Review Article: Oncology: Genitourinary Cancer

Sexual function after penile cancer treatment—a narrative review

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Background and Objective: Penile cancer (PC) is a rare malignancy with variable worldwide incidence. Primary lesion treatments vary according to the tumor stage. However, regardless of the technique necessary for the treatment, penile surgery can cause a profound impact on sexual function leading to a variable impact on the quality of life (QOL) and self-image. Therefore, this article aims to evaluate the impact of treatment modalities on sexual function in PC survivors.

Methods: A non-systematic literature search of the PubMed database was conducted. The inclusion criteria were studies published in English and reporting results and outcomes regarding sexual function after PC treatments.

Key Content and Findings: In general, studies that analyzed the impact of radiotherapy, laser ablation, glans resurfacing, and wide local excision (WLE) show good sexual function post-therapy. Glansectomy, despite the modification of the anatomy and sensitivity showed a moderate impairment in sexual function with a good overall sexual function and good psychological results. Even though partial penectomy (PP) represents a more morbid treatment, studies showed a good sexual function results post-treatment, depending of the residual penis shaft length (especially above 3 cm in length).

Conclusions: Despite the ongoing clinical research advances in the area, there are conflicting results. Overall, the present literature shows better International Index of Erectile Function (IIEF) results with conservative treatments. However, there is a growing need for a better understanding of the sexual function nuances of the PC patient.

Keywords: Sexuality; penile cancer (PC); sexual function

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Introduction

Background and rationale

Penile cancer (PC) is a rare tumor in developed countries. The incidence of PC in North America and Europe is less than 1 per 100,000, however, its estimated incidence in some developing countries is up to 50 cases per 100,000 people (1). Brazil is the leader in the world, with PC representing around 17% of all malignancies in certain regions of the country (2).

The worldwide variation in incidence is still under investigation. However, low socioeconomic status, obesity, human papillomavirus (HPV) infection, poor hygienic habits, and cultural characteristics (such as circumcision rates, early sexual initiation, and smoking) are already known risk factors (3). Although it can affect men of any age, it is mostly diagnosed in the 6th decade (4), an age when most men are still sexually active.

The most common histologic type is squamous cell carcinoma and the primary lesion usually involves the glans

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Table 1 The search strategy summary

Items	Specification
Date of search	September 2022
Databases and other sources searched	PubMed database
Search terms used	"Sexual function" OR "sexuality" AND "penile cancer" AND "treatment"
Timeframe	January 1990–September 2022
Inclusion criteria	Articles published in English; studies reporting results and outcomes regarding sexual function and patient satisfaction after penile cancer treatment
Exclusion criteria	Case reports and studies/articles that did not meet the above criteria; articles that were not written in English or without translation
Selection process	All authors conducted the search. Studies were included after authors reached consensus

and prepuce in most cases. The coronal sulcus and penile shaft are less affected (5).

Primary lesion treatments depend on the tumor's extension and depth, according to the tumor-node-metastasis (TNM) classification. Therefore, T1 and selected T2 and T3 stage tumors can be treated with less invasive, organ-sparing therapy modalities, such as laser therapy, radiotherapy, glansectomy, wide-local excision, and partial penectomy (PP). Most T3 and T4 malignancies require more aggressive treatment (2,6).

Regardless of the technique necessary for the treatment, penile surgery can cause a profound impact on sexual function leading to a variable impact on the quality of life (QOL) and self-image. Organ-sparing techniques aim to maintain the integrity of the penile shaft as much as possible, representing a way to diminish the negative impact on erectile function without harming oncological radicality (7-10). However, only a few studies have been published about postoperative sexual function in patients who had been submitted to PC treatment (7,8,10).

Objective

This article aims to evaluate the impact of PC treatments on survivors' sexual function. We present this article in accordance with the Narrative Review reporting checklist (available at https://amj.amegroups.com/article/view/10.21037/amj-22-72/rc).

Methods

A non-systematic literature search of the PubMed database was carried out in September 2022 to select papers published between 1990 and 2022. The search returned 1,172 results. The inclusion criteria were studies published in English and reporting results and outcomes regarding sexual function and patient satisfaction after PC and its multiple treatments [radiotherapy and brachytherapy (BT), laser ablation, glans resurfacing, wide local excision (WLE), glansectomy, and PP]. After applying the inclusion criteria, 33 papers were selected (*Table 1*) .

