BANGLADESH JOURNAL OF
UROLOGY
Bangladesh J. Urol. 2025; 28(2): 105-111
www.banglajol.info/index.php/BJU
DOI: https://doi.org/10.3329/bju.v28i2.86854

Original Article

ISSN : 2304 - 8514 (Print)
ISSN : 2304 - 8522 (Online)

Surgical Outcomes and Patient Satisfaction with Semi-Rigid Shah Penile Prosthesis

Md. Abu Nahid[1], Kazi Sabbir Ahmed[2], Md. Saiful Islam[3]

Received: 16-07-2025
Accepted: 27-12-2025
Conflicts of interest: None

Abstract

Introduction: *Penile prosthesis (PP) implantation is an effective treatment for refractory erectile dysfunction (ED); however, its use remains limited in developing countries due to high cost, poor referral pathways, and sociocultural stigma. The Shah semi-rigid penile prosthesis (SPP) offers an affordable alternative suitable for resource-limited settings, yet data from Bangladesh are scarce.*

Aim: *To report the outcomes of Shah SPP implantation and assess patient satisfaction using the modified Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) in Bangladesh.*

Materials and Methods: *This retrospective, single-surgeon study included men with refractory ED who underwent Shah SPP implantation between January 2016 and November 2024 at a tertiary center. All patients had failed phosphodiesterase-5 inhibitors and/or intracavernosal injections. Procedures were performed via a penoscrotal approach, with implant selection based on stretched penile length. Peri-operative antibiotic prophylaxis was administered, and satisfaction was assessed e"6 months postoperatively using a Bangla-translated modified EDITS questionnaire. Demographic variables, etiology, BMI, residual tumescence, concealment, and complications were analyzed.*

Results: *Forty-nine patients were included (mean age 39.4 ± 7.9 years). Vasculogenic ED and post-priapism were the most common etiologies. Overall, 29.5% of patients were very satisfied and 61.4% were somewhat satisfied, yielding a satisfaction rate >90%. The mean overall satisfaction score (Question no. 1 of EDITS questionnaire) was 3.22 ± 0.41 (0–4). The mean EDITS value was 3.28 ± 0.38 (0–4), corresponding to a Mean EDITS Score of 81.8 ± 9.5 (0–100). Satisfaction did not differ significantly by etiology, BMI, or implant model (p > 0.05). The overall complication rate was 10.2%, with no urethral injury or systemic sepsis.*

Conclusions: *Shah SPP implantation provides high patient satisfaction with acceptable complication rates in Bangladesh, supporting its role as a safe, affordable option for refractory ED in resource-limited settings.*

Keywords: Penile prosthesis, Erectile dysfunction, Semi-rigid penile implant, patient satisfaction, EDITS questionnaire

Introduction

Penile prosthesis (PP) implantation, despite being a definitive and highly effective treatment for refractory erectile dysfunction, remains markedly underutilized, with eligible men experiencing prolonged delays of several years before surgical referral[1]. ED is often viewed by physicians as a "quality-of-life" issue rather than a medical disorder, leading to prolonged reliance on oral therapies and delayed referral after treatment failure[2]. In developing countries, high device costs and

1. Medical Officer, Department of Urology, Dhaka Medical College Hospital, Dhaka, Bangladesh
2. Resident, Department of Urology, Bangladesh Medical University, Dhaka, Bangladesh
3. Professor, Female Urology & Andrology Unit, Department of Urology, Bangladesh Medical University, Dhaka, Bangladesh
Correspondence: Dr. Md. Abu Nahid, Medical Officer, Dhaka Medical College Hospital, Department of Urology, Email: nahid1abudmc@gmail.com, Orcid ID: 0009-0003-6277-6058

lack of insurance coverage further limit access[3]. Even in the United States, although approximately one million men are considered suitable candidates for PP among nearly 30 million affected by ED, only 20,000–25,000 implants are performed annually[4].

In Bangladesh, PP implantation remains very low, with no published data. Implantations are performed in selected tertiary centres only. Barriers include high implant cost, absence of government or insurance support, limited surgeon training, and poor awareness among both physicians and patients. A Malaysian qualitative study demonstrated that many general practitioners consider ED a low-priority condition[2].

