SURGERY

The AdVance Sling and Male Sexual Function: A Prospective Analysis on the Impact of Pelvic Mesh on Erectile and Orgasmic Domains in Sexually Active Men With Postprostatectomy Stress Urinary Incontinence

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ABSTRACT

Background: Transvaginal pelvic mesh surgery has been shown to cause female sexual dysfunction.

Aim: To evaluate the sexual function impact of AdVance male sling (MS) on erectile and orgasmic domains.

Methods: A review of a prospectively collected database was conducted in all sexually active men who underwent AdVance MS for postprostatectomy stress urinary incontinence between 2012 and 2018.

Outcomes: Patient demographics, clinical outcomes, and validated questionnaires such as the Brief Male Sexual Function Inventory (BMSFI), International Index of Erectile Function (IIEF) and Patient Global Impression of Improvement (PGI-I) were reviewed at 6, 12 and 24 months.

Results: Of the total of 65 men who received AdVance sling, an increase in IIEF-5 score ≥5 points were reported in 10 (15%) patients with no patients complained of deteriorating erectile function at 24 months. The improvement in orgasmic function (Question 10 on IIEF-15) was reported in 22 (34%) patients while 3 (5%) patients reported lower orgasmic scores. The sexual domains scores in BMSFI were higher in 40 (62%) patients, especially with regards to sexual desire (Question 1 and 2) and satisfaction with sex life (Question 11). No patient reports pelvic or urethral pain. The reported improvement in erectile and orgasm scores remained similar throughout the 24-months follow-up period. All 20 patients with preoperative climacturia reported resolution of their symptoms during sexual activity. The overall PGI-I was 1.4 (1−3) and men with a higher continence rate were more likely to report better male sexual function ($P = .044$).

Clinical implications: AdVance MS appears to improve erectile and orgasmic domains, and there is a positive correlation between urinary continence and male sexual function.

Strengths and limitations: Strengths of this study include the prospective large patient population analyzed regarding the impact of MS on male sexual function with the use of validated instruments for erectile, orgasmic, and urinary domains. Limitations include single-centre data, relatively short-term follow-up study and lack of a comparative arm.

Conclusion: Despite the reported adverse effect of sexual dysfunction following pelvic mesh in the female population, the AdVance PMS appears to improve male sexual function with regards to erectile and orgasm domains. **Chung E, Wang J. The AdVance Sling and Male Sexual Function: A Prospective Analysis on the Impact of Pelvic Mesh on Erectile and Orgasmic Domains in Sexually Active Men With Postprostatectomy Stress Urinary Incontinence. Sex Med 2022;10:100529.**

Key Words: Search Surgical Mesh; Stress Urinary Incontinence; Erectile Dysfunction; Orgasm; Clinical Outcome; Patient Satisfaction

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INTRODUCTION

While robotic-assisted radical prostatectomy has transformed prostate cancer surgery with faster recovery and lower complication rates, the incidence of postprostatectomy urinary incontinence (PPUI) remains around 10% at 12 months postoperatively,[1,2] while as many as 60% of males reported some degree of erectile dysfunction (ED) in contemporary literature.[3] Furthermore, studies have shown no significant difference in terms of urinary and sexual quality of life-related outcomes compared to robotic-assisted, laparoscopic or open radical prostatectomy.[2,4]

The male sling (MS) is recommended for males with mild to moderate PPUI and is often preferred over an artificial urinary sphincter since it is less invasive and avoids the need for mechanical manipulation when voiding.[5,6] In recent years, the AdVance (Boston Scientific, MN) MS has gained considerable popularity as a minimally invasive, effective, and safe surgery in males with PPUI.[5] For female stress urinary incontinence (SUI), transvaginal mid-urethral sling surgery is considered the standard of care[7] and it is not uncommon for many females to undergo transvaginal mesh surgery to fix concurrent pelvic organ prolapse at the time of SUI surgery since both conditions often coexist. For the last 2 decades, there have been increasing concerns regarding the unique complications of the transvaginal pelvic mesh such as pelvic pain, dyspareunia and mesh infection resulting in various governmental agencies.[8,9] Many international organisations[10,11] have released statements to highlight these issues, while numerous court actions have been launched against mesh manufacturers and surgeons.[12]

Given the association between pelvic mesh surgery and female sexual dysfunction, there is concern whether males who received pelvic mesh for PPUI may suffer from similar sexual dysfunction too. This prospective study compares the urinary and sexual outcomes following AdVance MS surgery in males who are sexually active and have mild to moderate SUI. Does AdVance MS surgery adversely impact erectile and orgasmic domains, in a group of sexually active males with PPUI?

