Sexual function after surgical treatment for penile cancer: Which organ-sparing approach gives the best results?

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Abstract

Introduction: We compared the postoperative sexual function of patients who underwent wide local excision (WLE) and glansectomy with urethral glanduloplasty for penile cancer.
Methods: We retrospectively reviewed clinical data of 41 patients affected by superficial, localized penile cancer (≤cT2a) between 2006 and 2013. Patients with severe erectile dysfunction and not interested in resuming an active sexual life were selected for penile partial amputation. Patients with preoperative satisfying erectile function and concerned about the preservation of their sexual potency were scheduled for WLE (Group A) or glansectomy with urethral glanduloplasty (Group B). Sexual function was assessed with the International Index of Erectile Function (IIEF) questionnaire and the Sex Encounter Profile (SEP). At 1 year, patients were asked to complete the questionnaires again and were questioned about their genital sensibility and ejaculatory reflex persistence. Postoperative complications were reported according to the Clavien-Dindo classification. Statistical analysis was performed by two-tailed test: Student t-test and chi-square.
Results: Among the 41 patients enrolled, 12 underwent WLE (29.2%), 23 glansectomy with urethral glanduloplasty (56%) and 6 with penile partial amputation (14.6%). A decrease in postoperative IIEF was recorded in both groups, but was statistically significant only in Group B (*p* = 0.003). As for the SEP, while no significant changes were recorded postoperatively in Group A, a marked reduction was reported for Group B, with a statistically significant decrease in the possibility of achieving penetrative intercourse (*p* = 0.006) and in the perceived satisfaction during sexual activity (*p* = 0.004).
Conclusions: WLE lead to better sexual outcomes and less postoperative complications as compared to glansectomy with urethral glanduloplasty.

Introduction

Penile cancer affects less than 1/100 000 in Western countries[1,2] and is a severe health problem in developing countries where its incidence can be up to five times higher.[3] Excellent oncological results can be achieved with radical approaches, in spite of a devastating impact on patient quality of life and sexual function.[4-7] Historically, the primary tumour has been surgically treated with demolitive technique, such as partial or total amputation. A standard 2-cm free margin was believed necessary to achieve excellent oncologic results.[8] However, according to recent evidence, only few millimeters of tumour-free tissue is sufficient to consider surgical margins as negative.[9-11] Following this lead, the last update of the European Association of Urology (EAU) guidelines suggest a 5-mm margin to achieve the oncological safety in penile-sparing surgery.[12] Consequently, penile-sparing approaches have been increasingly employed, with excellent functional outcomes and significant improvements in patients' quality of life compared to radical treatment.[13-18] Radical procedures are now reserved in selected cases, such as advanced local tumours or recurrence after organ-sparing surgery. On the other hand, conservative procedures, such as glansectomy with urethral glanduloplasty and primary lesion wide local excision (WLE), are considered the gold standard for T1, T2 and selected T3 tumours.[12]

Only few comparative data have been published about postoperative sexual function in patients who underwent demolitive and conservative penile procedures. In this study, we evaluated the postoperative sexual function of patients who underwent two different conservative approaches for penile cancer: WLE and glansectomy with urethral glanduloplasty. To our knowledge, this is the first comparative study to specifically focus on the sexual function after such delicate procedures.

Methods

We retrospectively reviewed the records of 49 patients evaluated in our urology department for a primary penile cancer between 2006 and 2013. Among these, we selected those affected by superficial, localized penile cancer (≤cT2a), with non-palpable inguinal nodes and negative node sentinel biopsy. We excluded those positive to the sentinel node biopsy (n = 8) and those who received a modified monolateral inguinal lymph node dissection to avoid bias in terms of either oncological and functional outcomes.[4] Adhering to EAU guidelines,[12] we planned the surgical treatments. Patients with preoperative satisfying erectile function and concerned about the preservation of their sexual potency were scheduled for WLE (Group A) or glansectomy with urethral glanduloplasty (Group B), according to tumour characteristics. Patients with severe erectile dysfunction and not interested in resuming an active sexual life were selected for penile partial amputation without glans reconstruction, favouring oncologic safety (Group C). In particular, patients with single lesions <1.5 cm underwent WLE. Patients with contrast lesions >1.5 cm or multiple glans lesions underwent a glansectomy. A frozen section examination during the surgical procedure was performed in all cases to confirm safe surgical margins.

At the preoperative visit, a careful examination excluded the infiltration of the corpora cavernosa or the urethra and we evaluated the status of the inguinal nodes. The stretched length of the penis was measured and sexual function was assessed by the International Index of Erectile Function (IIEF) questionnaire[19] and the Sex Encounter Profile (SEP-2, SEP-3).[20]

At the 1 year follow-up, patients were asked to complete the questionnaires again and were questioned about their genital sensibility and the ejaculatory reflex persistence. The postoperative length of the shaft was measured. Postoperative complications were reported according to the Clavien-Dindo classification.[21] Statistical analysis was performed by two-tailed paired samples Student T-test and chi-square or their non-parametric counterparts, using IBM SPSS Statistics Software version 20.

