




Can malleable penile prosthesis implantation improve voiding dysfunction in men with concurrent erectile dysfunction and buried penis?

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Purpose: A buried penis causes voiding dysfunction and limits penetrative sexual intercourse. This pilot study evaluates the urinary outcomes in men with buried penis following insertion of malleable penile implants.

Materials and Methods: Men with buried penis and co-existing urinary problems and erectile dysfunction underwent malleable penile prosthesis implantation were reviewed in a prospective ethics approved database. Patient demographics, flow rate (Qmax), International Prostate Symptom Score (IPSS), Patient Global Impression of Improvement (PGI-I) score, International Index of Erectile Function (IIEF)-5 score, Sexual Encounter Profile (SEP) and overall satisfaction score (on a 5-point scale) were recorded.

Results: A total of 12 men (age 55 to 72 years) were reviewed, and the average gain in penile length post-implant, as measured from the pubis to the tip of the glans penis, was 6.8 (3 to 8) cm. There was a significant improvement in IIEF-5 score (8.2 vs. 22.5; $p=0.029$) post-implant, and more than half of patients were able to resume normal sexual intercourse and positive SEP-2 and SEP-4 were reported in 9 (75%) and 8 (67%) patients. There were no significant intraoperative or postoperative complication. Significant improvement in Qmax (8.4 ml/s vs. 18.6 ml/s; $p=0.042$) and IPSS (24.5 ± 5.5 vs 15.5 ± 3.5 ; $p=0.038$) were observed. More than two-thirds (83%) reported PGI-I score at 1 or 2, while 9 (75%) patients scored a 5/5 in overall satisfaction rate.

Conclusions: Malleable penile implants increases penile length and improves urinary function in a highly select group of men with a buried penis and erectile dysfunction.

Keywords: Erectile dysfunction; Lower urinary tract symptoms; Outcomes; Penile prosthesis; Satisfaction

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INTRODUCTION

A buried penis is characterised by a normal-sized phallus but has a reduced visible and functional length of the phallus. Obesity is one of the most common causes of an adult acquired buried penis and the excess fat accumulation in the pubic area coupled with poor penile skin suspension, peno-

scrotal webbing and hypermobility of the connective tissue between the dartos fascia and the penis, can cause the penis to retract inwards under the prepubic skin [1]. This condition invariably results in a high patient dissatisfaction rate due to physical embarrassment, poor hygiene, voiding issues, and limitation in penetrative sexual intercourse. Furthermore, the difficulty to hold onto the retracted penis during void-

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ing, coupled with the presence of coexisting phimosis can lead to spraying of urine, terminal dribbling, urinary soilage, skin infection, and breakdown [2]. In addition to these functional issues, many men with acquired buried penis suffer of significant psychological distress [3].

While weight loss or bariatric surgery can offer numerous health benefits in a population that has often significant comorbidities, it may result in a resolution of the buried penis since there will be significant remaining prepubic fat deposition and associated skin “hypermobility” at the prepubic region [1]. Nonetheless, the phallus remains buried and tethered to the pubis in many cases. Since sexual dysfunction is not uncommon in men with a buried penis, the insertion of a penile prosthesis implant can address underlying erectile dysfunction (ED) and in an “erect” state, it increases the penile length allowing for penetrative sexual intercourse. In men who wish to avoid mechanical handling of an inflatable penile prosthesis implant and its associated complications, the malleable penile prosthesis implant can provide sufficient penile “rigidity” and allows for the penis to extend outwards, making it easier to handle the penis and potentially easier for men to void standing up.

This study evaluates the clinical outcomes and patient satisfaction rates following the insertion of the malleable penile prosthesis implant, in a highly select group of men with a buried penis who have coexisting ED and urinary issues.

MATERIALS AND METHODS

1. Patient population

All men with a buried penis and co-existing urinary problems and ED who received malleable penile prosthesis implant following informed consent were reviewed in a prospective Institutional Review Board-approved database of the Princess Alexandra Hospital, University of Queensland (approval number: HREC/11/QPAH/610 SSA/11/QPAH/635). Inclusion criteria include patient age ≥ 18 years, failed medical therapy for ED (International Index of Erectile Function (IIEF)-5 score ≤ 11) and have persistent urinary symptoms related to difficulty holding onto his penis to void standing up. Exclusion criteria were patients who had previous urethra or prostatic surgery, prostatic volume ≥ 90 g on renal tract ultrasound, and were not suitable or keen for penile prosthesis implant.