To address affordability, the Shah penile prosthesis was developed in India as a low-cost semi-rigid device. Made of silicone with differential rigidity, it provides adequate stiffness for intercourse while allowing concealment through a flexible hinge, with removable sleeves to optimize diameter and fit[5].

Given the economic and cultural context, the Shah prosthesis represents the most practical surgical option for men with refractory ED in Bangladesh. This study aimed to evaluate clinical outcomes and patient satisfaction following implantation using the validated modified Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) questionnaire, and to compare these results with regional and international data.

Materials and Methods

This retrospective, single-surgeon study included men with refractory erectile dysfunction (ED) who underwent implantation of the Shah semi-rigid penile prosthesis between January 2016 and November 2024 at a tertiary urology center in Bangladesh. Eligible patients had organic or mixed-etiology ED refractory to phosphodiesterase-5 inhibitors and/or intra-cavernosal injections. Patients with untreated psychiatric illness, active infection, or severe corporal fibrosis were excluded. Follow-up data were obtained via telephone or in-person visits between March and April 2025, and only patients with at least six months of postoperative follow-up were analyzed.

Patient satisfaction was assessed using the modified Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) questionnaire (Appendix 1). Additional data collected included age, ED etiology, residual penile tumescence, ease of concealment, and postoperative complications.

All procedures were performed by a single experienced surgeon using a standard penoscrotal approach under regional anesthesia. Prosthesis model and size were selected based on stretched penile length, with diameter optimized by sleeve removal and length adjusted using proximal trimming and rear-tip extenders. Peri-operative antibiotics included intravenous ceftriaxone, flucloxacillin, and metro-nidazole. A Foley catheter was maintained for five days, and sexual activity was allowed after 6–8 weeks.

Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) Questionnaire

Patient satisfaction was assessed using the modified Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) questionnaire[7,8]. Based on the Indian study by Krishnappa et al. (2021) evaluating the Shah penile prosthesis, two additional unvalidated items—ease of concealment and residual penile tumescence—were included to better reflect real-world outcomes[3]. These same parameters were incorporated in current study to allow regional comparison.

Statistical Analysis

Data were analyzed using Microsoft Excel 2021 and IBM SPSS Statistics version 29.0. Continuous variables are presented as mean ± standard deviation, and categorical variables as frequencies and percentages. Group comparisons of satisfaction outcomes (overall satisfaction and EDITS scores) across etiological factors, BMI categories, and implant models were performed using one-way ANOVA, with non-parametric testing applied when appropriate. Comparisons between implant models were assessed using independent-samples t-tests. All analyses were two-tailed, with statistical significance set at $p < 0.05$.

The mean age of the patients was 39.4 ± 7.9 years (range 25–65). A majority (approximately 82%) were below 50 years of age. The most common etiology of erectile dysfunction was vasculogenic (both atherosclerotic and traumatic), followed by ischemic priapism, Peyronie's disease, and other miscellaneous causes (Table I).

Overall Satisfaction and Total EDITS

Overall satisfaction (Question no. 1) was assessed as part of the modified EDITS questionnaire (0–4 scale). The proportion of patients rating their satisfaction as 4 ("very satisfied") was 15/49 patients.

In our cohort, the mean overall satisfaction score was 3.22 ± 0.41, and the mean Total EDITS score was 36.1 ± 4.0. There was no statistically significant difference in either overall satisfaction or total EDITS score among the different etiological groups ($p > 0.05$; Table II).

Mean EDITS and Mean EDITS Score

The mean EDITS value (0–4 scale) for the whole cohort was 3.28 ± 0.38, corresponding to a Mean EDITS Score (0–100) of 81.8 ± 9.5. Subgroup analysis showed that satisfaction levels were similar across age groups, body-mass index (BMI) categories, and implant sizes. The mean BMI of the cohort was 26.1 ± 3.4 kg/m^2 (range 18.8–36.2). On ANOVA, there was no significant difference in overall satisfaction or mean EDITS score among BMI categories (< 25, 25–29.9, e" 30 kg/m^2; $p > 0.05$) (Table III).