Key findings and discussion

Radiotherapy and BT

External beam radiation (EBRT) and BT have been used in the treatment of PC patients. Indications include superficial (without extension to corpus cavernosum) or exophytic lesions of less than 4 cm and tumors located on the glans or coronal sulcus (11). Usually, circumcision is recommended to be performed 3 to 4 weeks before BT to limit irradiation's side effects and make easier seeds implantation (11,12).

Soh *et al.* (13) compared 19 men treated with penile BT (between 1992 and 2009) to 19 controls that did not have any penile disease. Their sexual function and QOL were evaluated with the International Index of Erectile Function-15 (IIEF-15) and a specific questionnaire designed for this survey. The BT group was investigated before and after at least one year of treatment. Before BT, 17 (89.5%) patients had declared they had been sexually active and 15 declared they never had erectile dysfunction (ED). After treatment, sexually inactive men rose (from 10.5% to 47.3%), also with an increase in the number of men

experiencing ED (from 21.1% to 57.8%), anorgasmia, and anejaculation. Despite these findings, no patient complained about his sexuality after treatment and 11 (57.9%) were very satisfied with their sexual life. The authors found no other correlation between the parameters of BT (dose, dose rate, number of needles, active length) and patients sexual function. There is also an inverse correlation between the age of the patients and their partners with the intensity of sexual desire post-treatment. Furthermore, patients reported preservation of body image and sense of manliness after BT.

Also, the IIEF domains between the two cohorts (erection, sexual desire, and overall satisfaction) showed statistically significantly higher scores in the treatment group than in the control group. This could be due to a small number of participants and that fewer participants in the control group declared having sexual intercourse.

Gambachidze *et al.* (12) also showed a moderate impact of BT on patients' sexuality after a median 5.9 years (5.2–6.7 years) of follow-up. In their retrospective study, 23 eligible participants submitted to BT responded IIEF-5 questionnaire to evaluate erectile outcomes. Sixteen patients (70%) maintained sexual activity, with a mild ED level (average IIEF-5 of twenty). Similar results were published by Delaunay *et al.* (14). In their study, with a median follow-up of 80 months (12.8–189.8 months), 58.8% were still sexually active at least one year after BT and only 5.5% did not present erections after. Utilizing the IIEF-5 score, authors reported that 7 (36.8%) patients had normal erectile function and 8 (42.1%) had frequent erections. Also, 10 (58.8%) classified their erections as "hard" or "almost hard" and only four (23.5%) declared their erections as soft. Additionally, 9 men (47.3%) assured that BT did not have any impact on their sexual function.

Opjordsmoen *et al.*, in 1994, studied the post-therapy sexuality of thirty PC treated patients. After 80 months median (range, 11–225 months) of follow-up, they evaluated patients by applying their global score of overall sexual function. In the cohort treated with a total dose of 60–64 Gy, 83% kept almost the same sexual score as before treatment. Also, they had better sexual function than the cohorts of men treated with PP or local excision/laser beam treatment (15). Although analyzing a small sample (15 patients submitted to surgery and 2 with radiotherapy), Ficarra *et al.* also showed (after 69 months of median follow up), that more invasive treatment leads to worse sexual function (16).

In general, published articles show satisfactory sexual function in patients submitted to radiotherapy or BT.

Laser ablation

In 2008, Bandieramonte *et al.* evaluated 214 patients with penile lesions on the glans and/or coronal sulcus, submitted to CO_2 laser therapy. All patients reported preservation of erectile function and sexual activity. However, they did not use a validated questionnaire to obtain this data. Also, penile anatomy was preserved in every patient, and the appearance was considered satisfactory (17). van Bezooijen *et al.* had reached a similar conclusion. They evaluated 19 patients with carcinoma *in situ* of the penis treated with the neodymium: YAG or carbon dioxide laser. In their conclusion, no deforming scars were noted, and sexual and urinary function was preserved (18).

Skeppner *et al.*, using a self-made, not validated questionnaire, reported that men who had been treated with laser for early-staged PC maintained their sexual activities. Furthermore, they reported levels of satisfaction with sexual life comparable to those of the general male population. Nonetheless, there was a decrease in the post-therapy rates of manual stimulation, caressing, and fellatio (19).

