Post-Priapism Erectile Dysfunction Rates and Associated Factors in Adult Patients at a National Referral Hospital

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Abstract

Background: Priapism is prolonged penile tumescence that goes on for 4 hours unassociated with sexual stimulation, and can lead to erectile dysfunction (ED). **Methods:** Using a cross-sectional study, 78 adult male patients managed with priapism at a national referral hospital were interviewed. Data were analyzed using Stata 16. **Results:** Seventy-seven (98.7%) participants had ischemic priapism, while only one had a non-ischemic type. The median duration of symptoms before presentation was 72 hours, [mean 112 hours (range 12– 720)]. The prevalence of ED after priapism was 100% compared with 74.4% before priapism. Forty-six patients (59%) developed severe ED. Longer duration of presentation ($p = 0.001$) and treatment method used, including T shunt ($p = 0.014$), Winter ($p = 0.003$), and Burnett ($p = 0.048$), were significantly associated with ED. **Conclusion:** Priapism contributes to significant sexual morbidity with patients presenting late for treatment, worsening the ED after priapism. Some medical conditions and surgical treatment methods are associated with ED. Public health awareness is needed to promote early presentation and training of clinicians on effective early management of priapism.

Keywords: Erectile dysfunction, Priapism, Penile prostheses

Introduction

Erectile dysfunction (ED) is the persistent inability to attain and maintain an erection sufficient for satisfactory sexual function, and it has a considerable effect on the quality of life (1, 2). Priapism is a potentially painful pathological condition of prolonged penile tumescence for 4 or more hours that persists beyond stimulation of sex and orgasm, and is not associated with sexual stimulation (3).

Priapism is categorized into ischemic (low flow or veno-occlusive), arterial (high flow/non-ischemic), and stuttering (recurrent or intermittent). Each type of priapism has distinct pathophysiology as well as management options (4). The commonest form of priapism is ischemic priapism, which accounts for over 95% of all episodes of priapism.

Initial treatment of ischemic priapism is the therapeutic aspiration with or without irrigation of the corpora cavernosum or intracavernosal injection of sympathomimetic. Surgical shunts are utilized after the failure of the initial nonsurgical management (5). The initial management of non-ischemic priapism is conservative with ice packs and perineal compression. Selective arterial embolization is recommended when conservative therapy fails (6).

The treatment of stuttering priapism aims to prevent future episodes and ischemic priapism (7).

ED after priapism is influenced by the duration of symptoms, causative factors, intervention modality, and the number of interventions employed. The median duration of presentation has been estimated to range from 6 hours to 28 days, with as few as 20% presenting within 12 hours, mean of 96 hours (8). Similarly, ED occurred in 46.6% of these patients, with 33.3% having severe ED unresponsive to PDE5 inhibitors. In such patients, penile prostheses can be an option (9).

There is inadequate information about the incidence of ED among men presenting with priapism in Kenya and the East Africa region. Equally, factors associated with and thought to contribute to ED in our setup have not been clearly elucidated. Penile prostheses are majorly unavailable and out of reach for most patients in this region. Determining the ED rates and factors associated with ED in these patients will help make informed decisions when managing patients who present with priapism. Therefore, this study aimed to investigate the rate and factors contributing to ED in patients presenting with priapism, helping formulate policies and intervention measures to reduce these rates.

Materials and Methods

Study design and sample size

A cross-sectional study was conducted on a cohort of patients managed for priapism at a national referral hospital between 2010 and 2020.

Cochrane (1963) formula for sample size determination was used as follows:

$n = (Z2 \times P (1 / P))/e2$

where:

Z = value from standard normal distribution corresponding to the desired confidence level [$Z = 1.96$ for 95% confidence interval (CI)]

P is expected true proportion = 50%

e is desired precision (half-desired CI width)

For small populations, n was adjusted so that n (adjusted) = $(N \times n)/(N + n)$.

From a pool of approximately 100 patients seen over the study period, a sample size of 80 was derived.

Inclusion criteria and sampling strategy

All consenting adult patients managed for priapism at the national referral hospital were included.