MATERIALS AND METHODS

This prospectively collected database has received institutional ethics approval and all sexually active males who received AdVance MS for PPUI between January 2012 and December 2018 were reviewed (Figure 1). Inclusion criteria are persistent PPUI beyond 12 months, having a regular sexual partner, and a reasonable erectile function (EF) as evidenced by an International Index of Erectile Function (IIEF)-5 score ≥17 with or without oral phosphodiesterase type-5 inhibitor (PDE5i) and/or intracavernosal injection (ICI) therapy. Patients who received adjuvant or salvage radiation therapy, androgen deprivation therapy, and previous continence surgery, were excluded from this study.

Patient demographics, clinical outcomes, and validated questionnaires such as the IIEF-5 and IIEF-15, Brief Male Sexual Function Inventory (BMSFI), and Patient Global Impression of Improvement (PGI-I) were collected preoperatively and at 6, 12-, and 24-months follow-up visits. All intra- and postoperative complications were reviewed too. Complete continence is defined as 0 pad use.

Statistical analysis was performed with SAS 9.1.3 (SAS Institute, Cary, NC) computer software with values of the study parameters compared using the Student t-test or Wilcoxon signed-rank test where appropriate. An improvement in IIEF-5 score ≥5 points is considered significant based on the change in the severity of the ED category.[13] A chi-square contingency analysis was used to examine the relationship between pre-and post-AdVance surgery, with a significance level of $P < .05$ was considered statistically significant.

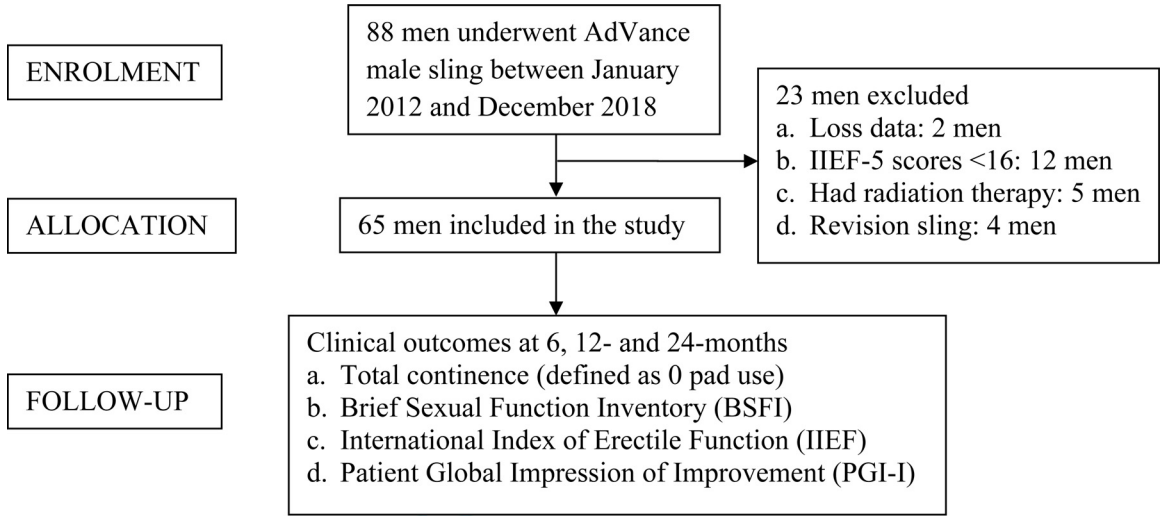

Figure 1. Flow diagram of study recruitment.

