Aesthetic neo-glans reconstruction after penis-sparing surgery for benign, premalignant or malignant penile lesions

Enzo Palminteri, Fernando Fusco, Elisa Berdondini, Andrea Salonia

Abstract  Purpose: To describe the technique and results of penis-sparing surgery combined with a cosmetic neo-glans reconstruction for benign, pre-malignant or malignant penile lesions. 

 Patients and methods: Twenty-one patients (mean age 61 years) with penile lesions with a broad spectrum of histopathology underwent organ-sparing surgery with neo-glans reconstruction, using a free split-thickness skin graft harvested from the thigh. Three patients were treated by glans-skin-nining and glans-resurfacing, 10 by glansectomy and neo-glans reconstruction, four by partial penectomy and a neo-glans reconstruction, and four by neo-glans reconstruction after a traditional partial penectomy.

 Results: The mean follow-up was 45 months; all patients were free of primary local disease. All patients were satisfied with the appearance of the penis after surgery, and recovered their sexual ability, although sensitivity was reduced as a consequence of glans/penile amputation.

 Conclusion: In benign, premalignant or malignant penile lesions, penis-sparing surgery combined with a cosmetic neo-glans reconstruction can be used to assure a normally appearing and functional penis, while fully eradicating the primary local disease.

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lesions are red, moist patches which can be misdiagnosed as either a benign skin condition (i.e., Zoon’s balanitis or lichen planus) or a premalignant lesion such as lichen sclerosus (LS) that, if left untreated, has the risk of progression to invasive squamous cell carcinoma (SCC) in 5–33% of cases [3]. Above all, both benign, premalignant and malignant lesions can cause pruritus, pain, bleeding, crusting and difficulties in retracting the foreskin, with subsequent overall psychosexual disability.

The treatment of benign, premalignant and malignant penile lesions has changed over time [4,5]. Traditional penile surgery is associated with a mutilating approach, eventually characterised by a high incidence of aesthetic, dysfunctional and psychological postoperative disorders [6–8]. In this context, the use of either medical or topical surgical treatments has been supported with the specific aim of maintaining a good functional and aesthetic penile shaft: topical chemotherapy, laser ablation, cryotherapy, and local excisions have been thus reported [3,4]. However, these techniques are associated with high failure rates and unsightly scarring that affects penile appearance and sexual activity.

Recently, in patients with either premalignant or malignant superficial lesions, alternative forms of surgical therapy, specifically aimed at preserving the phallus without jeopardising local cancer control, have been extensively suggested. These organ-sparing techniques, providing the reconstruction of an aesthetic neo-glans with no impairment of patient survival, have also been suggested for more advanced tumours [1–3,9].

Here we report our surgical experience in 21 patients with either benign, premalignant or malignant penile lesions, using organ-preserving surgery developed to preserve a functional and aesthetic penile shaft at the same time, while fully eradicating the primary local disease.

**Patients and methods**

From 2002 to 2010, 21 patients (mean age 61 years, range 41–78) with benign, premalignant or malignant penile lesions were treated at our centre. Of these men, 13 (62%) had already received previous medical or surgical treatments at different hospitals. All patients had preoperative biopsies taken to confirm the presence of the lesion. Likewise, patients with malignant lesions also had penile MRI to define the local extension of the tumour. Regional and metastatic disease was then clinically assessed with a physical examination and CT. Patients with suspected urethral stricture were evaluated by uroflowmetry, retrograde and voiding cysto-urethrography and urethroscopy. All patients underwent organ-preserving surgery with cosmetic reconstruction of a neo-glans using a free split-thickness skin graft (STSG) harvested from the thigh via four different surgical techniques.

**Glans skinning and glans resurfacing**

The penis is circumcised and the penile skin degloved. The glandular epithelium is fully removed up to the coronal sulcus. The STSG is harvested from the thigh using a manual dermatome, to be subsequently transplanted like an umbrella over the bed of the stripped glans. The graft is then tailored and quilted over the glans with multiple 6/0 polyglactin interrupted suture. The penile skin is sutured to the graft at the coronal sulcus (Figs. 1 and 2). This procedure is suitable for ‘crippling’ benign and premalignant lesions, and for malignant lesions which appear limited to the glandular epithelium.

