

Recent trends in surgical and reconstructive management of vulvar cancer: review of literature

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Abstract Vulvar cancer (VC) is a rare disease. The most common histologic type is squamous-cell carcinoma. VC could be divided into two types: type one, commonly associated with HPV infection, occurs in young women and type two, associated with non-neoplastic lesions that usually occurs in older women. Previously VC was often treated with radical Vulvectomy. Today update in diagnostic and surgery technique, capable to identify early stages of disease and adaptation in surgery procedures, according to the stage of disease, age of patients and possible physical and psychological morbidity consequence, allow using less radical surgery approaches. That has led to decrease therapy-associated morbidity while preserving oncologic safety and improving psychosexual outcomes. Finally, several surgical treatments are available in case of VC and, despite radical surgery is often required, less radical surgery associated with reconstructive plastic surgery decreases some of short- and long-term associated complications.

Keywords Surgery · Reconstruction · Management · Vulvar · Cancer

Introduction

Vulvar cancer (VC) is relatively rare accounting for approximately 5 % of female genital tract after cancer of the uterine corpus, ovary, and cervix and less than 1 % of all women's cancer [1]. The most common histologic type is squamous-cell carcinoma, which represents 95 % of all vulvar cancers. Other histological types are present such as melanoma, sarcoma, and basalioma with less frequency. Prognosis of VC is strongly influenced by the stage of disease at the time of the first discovering but many tumours are already advanced when the patient is first examined, especially in older women who apparently ignore such symptoms as pruritus, bleeding, and pain delaying final diagnosis [2, 3]. There are two pathways of VC development. Type one is linked with high-risk HPV genital infection and typically occurs in younger women, the second one, is not associated with HPV infection but is linked with chronic vulvar inflammation and atrophic vulvar lesion such as lichen sclerosus and occurs in older women. [2, 4] This knowledge is a cornerstone of a modern optimal management of squamous-cell carcinoma of the vulva. In fact a global clinical status evaluation of the disease and careful surgical considerations have to be made according to type, age, histological evidence, and potential sexuality impairment in order to decide the best individualised surgery treatment: less radical surgery for early-stage disease, especially in young woman, plastic reconstructive techniques for large surgical defects in advanced VC and radiation therapy into the treatment regimen of loco regional involvement [2, 5].

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Discussion

Cancer of the vulva is a rare malignancy concerning about 5 % of gynaecological malignancies and 95 % of cancers are squamous-cell carcinoma [1]. Several infectious agents have been proposed as possible etiologic factors, including granulomatous infections, herpes simplex virus. Nevertheless, Infection supported by human papillomaviruses (HPV) plays a fundamental role. Particularly VC could be divided in two types. The type one is associated with Human Papillomavirus (HPV) and occurs typically in young woman. Recently the number of young women with VC increased markedly and today represents approximately 15 % of all vulvar cancers [6, 7]. About 40–60 % of VC and up to 90 % of vulvar intraepithelial neoplasia (VIN) are related with HPV and about 80 % of VIN III lesions develop in invasive VC if no treatment is adopted [7]. Early detection in young women with objective suspicion lesions such as condylomatosis of the vulva or with predisposing factor such as low economic status, or smoking is essential to reduce morbidity and mortality in this group [2]. The second one traditionally affects elderly women with a median age of 65–70 and is linked with non-neoplastic epithelial disorders. One of the most representative non-neoplastic epithelial lesions is lichen sclerosus cause of severe pruritus. Its induce scratching lesions that over time get a chronic inflammatory lesions, which can lead to squamous carcinoma. Even if most of affected women complain several symptoms, including vulvar pruritus, pain and irritation, up to 50 % are asymptomatic at the time of the diagnosis. The lesion may also occur as an endophytic ulcer or an exophytic or papillomatous mass [8]. 95 % of malignant tumours of vulva are squamous-cell carcinoma, also histologically divided in three groups: warty, basaloid, and keratinizing. Keratinizing squamous-cell carcinoma of the vulva usually occurs in post-menopausal, warty and basaloid occurs in younger women instead. The second most common cancer reported is melanoma. Verrucous carcinoma, basal cell carcinoma, giant cell carcinoma, acantholytic SCC, Bartholin's gland cancer, and Paget's disease are less common [2]. The most common localisations of VC are the labia (80 %), the clitoris (10 %) and the lower commissure (10 %). Typically VC shows unilateral lesions, but bilateral presentations or multicentre occurrences are also possible [5]. The majority of cancers of the vulva are unifocals and exhibit a slow growth pattern with local invasion and superficial spread. Lymphatic spread is primarily to the superficial and deep inguinal lymphatics and then sequentially to the pelvic, external iliac, and obturator nodes. VC is staged by FIGO and TNM staging systems. Currently the most useful system is the last FIGO stage classification reviewed in 2009

[9] (Table 1). VC is highly curable when diagnosed in an early stage, even if survival is strictly dependant on the pathological status of the inguinal nodes [10].