Table 1. Clinical outcomes on erectile and orgasmic domains following AdVance surgery

	Preoperative	Postoperative 6 months	Postoperative 12 months	Postoperative 24 months
Number of patients reporting improvement in erectile function (based on IIEF-5 score ≥5 points)	Baseline	5 (10%)	5 (10%)	5 (10%)
Number of patients reporting improvement in orgasmic function (IIEF-15 score for Question 10)	Baseline	22 (34%)	22 (34%)	22 (34%)
Number of patients reporting improvement in overall satisfaction (BMSFI score for Question 11)	Baseline	40 (62%)	40 (62%)	40 (62%)

BMSFI = brief male sexual function inventory; IIEF = International Index of Erectile Function.

RESULTS

Patient Demographics

A total of 65 males with a mean age of 62.6 (41−76) years received AdVance MS over the 6 years. Forty-eight (74%) males had bilateral nerve-sparing robotic-assisted radical prostatectomy while 17 (26%) had single nerve-sparing surgery. The mean time from postprostatectomy to AdVance sling was 17.5 (12−32) months while the preoperative mean pad use over 24 hours and 24-hour pad weight were 2.4 (1−4) and 348 (150−480) g. Twenty (31%) patients reported climacturia alone.

At the time of review, 20 (31%) males reported spontaneous erection. Thirty-five (54%) males required PDE5i postoperatively and most patients took on-demand PDE5i drugs while 10 (15%) males used ICI therapy since they had a suboptimal response to PDE5i therapy.

Clinical and Safety Outcomes

Following AdVance MS, complete continence was achieved in 52 (80%), 52 (80%) and 50 (77%) patients at 6, 12, and 24 months of follow up. All 20 patients with preoperative climacturia reported the resolution of their symptoms.

An increase in IIEF-5 score ≥5 points was reported in 10 (15%) patients with no patients complaining of deteriorating erectile function at 24 months (Table 1). Most of the improvement in the mean IIEF-5 score was reported within the first 12 months with no difference observed between 12- and 24-month (Figure 2). There was no difference detected between males with spontaneous erection and those using medical therapy (P = .18). The improvement in orgasmic function (Question 10 on IIEF-15) was reported in 22 (34%) patients while 3 (5%) patients reported lower orgasmic scores. The sexual domains scores in

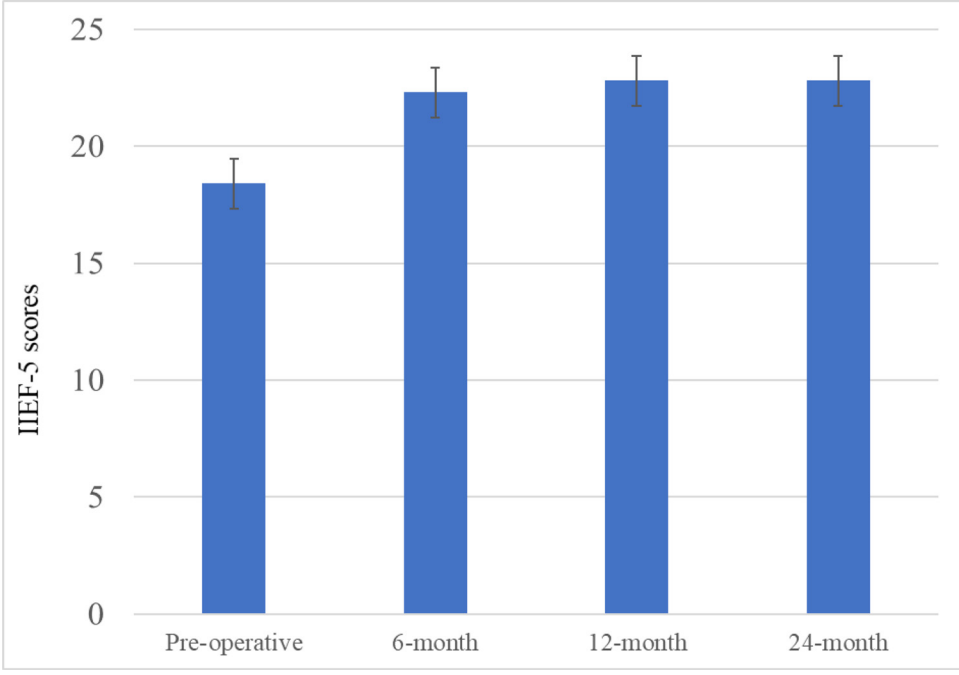

Figure 2. Changes in mean IIEF-5 scores following AdVance surgery (IIEF: International Index of Erectile Function).

