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ORIGINAL ARTICLE

Sexual Function

Sexual outcomes after partial penectomy for penile cancer: results from a multi-institutional study

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Penile cancer is an uncommon malignancy. Surgical treatment is inevitably mutilating. Considering the strong impact on patients' sexual life we want to evaluate sexual function and satisfaction after partial penectomy. The patients in this study ($n = 25$) represented all those who attended our institutions and were diagnosed and treated for penile cancer from October 2011 to November 2013. All patients underwent partial penectomy and followed-up (mean: 14 months; range: 12–25). Sexual presurgical baseline was estimated using the International Index of Erectile Dysfunction 15 (IIEF-15). Sexual outcomes of each patient were estimated considering four standardized and validated questionnaires. We analyzed the means and ranges of IIEF-15 including erectile function (IIEF-1–5 and -15), orgasmic function (IIEF-9 and -10), sexual desire (IIEF-11 and -12), intercourse satisfaction (IIEF-6–8), and overall satisfaction (IIEF-13 and -14). Then, we also used Quality of Erection Questionnaire (QE), Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) and Self-Esteem and Relationship (SEAR) to evaluate the sexual function and satisfaction of our patients. The final results showed that penile cancer leads to several sexual and psychosexual dysfunctions. Nevertheless, patients who undergo partial penectomy for penile cancer can maintain the sexual outcomes at levels slightly lower to those that existed in the period before surgery.

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INTRODUCTION

Cancer of the penis is a rare diagnosis in the Northern hemisphere (1 in 100 000 inhabitants in the USA and Europe),^{1,2} whereas it is much more common in the Southern hemisphere (50 in 100 000 in Brazil).³ Penile cancer accounts for 20%–30% of all male cancers in some regions of Asia, Africa, and South America⁴ and is a severe problem in the developing world.⁵

Etiological factors are thought to include poor penile hygiene, phimosis, tobacco smoking, and human papillomavirus (HPV) infection.^{6,7} It is a rare disease in communities that practice circumcision in newborns or before puberty (Jews, Muslims, and the Ibos of Nigeria).⁶ Early circumcision involves a 3- to 5-fold reduction of the risk of penile cancer while adult circumcision does not exert a protective effect.⁸

Squamous cell carcinoma (SCC) accounts for more than 95% of cases of the malignant penile disease.⁹ The prepuce and glans are the most common primary lesion sites.¹⁰ In selected patients, early disease can be treated with organ-preserving techniques such as Mohs micrographic surgery and laser and radiation therapy. Patients with more advanced primary disease require partial or total penectomy. Patients with inguinal metastatic disease should undergo elective or therapeutic lymph node dissection.⁵

Cases which a sufficient portion of the penile shaft can be preserved to enable patients to direct the urinary stream comfortably are managed by partial penectomy.¹¹ Penile cancer has profound implications for a

man's self-image and sexual life,¹² yet very little has been published on patients' sexual function and their partners' sexual satisfaction. Kieffer *et al.*¹³ recently investigated the quality of life (QoL) of patients treated for penile cancer. They reported that partial penectomy was associated with sexual and psychological problems regarding orgasm, body image, life interference and urination, and stressed the lack of studies in this field of urology. The opinion of patients' partners has never been explored.

This study examined patients' sexual activity, self-esteem, and sexual relationships after penile cancer surgery as well as their partner's satisfaction with treatment.

MATERIALS AND METHODS

Patients

The patients enrolled in the study ($n = 25$) were diagnosed and treated for penile cancer at the three participating institutions from October 2011 to November 2013 (10 patients, Department of Urology Tor Vergata Rome; 7 patients, Department of Urology Biella; 8 patients, Clinica Musumeci GECAS Catania).

Inclusion criteria were partial penectomy for penile carcinoma, erectile function domain score (items 1–5, and 15 of the International Index of Erectile Function, IIEF-15) ≥ 17 , and a postoperative penile stump length ≥ 3 cm. Exclusion criteria were a conservative treatment (Mohs micrographic surgery; laser and radiation therapy), total penectomy, recurrence and/or metastasis, and surgical complications (e.g., wound infection).