Glans resurfacing

Patients with Tis, Ta, low-grade T1 tumors, as well as erythroplasia of Queyrat, may be treated with glans resurfacing (20), which is a less morbid procedure. Hadway *et al.* (21) reported that the median post-operative IIEF-5 score was 24. All patients who had been sexually active before treatment regained their sexual life three to five months after the procedure. All participants reported a preserved or better post-operative sensitivity at the glans. Palminteri *et al.* (22) showed similar results. In their study, all five patients who had undergone glans skinning and resurfacing reported normal sexual function and sensitivity, without orgasmic function impairment. However, they did not use a validated questionnaire. Therefore, these studies have shown a high level of satisfaction with resurfacing.

WLE and circumcision

Patients with Tis or Ta, T1 PC situated on the prepuce can be treated with WLE with circumcision (20). This is an organ-sparing procedure with excellent oncological outcomes.

Wan *et al.* evaluated 15 patients who had been submitted

to WLE or PP and assessed their sexual functions using the IIEF-15, Self-Esteem and Relationship (SEAR), and Erectile Dysfunction Inventory of Treatment Satisfaction (EDITS) questionnaires. With a 6-month follow up they noticed that the scores of WLE patients were significantly higher than their preoperative scores. Also, those patients had better erectile function, sexual desire, and intercourse satisfaction scores than patients who were treated with PP (23). Li *et al.* analyzed 29 patients submitted to circumcision, WLE, or both. Their erectile function was assessed through IIEF-5 preoperatively and 3 months after the procedure. Preoperatively, 7 (24.1%) participants reported moderate to severe ED and 22 (75.9%) reported having none to mild ED. After surgery, 21 (95.5%) of the patients who had reported mild or no ED preserved their erectile function (24).

Sedigh *et al.* had similar results. The authors retrospectively evaluated the sexual function of 12 patients who had undergone WLE and 23 patients who had been submitted to glansectomy with urethral glanduloplasty. Patients answered the IIEF-15 and Sex Encounter Profile (SEP) questionnaires before and after surgery. They observed that erectile function, orgasmic function, and intercourse satisfaction suffered no alteration in patients submitted to WLE. Meanwhile, patients submitted to glansectomy had a lower postoperative index in all the above domains. Also, this group of patients had lower overall satisfaction scores (7). These findings suggest that less invasive treatments preserve sexual function in the PC patient (10).

Glansectomy

Glansectomy with urethral glanduloplasty is an organ-sparing procedure that can preserve the anatomy and function of the penis. It is mostly used in cases of distal glans Ta, T1, and T2 grade tumors (20).

Croghan *et al.* (25) reported the sexual outcomes of 35 patients who underwent glansectomy with reconstruction (RG), partial glansectomy (PG), and PP using the IIEF-5 score. They noticed a small decrease in patient satisfaction in the PG group (approximately 2 points) and a moderate impairment in the RG group (approximately 3.5 points). At least half participants in both groups had erections and remained sexually active. This study also showed that 80% of patients with reconstructed glans had at least "some sensibility" reminiscent (25). These data go in conformation with Gulino *et al.* (26). A cohort (n=42) treated with a variety of glansectomy with glanduloplasty approach reported post-operative preservation of IIEF-15 scores. Also, in a 6-month follow-up, 73% of patients had spontaneous rigid erections and 60% reported coital activity, normal ejaculation, and orgasm (26).

Morelli *et al.* (27) also showed that reconstruction after glansectomy has favorable functional outcomes. The authors applied a technique of neoglans reconstruction with a split-thickness skin graft harvested from the thigh in 15 patients. Despite declaring a loss of sensitivity in the glans, all of them kept their sexual activity at 3 months postoperatively, with maintenance of orgasmic and ejaculatory function. Also, patients declared a favorable psychologic impact.

O'Kane *et al.* (28) reported in their cohort (n=15), that most patients submitted to glansectomy were able to achieve erections and maintain sexual intercourse (n=9). However, they did not use validated instruments to evaluate sexual function. Meanwhile, Scarberry *et al.* (29), using the IIEF-15 demonstrated that patients who were submitted to glansectomy reported poor erectile function or no sexual activity post-operatively. Despite that, it did not represent a significant negative effect on their QOL. The small cohort (n=6) could represent a bias.