BMSFI were higher in 40 (62%) patients, especially concerning sexual desire (Question 1 and 2) and satisfaction with sex life (Question 11). The overall satisfaction score was high with 15 (23%) and 48 (74%) patients scoring 4/5 and 5/5 on a 5-point satisfaction scale, with higher satisfaction scores reported among those with spontaneous erections compared to those on medications. There is a positive correlation between men with higher urinary continence rates and better male sexual function ($P = .003$).

The reported improvement in erectile and orgasm scores remained similar throughout the 24-months follow-up period. The overall PGI-I was 1.4 (1−3) and males with a higher continence rate were more likely to report better male sexual function ($P = .044$). Temporary pain and/or dysesthesia in the inner thigh (Clavien-Dindo Grade 1) lasting less than 4 weeks was reported in 42 (65%) patients during the early postoperative period following MS surgery. No patient reported urethral, perineal, or pelvic pain during and after sexual intercourse.

DISCUSSION

In recent years, there is increasing healthcare concerns relating to surgery with synthetic mesh. For transvaginal mesh surgery, various organisations and governmental agencies have recommended and, to some extent, recalled various pelvic mesh products[8−11] although transvaginal mid-urethral sling for SUI has much lower mesh-related risks compared to the synthetic mesh in pelvic prolapse repair. Complications such as mesh erosion and exposure, sexual dysfunction, and vaginal and pelvic pain are not uncommon. The safety of these procedures has been the subject of international debate and scrutiny with numerous medicolegal actions against mesh manufacturers and surgeons currently underway in various countries.[12] More recently, the United States Food and Drug Administration has issued similar warnings concerning pain, infection and adhesion-related to the surgical mesh used in hernia repair.[14]

MS has gained increasing popularity as the preferred treatment option to treat PPUI due to numerous advantages such as minimally invasive surgery, earlier return of urinary continence, lower mechanical failure rate, and cheaper cost.[5] Contemporary published literature on AdVance MS shows excellent clinical outcomes.[5,15−17] Similarly, our study showed most of the patients achieved total continence with sustained continence outcomes at 24 months of follow-up study. This study utilized a strict definition of complete continence as 0 pad use based on the recent International Continence Society report on the terminology for sexual health and lower urinary tract dysfunction[18] and the high success rate of AdVance MS in this highly select group of males with PPUI in restoring continence is likely to further enhance other quality of life measures including sexual activities, as evident by the significant improvements in overall PGI-I (mean 1.4) scores in this study. There is a strong correlation between urinary incontinence and sexual function in males following RP, and restoration of urinary continence will improve sexual function.[19] In females, a systematic review, and meta-analysis on the impact of incontinence surgery on sexual function showed that coital incontinence is significantly reduced following continence surgery in the absence of pelvic organ prolapse.[20] Similarly, the published literature shows MS to be effective to treat climacturia and coital incontinence for males.[21] Nolan[22] found that MS significantly improves the frequency of leakage during sexual arousal or orgasm ($P = .041$) and even though 53% of males remained incontinent postoperatively, most males reported less bother with leakage of urine during sexual arousal or orgasm ($P = .027$). In our study, all 20 patients with preoperative climacturia reported the resolution of their symptoms. Furthermore, males with a higher continence rate were more likely to report better male sexual function ($P = .044$).

