Glans reconstruction using inverted urethral flap in penile cancer patients who undergo glansectomy or distal corporectomy under penile block. A feasible option in high-risk patients

Vasileios Sakalis¹, Anastasia Gkotsi², Vasileios Sfiggas, Asterios Fotas¹, Ioannis Vouros¹, Georgios Salpiggidis¹, Athanasios Papathanasiou¹

¹ Department of Urology, Hippokrateion Hospital of Thessaloniki, Greece
² 2nd Department of Internal Medicine, Hippokrateion Hospital of Thessaloniki, Greece

Abstract

Objective: To assess the limitations and the complications of urethral flap neoglans reconstruction in high-risk patients who undergo a penile amputation procedure under local anaesthesia.

Materials and Methods: 5 patients with squamous cell carcinoma of the penis underwent glans reconstruction using an inverted urethral flap after glansectomy or distal corporectomy. A penile block with 10ml lignocaine 2% and 10ml naropaine 0.75% was used. After tumour excision, the urethra was carefully dissected and margins were sent off for frozen section prior to reconstruction. The median patient age was 77 years (range 67 to 89). The American Society of Anaesthesiologist (ASA) score was 3. The median operation time was 139 minutes (range 125-160). The median follow up time was 12 months (range 8 to 15).

Results: Penile block served adequately in all cases. None required additional analgesia perioperatively. Flaps were taken well in all patients and no complications noted. There were no local recurrences.

Conclusions: Neoglans reconstruction using an inverted urethral flap is a feasible and reproducible procedure which can be performed under penile block thus avoiding anaesthesia-related risks in high risk patients who are interested in good cosmetic results.

Introduction

Penile cancer (PenCa) is a rare disease that accounts for 0.4 - 0.6% of all malignancies in Europe and North America¹. Early detection and treatment often leads to complete cure, while spread to lymph nodes or distant metastasis carry significantly less favorable outcomes². Surgery remains the definitive treatment option for the primary penile lesion in addition to regional lymphadenopathy management. External beam radiotherapy or brachytherapy are alternatives treatment methods to surgical excision, but recommended only in smaller size tumours (<4cm)³. Surgical management usually means partial or total amputation with subsequent functional disability and psychosexual morbidity that can be psychologically devastating for both patient and partner³.

Key words
Glans reconstruction, urethral flap, penile cancer
According to the European Association of Urology (EAU) guidelines, stage T1 and T2 tumors should be treated with penile preserving and reconstructive techniques such as glansectomy and neoglans reconstruction for glans tumors or distal corporectomy and neoglans reconstruction for tumors invading distal corpora. The traditional teaching of primary lesion excision with 2 cm of macroscopically healthy tissue has been replaced by a 5 mm surgical margin that is equally oncologically safe, sparing functional penile length. Moreover, neoglans reconstruction reduces psychological distress, allows sexual activity, improves urination and thus enhances quality of life.

So far, several techniques for neoglans reconstruction have been described. Split skin grafts, harvested from the inner thigh, are commonly used in modern penile cancer centers with excellent functional and cosmetic results. Less often, full skin grafts from scrotum or lower abdomen and oral mucosal grafts are used. Alternatively, glans can be reconstructed with the use of urethral, rectus abdominis or palmaris longus flaps. Nevertheless, whichever the reconstructive procedure is used, general anaesthesia is prerequisite, thus excluding the anaesthetically high-risk patient group. In addition, grafting requires tissue harvesting equipment that is not available in many centers.

In this paper we present our experience with the inverted urethral flap for neoglans reconstruction, under penile block in high-risk penile cancer patients to whom general or spinal anesthesia was contraindicated.

**Material and Methods**

Urethral flap neoglans reconstruction under penile block was offered to 7 invasive penile cancer patients, unfit for general or spinal anesthesia due to serious comorbidities, who underwent glansectomy ± distal corporectomy.

All patients provided their written consent to undergo this procedure and to participate in the study. The patients were staged preoperatively by CT Scan Thorax - Abdomen - Pelvis to detect loco-regional or distant metastasis. Regional lymphadenopathy was assessed by groin ultrasound. Fine needle aspiration cytology (FNAC) performed in all suspicious nodes according to standardized ultrasound criteria for FNAC.

Patients with history of penile urethral stricture disease or positive urethral margins on frozen sections were excluded from the study and had a simple parachute or fish mouth closure of penile shaft skin over the corpora defect.