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Given the controversies over penile length measurement, standardized protocol was applied by a skilled operator at all participating institutions. Length was measured with the penis fully stretched, not flaccid, and the glans held between thumb and forefinger; the suprapubic fat was pressed inwards as much as possible and the foreskin, if present, was retracted.¹⁴ Penis length was the distance from the pubic ramus to the distal tip of the glans, taken on the dorsal side.

Ethics Committee approval was obtained for the clinical study and data collection. Each patient provided his written informed consent prior to enrollment, according to the Ethics Committee of each institution. All data were collected in a database and analyzed retrospectively. Patients and partners were invited to the out-patient clinic for a follow-up visit that involved a physical examination and 4 self-administered questionnaires on day 90 ± 5 for patients and self-administered questionnaires, also on day 90 ± 5, for partners. Mean follow-up was 19 ± 6.3 months (range: 12–25).

Procedures: surgery

All patients were operated on using the same organ-sparing partial penectomy technique followed by pseudoglans reconstruction with an inverted distal urethral flap. The shaft penis was completely degloved to enable complete dissection of the urethra off the corpora cavernosa down to the crura. The distal portion of the urethra was then spatulated ventrally for approximately 2.5 cm, everted and used to cover the corporeal heads, forming a pseudoglans.^{15,16}

A skilled surgeon from each institution applied the same technique.

Research methods

The IIEF-15 questionnaire was provided prior to surgery, to collect data on erectile function. Moderate to severe erectile dysfunctions were exclusion criteria. Sexual outcomes were investigated by four self-administered standardized questionnaires, validated in Italian, 3 months after surgery. Urinating problems were not investigated.

Before the operation, 3/25 (12%) men were using erectile dysfunction drugs (phosphodiesterase type 5 inhibitors, PD5i; tadalafil 5 mg d⁻¹)

Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) questionnaire

This tool was used to assess Patient and Partner satisfaction with postoperative erectile function with or without drug treatment (e.g., PD5i). The 11 items of the Patient scale and the 5 items of the Partner scale were scored from 0 (no satisfaction, dissatisfaction) to 4 (high satisfaction). The mean EDITS score of each patient and partner was calculated. For easier interpretation, mean scores were multiplied by 25; as a result, EDITS scores ranged from a minimum of 0 (extremely low satisfaction) to a maximum of 100 (extremely high satisfaction).¹⁷

International Index of Erectile Function (IIEF-15) questionnaire

This 15-item, self-administered questionnaire was devised in the 1990s as a reliable, cross-culturally valid, and psychometrically sound measure of erectile function with high sensitivity and specificity in assessing treatment-related changes in patients with erectile dysfunction. Items are scored from 0 to 5 and are divided into five domains: erectile function (items 1–5 and 15; maximum score 30); Orgasmic function (items 9 and 10; maximum score 10); Sexual desire (items 11 and 12; maximum score 10); Intercourse satisfaction (items 6–8; maximum score 15); and Overall satisfaction (items 13 and 14; maximum score 10). Patients were given it before the operation and 3 months after surgery, respectively, to assess pre-morbid sexual function and current function.¹⁸

Quality of Erection Questionnaire (QEIQ)

This is a new 6-item tool evaluating erection hardness, onset, and duration. It is employed as a total score, which is the sum of all items converted to a 0–100 scale.¹⁹

Self-Esteem and Relationship (SEAR) questionnaire

This 14-item measure assesses the effect of treatment and any erectile dysfunction on the patient's self-esteem and sexual relationship. It involves two domains, Sexual Relationship (items 1–8) and Confidence (items 9–14); the confidence domain has two subscales, Self-Esteem (items 9–12) and Overall Relationship (items 13 and 14). Here, too, the domain scores, subscale scores, and overall (total) score were converted to a 0–100 scale, higher scores indicating a more favorable response (0 least favorable, 100 most favorable).²⁰

Statistical analysis

Clinical data and questionnaire scores were recorded and entered into tables. *T*-test for dependent means (also called a paired samples *t*-test) was applied to pre- and post-operative IIEF-15 scores. Results were considered significant if the *P* ≤ 0.05.