Results

We tallied baseline patient characteristics (Table 1).

One patient scheduled for WLE of a 1.5 cm glans lesion had a positive surgical margin at the definitive histological examination, managed with a second stage glansectomy with urethralglanduloplasty. This patient, initially belonging to Group A, was excluded for the evaluation of functional outcomes. Another patient who had undergone WLE (T1b penile cancer with negative margins) developed local recurrence after 25 months, and was managed with a glansectomy with urethral glanduloplasty. Concerning the length of the stretched penis, Groups A and B were comparable in terms of preoperative measures, such as age, preoperative IIEF-15 and SEP 2-3 ($p = 0.08$). However, a sharp decrease of penile length was noted in patients undergoing glansectomy with urethral glanduloplasty (Group B), with an average decrease of 3.5 cm (range: 2.5–5) ($p = 0.001$). Even if a decrease in postoperative IIEF was recorded in both groups, it was statistically significant only in Group B ($p = 0.003$) (Table 2).

As for the SEP, many patients in both groups reported allowed (SEP-2) and satisfactory (SEP-3) intercourse preoperatively. While no significant changes were recorded postoperatively in Group A, a marked reduction of SEP-2 and SEP-3 was reported for Group B, with a decrease in the possibility of achieving penetrative intercourse ($p = 0.006$) and in the perceived satisfaction during sexual activity ($p = 0.004$). Finally, we analyzed two major aspects concerning patient sexual functions: the genital sensitivity level and the presence of an ejaculatory reflex after appropriate stimulation (Table 3).

Table 1. Baseline patients characteristics					
	Group A (n = 12)	Group B (n = 23)	Group C (n = 6)	Total (n = 41)	p value
Mean age, years	56 (28–72)	60 (45–68)	73 (62–92)	63 (28–92)	0.09
Penile stretched length, cm	12.6 (8.8-16)	13.8 (8–17.5)	12.8 (8.2–16.5)	12.9 (8–17.5)	0.08
pT Stage					
T1	8	10	2	20	
T2	4	13	4	21	
Hospital stay, days	5 (4–7)	6 (4–8)	8 (5–15)	6.5 (4–15)	0.06
Complications					
Clavien 1–2	0	0	1	1	0.08
Clavien 3	0	3 (meatal stenosis)	0	3	0.06
Positive margins	1	0	0	1	0.07
Recurrence	1	0	0	1	0.07
Mean follow-up, months	33 (16–45)	36 (20–50)	23 (18–52)	34 (16–52)	0.08
Disease free at last follow-up, months	12	23	6	41	0.07

Table 2. The International Index of Erectile Function (IIEF)-15

IIEF Domains	Group A Preoperative	Group A Postoperative	p value	Group B Preoperative	Group B Postoperative	p value
Erectile function score (1–30)	17.2 (15–22) Mild to moderate	16.5 (13–21) Mild to moderate	0.3	19 (16–25) Mild	15.7 (13–19) Mild to moderate	0.012
Orgasmic function score (0–10)	6 (2–8) Mild to moderate	5.3 (3–8) Mild to moderate	0.25	6 (2–7) Mild to moderate	4.8 (1–6) Moderate	0.04
Sexual desire score (2–10)	7.2 (5–9) Mild	6.4 (4–8) Mild to moderate	0.15	7.2 (5–9) Mild	6 (2–7) Mild to moderate	0.8
Intercourse satisfaction score (0–15)	9.3 (7–13) Mild to moderate	8.2 (5–11) Mild to moderate	0.09	9 (4–12) Mild to moderate	7 (3–10) Mild to moderate	0.12
Overall satisfaction score (2–10)	6 (5–9) Mild to moderate	4.5 (2–6) Moderate	0.25	7.3 (4–9) Mild	3.6 (2–5) Moderate	0.01
Total (5–75)	45.7	40.9	0.08	48.5	37.1	0.003

In Group A, an unmodified postoperative genital sensibility was recorded, with ejaculatory reflex preservation in 75% of cases; on the other hand, Group B had a reduction of genital sensibility in 59.1% of patients, with 9.1% of patients reporting total absence of erogenous sensations. The ejaculatory reflex was preserved in 68.2% of cases.

Discussion

Penile cancer is rare in western countries. The EAU has recently published guidelines for its management,[12] although a standardized approach is still lacking. Historically, total and partial penectomy have been widely employed, with a 2-cm healthy tissue margin to assure good oncologic outcome.[8] However, significant functional and psychological issues are encountered with radical approaches. D'Ancona and colleagues investigated the impact of partial penectomy on quality of life in a series of 14 penile cancer patients, reporting a satisfying quality of life in all patients and a preserved sexual function only in 64% of cases.[5] More recently, Romero and colleagues showed a statistically significant reduction of erectile function and sexual satisfaction after partial penectomy. This was attributed to the sensible reduction of penile size and glans removal, leading to an important feeling of shame about the penis. In their series, only 33% of patients maintained their preoperative sexual intercourse frequency and were satisfied with their sexual life.[6]

