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Partial Reconstruction with Thigh Skin Graft for Penile Cancer: Case Presentation, Description of Surgical Technique and Literature Review

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Abstract: *Background:* Penile cancer is a rare neoplasm, the most common variety is invasive squamous cell carcinoma or epidermoid carcinoma. Its incidence is very low in developed countries. Partial and radical penectomy has been the gold standard for the treatment of this disease. In recent decades, different reconstructive techniques have been developed with a much lower impact on the quality of life of the patient. *Objective*: describe a surgical technique to treat premalignant lesions and superficial malignant lesions of the penis, and review of the literature. *Method*: a description of the surgical technique regarding partial penile reconstruction using a thigh skin graft for the treatment of premalignant lesions and superficial penile cancer was done. The surgery is divided in 6 steps, which includes general preparation, cystoscopy, resection of lesions on the shaft of the penis and scrotum, estimation of graft size and graft taking, preparation and placement of the graft on the shaft of the penis and wound healing, urinary catheter placement and follow-up. *Results:* this surgery shows a good cosmetic result, without local progression of the underlying disease. *Conclusion*: Conservative surgical treatment is a possible option in premalignant and malignant penile lesions, as it allows a better quality of life for the patient without affecting overall survival.

Keywords: Penile Cancer, Skin Graft, Squamous Cell Carcinoma, Penile Reconstruction

1. Introduction

Penile cancer is a rare neoplasm, strongly linked to hygienic and cultural habits [1]. Early diagnosis allows a more effective and less traumatic treatment for the patient. This tumor has a high mortality rate due to its detection in advanced stages of the disease. The most common variety is invasive squamous cell carcinoma or epidermoid carcinoma. Historically, partial and radical penectomy has been the gold standard for the treatment of this disease. In recent decades, different reconstructive techniques have been developed with a much lower impact on the quality of life of the patient. This article presents the case of a patient with a diagnosis of invasive squamous cell carcinoma of the penis, the therapeutic management and the description of the reconstructive technique implemented, as well as the aesthetic and functional results one year after the intervention. In addition, a review of the topic is carried out focused on the reconstructive options available today.

2. Case Presentation

The case of a 52-year-old male patient, HIV and HCV positive, smoker and circumcised in childhood is presented. Physical examination reveals a 5 cm irregular raised lesion with a verrucous appearance that involves about 70% of the ventral aspect of the body of the penis, it dotes not involve the corpora spongiosa, cavernosa or urethra and two lesions with a similar appearance at the scrotum level. There is no palpation of lymph nodes at the groin level. A penile lesion biopsy was performed, which reported superficially invasive squamous carcinoma: T1a, non palpable inguinal lymph nodes, hence no image staging is needed. Thus, surgery with partial penile reconstruction using a thigh skin graft was decided.

3. Description of Surgical Technique

Step 1: General Preparation. The patient is placed in a supine position, with the lower limbs slightly abducted. The procedure is performed under general anesthesia. Broad spectrum antibiotic therapy (first-generation cephalosporin) is administered as preoperative antibiotic prophylaxis. The lesions to be resected are marked with a dermographic pencil (Figure 1 (A and B)). The external genitalia and the skin of the right thigh are shaved in the operating room and skin preparation is performed with iodized antiseptic solution.

Step 2: Cystoscopy. Cystoscopy is performed and urethral indemnity is determined to continue with surgical planning.

Step 3: Resection of lesions on the shaft of the penis and scrotum. Skin marking of the resection limits is performed. Two scrotal verrucous lesions of 30 mm diameter each are resected, and a simple scrotal skin suture is performed with vicryl 4.0 (Figure 2 (A and B)). Subsequently, the entire lesion on the ventral aspect of the penis is resected up to Buck's fascia with scissors, with a 15-mm resection margin (Figure 2 (C)). Lesions are sent for delayed histopathological analysis. Haemostasis control is performed with an electrosurgical device, avoiding excessive cauterization to avoid excess necrotic tissue in the graft bed.

Step 4: Estimation of graft size and graft taking. The area of the graft needed is estimated by placing a clean gauze pad on the resection surface at the level of the shaft of the penis. The haematic remains are absorbed by the gauze defining the necessary size of the skin graft. We proceed to take a 15 x 15 cm epidermal graft of the right thigh with a thickness between 2 and 4 mm, which corresponds to a partial thickness free graft (Figure 3 (A).

Step 5: Preparation and placement of the graft on the shaft of the penis. Multiple fenestra are performed in the thigh skin graft to allow blood and fluids to drain. The fenestrated graft is placed on the resection site at the ventral aspect of the shaft of the penis, fixing it to the site with absorbable vicryl 4.0 suture (Figure 3 (B and C)).