The potential adverse impact of synthetic pelvic mesh on various male sexual domains should be investigated given the current medicolegal climate between synthetic transvaginal mesh and female sexual dysfunction.[22] The adverse outcomes relating to transvaginal mesh surgery and female sexual dysfunction could be explained by the excessive dissection for, and placement of, the mid-urethral sling resulting in compromise of the neural integrity of the anterior vaginal wall, and the physical presence of synthetic material between the periurethral and vaginal tissue causing vaginal pain and dyspareunia during sexual activity.[23] It is also possible females with SUI are likely older and therefore more likely to suffer from low desire and dry vagina (atrophic vaginitis)[24] although these problems can be seen in females with sexual dysfunction in the absence of urinary incontinence too.[25] In contrast, the MS which repositions the bulbar urethra and external sphincter towards the bladder neck[5] could potentially improve sexual orgasm in males since retroluminal support of the bulbous urethra could increase the blood flow within the corpus spongiosum.[26] Furthermore, restoration of bulbospongiosus muscle at the time of MS surgery could aid in the overall sensation of orgasm too.[26] This observation is supported in our study where there was a positive correlation between males with higher urinary continence rates and better male sexual function ($P = .003$). Bauer[15] published 36-month data for AdVance XP sling showing no significant postoperative changes in IIEF-5 scores. Similarly, we did not detect any deterioration in erectile function score and 10 (15%) patients reported better quality of erection. This difference could be related to the higher number of sexually active males in our cohort. Our study found sustained improvement in EF and orgasmic function (Question 10 on IIEF-15) in 10 (15%) and 22 (34%) patients during the 24-months follow-up period. There were higher sexual domains scores in the BMSFI questionnaire, especially regarding sexual desire (Question 1 and 2) and satisfaction with sex life (Question 11).

Safety concerns regarding mesh-related complications could be affected by various mesh factors such as the mesh design, material compositions and the surface area of material in direct contact with native tissue. The AdVance MS is made of

polypropylene material with a 3.55 cm centre width and 1.2 cm arm width.[27] The placement of AdVance MS on the corpus spongiosum avoids direct contact between the mesh and corpus cavernosum, and intraoperatively, surgical care is taken during the trans-obturator surgical placement for the 2 (outside-in) arms of the MS behind the ischiopubic ramus to avoid injury to the proximal corporal bodies. Temporary postoperative pain is largely related to local irritation around the insertion of the adductor longus tendon since obturator nerve injury is very rare.[28] While pain and/or dysesthesia in the inner thigh was reported in 42 (65%) patients in our study during the early postoperative period, no patient-reported urethral, perineal, or pelvic pain during and after sexual intercourse at subsequent follow-up visits.

We acknowledge several limitations to our study such as small patient numbers, relatively short-term follow-up, and single-centre data with no comparative arm. To establish the relationship between continence surgery and male sexual function, it is important to establish the impact of PPUI on sexual dysfunction and subsequent clinical improvement following MS by using questionnaires that assess both function and activity. Our study showed that male sling was associated with improvement in some aspects of male sexual function domains, although this study was not designed to test if MS results in better erection or orgasm. The use of erectile agents such as PDE5i and ICI therapy potentially introduces bias in the sexual function outcomes in this study group. While validated questionnaires such as BSFI, IIEF, and PGI-I were used, none of these has been designed specifically to address urinary incontinence and sexual function in the setting of RP. There is a need to develop a more male-specific, clinically based terminology and grading system of patient-reported outcome measures for urinary incontinence[29] and sexual dysfunction[30] in the context of prostate cancer survivorship. Our study highlights that MS in a carefully select group of males can improve urinary and sexual functions in the intermediate-term, without the reported mesh-related sexual dysfunction seen in the transvaginal mesh population.

CONCLUSION

While the increased availability of biomaterials including synthetic meshes has provided additional options for surgical repair, there are greater demands for clinical governance and surgical vigilance given recent mesh-focused bad press. Despite the publicized adverse effects of transvaginal pelvic mesh in female sexual dysfunction, the AdVance MS appears to improve male sexual function with positive impacts across erectile and orgasm domains.

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STATEMENT OF AUTHORSHIP

Study conception - Eric Chung; Data collection and analysis - Eric Chung, Juan Wang; Drafting the article - Eric Chung, Juan Wang; Critical revision of the article - Eric Chung; Final approval - Eric Chung, Juan Wang.

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