



CASUISTRY

Reconstruction of the glans with free-skin graft applying the Bracka technique

Á. Gómez-Ferrer,* J. Rubio-Briones, A. Collado, M. Trassierra, J. Casanova, J.L. Monrós, J.V. Ricós, M.Á. Bonillo, I. Iborra, E. Solsona

Servicio de Urología, Instituto Valenciano de Oncología, Valencia, Spain

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Abstract

Introduction: We analyze our experience in the conservative surgical management of penile cancer and/or penile skin pathologies at our institution.

Material and methods: We have retrospectively reviewed all the skin grafting procedures performed in penile surgery in the last eight years. We show the indications and results of these surgical procedures and the detailed surgical technique originally described by Bracka.

Results: Ten patients had several types of partial penile removal surgery followed by free-skin graft resurfacing, creating a neoglans. There were no relevant or major complications; two patients suffered partial necrosis of the skin graft. There was no local recurrence. 6 Patients returned to normal sexual activity after complete healing.

Conclusions: There is a significant number of patients with penile cancer and/or other penile skin pathologies who can undergo definitive and non-mutilating surgery with excellent oncologic, cosmetic and functional results with skin grafting.

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Reconstrucción del glande con injerto cutáneo libre según técnica de Bracka

Resumen

Introducción: Analizamos nuestra experiencia en el manejo conservador y reconstructivo de los pacientes tratados de cáncer de pene y/o patologías cutáneas del pene en nuestra institución.

Material y métodos: Hemos revisado retrospectivamente todos los procedimientos de injerto cutáneo realizados en la cirugía peneana a lo largo de los últimos 8 años. Se presentan las indicaciones y resultados de estas cirugías y el procedimiento quirúrgico detallado descrito originalmente por Bracka.

*Corresponding author.

E-mail: dr.alvaro@gomez-ferrer.net (Á. Gómez-Ferrer).

Resultados: Diez pacientes fueron sometidos a extirpación parcial del pene seguida de técnica quirúrgica reconstructiva con injerto libre de piel creando un neoglándulo. No se han registrado casos de complicaciones mayores; dos pacientes tuvieron pérdida parcial del injerto y ninguno ha presentado recidiva local. Seis pacientes comunicaron haber reanudado su actividad sexual después de la curación completa.

Conclusión: Existe un grupo importante de pacientes con cáncer de pene y/o otras patologías en el glándulo donde es posible realizar una cirugía reconstructiva penéana no mutilante con resultados oncológicos, estéticos y funcionales satisfactorios.

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Introduction

Penile carcinoma is one of the less frequent malignancies in the adult male in developed countries, between 0.1-0.9 per 100,000 inhabitants/year in Europe.¹ Of these, 78% of the tumors appear on the glans and/or foreskin.

Despite this distal location in the anatomy of the penis, the traditional approach of obtaining wide surgical margins of safety has historically conditioned the implementation of mutilating surgery (glandectomy and partial or total penectomy) with great impact in the psychic, sexual and aesthetic sphere in these patients. We now know what lower resection margins are sufficient and guarantee, with appropriate monitoring, control and survival in selected cases.²

Furthermore, the foreskin, the glans and the urethral meatus may suffer different chronic, relapsing and preneoplastic diseases that may be eligible for definitive surgical treatment such as that shown in this work. Among them, we can list the xerotica balanitis obliterans, varying degrees of hyperkeratosis, dysplasia and squamous metaplasia, Bowen's disease and Queyrat erythroplasia. Sometimes the skin and/or mucosa surrounding the neoplastic lesion also suffers from a benign or premalignant condition, which makes its simultaneous surgical eradication appropriate.

To avoid mutilating surgical excision, many conservative treatments have been postulated: topical (5-fluorouracil and 5% imiquimod 5%), laser ablation, cryotherapy and radiotherapy. Although it may be indicated for small and low-grade tumors and stages, they have the disadvantage of a higher local recurrence rate, poorly tolerated side effects and the need for repeated or more chronic treatment.

