12} Bolat et al. stated that masturbation and forced manipulation to erected penis followed sexual intercourse with a rate of 10.9%, and the other etiological factors were turning or folding the erected penis while sleeping (6.3%).¹¹ Kati et al. and Barros et al. reported sexual intercourse and masturbation or non-sexual intercourse (masturbation or penile manipulation) as the

TABLE 2: Parameters affecting erectile dysfunction after penile fracture between groups according to study results.

			Group 1 n (%)	Group 2 n (%)	p
Patients applied to the emergency service	< 6 hours		2 (6.46)	16 (51.61)	0.043
	> 6 hours		6 (19.35)	7 (22.58)	
The etiology	Sexual intercourse	Yes	4 (12.90)	15 (48.40)	0.676
		No	4 (12.90)	8 (25.80)	
	Jamming the penis in the door or sleeping on it	Yes	3 (9.67)	5 (16.13)	0.393
		No	5 (16.13)	18 (58.06)	
Voluntary bending or cracking the penis	Yes	1 (3.22)	3 (9.67)	1.000	
	No	7 (22.58)	20 (64.53)		
Clinical symptom	Hematoma	Yes	7 (22.58)	20 (64.53)	1.000
		No	1 (3.22)	3 (9.67)	
	Cracking sound originating from penis and had sudden detumescence	Yes	4 (12.90)	10 (32.26)	1.000
		No	4 (12.90)	13 (41.94)	
The site of penile fracture	Right and left lateral regions	5 (16.13)	15 (48.40)	1.000	
	Dorsal or ventral regions	3 (9.67)	8 (25.80)		
Surgical Application Time	<12 hours		2 (6.46)	16 (51.61)	0.043
	>12 hours		6 (19.35)	7 (22.58)	

most common causes.^{13,14} In our study, although the findings are consistent with the literature, we believe that because of the feelings of embarrassment caused by the sexual intercourse, or the guilt of voluntary bending, some of the patients state jamming their penises onto the door or turning over them while sleeping as major reasons.

When the clinical symptoms of penile fracture were examined, Bozzini et al. reported 92% hematoma (eggplant deformity) and 5.1% hematoma limited to the penile shaft.¹⁰ Pavan et al. detected the findings as 82.6% penile hematoma, 82.6% detumescence, and 43.5% swelling in the penis.¹² Similarly, in a systematic review it was stated that penile hematoma was the most common finding in the clinical examination with an incidence of 97.5%.¹⁵ In the same review, it was reported that penile fracture was seen with 79% rapid detumescence, 86% penile swelling, 69% penile cracking sound, and 79% penile pain. Kati et al. also stated that penile pain and swelling were seen in all patients and the penis was cracked in 44.6% of the patients.¹³ In our study, hematoma was seen in 87.1% of the patients and in 83.9% of the patients it was located at the penile shaft, 16.1% had a penile root + perineal/scrotal

hematoma, 35.5% had a cracking sound, and 45.5% had sudden detumescence which was consistent with the previous reports. In our study, cracking sound from the penis and low rates of detumescence were attributed to the difficulties related to the insufficient definition of the patients.

When the patients' admission times to the hospital after the fracture occurred and the time until surgery were investigated we found that early admission to the hospital (<6 hours) and early surgery (<12 hours) decreased the possibility of erectile dysfunction. Bozzini et al. reported that the time from patient admission to the intervention was the only important determinant of the risk of erectile dysfunction in the 1st and 3rd months.¹⁰ Similarly, in a systematic review by Falcone et al. the timing of the surgical procedure significantly affected the surgical and functional outcomes and that early surgery was the gold standard. In the same review, it was stated that long-term complications of early surgical repair are not rare, but it is a safe surgical procedure. However, in the study of Barros et al.¹⁴ it was stated that early (<24 hours) and late (> 24 hours) surgical repair did not differ significantly in means of postoperative erectile dysfunction.

There are some limitations to our study. This study was difficult to interpret because of the limited number of patients. There may also be some limitations since the erectile function of the patients before penile fracture was asked and investigated retrospectively after trauma. However, since penile fracture is an emergency condition, it is almost impossible to have an idea about the erectile function of these patients in a prospective fashion.

CONCLUSION

Penile fracture is a rare urological emergency which occurs mostly during sexual intercourse. The diagnosis is made by clinical signs and symptoms. Erectile dysfunction, which can be seen after penile fracture, is significantly reduced with early admission to hospital, particularly in the first 6 hours and also early surgery within the first 12 hours has a positive effect on preserving the erectile functions.

Informed Consent

Ethics statement For human study The present study protocol was reviewed and approved by the institutional review board of Pamukkale University Noninvasive Clinical Research Ethics Com-

mittee (Reg. No. 60116787-020/88343). Informed consent was submitted by all subjects when they were enrolled.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Aykut Başer, Ali Ersin Zümürütbaş, Hülya Yılmaz Başer; **Design:** Aykut Başer, Yusuf Özlülerden; **Control/Supervision:** Aykut Başer, Ali Ersin Zümürütbaş; **Data Collection and/or Processing:** Aykut Başer, Okan Alkış, Hülya Yılmaz Başer; **Analysis and/or Interpretation:** Aykut Başer, Okan Alkış, Yusuf Özlülerden; **Literature Review:** Aykut Başer, Hülya Yılmaz Başer; **Writing the Article:** Aykut Başer; **Critical Review:** Aykut Başer, Ali Ersin Zümürütbaş; **References and Fundings:** Aykut Başer; **Materials:** Yusuf Özlülerden, Okan Alkış.

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