RESULTS

This study involved 25 Italian Caucasian patients. Two patients, who had been enrolled but died from other causes (myocardial infarction and stroke), were not included. Five patients were aged ≤40 years (20%). Twelve patients had phimosis or redundant prepuce, 10 had a history of smoking, and 2 had a history of acuminant warts. Five patients (20%) were positive for HPV 16 on the HPV-DNA test, whereas the other patients did not undergo this test. Eleven patients (44%) had T1 tumor, 6 pT1a (24%) and 5 pT1b (20%), whereas 14 patients (56%) had T2 tumor. Eleven patients (44%) required radical or modified lymphadenectomy. Patients' data are summarized in **Table 1**.

At the time of the study, mean patient age was 61.5 ± 2.5 years (range: 25–75); 75.5% came from urban areas. All were married and living with their wives, except for a young man. All patients were sexually active prior to surgery according to IIEF-15 data. All partial penectomies had approximately the same extent, with an average postoperative stump of ≥3 cm (range: 3–4.5 cm). None of the patients experienced surgical complications such as wound infection. None suffered from any severe, chronic illness that could otherwise interfere with their QoL. All patients and partners compiled their questionnaires. The results are shown and summarized in **Table 2**.

Table 1: Patient characteristics on presurgery staging and pathology results

<i>Patients' presurgical data</i>	<i>Patient (n)</i>	<i>Percentage of patients</i>
Total	25	100
Age		
≤40 years	5	20
>40 years	20	80
Positive history		
Phimosis	12	48
Smoking	10	40
Acuminant warts	2	8
HPV16-DNA	5	20
Histopathological data		
pT1a	6	24
pT1b	5	20
pT2	14	56

HPV: human papilloma virus

Table 2: Postoperative sexual data

Questionnaires	Presurgery mean score	Postsurgery mean score	P
EDITS			
EDITS patient		74.97	
EDITS partner		73.25	
IIEF-15			
Erectile function	28.68±1.04	21.28±3.07	<0.001
Orgasmic function	9.86±0.59	7.92±0.86	0.03
Sexual desire	8.75±1.67	7.16±0.94	<0.001
Intercourse satisfaction	12.5±1.75	7.32±2.65	0.006
Overall satisfaction	9.01±0.79	6.52±1.84	<0.001
QEQ		77.46	
SEAR			
SEAR 1–8		68.06	
SEAR 9–12		73.25	
SEAR 13–14		74.5	

P value was calculated through Student's *t*-test; EDITS: Erectile Dysfunction Inventory of Treatment Satisfaction; IIEF: International Index of Erectile Dysfunction; QEQ: Quality of Erection Questionnaire; SEAR: Self-Esteem and Relationship

The sexual function data are reported first (IIEF-15 and QEQ) and those regarding the satisfaction and self-esteem (EDITS and SEAR) are reported next. The patients who did resume their sexual life did that on postoperative day 75 ± 8.6 (range: 55–89); 5 (20%) including the three patients who used them preoperatively took erectile dysfunction medications (PDE5i, tadalafil 5 mg d^{-1}).

International Index of Erectile Function (IIEF-15 questionnaire)

The preoperative IIEF-15 scores regarded the 8 weeks before surgery, not the classic 4. For the first domain, the mean Erectile function score was 28.68 ± 1.04 (range: 24.5–30); the Orgasmic function score was 9.86 ± 0.59 (range: 8.8–10); the sexual desire score was 8.75 ± 1.67 (range: 7.9–10); the Intercourse satisfaction rate was 12.5 ± 1.75 (range: 11.8–14.5); and the Overall satisfaction rate was 9.01 ± 0.79 (range: 7.9–9.8).