2. Data collection

Patient demographics, flow rate (Q_{max}), International Prostate Symptom Score (IPSS) and Patient Global Im-

pression of Improvement (PGI-I) score, IIEF-5 score, Sexual Encounter Profile (SEP), and overall satisfaction score (on a 5-point scale with 1 being least satisfied and 5 being most satisfied with malleable penile prosthesis implant) were assessed at the initial preoperative consultation, and following malleable implant surgery at 1, 6, and 12 months follow-up visits. All intra and postoperative complications were recorded too.

3. Surgery

A full detailed surgical description on the insertion of a malleable penile prosthesis implant has been described in the literature [4]. In brief, all men received preoperative intravenous vancomycin 1 g and gentamicin 240 mg, and the Coloplast Genesis (Coloplast Corp., Minneapolis, MN, USA) malleable implant was sized and utilised. A size 16 Foley catheter was inserted at the end of the procedure and removed the following day. All patients were discharged at postoperative day 1 and oral ciprofloxacin 500 mg prophylaxis was continued through the 7th postoperative day.

4. Statistical analysis

Statistical analysis was performed with SAS 9.1.3 (SAS Institute, Cary, NC, USA) computer software with values of the study parameters compared using Student t-test or Wilcoxon signed-rank test as appropriate. A chi-square contingency analysis was used to examine the relationship between pre- and post-malleable implants, with statistical significance set at 5%.

RESULTS

1. Patient demographics

A total of 12 men (age 55 to 72 years) underwent a malleable penile prosthesis implant. The average waist circumference was 38.2 cm (34 to 44 cm) inches and ten men have a body mass index >30 kg/m² (average 32 kg/m², 30.5 to 38 kg/m²). Associated medical comorbidities were ischemic heart disease (5 patients), diabetes mellitus (8 patients), hypertension (12 patients), dyslipidaemia (11 patients), and male hypogonadism (7 patients).

The average preoperative IIEF-5 score was 8.2 (5 to 11). All patients received flexible cystoscopy and no urethral stricture was identified. Four patients were taking oral benign prostatic hyperplasia (BPH) drugs. Renal tract ultrasound showed an average of 44.5 g (35 to 55 g) prostate. The average flaccid penile length as measured from the pubis to the tip of glans penis was 3.8 cm (3 to 5.5 cm). Seven patients are uncircumcised and 2 patients with phimosis underwent

Table 1. Comparison of selected variables before and after malleable penile prosthesis implant (at 12 months follow-up)

Variable	Before surgery	12 months after surgery	p-value
Average penile length (from base to tip of glans penis) (cm)	3.8 (3.0–5.5)	9.9 (6.8–13.2)	0.008
Qmax (mL/s)	8.4 (6.2–10.1)	18.6 (10.8–18.9)	0.042
Average IPSS	24.5 (19–30)	15.5 (12–19)	0.038
Average IIEF-5 score	8.2 (5–11)	22.5 (20–25)	0.029

Values are presented as mean (range).

IPSS, International Prostate Symptom Score; IIEF, International Index of Erectile Function.

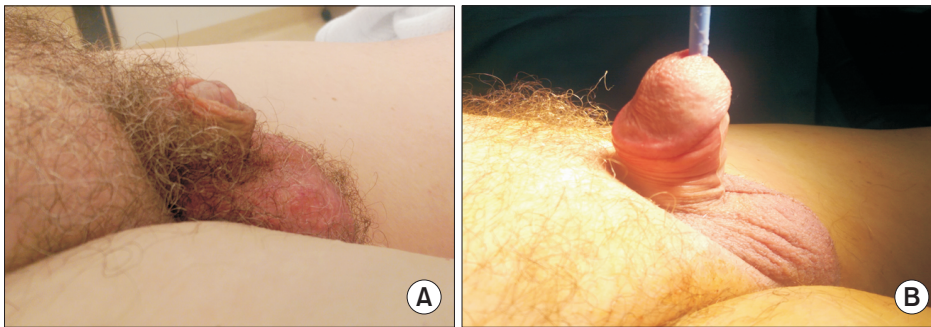


Fig. 1. Comparison between preoperative and postoperative penile size. (A) Preoperative penile size. (B) Postoperative penile size.

concurrent circumcision at the time of malleable implants.