PP

A recent systematic review (30) selected 4 articles to evaluate the sexual function of patients undergoing PP. The criteria on which they were based was the IIEF questionnaire. Of the 4 articles, 3 showed a decrease in sexual functions in all IIEF domains (erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction). They established a relationship between post-operative penis size and sexual satisfaction. The bigger the residual penis (especially above 3 cm in length), the better the postoperative sexual function. Advanced age and high levels of anxiety were correlated with worse postoperative sexual function. Wan *et al.* (23) reported an impairment only in the orgasmic function, increasing all other IIEF domains post-surgery. In their conclusion, despite everything, many patients were still able to maintain satisfying sex lives post-PP (31-33).

Romero *et al.* evaluated 18 patients who had been submitted to PP. The medium size of the penile shaft was 4.0 cm in the flaccid state and 55.6% of those patients had erection enough for penetration during a sexual encounter. The shame of penis length or the absence of the glans were the main reasons for not having sexual activities for the

abstinent patients. However, only 33.3% resumed their pre-treatment sexual activities rhythm and were pleased with their sexual function (31).

Regarding QOL aspects a study found that these patients can keep the QOL (in social, psychological, and sexual terms) in the same level as before surgery, declaring that self-image and the relationship with their partners were practically unchanged (34).

With different results, Bhat *et al.* in 2018 also evaluated the partners of patients submitted to surgery due to PC. They concluded that the patients have their sexual function reduced by performance anxiety and loss of masculine image, directly affecting their interpersonal relationship with their partners. They also affirm that, with time, both patients and partners discover how to satisfy each other, not always through intercourse (35).

Another systematic review showed that PC treatment results in negative effects on well-being in up to 40% of patients. Also, approximately 50% of patients presented psychiatric symptoms, showing the psychological burden that these patients must carry. All of these have a direct effect on their sexual function (10,36).

Total penectomy

Radical penectomy is the standard treatment reserved for high-grade, aggressive malignancies, in which organ preservation treatments would not leave a cancer-free residual shaft suitable for sexual penetration or micturition (37). Recently, the rates of total penectomy have reduced, since less invasive treatments have shown better functional and psychological results without oncological compromise.

Sosnowski *et al.* (38), using the European Organisations for Research and the Treatment of Cancer (EORTC)-QLQ-C30 v 3.0 questionnaire, assessed the QOL in 10 patients who were submitted to total penectomy. The results showed that, after 16 months, the majority of patients do not experience orgasm or ejaculation and that sexual activities were very unsatisfactory. However, 85% of the participants reported that their relationship was not impaired. Also, no patient defined their self-esteem as low. Mortensen *et al.* (39) have also demonstrated that patients with a good partner relationship have a lower impact on QOL despite the morbidity of radical treatment.

In addition, in Sosnowski *et al.*'s article (38), 40% of the reported cohort have found new ways to achieve sexual satisfaction. In this study, men declared that visual stimulation, breast stimulation, and touching the area of pubic symphysis at the site of the scar or the perianal scrotum were equivalent to sexual activity. Two also reported that stimulation of their remaining genital tissue or healed surgical site, perineum, and scrotum, produced an orgasm.

These data show that radical penectomy has a severe impact on sexual function, preventing penetration, and resulting in a higher loss in the QOL when compared to more conservative treatments. However, it should be noted that the relationship of men submitted to more morbid treatment was not compromised in most cases. Also, some patients discovered new ways of stimulation and sexual pleasure, maintaining a certain degree of sexual function.

Conclusions

Penile carcinoma causes a deep effect on patients diagnosed with this malignancy. Due to the inconvenience of the tumor itself (size, smell, infection), many give up their sexual life. Also, treatment can have a profound impact on sexual function. The aesthetic aspect and the size of the residual male sexual organ can impair sexual activity.

Despite the ongoing clinical research advances in the area, there are conflicting results in the literature. The lack of a consistent methodology, the different techniques used for different tumor stages, the limitation of currently used questionnaires, and the abstract topics involved contribute to these inconsistencies.

Overall, the present literature shows better IIEF results with conservative treatments. The data presented here could be used to guide preoperative counseling of patients. However, there is a growing need for a better understanding of the sexuality nuances of these patients, to deliver quality treatment and assistance for both the patient and his partner.

Even if it is not the subject of this review, it is always important to reaffirm the need to establish preventive and awareness-raising measures to reduce the incidence of PC, thus reducing the negative impact on patient survival and the sexual function of survivors.

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