Step 6: Wound healing, urinary catheter placement and follow-up. A 16 Fr Foley-type bladder catheter is placed to eliminate the possibility of urine coming into contact with the graft. The wound is covered with vaseline gauze, a self-adherent elastic bandage, and subsequently with multiple gauze in compression mode, which is achieved with vicryl 3.0 ligatures. In this way, it is sought to reduce postoperative edema.

The surgery is performed in 150 minutes by an urologist specialized in urethral and reconstructive surgery, and two residents.

The patient remains hospitalized for 24 hours and is discharged from the hospital with indication of absolute bed rest for 48 hours, to optimize the immobilization of the graft. The healing and the urinary catheter are removed on the seventh postoperative day, observing the vitality of the graft and paying attention to the presence of necrotic tissue. At the level of the thigh, the gauze is progressively extracted until the entire graft site is healed. The patient is examined every 4 months for one year.

The results one year after surgery show a good cosmetic result, without local progression of the underlying disease. (Figure 4 (A, B and C)). The patient denies perceiving differences in the length of the penis, in flaccid state and in erection. He does not present alterations in the quality of his erections. The sensitivity of the penis is slightly compromised, while at the level of the thigh it presents hypopigmentation as a sequel at the level of the graft intake site, without alterations in sensitivity.

The histopathological result of the penile lesion was a superficially invasive squamous cell carcinoma developed from a high-grade intraepithelial lesion (mixed PeIN III: Warthin and basaloid type) with free margins. Scrotal lesions were classified as a low-grade epithelial lesion (viral condyloma).

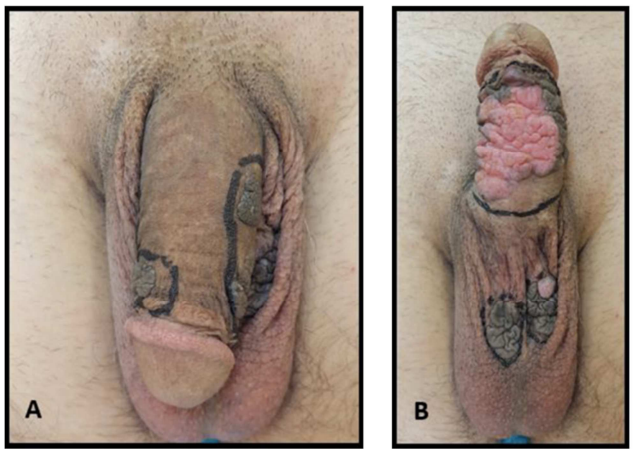

Figure 1. *A, B): Front view of the dorsal and ventral aspect of the penis, with verrucous lesions on the body and scrotum marked with a dermographic pencil, respecting the surgical margins.*

Figure 2. *A) Resection of scrotal lesions. B) Scrotoplasty with absorbable vicryl 4.0 suture. C) Resection on the ventral aspect of the shaft of the penis with scissors.*

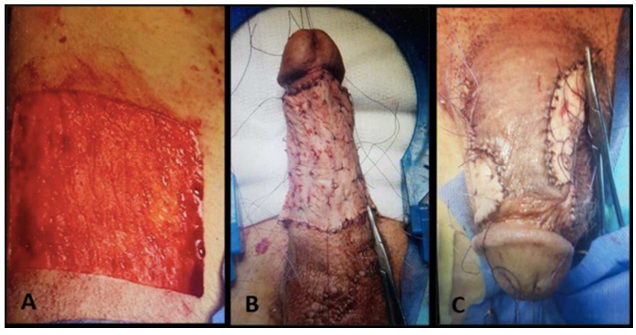

Figure 3. *A) Thigh skin graft removal B) Placement of fenestrated graft on the ventral aspect of the penis. C) Fixation of the graft with Vicryl 4.0 on the dorsal aspect of the penis.*

Figure 4. *A) Evolution of the graft extraction area and the penis one year after surgery. B, C) dorsal face and ventral face of the penis.*

4. Discussion

Penile cancer accounts for less than 1% of malignant tumors in men in United States. Its incidence is very low in developed countries. However, in Africa and in some regions of South America penile cancer can represent between 10 and 20% of all malignant tumors [2]. In Brazil, for example, its incidence is up to 8.3 cases per 100.000 men, consequently being the fourth most frequent malignant neoplasm in men [3]. In Argentina, the largest series of cases reported in the literature to date corresponds to a multicenter study carried out in 2003 by the Argentine Association of Urology Resident Physicians (AAMRU) that reported 110 cases over a 10-year period [4]. It is also important to highlight the experience of Carlos Palazzo et al., who in 2012 reported 33 cases in a 7-year period, in the provinces of Tucumán and Santiago del Estero [1]. This author estimates that the incidence of this disease in the provinces of northern Argentina is 4.3 cases per 100.000 males [1].