2. Efficacy, feasibility, and safety outcomes

Significant improvement in urinary function scores was observed between pre- and post-malleable implant surgery with Qmax 8.4 mL/s (6.2 to 10.1 mL/s) vs. 18.6 mL/s (10.8 to 18.9 mL/s) ($p=0.042$) and IPSS 24.5 ± 5.5 vs. 15.5 ± 3.5 ($p=0.038$) at 1 month postoperatively. These improvements remained sustained at 6- and 12-month follow-up review (see Table 1). Two patients have ceased BPH medications since malleable prosthesis implantation.

The average gain in penile length, as measured from the pubis to the tip of the glans penis, between pre- and post-implant was 6.8 cm (3 to 8 cm) ($p<0.05$) (see Fig. 1). There was significant improvement in IIEF-5 score (8.2 vs. 22.5; $p=0.029$) post-implant too (see Table 1). More than two-thirds of the patients were able to resume normal sexual intercourse and the number of patients who reported positive SEP-2 (were you able to insert your penis into your partner's vagina?) and SEP 4 (satisfactory sexual experience) were 9 (75%) and 8 (67%) patients. Two patients were not sexually active post-implant due to lack of sexual interest from their partners now.

More than two-thirds (83%) reported a PGI-I score at 1 or 2, and the overall satisfaction rate on a scale of 1 to 5 (1 being least satisfied and 5 being most satisfied with treatment), 9 patients scored a 5 out of 5, while 2 patients rated a 4 out of 5 in satisfaction scale. A single patient reported a 3 out of 5 score deemed the malleable implant provides mini-

mal penile length postoperative (less than 1 cm between preoperative and postoperative penile length) and no significant improvement in urinary flow.

There was no reported intraoperative complication. Postoperative penile bruising was seen in 6 (50%) patients and most patients do not require oral analgesia beyond day 3 following surgery (11 patients). One patient had persistent swelling and pain until week 2 postoperative (Dindo–Clavien Grade 1). There was no documented urinary retention or prosthetic infection. No long-term complication was recorded at subsequent 6 and 12 months review.

DISCUSSION

The buried penis, also known as hidden or concealed penis, is commonly seen in men with significant truncal obesity. The penile shaft often invaginates into the pre-pubic fat pad resulting in voiding and sexual problems. Men with a buried penis may not be able to hold onto their retracted penis and often have to sit to void due to urinary dribbling and splaying. The combination of poor hygiene and persistent moisture trapped near the penis can often cause penile discomfort and balanoposthitis, while chronic colonization can lead to inflammatory skin contracture and the formation of a phimotic ring of scar in uncircumcised men [1]. Circumcision alone without monsplasty or penile fixation is insufficient to alleviate the discomfort and minimise recurrent balanoposthitis. In post-bariatric patients, the abundant pre-pubic skin tissue will form an apron covering the geni-

tals further exacerbating the phallus retraction and ensuing problems in local hygiene and sexual intercourse.

Published literature supports the role of penile reconstruction for buried penis with significant improvements in both urinary and sexual quality of life outcomes observed [2,5,6]. However, continued weight loss may have played a part in the reported improvement in urinary parameters [2] and many published studies do not have detailed information on the exact weight of the excised prepubic fat pad required to improve urinary function [2,5,6]. In our study, significant improvement in urinary function scores was observed early in the postoperative period including those who were initially reporting suboptimal effect with BPH drugs. These urinary improvements continue to be sustained at the 12-month review, with more than 75% of patients reported maximum satisfaction on the overall satisfaction score. Our study showed malleable penile prosthesis implantation can improve urinary function in men with a buried penis, by allowing for the penis to be extended outwards, making it easier for these men to handle the penis to void standing up and minimise urinary dribbling or splaying that is a common complaint in men with a buried penis. Significant improvement in urinary function scores based on IPSS score (24.5 vs. 15.5; $p=0.038$), Qmax uroflow rate (8.4 mL/s vs. 18.6 mL/s; $p=0.042$) and PGI scores were recorded in our study.