The postoperative data were very encouraging although predictably lower. The mean erectile function (items 1–5 and 15) score was 21.28 ± 3.07 (range: 12–29), with a total of 17 patients reporting erection of the penile stump hard enough for penetration “most times” or “always” during the entire sexual intercourse, similar to that before surgery. Five patients reported moderate erectile dysfunction (score 11–16).

The Orgasmic function (items 9 and 10) score was 7.92 ± 0.86 (range: 2–10), with 16 patients reporting that they ejaculated and experienced the feeling of orgasm “almost always” or “always” when they had sexual stimulation or intercourse. Three patients did not reach orgasm.

Items 11 and 12 investigated sexual desire. Fourteen patients reported feeling desire “always” or “most times.” Five patients reported a reduction in frequency (“a few times” to “never”) and/or level (“moderate” to “low”) of sexual desire. The mean score was 7.16 ± 0.94 (range: 3–10).

Intercourse satisfaction (items 6–8) registered a score of 7.32 ± 2.65 (range: 0–14). Seven patients maintained the same sexual frequency as before the operation, but the majority of patients reported a reduction and 2 “did not attempt intercourse.” Sexual intercourse and satisfaction varied, the majority finding intercourse “almost always” or “a few times” satisfactory and satisfaction being described as “fairly” or “highly enjoyable.”

The Overall satisfaction score (items 13 and 14) was 6.52 ± 1.84 (range: 4–10). Two patients were “very dissatisfied” after

partial penectomy; 7 were “very satisfied” with their overall sex life and sexual relationship with their partners. The rest reported that they were “equally satisfied and dissatisfied.”

In conclusion, with regard to the erectile function domain, 17/25 patients (68%) had high or very high confidence in achieving erections. Although 3 patients did not reach orgasm at all, 64% (16/25) reported a good result. Sexual desire was maintained in 14/25 patients (56%). The majority of patients reported a reduction in the frequency of intercourse; the main reason for embarrassment appeared to be related to shame for the small penile size, which seems to be related to overall satisfaction (Table 2).

Significant differences were found using paired samples *t*-test in all the five domains.

Quality of Erection Questionnaire (QEQ)

The mean score was 77.46 ± 16.20 (range: 33–91.6). With regard to the first item, “you had erections hard enough for penetration of your partner,” 18 patients answered “about half the time” to “almost always or always,” and only three patients answered “almost never.” Items 2–6 explore the characteristics of erection in relation to intercourse, and most patients reported being quite satisfied or satisfied. The QEQ data, describing the quality of erection, can be considered satisfactory, since 18/25 (72%) patients were very confident with their potency after treatment.

Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS questionnaire)

Treatment satisfaction differs from treatment efficacy since it focuses on a person's subjective evaluation of the treatment received. What we consider as “treatment” is the surgical partial penectomy procedure, with or without the postoperative use of PD5i; 5/25 patients (20%) currently take PD5i.

When questioned about treatment, only four patients reported a quite low satisfaction rate (≤ 50), whereas 9 patients reported a high satisfaction rate with an overall score (≥ 80). However, the mean EDITS Patient score was 74.97 ± 17.06 (range: 43.18–93.18).

Partner satisfaction has never been evaluated, although it is probably an important determinant. All partners were interviewed and filled in the questionnaire. All those we talked to seemed to be very sympathetic to their partner. The quite high EDITS Partner score of 73.25 ± 15.20 (range: 50–95.7) confirmed these subjective considerations. None of the partners had a score ≤ 50 .

Self-Esteem and Relationship (SEAR questionnaire)

The first 8 items of the SEAR questionnaire analyze the patient's sexual relationship. The overall score of SEAR 1–8 was 68.06 ± 19.14 (range: 28.12–96.8). Seven patients had a score ≤ 50 and 6 patients had a score ≥ 85 .