Under penile block (10ml Lignocaine 2%, 10ml Naropaine 0.75%), penile shaft skin was circumferentially incised 1cm proximal to the tumour. Dartos fascia was dissected off the Buck’s fascia and the penis was degloved. A tourniquet was applied at the penile base to ensure haemostasis. Typical glansectomy followed along the plane of tunica albuginea using dissecting scissors. Once the glans was dissected off the corpora, the corpus spongiosum was transsected.
Glans reconstruction using inverted urethral flap in penile cancer patients who undergo glansectomy or distal corporectomy under penile block. A feasible option in high-risk patients p. 55 - 60

with a clean blade. Frozen sections were requested for both urethral tissue and tunica albuginea from cavernous bodies. When tunica involvement was evident, distal corporectomy commenced. The penile urethra was mobilized to gain adequate length to cover the cavernous bodies. The corporeal defect was sutured with 3 - 0 vicryl continuous suture (Figure 1). Tourniquet removal identified bleeders from Buck’s fascia or corporal tissue allowing bleeding only from the transected spongiosum. The urethra was then ventrally spatulated 2cm and everted to cover the cavernosal tissue serving as a neoglands (Figure 2). The urethral margins were fixed to the tunica using interrupted 4 - 0 rapid, while the spatulated proximal edge was sutured to the median raphe of the penile shaft skin. The Dartos fascia was sutured 1cm away from neoglands and the penile skin was approximated to the edge of the urethral flap (Figure 3). At the end of the procedure, a two - way 14 Fr Silicon catheter was inserted and Vaseline gauze on a light dressing was applied. Patients were advised to stay on bed for 24 hours to maximize flap adherence. Full mobilization was allowed from the 2nd postoperative day. The catheter was removed on the 5th postoperative day (Figure 4). All patients had a preoperative dose of Gentamycin and three doses of Co - Amoxiclav 625mg in the next 24 hours. Follow up was at the 2nd postoperative week and then 3 monthly as per EAU guidelines.

Results
Since May 2013, 24 penile cancer patients were admitted for surgical management. 10 patients were classified as anaesthetically high risk, with ASA (American society of Anaesthesiologists) score ≥ 3. Urethral flap neoglands reconstruction was offered to 7 of them. The study included 5 patients since 2 were excluded due to positive urethral margins.

The basic demographics are shown on table 1. All patients had ASA score 3. Two were considered high risk due to uncontrolled diabetes, two due to reduced lung capacity and one due chronic renal failure and hypertension. One patient had glansectomy while four had additional distal corporectomy as tunica involvement was evident. There were no perioperative or postoperative complications. The median operation time was 139 min (Range: 125 - 160) including the time of the frozen section. Postoperative analgesia was controlled with paracetamol per request.

The flaps appeared erythematous and moist until the 4th-5th postoperative day due to exteriorization of urothelium and to the secretions from urethral glands. Tiny darkened areas typically observed at points of tension, without interfering with the viability of the flap.

Fresh frozen section results agreed with the final pathology results. The histologic diagnosis in all patients was squamous cell carcinoma of usual type arising from penis, stage T2. None had neither deep nor lateral positive margins.

At the 2nd week follow up, there were no complains in terms of pain, sensation, secretions and urination. One patient presented with a buried penis, having...
difficulties in urinating, but he managed to avoid wetting himself by pressing his pubic fat and exposing the penile stump (Figure 5).

There were no local recurrences and none required further penile operation. At preoperative staging, two patients had palpable groin lymphadenopathy and one had positive fine needle aspiration unilateral. He underwent groin radiotherapy as he was not fit for groin dissection.

All flaps were taken well and there were no neomeatal related complications.

Discussion

Urethral flap neoglans reconstruction is a good alternative to grafting in invasive penile cancer patients, who undergo a penile preserving procedure under local anaesthesia. A penile stump of sufficient length enables not only sexual activity, but also proper urination in the standing position.

Clearly, this reconstruction technique offers many advantages. The procedure is well tolerated under local anaesthesia. It minimizes the anaesthesia related risks thus representing an ideal option for high risk patients. It is an easy to perform procedure, as long as the surgeon respects the anatomical planes. In terms of oncological safety, we believe that it shares similar recurrence rate with any other neoglans reconstruction, and it does not exceed the known 27% recurrence rate in the first two years, as long as the urethral margins are free of disease\textsuperscript{10}.