Commonly, penile cancer occurs in the fifth decade of life. Many clinical and social factors have been associated with the development of penile cancer: smoking, chronic inflammatory diseases, poor genital hygiene, phimosis, and low socioeconomic status. This disease is virtually non-existent in men who are circumcised close to birth. One theory holds that the accumulation of smegma due to phimosis results in a chronic inflammatory environment that leads to the development of carcinoma. Human papillomavirus (HPV) is implicated in approximately 50% of penile malignancies and has recently gain attention, following the development of the vaccine and the identification of mechanisms of action in cervical and oropharyngeal cancer [2].

Among the premalignant lesions we can describe leukoplakia, obliterative xerotic balanitis, and condylomata acuminata.

Penile intraepithelial neoplasms (PeIN) are carcinoma in situ lesions and are also known as erythroplasia of Queyrat (if it originates from the glans penis) or Bowen's disease (if it originates from the shaft of the penis).

Invasive carcinoma of the penis is typically squamous cell carcinoma, also known as epidermoid carcinoma. It generally develops at the glans, and less frequently at the foreskin. It can be a papillary or ulcerative tumor. Verrucous carcinoma is a variant of squamous cell carcinoma and represents up to 16% of penile carcinomas. At the macroscopic level, it is distinguished by its papillary appearance, while at the microscopic level it has a well-defined margin, unlike the infiltrating margins of the typical squamous cell carcinoma.

The dissemination can be lymphatic (femoral and iliac nodes) or hematogenous. Metastases are clinically apparent in less than 10% of cases and can involve the lung, liver, brain, and bone.

Staging corresponds to that proposed by the AJC (American Joint Committee) in 2010 [5]. In stage I the tumor is confined to the glans or foreskin, in stage II the shaft of the penis is involved. In stage III, there are involved lymph nodes and are operable. Finally, stage IV includes those cases in which the tumor extends beyond the shaft of the penis, with inoperable nodes or distant metastases.

The most frequent clinical findings are the presence of a suspicious lesion in any part of the penis, pain, bleeding, and eventually a palpable tumor in the inguinal region in cases of advanced disease.

The most important differential diagnoses are premalignant lesions, intraepithelial neoplasms of the penis and some sexually transmitted diseases such as syphilitic chancre or condyloma acuminata, related to HPV.

Within the therapeutic options for invasive carcinoma, the common objective is to achieve resection with oncological criteria, that is, complete resection of the tumor with adequate margins. For injuries limited to the foreskin, circumcision may be sufficient. If the lesion involves the glans or the distal end of the shaft of the penis, traditionally penectomy with a margin of 2 cm has been the suggested option to reduce the risk of local recurrence [6]. Mohs surgery and local resection of the tumor have also been proposed for these tumors as options aimed at preserving the penis despite not having a negative margin. For lesions on the proximal shaft of the penis, or when partial penectomy involves reducing the size of the penis to insufficient size to achieve sexual function, radical penectomy and a perineal meatus are recommended. For those with groin involvement, femoral lymphadenectomy can be performed with or without radiation therapy. On a systemic level, chemotherapy options include bleomycin, methotrexate, cisplastin, and 5-fluorouracil.

Survival in penile cancer is directly related to the presence or absence of lymph node involvement. For those patients without nodal disease, the 5-year survival rate ranges from 65% to 90%. If there is lymph node involvement at the femoral level, survival decreases to 30-50%, while iliac involvement decreases survival to less than 20%.

Penis amputation has historically represented the oncological gold standard for the treatment of the primary tumor, but it has the unsatisfactory adverse effects of disfigurement or emasculation. Even in cases where a partial penectomy is performed, more than half of the patients treated under this modality are sexually abstinent or experience feelings of insecurity due to the size of their penis or the absence of the glans [7]. Approximately half of the patients operated for penile cancer experience psychiatric symptoms and a reduction in the overall quality of life [8].

However, the emerging opinion suggests that treatment aimed at preserving the penis is acceptable and should be sought to maximize quality of life and sexual function [9]. This surgical approach involves maintaining the length of the penis, its appearance, and its sensitivity while ensuring the integrity of the urethra, to reduce morbidity and preserve penile function.