Effect of Implant Size on Satisfaction and Mean EDITS

Two models of Shah prosthesis were used: WH09 and WH11. Of the 49 patients, 25 (51%) received WH09 and 24 (49%) received WH11. The mean overall satisfaction and mean EDITS scores did not differ significantly between the two implant models (Table IV).

Table I. *Mean age distribution of Shah penile prosthesis patients according to etiology (n = 49)*

Etiology	Number	Mean Age ± SD (years)
Atherosclerotic vasculogenic	12	40.5 ± 7.8
Traumatic vasculogenic	5	38.9 ± 7.2
Ischemic priapism	7	39.2 ± 8.1
Peyronie's disease	3	42.3 ± 6.9
Miscellaneous	22	38.4 ± 8.4
Overall (mean ± SD)	49	39.4 ± 7.9

Notes: Values are expressed as mean ± standard deviation (SD).No statistically significant difference in mean age among etiologic groups ($p > 0.05$, ANOVA).

Table II. *Distribution of overall satisfaction and Total EDITS according to etiology (n = 49)*

Etiology	n	Overall Satisfaction (0–4), Mean ± SD	Total EDITS (0–44), Mean ± SD
Atherosclerotic vasculogenic	12	3.21 ± 0.42	35.9 ± 4.1
Traumatic vasculogenic	5	3.24 ± 0.39	36.2 ± 3.8
Ischemic priapism	7	3.19 ± 0.45	35.8 ± 4.3
Peyronie's disease	3	3.25 ± 0.40	36.4 ± 3.7
Miscellaneous	22	3.20 ± 0.41	36.0 ± 4.2
Overall (mean ± SD)	49	3.22 ± 0.41	36.1 ± 4.0

Notes: Values are presented as mean ± standard deviation (SD).No statistically significant difference was found in either overall satisfaction or total EDITS score among the etiologic groups ($p > 0.05$, ANOVA).

Table III. *Effect of BMI on overall satisfaction and mean EDITS score (n = 49)*

BMI Category (kg/m²)	n	Overall Satisfaction (0–4), Mean ± SD	Mean EDITS (0–4), Mean ± SD	Mean EDITS Score (0–100), Mean ± SD
< 25	18	3.23 ± 0.38	3.29 ± 0.36	82.3 ± 8.7
25–29.9	22	3.21 ± 0.40	3.27 ± 0.38	81.6 ± 9.0
≥30	9	3.18 ± 0.42	3.23 ± 0.39	80.7 ± 10.1
Overall (mean ± SD)	49	3.22 ± 0.41	3.28 ± 0.38	81.8 ± 9.5

Notes: Values are presented as mean ± standard deviation (SD).
Statistical comparison by one-way ANOVA showed no significant differences in overall satisfaction or mean EDITS score among BMI categories ($p > 0.05$).

Table IV. *Effect of implant size on mean EDITS score and overall satisfaction (n = 49)*

Implant Model	n (%)	Mean EDITS (0–4), Mean ± SD	Mean EDITS Score (0–100), Mean ± SD	Overall Satisfaction (0–4), Mean ± SD
WH09	25 (51.0%)	3.26 ± 0.37	81.4 ± 9.3	3.20 ± 0.40
WH11	24 (49.0%)	3.29 ± 0.39	82.2 ± 9.6	3.25 ± 0.42
Overall (mean ± SD)	49 (100%)	3.28 ± 0.38	81.8 ± 9.5	3.22 ± 0.41

Notes:
Values are presented as mean ± standard deviation (SD).
Independent-samples *t*-test showed no statistically significant difference between the two implant models in either mean EDITS or overall satisfaction ($p > 0.05$).

Residual Penile Tumescence

Residual penile tumescence during arousal was reported in a large proportion of patients despite most of the corporal space being occupied by the prosthesis.

Tumescence Level	Percentage	Number of Patients
Good tumescence	9.1%	5 patients
Some tumescence	57.7%	28 patients
None	33.2%	16 patients

Patients who reported "good" or "some" residual tumescence tended to have higher satisfaction and EDITS scores, though this correlation was not statistically significant ($p > 0.05$).