The evidence for achieving 2-cm free margins is unknown. Recently, several authors have stated that a few millimeters of healthy tissue are sufficient and do not jeopardize primary oncologic control. In 1999, Hoffman and colleagues were the first to suggest that local control could be achieved with surgical margins <2 cm, analyzing the outcomes of 7 patients who had undergone partial penectomy with surgical margins <10 mm – none of these patients experienced local recurrence.[9] More recently, a histopatological review on 102 surgical margins confirmed that few millimeters of healthy margins are enough to achieve excellent oncological results after conservative surgery for penile cancer.[10] The same conclusions were reached by Philippou and colleagues, who concluded that penile conserving surgery is oncologically safe and a surgical excision margin of less than 5 mm is adequate. Notably, local recurrence did not negatively affect long-term survival.[18] These findings were successfully confirmed by Djajadiningrat and colleagues, who observed a higher local recurrence rate after conservative surgery (41% vs. 29%), but with no effect on 5-year cancer-specific survival (CSS).[22] All these considerations were confirmed in our study, where a 5-mm healthy tissue was enough to achieve remarkable oncologic outcomes. The only positive margin was found after WLE, and was successfully managed after a second surgery. The only local recurrence, experienced a few years after WLE, was again successfully managed with no impacts on CSS to date. As

Table 3. Sex encounter profile, genital sensitivity and ejaculatory reflex

Domains	Group A Preoperative	Group A Postoperative	p value	Group B Preoperative	Group B Postoperative	p value
SEP-2 (positive answer)	75%	75%	>0.05	86.4%	59.1%	0.006
SEP-3 (positive answer)	75%	62.5%	0.09	71%	31.8%	0.004
Genital sensivity	75%	62.5%	0.09	71%	31.8%	0.004
Preserved ejaculatory reflex	100%	100% Unmodified	>0.05	100%	31.8% Unmodified 59.1% Reduced 9.1% Absent	0.003

SEP: Sex encounter profile.

we expected, WLE had a slightly higher risk of local recurrence as compared to glansectomy.

Conservative approaches are superior in terms of functional and cosmetic outcomes, while maintaining an adequate oncologic safety. Organ-sparing surgery preserves penile length and shape, with satisfying recovery of the sexual function and acceptable psychological repercussions, while not jeopardizing oncological safety.[14,23]

Even the recent update of EAU guidelines underlined the need of as much organ preservation as possible, while removing the primary penile lesion.[12] As an alternative to radical approaches, several surgeons have employed techniques of glansectomy without glans reconstruction with acceptable aesthetic results.[15] In 2007 Palminteri and colleagues reported their experience in glansectomy associated to glans reconstruction by a skin graft harvested from the thigh after penile cancer. Skin reconstruction led to excellent functional and aesthetic outocomes without jeopardizing cancer control.[16] WLE plus primary closure of the glans is another penile-sparing option, which is oncologically safe with the benefits of a maximally conservative procedure.[17] Since 2006, we have performed two penile-sparing approaches: WLE with primary closure without grafting and glansectomy with urethralglanduloplasty. Notably, no recent studies have compared different conservative approaches of penile cancer in terms of sexual outcomes.

We found that WLE achieved the best results in terms of postoperative sexual function compared with glansectomy with urethral glanduloplasty. This conservative procedure did not affect erectile function or future penetrative intercourse, whereas glansectomy affected both these domains. In particular, erectile function, orgasmic function, and overall satisfaction were the most affected domains after glansectomy. WLE was superior in terms of postoperative erectile function, as it preserved the anatomical structures giving the penis the necessary rigidity for penetration, and sensibility for satisfactory intercourse. These results have been strongly confirmed in our study by the IIEF and SEP scores. Glansectomy with urethral glanduloplasty is an organ-sparing approach which can lead to satisfactory aesthetic and functional results. However, the complete removal of the glans is a strong drawback, as it reduces patient sensibility during the intercourse. The glans reconstruction with the urethra provides genital sensation which is not comparable to the original one. On the other hand, the negative impact of the erectile function can be explained by the penile shortening as demonstrated by our study, leading to difficult vaginal penetration, and the strong psychological consequences of the glans removal. Our results are in contrast with the study by Gulino and colleagues,[23] which reported no differences in postoperative IIEF score, ejaculation or orgasm activity in a series of 14 patients undergoing glansectomy with urethral glanduloplasty.

A final aspect involves postoperative complications. In our hands, all the techniques were safe with no major complications. WLE was superior to glansectomy in terms of overall complications, as three cases of meatal stenosis were reported after the latter procedure.

Our results must be balanced against the limits of our study, which is a retrospective, single-center analysis with a limited number of cases. In addition, the disproportion among the groups might lead to improper conclusions. A prospective, randomized analysis could be the best way to compare two different conservative treatments, even if it is always difficult to apply randomization methods when a surgical treatment is scheduled, for each surgery should be tailored to the patient according to his clinical and pathological characteristics, and preferences.

Conclusion

Among the conservative treatments for penile cancer, WLE leads to better sexual outcomes and less postoperative complications compared to glansectomy with urethral glanduloplasty. When feasible, WLE could represent the best conservative approach to treat localized primary penile cancer.

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