**Glansectomy and neo-glans reconstruction**

The penis is circumcised and the penile skin degloved. The glandular epithelium is fully removed up to the coronal sulcus. The STSG is harvested from the thigh using a manual dermatome, to be subsequently transplanted like an umbrella over the bed of the stripped glans. The graft is then tailored and quilted over the glans with multiple 6/0 polyglactin interrupted suture. The penile skin is sutured to the graft at the coronal sulcus (Figs. 1 and 2). This procedure is suitable for ‘crippling’ benign and premalignant lesions, and for malignant lesions which appear limited to the glandular epithelium.

**Partial penectomy and neo-glans reconstruction**

The partial penectomy is performed with resection margins of only few millimetres, according to the current techniques [10].
The lateral edges of the residual corpora cavernosa are sutured together to create a hemispheric dome-shaped stump. The urethra is then spatulated and the meatus is fixed on the new tip of the corpora cavernosa. The STSG is transplanted like an umbrella over the summit of the hemispheric stump, where it is quilted. The graft is fixed to the penile skin with the aim to recreate a neo-sulcus (Fig. 4). This procedure is suitable for malignant lesions which appear to involve the penile shaft.

Neo-glans reconstruction after previous traditional partial penectomy

The lateral edges of the residual corpora cavernosa are sutured together to create a hemispheric dome-shaped stump. The urethra is then spatulated and the meatus is fixed on the new tip of the corpora cavernosa. The STSG is transplanted like an umbrella over the summit of the hemispheric stump, where it is quilted. The graft is eventually fixed to the penile skin with the aim to recreate a glandular neo-sulcus (Fig. 4). This procedure is suitable for malignant lesions which appear to involve the penile shaft.

The top of the penile stump is skinned and the tip of the residual corpora cavernosa is reconverted to a hemispheric shape. The urethra is spatulated and the meatus is fixed on the new tip of the corpora cavernosa. The STSG is transplanted like an umbrella over the summit of the hemispheric stump, where it is quilted. The graft is fixed to the penile skin thus recreating a neo-sulcus (Fig. 5). This procedure is suitable for unaesthetic residual penile stumps after previous traditional partial penectomy.

In all cases a 12-F silicone Foley catheter is inserted, and a soft and humid dressing is applied covering the penis. The dressing is left in place for 3 days and the patient is requested to remain in bed. At 4 days after surgery the patient is mobilised and discharged from hospital if the graft is observed to be in good condition, with no penile haematoma, seroma or infection.

The mean (range) follow-up was 45 (4–104) months; the follow-up assessment included a careful examination of the
external genitalia, with groin inspection and palpation, and a biopsy of any suspicious area of penile induration or reddening, every 6 months. All patients with confirmed malignant tumours had a chest X-ray and full-body CT every 12 months.

Results

Of 21 patients, three (14%) were treated by glans-skinning and glans-resurfacing, 10 (48%) by glansectomy and neo-glans reconstruction, four (19%) by partial penectomy with a neo-glans reconstruction, and four (19%) by neo-glans reconstruction after previous traditional partial penectomy. Table 1 details the surgical and pathological characteristics of all patients. In this context, 11 (52%) patients had urethral strictures and were eventually treated with a meatotomy or a simple derivative urethrostomy. Four (19%) patients came to our referral surgical centre for neo-glans reconstruction after a traditional unesthetic, partial penectomy for SCC. There were no significant immediate complications during or after surgery; five (24%) patients had partial graft loss and wound separation that was resolved after conservative management.

Patients were assessed for subjective satisfaction by self-report. All men were satisfied with the aesthetic results of the penile shaft after surgery; they also reported having recovered sexual functioning, although penile sensitivity was eventually reduced as a consequence of either the glandular skinning or glans/penile amputation. Patients who had neo-glans reconstruction after previous traditional partial penectomy reported

Table 1 Patients' characteristics.