Urethral flap neoglans reduces postoperative morbidity as it avoids donor site complications such as pain, infection, bleeding, poor healing, irritation and need for wound care. In addition, there is no need for graft harvesting equipment, reducing the cost of the operation, thus making it feasible in poor equipped centers.

To the best of our knowledge, there is no penile cancer operation that can offer a full recovery of sexual activity\textsuperscript{11}. However, neoglans reconstruction is an additional aid in the maintainance of sexual function to preoperative levels. Our patient group suffered from erectile dysfunction prior to penile cancer diagnosis, hence making the assessment of postoperative sexual dysfunction difficult. Gulino et al, evaluated 42 penile cancer patients who underwent glansectomy ± distal corporectomy and neoglans reconstruction from an inverted urethral flap. They used specific questionnaires (IIEF-15 and Bigelow - Young) and non-specific questions about sexual function, ejaculation

![Figure 5. The urethral neo-glans on the 14th postoperative day. A case of iatrogenic buried penis.](image)

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Patient demographics, histology results and need for systemic therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Age (Median (range))</td>
<td>77 (67-89) years</td>
</tr>
<tr>
<td>Follow up (Median (range))</td>
<td>12 (8-15) months</td>
</tr>
<tr>
<td>ASA Score</td>
<td>Score 3 (5 patients)</td>
</tr>
<tr>
<td>Tumor Stage</td>
<td>T2a (3 patients), T2b (2 patients)</td>
</tr>
<tr>
<td>Tumor Grade</td>
<td>Moderate (2 patients), Severe (3 patients)</td>
</tr>
<tr>
<td>Lateral margins</td>
<td>&gt;2 mm</td>
</tr>
<tr>
<td>Deep margins</td>
<td>&gt;3 mm</td>
</tr>
<tr>
<td>Groin Lymphadenopathy</td>
<td>Palpable (2 patients), Positive FNA (1 patient)</td>
</tr>
<tr>
<td>Distant metastasis</td>
<td>None</td>
</tr>
<tr>
<td>Neo Adjuvant Therapy</td>
<td>None</td>
</tr>
<tr>
<td>Adjuvant Therapy</td>
<td>None</td>
</tr>
<tr>
<td>Operation Time (Median (range))</td>
<td>139 (125-160) min</td>
</tr>
<tr>
<td>ASA: Americal Society of Anaesthesiologists</td>
<td></td>
</tr>
</tbody>
</table>

Glans reconstruction using inverted urethral flap in penile cancer patients who undergo glansectomy or distal corporectomy under penile block. A feasible option in high-risk patients p. 55 - 60
and libido. The study showed that 60% of patients engaged in a successful sexual intercourse at 5th postoperative week while 76% of patients regained ejaculation and orgasm by that time. Urethral thermoreceptors and/or mechanoreceptors might be involved and activate ejaculatory and orgasmic pathways.

As adequate penile length is preserved, the aesthetic result is satisfactory and the neoglans is more natural, compared to split skin grafts. The spongy neoglans retains its own blood supply; it engorges during erection and gives a more physiologic appearance.

Although, we did not encounter any postoperative problems, there are few well-described complications in the literature. Ventral penile curvature is a consequence of short urethra that acts as a bowstring at erection, occurs in 10% of cases. Sansalone et al, reports a 6% risk of bleeding and hematoma that might need surgical evacuation and a 3% risk of early local recurrence. Another Italian group, who studied the sexual outcomes after glansectomy and glans reconstruction using urethral flap, reported that 24% of patients had orgasm and ejaculation difficulties while 40% failed to have coital activity. Furthermore, only 73% of patients reported spontaneous rigid erections. The negative psychosocial impact is primarily a result of penile cancer disease and the penile operation-glans reconstruction is proved to add a positive value.

The main disadvantages of this procedure are the possibility of positive urethral margins and flap failure. The surgeon needs to rely on the frozen section results. If the section is positive, an additional section of spongiosum should be examined, and if there is insufficient length, a simple penectomy without reconstruction should be performed. Urethral flap viability depends on adequate urethral blood supply. Patients with history of penile urethra stricture disease and extensive spongiofibrosis should be treated with another type of reconstruction.

Conclusion
We do believe that neoglans reconstruction using urethra flap complies with EAU penile cancer guidelines- it is a quick, oncologically safe and reliable technique. It has good cosmetic and functional results. It is feasible under penile block and devoids of anaesthetic complications in high-risk patients who are not fit for general or regional anaesthesia.
References