We present our experience in conservative surgery in penile cancer and/or penile skin diseases with subsequent penile glans reconstruction by free-skin graft. This technique was originally described by Bracka in severe cases of balanitis xerotica obliterans.^{3,4}

Materials and methods

Surgical technique

The patient is placed supine with the genital area exposed, and the area where the graft is to be obtained, usually the side of the left thigh. A tourniquet is placed at the base of the penis for hemostatic control. If there is



Figure 1 Aspect of the glans after being completely denuded.

defined gross lesion, it is completely removed using fine surgical instruments in order to obtain a minimum but sufficient safety margin, checked routinely by means of an intraoperative biopsy of the tumor base, emulating the steps described in the surgery of Mohs. The extent of the lesion will determine the partial or total excision of the glans, and depending on its depth, it will require varying degrees of distal corporectomy, closure of the tunica albuginea of the corpora cavernosa in such case, for hemostatic control.

Similarly, when performing a partial penectomy with resection of the end of the corpora cavernosa, the latter can be sutured folding them conically simulating the shape of the glans and thus preparing the tunica albuginea so that it serve as the support of the free graft.

When there is an associated pathology in the rest of the mucosa of the glans, the mucosa of the glans is superficially completely removed, searching for the plane with the corpus spongiosum by means of cold dissection with fine scissors (fig. 1). The urethral meatus is finally cut with this procedure and a neomeatus with healthy spatulated urethral mucosa is created, which is sutured to the corpus spongiosum of the glans. Likewise, it will be attached to the free-skin graft in which a hole will have been made for this purpose.

Upon completion of the mucosectomy of the glans and excision of the tumor, the tourniquet is released

and hemostasis is completed with fine sutures and electrocautery. Additionally, a topical hemostatic material may be applied to enhance clotting while the skin graft is obtained.

Obtaining a free-skin graft

A fine free-skin graft without dermis is obtained with the help of the dermatome. Its length must be double the size of area to be covered. The graft must have a minimum thickness so that it attaches to the glans or corpora cavernosa and the hair follicles are cut so they do not grow hair. It is convenient to perforate the graft with a fine needle so that possible bleeding drains through the holes created. Finally, it is placed on the denuded glans; a hole is made for the urethral neomeatus and its sutured to the urethra and the entire circumference of the coronal sulcus with 4-6 0 absorbable sutures, also adding some isolated stitches to fix the graft to the glans on the surface (fig. 2).

At the end of surgery a type Foley 16 F urethral catheter is placed and the graft is covered with an unctuous dressing, bandaging the penis with slight compression. The skin where the graft was obtained heals occlusively in a similar manner to a first or second degree burn.

Aftercare

The patient must rest for two days during which the dressing is not removed unless there is an incident. If there are no complications, the patient is discharged on the third or fourth day with a urethral catheter. The patient is seen on an outpatient basis on alternate days to have the dressing changed and for follow-up. The catheter is removed on the seventh day. The bandage should be removed carefully after soaking the dressings with saline solution to avoid pulling or lifting the graft (fig. 3). Collections may develop underneath the graft, which must be evacuated by expanding the holes created on the graft or by making new holes if necessary. Once healing is complete, the patient may resume normal activity, including sexual activity if he so wishes (fig. 4).



Figure 2 Free-skin graft sutured to the neomeatus and to the skin of the penis. Isolated sutures are subsequently applied to attach it to the glans.



Figure 3 Result one month after surgery.



Figure 4 Final result.

Results

From 2001 to 2009 we performed free-skin grafts on 10 patients using the technique described. The mean age at the time of surgery was 57.5 (range: 34-77) years. The diagnoses that led to the surgery were varied.

Four cases had benign disease of the glans penis: two patients had erythroplasia of Queyrat, one with a history of verrucous carcinoma on the glans and the other unsuccessfully treated topically; one patient had balanitis xerotica obliterans and the other hyperkeratosis with dysplasia. These patients were operated after failure of topical treatments; the four underwent mucosectomy of the glans alone.