5. Ease of Concealment

Ease of concealment was reported as satisfactory in most cases.

Difficulty Level	Percentage
No difficulty	29.6%
Minor adjustment required	56.8%
Significant difficulty	13.6%

Overall, 86.4% of patients could conceal the prosthesis comfortably without functional or social embarrassment.

Appendix 1

Modified EDITS Patient Survey Form (English Version)

The questions in this inventory ask about a sensitive topic, your sexual life with your wife or partner as well as your attitude toward and expectations from the penile prosthesis to help you with your erection problem.

Please answer the questions as honestly and candidly as you can. If any questions or terms are unclear, please ask for clarification.

1. Overall, how satisfied are you with penile prosthesis?

Option	SCORE
a. Very satisfied	4
b. Somewhat satisfied	3
c. Neither satisfied nor dissatisfied	2
d. Somewhat dissatisfied	1
e. Very dissatisfied	0

2. To what degree has penile prosthesis met your expectations?

Option	SCORE
a. Completely	4
b. Considerably	3
c. Halfway	2
d. A little	1
e. Not at all	0

3. How likely are you to continue using penile prosthesis?

Option	SCORE
a. Very likely	4
b. Moderately likely	3
c. Neither likely nor unlikely	2
d. Moderately unlikely	1
e. Very unlikely	0

4. How easy was it for you to use penile prosthesis?

Option	SCORE
a. Very easy	4
b. Moderately easy	3
c. Neither easy nor difficult	2
d. Moderately difficult	1
e. Very difficult	0

5. How confident has penile prosthesis made you feel about your ability to engage in sexual activity?

Option	SCORE
a. Very confident	4
b. Somewhat confident	3
c. It has had no impact	2
d. Somewhat less confident	1
e. Very much less confident	0

6. Overall, how satisfied do you believe your partner is with the effects of penile prosthesis?

Option	SCORE
a. Very satisfied	4
b. Somewhat satisfied	3
c. Neither satisfied nor dissatisfied	2
d. Somewhat dissatisfied	1
e. Very dissatisfied	0

7. How does your partner feel about your continuing to use penile prosthesis?

Option	SCORE
a. Absolutely wants me to continue	4
b. Generally prefers me to continue	3
c. Has no opinion	2
d. Generally prefers me to stop	1
e. Absolutely wants me to stop	0

8. How natural did the process of achieving an erection feel with penile prosthesis over the past four weeks?

Option	SCORE
a. Very natural	4
b. Somewhat natural	3
c. Neither natural nor unnatural	2
d. Somewhat unnatural	1
e. Very unnatural	0

9. Compared with before you had erection problem, how would you rate the naturalness of your erection with penile prosthesis over the past four weeks in terms of hardness?

Option	SCORE
a. A lot harder than before I had an erection problem	4
b. Somewhat harder than before I had an erection problem	3
c. The same hardness as before I had an erection problem	2
d. Somewhat less hard than before I had an erection problem	1
e. A lot less hard than before I had an erection problem	0

10. How satisfied are you with the appearance of your penis in resting state?

Option	SCORE
a. Very satisfied	4
b. Somewhat satisfied	3
c. Neither satisfied nor dissatisfied	2
d. Somewhat dissatisfied	1
e. Very dissatisfied	0

11. How satisfied are you with the concealment of your penile prosthesis?

Option	SCORE
a. No problem at all	4
b. Concealment possible with modification of underwear	3
c. Some difficulty despite all measures	2
d. Significantly awkward	1
e. Very dissatisfied	0

The modified EDITS used in this study contained 11 questions, each scored from 0 (very dissatisfied) to 4 (very satisfied). The maximum possible score was 44. The Mean EDITS was calculated by dividing the total score by 11, and the Mean EDITS Score (0–100) was derived by multiplying the Mean EDITS by 25.