The second domain of the SEAR is about confidence and has two subdomains, self-esteem and overall relationship. The self-esteem score (items 9–12) was 73.25 ± 16.29 (range: 43.75–100); 17 patients had a self-esteem score ≥ 75 , with a quite good result. Only two patients were dissatisfied. The SEAR 13–14 overall relationship score was 74.5 ± 22.67 (range: 25–100). Seven patients had a score of 100 and 19 a score ≥ 75 . Furthermore in this subdomain, only two patients had a low score (25) (Table 2).

DISCUSSION

Penile cancer is a rare malignancy in the Northern hemisphere. Its radical treatment can be disfiguring and may have an impact on sexual function, relationship with a partner, self-image, and self-esteem.

Moreover, very few studies have addressed this topic, and the partner's opinion has never been assessed.

We used four standardized and validated questionnaires. The IIEF-15 addresses the relevant domains of male sexual function including erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. Nevertheless, this tool is limited by the superficial assessment of the psychosexual background and the very limited assessment of partner relationship, two important factors in the presentation of male sexual dysfunction. For this reason, we evaluated IIEF-15 together with the other questionnaires. Moreover, a severe problem when speaking to patients about the erectile function is the patient's self-evaluation, since many men are not wholly truthful or are too embarrassed to be specific about their erection and erectile function.

The IIEF-15 was distributed both before and after surgery, to collect data on erectile function, whereas the QEQ, EDITS and SEAR questionnaires were given to patients and their partners after surgery. Before surgery, self-esteem and sexual life were obviously compromised due to the penile mass; for this reason, we assessed only erectile function preoperatively and waited for the resumption of patients' sexual life. The postoperative questionnaires were administered and completed 3 months from surgery.

A systematic review by Maddineni and co-workers²¹ reported that there are five main studies of radical treatment and sexual function in patients with penile cancer and that the IIEF-15 was the tool used most commonly to evaluate sexual function. In the study by Windhal and colleagues,²² 50% of patients reported being satisfied with their sexual life. Encouraging results were described by Romero *et al.*²³ and Gulino *et al.*²⁴ In the study by D'Ancona's group,²⁵ who used the Overall Sexual Functioning Questionnaire (OSFQ), nearly 36% of patients had no sexual function or moderately to severely reduced sexual function. Ficarra *et al.*²⁶ reported that patients with penile cancer who were subjected to mutilating treatment had lower sexual function scores.

We focused on different topics. The EDITS questionnaire stresses the importance of treatment satisfaction both in patients and their partners. The former showed a high rate of satisfaction with the treatment, and the latter proved the high partner compliance with the partner situation after surgical intervention.

As described in the results, the majority of patients (68%) had high or very high confidence in achieving erections; 64% of patients reported good results in achieving orgasm. Sexual desire was maintained in 14/25 patients. The majority of patients reported a reduction in the frequency of intercourse; the main reason of embarrassment appeared to be a feeling of shame due to the small penile size, and this seems to be related to overall satisfaction. Significant differences in pre- and post-operative scores were observed in all the IIEF domains. These findings clearly demonstrate the unavoidable deterioration of sexual outcomes after surgical procedures and seem to underline the fundamental role of partners' psychological involvement.

In the QEQ, 72% of patients reported being quite confident with their postoperative potency. These data seem to support the high scores of the IIEF-1-5 and -15.

Patients' sexual relationship was also investigated by the first domain of the SEAR questionnaire, which yielded a very good result and a score that was similar to IIEF items 13 and 14. Self-esteem and overall relationship exhibit almost the same good score, emphasizing how the physical deformity does not depress mood and social relationship.

Although penile cancer is an uncommon malignancy, 5-year disease-specific survival exceeds 90%, despite the possibility of local

recurrence.²⁷ These patients are therefore likely to live with the sexual and psychosexual effects of penile surgery for a long time. Inevitably, partial penectomy changes both patients' feelings of masculinity and their perception of self and body image. Clearly, these feelings may have an emotional basis, reflecting unconscious fears related to one's tarnished image as a lover, and may go as far as avoiding showing the surgical site to the partner. Furthermore, to our young partnerless patient the changed appearance was a major concern and a potential barrier to seeking a new relationship.