<table>
<thead>
<tr>
<th>Patient (age, years)</th>
<th>Technique Pathological staging</th>
<th>Associated urethral stricture</th>
<th>Associated urethroplasty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (65) Glans skinning and glans resurfacing</td>
<td>CIS, LSb</td>
<td>Meatal stricture</td>
<td>Meatotomy</td>
</tr>
<tr>
<td>2 (59) Glans skinning and glans resurfacing</td>
<td>Zoon’s balanitis</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>3 (69) Glans skinning and glans resurfacing</td>
<td>SCC (T1G1), LS</td>
<td>Penile stricture</td>
<td>Penile urethrostomy</td>
</tr>
<tr>
<td>4 (41) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G2), LS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>5 (58) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G1), LS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>6 (62) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G1)</td>
<td>Meatal stricture</td>
<td>Meatotomy</td>
</tr>
<tr>
<td>7 (64) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>8 (60) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>9 (60) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10 (62) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G1 in glans and T1G2 in Urethra), LS</td>
<td>Penile stricture</td>
<td>Perineal urethrostomy</td>
</tr>
<tr>
<td>11 (62) Glansectomy and neo-glans reconstruction</td>
<td>SCC (T1G2)</td>
<td>Penile stricture</td>
<td>Penile urethrostomy</td>
</tr>
<tr>
<td>12 (46) Glansectomy and neo-glans reconstruction</td>
<td>Severe Dysplasia, LS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>13 (64) Glansectomy and neo-glans reconstruction</td>
<td>Severe Dysplasia</td>
<td>Bulbar stricture</td>
<td>Perineal urethrostomy</td>
</tr>
<tr>
<td>14 (78) Partial penectomy and neo-glans reconstruction</td>
<td>SCC (T1G1), LS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>15 (50) Partial penectomy and neo-glans reconstruction</td>
<td>SCC (T1G1), Ca in situ</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>16 (72) Partial penectomy and neo-glans reconstruction</td>
<td>SCC (T2G1)</td>
<td>Meatal stricture</td>
<td>Meatotomy</td>
</tr>
<tr>
<td>17 (74) Partial penectomy and neo-glans reconstruction</td>
<td>SCC (T2G2)</td>
<td>Penile and bulbar stricture</td>
<td>Perineal urethrostomy</td>
</tr>
<tr>
<td>18 (58) Neo-glans reconstruction following previous traditional partial penectomy</td>
<td>LS</td>
<td>Penile and bulbar stricture</td>
<td>Perineal urethrostomy</td>
</tr>
<tr>
<td>19 (67) Neo-glans reconstruction following previous traditional partial penectomy</td>
<td>LS</td>
<td>Bulbar stricture</td>
<td>Perineal urethrostomy</td>
</tr>
<tr>
<td>20 (46) Neo-glans reconstruction following previous traditional partial penectomy</td>
<td>LS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>21 (57) Neo-glans reconstruction following previous traditional partial penectomy</td>
<td>Severe dysplasia, LS</td>
<td>Penile and bulbar stricture</td>
<td>Perineal urethrostomy</td>
</tr>
</tbody>
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a Carcinoma in situ.

b Lichen sclerosus.

c Squamous cell carcinoma.
functional outcome, without sacrificing rigorous cancer control. The use of these relatively new plastic approaches with total penile surgery [1–3, 9, 14–17]. In selected patients, conservative treatments, with final development of SCC in 5–33% over, pre-cancerous lesions often show recalcitrance after conservative treatment does not actually remove these lesions, cancer associated with pre-cancerous lesions due to LS, any conservative treatment does not actually remove these lesions, thus potentially allowing cancer recurrence over time, which might arise from an unstable epithelium bordering the primary lesion. Therefore, rigorous patient selection is compulsory to technically provide an aesthetic solution with effective long-term cancer control.

As suggested by the European Association of Urology Guidelines [19], in malignant lesions we used MRI to define the extent of the penile lesion. This method has been useful to define whether the lesion was limited to the glans or involved the corpora, and therefore directing treatment to glansectomy or partial penectomy.

We highlight that 52% of patients with penile lesions had a urethral stricture requiring surgical treatment; in 11 of these urethral strictures, most (six) were due to LS which involved the glans but also the urethra (Table 1). This confirms the need for a careful urethral evaluation before planning any genital surgery in these patients.

As to the assessment of patient satisfaction, similarly to other leading authors [20], patients were simply interviewed during the follow-up. The main limitation of this and other series is the lack of formal data on functional outcome after these techniques. Patients were assessed clinically for cosmosis, and were questioned about satisfaction and sexual function, but outcomes were not collated using any validated questionnaires. This remains a goal for the future and might be more effectively achieved using surgery-specific Patient Reported Outcome Measures questionnaires.

In conclusion, penis-sparing surgery coupled with neo-glans reconstruction is an adequate treatment in rigorously selected patients with either benign, premalignant or malignant penile lesions. While preserving a good aesthetic appearance of the penile shaft, the goal of all these techniques is to maintain a functional penis in terms of both urination and sexual function, without jeopardising cancer control.
Conflict of interest

I declare that me and my co-Authors don’t have any conflict of interest.

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References