Lichen sclerosis is a condition commonly seen in uncircumcised obese men and at times, this inflammatory process can extend into the urethra. In an adult acquired buried penis, Fuller et al. [7] found that urethral stricture is more common and the presence of lichen sclerosus increases the risk of urethral stricture disease ($p=0.00019$). In our study, none of the patients including the 2 patients with coexisting phimosis who underwent concurrent circumcision, had a urethral stricture.

The management of the adult buried penis is often challenging and various surgical techniques for release and reconstruction have been described such as primary closure, Z-plasty, and skin resurfacing, all of which may or may not include reduction scrotoplasty, dermato-lipectomy and formal panniculectomy in more severe cases of morbid obesity [8]. However, these reconstructive techniques often have high complication rates and wound infection remains the most common complications in those with higher BMI [9]. Sevinc et al. [10] found high complication rates in malleable implants in patients with prior radical surgery and removal of devices were related to erosion ($n=11$; 6.1%) and infection ($n=3$; 2.1%). In our study, there was no reported postoperative infection, wound or prosthetic-related. This is related to several factors including our strict antimicrobial prophylaxis,

meticulous surgical sterility, and the minimally invasive surgery associated with malleable implants. Additionally, the Coloplast Genesis implant has a hydrophilic coating which decreases bacterial attachment, facilitates absorption, and subsequent elution of antibiotics, also minimises infection risk [11].

The penile length loss with ED is not uncommon and the loss of perceived length and lack of the glanular engorgement can result in high sexual dissatisfaction by the patient and/or partner [12,13]. Habous et al. [14] reported malleable implant increases the mean±standard deviation erect length by 0.22 ± 0.53 cm ($p<0.05$) and that preoperative length correlated well with the immediate postoperative erect penis. While the exact difference in average penile length between the pre- and post-implant was not highly impressive at 6.8 cm in our study, the actual gain in penile length was statistically significant when the average flaccid penile length preoperatively was 3.8 cm ($p=0.008$).

Contemporary studies on malleable implants such as Casabé et al. [15] showed Genesis implant to be an effective treatment with high patient satisfaction rate. In a different malleable implant study with the AMS Spectra (American Medical Systems, now Boston Scientific [BSci], Marlborough, Massachusetts, USA) [16], the postoperative mean total IIEF erectile function domain score and mean Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) score were 22.5 ± 0.62 and 71.06 ± 3.16 , with an overall satisfaction rate of 96.2%. Al Ansari et al. [17] found the Genesis implants to have better axial rigidity than inflatable penile prosthesis implants as evidenced by the higher buckling force on digital inflection rigidometer. In our study, 9 (75%) patients were able to engage in penetrative sexual intercourse (based on SEP-2 questionnaire) and two-thirds of the patients had satisfactory sexual experience.

To our knowledge, this is the first study that specifically evaluates the clinical outcome of the malleable penile implant in a highly select group of men with a buried penis who have concomitant urinary symptoms and ED. While our study lacks a comparative arm between men undergoing monsplasty to “uncover” the buried penis vs. malleable implant, this study incorporates relevant questions to address the impact of malleable implants across various urinary and sexual domains. Furthermore, this study utilised validated questionnaires and objective urinary measurements with an uroflow study. We acknowledged some of the limitations in this study such as the small number of patients, short-term follow-up and generalizability of clinical findings to all men with buried penis and voiding dysfunction. Nonetheless, this unique study showed that malleable penile implants are

safe and allow for a permanent increase in penile length (and extend the penis outwards) to enable men with buried to void better while regaining the opportunity to be sexually active again.