Although few published data are available, the sexual outcomes of partial penectomy found in this study are similar to those found with other penile cancer treatment strategies. Opjordsmoen and colleagues²⁸ published one of the first studies on the topic, and described patients' sexual outcomes after different treatments, albeit in a small sample. They found that all organ-sparing techniques (local excision/laser beam treatment, definitive radiotherapy, and partial penectomy) had roughly similar sexual outcomes, but sexuality postirradiation was more impaired than that experienced by the other patients. In 2014, Delaunay *et al.*²⁹ concluded that penis brachytherapy is a good alternative treatment that appears to have a moderate impact on sexual function and behavior. Indeed, 10 (58.8%) of the 17 patients who were sexually active before brachytherapy were still active after treatment, and 17 (94.4%) of the 18 patients who had erections before penile cancer therapy still had them after treatment. Similar promising data were described by Sharma and colleagues,³⁰ who studied the role of high-dose-rate interstitial brachytherapy in selected patients with T1-T2-stage penile carcinoma, and found that 10/14 patients had satisfactory sexual function status at the last follow-up visit.

Anatomical preservation is an important factor in patients' sexual outcomes. In 2014, Hegarty *et al.*³¹ reviewed the organ-sparing techniques available to patients with penile cancer, and concluded that innovative surgical approaches would be able to preserve as much penile tissue and functional integrity as possible, thus minimizing disease and treatment impact on patients' QoL, without compromising oncological outcomes. In 2012, Veeratterapillay *et al.*³² found that penile-sparing surgery can achieve good oncological control with limited morbidity and psychosexual side-effects. A multicenter study by Yang and colleagues³³ has emphasized the important role of glans-sparing approaches that can achieve preservation of functional anatomy and esthetic appearance; glans preservation contributes to limiting postoperative erectile dysfunction and negative psychological effects, and promotes patients' return to satisfactory sexual intercourse. These considerations lend support to the view, recently expressed by Zukiwskyj and co-workers,³⁴ that organ-sparing techniques lead to more acceptable psychosexual and oncological outcomes.

Pretreatment evaluation of sexual function allows planning a follow-up process that can address several different domains. Medical rehabilitation can be considered in some cases where residual erectile dysfunction follows the surgical treatment. Nevertheless, a multidisciplinary follow-up with psychologists trained in sexual therapy is necessary and should begin when treatment is being decided, to help patients and their partners discuss their feelings and facilitate the return of sexual functioning. Patients should be reassured that although their penis will be smaller after surgery, penetration and pleasant intercourse may still be possible. Pretreatment education may also prevent psychologically based sexual problems.¹¹

This study assessed different aspects of patients' sexual outcomes after radical penectomy using four validated questionnaires. Its limitations involve first of all the small sample, penile carcinoma being a rare malignancy. In addition, data analysis was retrospective

and the study does not include a control group. Although preoperative evaluation would have been compromised by the tumor, administration of the QEQ, SEAR and EDITS questionnaires also before surgery would have enabled a more effective comparison of results. Finally, 3 months is a limited follow-up. Further studies will be conducted to gain further insights into the various outcomes of partial penile surgery.

CONCLUSIONS

Although uncommon, penile cancer has profound implications for men's sexual life. This study found a high percentage of patient and partner satisfaction with the surgical treatment and promising results regarding recovery of sexual function, self-esteem, and overall relationship satisfaction.

Appropriate preoperative education and multidisciplinary follow-up have the potential to improve sexual outcomes after partial penectomy. Further studies are required to gain a greater understanding of sexual outcomes after partial penectomy.

AUTHOR CONTRIBUTIONS

SS carried out surgical procedures, conceived the study and drafted the manuscript; MS carried out surgical procedures and follow-up; RL carried out surgical procedures and follow-up; GV carried out surgical procedures and participated in the study coordination; VI conceived the study, participated in its design and coordination and drafted the manuscript. All authors have read and approved the final version of the manuscript and agree with the order of presentation of the authors.

COMPETING INTERESTS

All authors declare no competing interests.

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