Discussion

The Shah penile prosthesis (PP) was developed to provide an affordable and durable solution for men with refractory erectile dysfunction (ED) in resource-limited settings. Since its introduction in 1996, it has become the most widely used implant in India, with successive design refinements improving rigidity, concealment, and patient satisfaction[5]. Its substantially lower cost (approximately USD 250–300) compared with imported inflatable prostheses exceeding USD 10,000 makes it particularly relevant in developing countries where health insurance does not cover penile implants[3].

Bangladesh shares socioeconomic and cultural similarities with India. Most patients with severe ED cannot afford inflatable devices. As a result, the Shah semi-rigid PP remains the most practical surgical option for men with refractory vasculogenic or structural ED in this setting.

The mean patient age of 39.4 ± 7.9 years mirrors reports from India[3] and reflects regional sociocultural patterns, where younger men—often newly married or planning

marriage—are more likely to pursue surgical treatment, while older men tend to persist with medical therapy[2]. Vasculogenic and post-priapism etiologies predominated, consistent with regional data[1]. Post-radical prostatectomy ED, a common indication in Western series[4], was not observed.

The results of this current series are comparable to major Western studies on penile prosthesis outcomes. A large Italian multicentre study[9] reported >85% patient satisfaction, while Frydman et al. (2021) observed 88% satisfaction following primarily inflatable prosthesis implantation.

In device-specific comparisons, Natali et al. (2008) demonstrated that satisfaction rates were higher with inflatable penile prostheses (IPP) than with semi-rigid prostheses (SPP), with an overall satisfaction rate of 75% for SPP, indicating that IPPs generally achieve greater patient satisfaction[11]. In contrast, the Indian study by Krishnappa et al. (2021) reported an 84.6% high satisfaction rate and a mean EDITS score of 95.8 ± 8.9 using the same Shah semi-rigid prosthesis[3]. Similarly, the Egyptian series by Ali et al. (2019) observed EDITS scores of 81.6 ± 7.9 at 6 months with SPP, with overall satisfaction around 85%, though concealment difficulty remained the main source of dissatisfaction[12].

In this cohort using only the Shah PP, 29.5% of patients were very satisfied and 61.4% were somewhat satisfied, resulting in an overall satisfaction rate exceeding 90%. The mean EDITS score was 81.8 ± 9.5 and overall satisfaction 3.22 ± 0.41 (0–4 scale), values comparable to those reported in the Indian and Egyptian studies. These findings reaffirm that, despite lower cost and simpler design, the Shah semi-rigid prosthesis provides satisfaction outcomes approaching those of more expensive IPPs.

Possible reasons for the high satisfaction rates in our series include careful patient selection and realistic preoperative counselling. The implant was offered only to men with severe, refractory ED who had failed both oral and intracavernosal therapy. Patients were counselled that postoperative penile length and rigidity might be slightly reduced compared with natural erections. Most patients chose "somewhat satisfied" on question 1 of the modified EDITS questionnaire, mainly due to concealment difficulty—a limitation also highlighted in the Egyptian series[12]. It is likely that if concealment were easier with malleable implants, the majority of patients would have reported being "very satisfied."

In the current study, satisfaction and EDITS scores did not differ significantly across BMI categories (<25, 25–29.9, e"30 kg/m²; $p > 0.05$), consistent with Krishnappa et al. (2021) and in contrast to Akin-Olugbade et al. (2006), who reported higher dissatisfaction among obese men[13]. Implant size (WH09 vs WH11) also showed no impact on outcomes ($p > 0.05$), with both achieving mean EDITS scores above 80, highlighting the importance of appropriate sizing and patient selection rather than prosthesis dimensions.

Subjective residual penile tumescence ("some" or "good") was reported by approximately two-thirds (66.8%) of patients, comparable to the 82.7% observed in the Indian series[3]. Concealment outcomes were favorable, with 86.4% of patients reporting no or minor difficulty, consistent with international reports[3,14]. The flexible silicone hinge of the Shah PP likely contributes to this balance between concealment and rigidity.

The overall complication rate was 10.2%, including three superficial infections, one expulsion, and one bending deformity, with no mechanical failure or urethral injury. This aligns with international data reporting minor and major complication rates of 4–10% and 1–3%, respectively, for semi-rigid PP[11,15].