CONCLUSIONS

In a highly select group of men with urinary dysfunction secondary to a buried and short penis with concurrent ED, malleable penile prosthesis increases penile length, improves urinary function and provides sufficient rigidity to the penis for sexual intercourse.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

AUTHORS' CONTRIBUTIONS

Research conception and design: Eric Chung. Data acquisition: Eric Chung and Juan Wang. Statistical analysis: Eric Chung. Data analysis and interpretation: Eric Chung, Brian Ng Hung Shin, and Juan Wang. Drafting of the manuscript: Eric Chung, Brian Ng Hung Shin, and Juan Wang. Critical revision of the manuscript: Eric Chung. Supervision: Eric Chung. Approval of the final manuscript: Eric Chung, Brian Ng Hung Shin, and Juan Wang.

REFERENCES

1. Ho TS, Gelman J. Evaluation and management of adult acquired buried penis. *Transl Androl Urol* 2018;7:618-27.
2. Voznesensky MA, Lawrence WT, Keith JN, Erickson BA. Patient-reported social, psychological, and urologic outcomes after adult buried penis repair. *Urology* 2017;103:240-4.
3. Hughes DB, Perez E, Garcia RM, Aragón OR, Erdmann D. Sexual and overall quality of life improvements after surgical correction of "buried penis". *Ann Plast Surg* 2016;76:532-5.
4. Habous M, Tealab A, Farag M, Soliman T, Williamson B, Mahmoud S, et al. Malleable penile implant is an effective therapeutic option in men with Peyronie's disease and erectile dysfunction. *Sex Med* 2018;6:24-9.
5. Theisen KM, Fuller TW, Rusilko P. Surgical management of adult-acquired buried penis: impact on urinary and sexual quality of life outcomes. *Urology* 2018;116:180-4.
6. Rybak J, Larsen S, Yu M, Levine LA. Single center outcomes after reconstructive surgical correction of adult acquired buried penis: measurements of erectile function, depression, and quality of life. *J Sex Med* 2014;11:1086-91.
7. Fuller TW, Pekala K, Theisen KM, Tapper A, Burks F, Rusilko PJ. Prevalence and surgical management of concurrent adult acquired buried penis and urethral stricture disease. *World J Urol* 2019;37:1409-13.
8. Pestana IA, Greenfield JM, Walsh M, Donatucci CF, Erdmann D. Management of "buried" penis in adulthood: an overview. *Plast Reconstr Surg* 2009;124:1186-95.
9. Erpelding SG, Hopkins M, Dugan A, Liao JY, Gupta S. Outpatient surgical management for acquired buried penis. *Urology* 2019;123:247-51.
10. Sevinc C, Ozkaptan O, Balaban M, Yucetas U, Karadeniz T. Outcome of penile prosthesis implantation: are malleable prostheses an appropriate treatment option in patients with erectile dysfunction caused by prior radical surgery? *Asian J Androl* 2017;19:477-81.
11. Chung E. Penile prosthesis implant: scientific advances and technological innovations over the last four decades. *Transl Androl Urol* 2017;6:37-45.
12. Trost LW, Baum N, Hellstrom WJ. Managing the difficult penile prosthesis patient. *J Sex Med* 2013;10:893-906; quiz 907.
13. Chung E. Penile reconstructive surgery in Peyronie disease: challenges in restoring normal penis size, shape, and function. *World J Mens Health* 2020;38:1-8.
14. Habous M, Giona S, Tealab A, Aziz M, Sherif H, Abdelwahab O, et al. Penile length is preserved after implant surgery. *BJU Int* 2019;123:885-90.
15. Casabé AR, Sarotto N, Gutierrez C, Bechara AJ. Satisfaction assessment with malleable prosthetic implant of Spectra (AMS) and Genesis (Coloplast) models. *Int J Impot Res* 2016;28:228-33.
16. Akdemir F, Okulu E, Kayıgil Ö. Long-term outcomes of AMS Spectra® penile prosthesis implantation and satisfaction rates. *Int J Impot Res* 2017;29:184-8.
17. Al Ansari A, Talib RA, Canguven O, Shamsodini A. Axial penile rigidity influences patient and partner satisfaction after penile prosthesis implantation. *Arch Ital Urol Androl* 2013;85:138-42.