Conservative strategies for the treatment of penile cancer are supported by analyzes that indicate that local recurrence has a minimal influence on the overall survival of the diseas [10]. Baumgarten et al. retrospectively evaluated the results of recurrence in different penile-sparing surgery options in an international multicenter cohort of 1.188 patients between May 1990 and July 2016 [11]. This represented the largest cohort of patients existing to date. The different therapeutic options included were circumcision, extended local excision (as in our case), laser treatment with or without excision, partial or radical glandectomy, and glans reconstruction with free skin graft. During the mean follow-up (43 months), there were 252 local recurrences (21.2%), of which 99 (39.3%) developed in the first year after the primary surgery. The average time to local recurrence was 16.3 months and the recurrence-free survival rate at 5 years was 73.6%. When stratifying by stages, the recurrence-free survival rate was 75%, 71.4%, and 75.9% in Ta / TIS, T1, and T2, respectively. Of the recurrences, 58.3% were treated with conservative procedures again and the secondary penectomy rate (partial or total) was only 19%. Only the surgical margin had a significant association with local recurrence after multivariate analysis. This study demonstrated that conservative options are an excellent choice for properly selected cases, as long as strict follow-up is guaranteed in the first postoperative year.

Within the reconstructive options, it is necessary to distinguish those techniques for partial reconstruction of the penis from those for total reconstruction of the organ [12].

In order to achieve complete penile reconstruction in cases of tumors that warrant it, trauma with complete avulsion of the penis or in transgender surgery (metoidioplasty), the first description in the literature was made by Chang in 1984, who performed penile reconstruction with a free forearm flap, which today is informally known as the “Chinese flap” [13]. Later, other techniques were developed that used flaps from other parts of the body, such as the latissimus dorsi flap and the anterolateral thigh flap [14]. However, these techniques represent a challenge since they are complex surgeries that require a multidisciplinary approach, with a high rate of complications. According to Dimitriy Nikolavsky, among the most common urological complications are urethral stricture and urethrocutaneous fistula [15].

There is very limited experience in penile transplantation and its future implementation and regulation is subject to technical, logistical and ethical consideration [16].

For cases of partial penile reconstruction, there are simpler and more reproducible techniques, with low morbidity and with highly acceptable cosmetic and functional results. These techniques range from primary closure of the incision for small defects, to closure associated with the use of skin grafts or flaps (skin advancement flaps from the body of the penis or scrotum, perigenital rotary flaps, and eventually extragenital flaps) [12]. Barbagli, Palminteri et al., presented a series of 17 cases of a technique called “resurfacing and reconstruction of the glans penis”, for benign (lichen sclerosus severus), premalignant and malignant lesions of the glans that had to be treated with glandectomy [17]. In all cases, they used a skin graft from the patient's thigh for this reconstruction. In 32 months of follow-up, there were no recurrences and all patients were able to maintain their sexual function and activity. For cases of tumors that warrant a partial penectomy, Packs and Ariel initially described a technique that does not reconstruct the glans, but instead forms a penile stump by suturing the skin to the sectioned corpora cavernosa and the urethra. This technique, in addition to having a poor cosmetic result, is associated with a 6% rate of meatal stenosis [18]. Other techniques use extra genital skin to make the penile stump, also with less than encouraging results [19]. In our region, Mazza and Cheliz described a technique with a fasciocutaneous scrotal flap, with better cosmetic results, but with the disadvantage of being a two-stage surgery and with a significant rate of meatal stenosis [20]. It is also possible to use oral mucosa grafts and free flaps shorter than those used in neophaloplasty [21]. More recently, Belinky et al. described a technique in which a urethral flap is used to reconstruct the glans in the same act as the partial penectomy [21]. This technique showed the absence of meatal stenosis and satisfactory cosmetic results, despite a 10% recurrence rate in the reported series.

In general terms, it is necessary to remember that the specific requirements of the surgical defect generated by the oncological treatment are those that will dictate the pattern of the reconstructive treatment to be used for each particular case.

5. Conclusion

Conservative surgical treatment is a possible option in premalignant and malignant penile lesions, as it allows a better quality of life for the patient without affecting overall survival. The thigh skin graft for the reconstruction of the penis can be easily used in the treatment of premalignant lesions and superficial malignant lesions. Negative surgical margins are of great importance in oncological terms and to avoid the need for other procedures in the future. General satisfaction and recovery of sexual function are acceptable. This technique and other conservative options are ideal de procedures for the treatment of premalignant lesions and superficial carcinomas of the penis.

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