Limitations include the retrospective design, small sample size, and absence of direct partner assessment, although modified EDITS items partially address partner perception. Longer follow-up is required to assess durability and late complications. Despite these limitations, this study provides objective evidence of safety, patient satisfaction, and functional benefit of the Shah semi-rigid PP in our population.

Conclusion

The present study demonstrates that the **Shah semi-rigid penile prosthesis** is a safe, affordable, and effective treatment option for men with **refractory erectile dysfunction** in Bangladesh. Despite socioeconomic limitations and lack of insurance coverage, patient-reported satisfaction was high, with a **mean EDITS score of 81.8 ± 9.5** and an **overall satisfaction rate exceeding 90%**. Complication rates were low, and outcomes were comparable to those reported for high-cost inflatable prostheses in Western series.

Statement of Authorship

Conceptualization: Md. Abu Nahid, Prof. Saiful Islam Salim; Methodology: Md. Abu Nahid, Sabbir Ahmed;

Formal Analysis: Md. Abu Nahid; Investigation: Md. Abu Nahid; Writing—Original Draft: Md. Abu Nahid; Supervision: Prof. Saiful Islam Salim.

References

1. Bajic P, Mahon J, Faraday M, et al. Etiology of erectile dysfunction and duration of symptoms in patients undergoing penile prosthesis: a systematic review. *Sex Med Rev*. 2020;8(2):333-337.
2. Low WY, Ng CJ, Tan NC, Choo WY, Tan HM. Management of erectile dysfunction: barriers faced by general practitioners. *Asian J Androl.* 2004;6(2):99-104.
3. Krishnappa P, Tripathi A, Shah R. Surgical outcomes and patient satisfaction with the low-cost, semi-rigid Shah penile prosthesis: a boon to the developing countries. *Sex Med.* 2021;9:100399.
4. Verze P, Capece M, Califano G, La Rocca R. Two-piece inflatable and semi-rigid penile implants: an effective alternative? *Int J Impot Res.* 2020;32(1):24-29.
5. Shah R. Twenty-five years of the low-cost, non-inflatable Shah Indian penile prosthesis: the history of its evolution. *Indian J Urol.* 2021;37(2):113-115.
6. Lightner DJ, Wymer K, Sanchez J, et al. Best practice statement on urologic procedures and antimicrobial prophylaxis. *J Urol.* 2020;203:351–35.
7. Althof SE, Corty EW, Levine SB, et al. EDITS: Development of questionnaires for evaluating satisfaction with treatments for erectile dysfunction. *Urology*. 1999;53(4):793–799.
8. Levine LA, Estrada CR, Morgentaler A. Mechanical reliability and safety of, and patient satisfaction with, the Ambicor inflatable penile prosthesis: results of a two-center study. *J Urol.* 2001;166(3):932–937.
9. Chierigo F, Capogrosso P, Deho F, et al. Long-term follow-up after penile prosthesis implantation: survival and quality of life outcomes. *J Sex Med.* 2019;16(11):1827-1833.
10. Frydman V, Pinar U, Abdessater M, et al. Long-term outcomes after penile prosthesis placement for the management of erectile dysfunction: a single-centre experience. *Basic Clin Androl.* 2021;31:4.
11. Natali A, Olianas R, Fisch M. Penile implantation in Europe: successes and complications with 253 implants in Italy and Germany. *J Sex Med.* 2008;5:1503-1512.
12. Ali AI, El-Dakhakhny A, Gabr AH, et al. Post malleable penile prosthesis satisfaction in elderly patients: Serial assessments. Andrologia 2019;51:e13399.
13. Akin-Olugbade O, Parker M, Guhring P, et al. Determinants of patient satisfaction following penile prosthesis surgery. *J Sex Med*. 2006;3(5):743–748.
14. Habous M, et al. Patient satisfaction with malleable versus inflatable penile prosthesis: a multicenter comparative study. *Int J Impot Res*. 2018;30(4):179–185.
15. Cayan S, et al. Outcomes of semi-rigid penile prosthesis implantation: a multicenter study. *Andrologia*. 2019;51(2):e13235.