Six patients had carcinoma of the glans: 5 patients had squamous cell carcinoma and one verrucous carcinoma. 5 patients were pT1 and limited excision of the carcinoma or partial glandectomy plus mucosectomy of the rest of the glans was performed, respectively due to the presence of

in situ carcinoma, presence of hyperkeratosis or due to the size of the lesion (verruccous carcinoma). The remaining case was pT2 and was treated with total glandectomy and concomitant dynamic sentinel node biopsy.

The mean hospital stay was 6.2 (range: 4-12) days. There were no relevant systemic complications. Two patients had partial necrosis of the graft, with subsequent epithelialization by secondary intention with good definitive cosmetic results. With a mean follow-up of 30 months (range: 5-48 months), there was no case of local or regional recurrence. One patient died 6 months after surgery due to other causes. Six patients reported having resumed sexual activity after complete healing.

Discussion

Penile cancer occurs distally on the glans and/or preputial skin in a percentage exceeding than 80% of cases. In low and moderate risk stages (carcinoma *in situ*, Ta and T1, grades I and II) conservative management can be considered. Conservative indication can even be extended in some selected cases of T2 and relapses.¹ The classic 2 cm margin now seems excessive and margins lower than 1cm have proven to have sufficient oncological control.

The aim of conservative and reconstructive surgery is to limit ablative surgery as far as possible, maintaining maximum penile length and achieving functional and acceptable cosmetic results without compromising the oncological outcome. When pathology is also associated with the mucosa of the glans, whether or not tumoral, its removal with free-skin graft coverage provides excellent aesthetic results, with final resolution of a generally chronic and recurring process.

There are other conservative alternatives to surgical treatment, which may be indicated in very selected cases. Among them is topical treatment with 5-fluorouracil and imiquimod cream, external or interstitial radiation therapy, laser ablation and cryosurgery.^{5,6} Likewise, tumor resection controlled under microscopic supervision by removing the tumor in successive layers (Mohs surgery) or laser ablation (carbon dioxide, argon, Nd: YAG or KTP) or circumcision itself for low-stage or grade tumors located in the foreskin, are also conservative surgical techniques that can be used with variable recurrence rates.

The glandectomy can be total or partial, depending on the extent of the tumor and if the rest of the mucosa is affected. In small tumors, the defect created in the glans can be repaired simply by primary closure. When the defect is greater and a total glandectomy or complete superficial removal of the remaining diseased mucosal is required, several reconstruction methods have been proposed. The one we present in this series is used at centers of excellence with excellent results.⁷⁻⁹

A free-skin graft can take root on both the denuded glans after mucosectomy, with or without partial glandectomy, and after total glandectomy on the distal end of the

corpora cavernosa, with or without partial corporectomy. An aesthetically more acceptable neoglans is that created. Übrig et al. described a simple method for filling small defects in the glans, by transposing a pedicled penile skin or preputial flap.¹⁰ This technique cannot be used when the mucosa of the glans is completely removed. The possibility of creating a neoglans using the distal end of the spatulated urethra, from the meatus to about 4cm long, sutured to the corpus cavernosum and forming a urethral mucosa neoglans on the distal end of corpus cavernosum has also been proposed. However, this Djordjevic technique has not been assessed on a large scale.

In summary, it is possible to perform minimally mutilating surgery in selected cases, targeting safety margins by means of tumor bed biopsies and covering the defect with free-skin grafts, with acceptable aesthetic and functional results without compromising the oncological prognosis. The main determinant in the optimal therapeutic decision is the size, location, stage and grade of the tumor to be treated. This technique definitively solves other lesions in the glans that are chronic and refractory to conservative treatment, which can occur in isolation or associated with penile cancer.

Conflict of interest

The authors declare that they have no conflict of interest.

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