A consecutive sampling of patients from the hospital records was done. The patients' hospital records were reviewed, including their contact details.

Variables:

Outcome variables were occurrence of ED before and after priapism as measured by IIEF (International Index of Erectile Function) and duration of presentation with priapism. Exposure variables included demographics, cause of priapism, comorbidities, medical and surgical history, and management of priapism.

Ethical approval

The institutional Ethics Review Committee granted ethical approval with the Approval No. P691/12/2020. In addition, the researcher gave a detailed explanation to the respondents with an assurance of anonymity and confidentiality, with written informed consent obtained from the respondents.

Data management and analysis

Stata 16.0 was used for data analysis. Mean, median, range, and proportion were used to describe the characteristics of the study participants. The chi-squared test of independence and Fisher's Exact test were used to assess the hypothesis for categorical variables, and Spearman rank correlation was used for continuous data. Statistical significance was set at $p < 0.05$.

Results

Two participants were excluded for incomplete data or failure to contact them, and statistical analysis was performed for 78 participants.

The mean age was 30.4 years (SD 7.65, range 17–47).

Of the 39 participants who responded on school attendance, 7 (18.0%) had studied up to the primary level, 29 (74.4%) up to the secondary level, and 3 (7.7%) up to the tertiary level.

Ischemic priapism was the most prevalent with 77 (98.7%) participants compared with 1 (1.3%) with non-ischemic type.

The median duration of symptoms before presentation was 72 hours, mean of 112.8 hours, and range 12–720.

Cause of priapism
The causes of priapism are outlined in Table 1.

Table 1. Causes of priapism

CAUSE	FREQUENCY	PERCENT
Idiopathic	21	26.9
Chronic myeloid leukemia	20	25.6
Sickle cell disease	14	18
Antipsychotic medications	11	14.1
Post-coital	6	7.7
Chronic kidney disease	1	1.3
During sex	1	1.3
Excessive binge drinking	1	1.3
Phosphodiesterase 5 inhibitors	1	1.3
Trauma	1	1.3
Unknown drug injection	1	1.3
Total	78	100

Of the 78 participants, 9 (11.54%) required repeat shunting, while 69 (88.5%) participants did not.
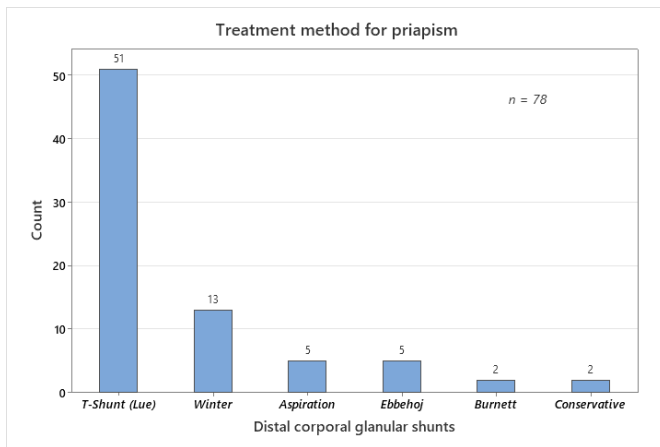

Figure 1. Treatment methods for priapism

Procedures offered included T shunt (Lue), 51 (65.4%), Winter, 13 (16.7%), Ebbehoj, 5 (6.4%), Aspiration, 5 (6.4%), Burnett, 2 (2.6%), and Conservative 2 (2.6%) (Figure 1).
The prevalence of ED after priapism was 100% compared with 74.4% before priapism. However, ED occurred in varying categories after the onset of priapism (Table 2).

Table 2. Categories of ED before and after priapism

CATEGORIES OF ED	ED BEFORE PRIAPISM		ED AFTER PRIAPISM	
	FREQUENCY	PERCENT	FREQUENCY	PERCENT
No ED	58	74.4	0	0
Mild	11	14.1	2	2.6
Mild-moderate	8	10.3	15	19.2
Moderate	0	0	15	19.2
Severe	1	1.3	46	59
Total	78	100	78	100

ED, erectile dysfunction.

The duration of priapism was associated with ED at $p = 0.01$ and Spearman rho coefficient -0.7341.
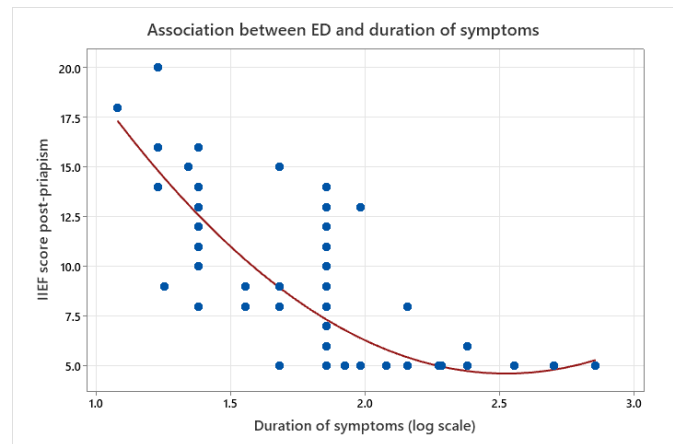

Figure 2. Association between ED post priapism and duration of symptoms

Patients, who took longer to present to the hospital, had worse ED scores (Figure 2).
The aspiration method was not associated with the occurrence of severe ED as compared with the other methods (Table 3). T shunt ($p = 0.014$), Winter ($p = 0.003$), and Burnett ($p = 0.048$) were significantly associated with the occurrence of ED.

Table 3. Comparison of severe ED in aspiration and other treatment methods

TREATMENT METHOD	SEVERE ED		TOTAL	p VALUE
	NO	YES		
Aspiration	5	0	5	Reference
T shunt (Lue)	20	31	51	0.014
Winter	3	10	13	0.003
Burnett	0	2	2	0.048
Ebbehoj	3	2	5	0.44
Conservative	1	1	2	0.286

ED, erectile dysfunction.

Discussion

The ischemic type of priapism is the most prevalent, with 77 (98.7%) participants compared with 1 (1.3%), who have the non-ischemic type. Montague DK. et al. indicate that the commonest form of priapism was the ischemic type, which accounted for over 95% of all episodes of priapism (5). This is a concern as the typical sequelae of untreated ischemic priapism have been severe penile fibrosis resulting in penile deformity, loss of penile length, and ED (3).

A longer duration of symptoms is associated with a reduction in erectile function. The interval between onsets of symptoms to presentation to a health facility has ranged from 6 hours to 28 days, with only 20% presenting within 12 hours (mean of 96 hours); as noted by Ugwumba et al., 46.6% of these patients developed ED, with 33.3% having severe ED unresponsive to PDE5 inhibitors (8). Thus, the time interval between the onset of symptoms and presentation for medical intervention impacts treatment outcomes.

Idiopathic (26.92%), chronic myeloid leukemia (25.64%), sickle cell disease (SCD; 17.95%), and use of antipsychotics at 14.10% were the main etiologies. Dilip et al. (2016) found that idiopathic causes contribute most to ED at 26% (10). SCD is a significant risk factor for priapism (6). Studies in Nigeria found SCD, local aphrodisiac (burantashi), and antipsychotic medications as the commonest causes of low-flow priapism (8).

ED after priapism occurred in 100% compared with 74.4% before priapism, with the majority having severe ED (59%). Existing literature demonstrates a high prevalence of ED among patients with priapism (10, 11). The management of patients with priapism aims to achieve detumescence as soon as possible and retain erectile function. The treatment methods administered in this study included T shunt (Lue), 51 (65.4%), Winter, 13 (16.7%), Ebbehoj, 5 (6.4%), Aspiration, 5 (6.4%), Burnett, 2 (2.6%), and Conservative 2 (2.6%) (12). Distal shunts (cavernoglanular) were prioritized in the treatment of patients. Phil et al. indicated that the success rate for distal shunts was 66–77%, while for proximal shunts, it is 50% (6). However, proximal shunting procedures would be warranted if distal shunting procedures failed.

A part of the treatment aimed at correcting priapism that has the potential complication of ED. Aspiration was not associated with the occurrence of ED. Surgical procedures T shunt, Winter, and Burnett were significantly associated with severe ED than Ebbehoj and Conservative methods. Dilip et al. reported that the rates of ED occurring were 81.9% and 80% for distal and proximal shunts, respectively (11, 12). Studies suggest that acute penile prosthesis implantation would be the best treatment method post-ED after priapism, with a 96% rate of satisfaction of patients (13, 14); however, it is majorly unavailable and out of reach for most patients in this region due to cost concerns.

There are limitations to the interpretation of our study findings. First, this was a retrospective study making it susceptible to selection and recall bias, missing data, and measurement errors that could have obscured the findings. The small sample size of this study also limits its broad applicability. Patients with priapism may not present to the hospital for financial reasons and social stigmatization. Hence, a well-designed prospective study would be recommended.

Conclusion

There is a high burden of ED following priapism in the country. Patients with priapism in this environment invariably present late for treatment which worsens the ED. A significant number of patients have an underlying medical condition which is associated with priapism. Surgical intervention methods such as use of T shunt,

Winter, and Burnett methods are also associated with occurrence of ED. Therefore, public health intervention measures must inform patients about the need to recognize the problem among males early, especially those with associated underlying medical conditions, and institute prompt referrals to appropriate treatment centers. Health care professionals also need to be informed about the early proper management of priapism to mitigate the occurrence of ED. This study would also inform the basis for developing protocols for advocating for the availability of penile prostheses for ED treatment at an affordable cost.

Conflict of interest
None to disclose

Author contributions
All other authors contributed equally in the conceptualization and writing of the first draft to reviewing and editing the original draft.

References

1. Sooriyamoorthy T, Leslie SW. Erectile dysfunction. In: StatPearls [Internet]. *Treasure Island* (FL): StatPearls Publishing; 2022.
2. Chew KK, Earle CM, Stuckey BG, et al. Erectile dysfunction in general medicine practice: prevalence and clinical correlates. Int J Impot Res. 2000; 12: 41-5.
3. Broderick GA, Kadioglu TJ. Priapism: pathogenesis, epidemiology, and management, J Sex Med. 2010; 7: 476-500.
4. Braun, M. Epidemiology of erectile dysfunction: results of the 'Cologne Male Survey'. Int J Impot Res. 2000; 12: 305.
5. Montague DK, Jarow J, Broderick GA, et al. American Urological Association guideline on the management of priapism. J Urol. 2003; 170: 1318-24.
6. Phil HS, Moon KH. Priapism: current updates in management. Korean J Urol. 2013; 54: 816-23.
7. Silberman M, Stormont G, Hu EW. Priapism. In: StatPearls [Internet]. *Treasure Island* (FL): StatPearls Publishing; 2022.
8. Ugwumba FO, Ekwedigwe HC. Ischemic priapism in South-East Nigeria: presentation, management challenges, and aftermath issues. Niger J Clin Pract. 2016; 19: 207-11.
9. Reddy AG, Alzweri LM, Gabrielson AT, et al. Role of penile prosthesis in priapism: a review. World J Mens Health. 2018; 36: 4-14.
10. Roghmann F, Becker A, Sammon JD, et al. Incidence of priapism in emergency departments in the United States. J Urol. 2013; 190: 1275.
11. Dilip KP, Deepak KB. Outcome and erectile function following treatment of priapism: an institutional experience. Urol Ann. 2016; 8: 46-50.
12. Ali Tabibi, Hamidreza A. Erectile function and dysfunction following low flow priapism: a comparison of distal and proximal shunts. J Urol. 2010; 7: 174-77
13. Bivalacqua, TJ, Burnett, AL. Priapism: new concepts in the pathophysiology and new treatment strategies. Curr Urol Rep. 2006; 7: 497–502.
14. Ralph DJ, Garaffa G. The immediate insertion of a penile prosthesis for acute ischaemic priapism. Euro Urol. 2009; 56: 1033-38.