In planning the operation there are various factors that should be taken into account: the patient's age, comorbidities and sexual function preservation, the tumour size and, the stage of the disease. In fact these factors are independent prognosis factors and clinical status of inguinal lymph nodes is the most important prognostic factor in overall survival [2, 8]. Surgery is first choice therapy of for locoregional VC. Surgical procedures include resection of the primary tumour as well as the inguinofemoral lymph nodes [5]. Local wide excision without inguinofemoral lymphadenectomy is considered only in documented T1 stage where no differences in local recurrence compared to radical vulvectomy were observed. However, according to the ipsilateral inguinal lymph nodes pathway of diffusion, new evidences have assessed that, in lateral T1 and especially in T2 squamous-cell cancers of the vulva, radical hemivulvectomy associated with ipsilateral superficial inguinal lymph node dissection can be the best treatment to reduce the risk of lymph nodes spread [11]. Particularly, when FIGO stage IA occurs, lymph node metastases were observed rarely and groin surgery is currently not recommended in these cases. Staging of the inguinal lymph nodes is always indicated from FIGO stage \geq IB according to the major risk of metastasis. Radical vulvectomy, radical wide local excision or partial vulvectomy with bilateral inguinal femoral lymphadenectomy is the right choice when there is evidence of local or systematic diffuse disease in order to reach macroscopic resolution of neoplasm lesion and determinate the stage of disease. In more then T1 stage of VC bilateral inguinofemoral lymphadenectomy is necessary due to the higher rate of nodal metastasis involvement correlated with stage of disease, size of lesion, and depth of invasion. In these stages Groin surgery is not adequate and resection of at least six nodes per groin is recommended to ensure complete dissection [12]. Radical vulvectomy consists in removal of entire vulva until the deep fascia of the thigh and pubis's periosteum and inferior fascia of the urogenital diaphragm elimination [2]. The disease-free margin must be at least 1 cm, in order to reduce the risk of recurrences; different studies suggested that all occurrences happened when surgically free margins is less than 8 mm. Radiotherapy should be considered prior to surgery in cases of extensive disease to allow less destructive surgical procedure and to reduce tumour volume [10]. The surgical treatment includes different techniques, depending on the characteristics of the disease: today the majority of patients with VC can be safely treated by radical wide local excision or partial vulvectomy and bilateral inguinofemoral lymphadenectomy [13]. The rationale of a separate inguinofemoral lymphadenectomy incisions with radical wide local

incision as alternative to the radical vulvectomy with triple incision technique avoiding the more aggressive classic radical vulvectomy with en bloc inguofemoral lymphadenectomy was that the dissemination of disease to the inguinal femoral lymph nodes does not occur in continuity but by embolization. Preserving a skin bridge get less post-operative wound leakage and less lymphedema of the legs [14].

En bloc surgery

In the early part of the century, conservative procedure such as a simple vulvectomy was frequently performed; however, the 5-year survival was only 20–25 %. Because of these poor results, Basset advocated a more radical technique, including vulvectomy en bloc with bilateral inguofemoral lymphadenectomy ('butterfly resection'); it has been the standard therapy up to 1990s, used even by Taussig and Way, that reported a 5-year survival rates of 60–70 %. The aim of radical en bloc resection was to remove all tissue possibly involved in VC including the skin bridge between vulva and groins [12].

However, the severe morbidity of this mutilating procedure as well as the consecutive psychosexual impairment was a very high price for the treatment [5], as well as impaired wound healing in about 40 % and seroma due to the large subcutaneous resection [8].

Triple incision technique

An approach to reduce morbidity with a more conservative surgery while preserving adequate local control was made by Byron who first introduced the triple incision technique [5]: it includes a complete excision of the tumour by vulvectomy or radical local excision and removal of the lymph nodes by two separate inguinal incisions without the complementary removal of skin [8].

Radical local excision

With a diameter of <2 cm, a complete excision of the tumour with a margin of 1 cm of healthy tissue is sufficient; it is important to value the status of lymph nodes with the sentinel node technique: if this one is negative, a strict follow up of the patient is planned; instead, its positivity requires an additional lymphadenectomy [13].

Groin surgery

Systematic inguofemoral lymphadenectomy comprises resection of superficial inguinal lymph nodes as well as deep femoral nodes [11]. However, systematic inguofemoral lymphadenectomy is associated with substantial

morbidity. Leg oedema (47.0 %), lymphocytes (40.0 %), wound breakdown (38.3 %), and erysipelas (29.1 %) are the most common complications [15, 16]. Sentinel node dissection might therefore be a favourable approach in patients with clinically negative nodes [17]. In VC, detection rates of the sentinel lymph node are very high ranging up to 100 % [18]. Finally, the sentinel node procedure is a promising conservative technique, but since its safety has not been proven yet, it should not be considered in the standard surgical approach to VC [13].

Reconstructive surgery

Surgery for malignant vulvar disease frequently requires resection of a considerable area of skin; patients may suffer from significant morbidity if this skin is not replaced [19]. Plastic surgery operations allow to implement therapeutic measures in accordance with the stage of tumour development [3]. Post-ablative reconstruction of oncologic vulvar defects could be challenging because of scanty local tissue: it should not interfere with the important functions of micturition, reproduction and defecation [20]. Reconstruction of the vulva is important for functional cosmetic and psychological reasons. The wide range of reconstructive options includes: skin grafts, skin flaps, fasciocutaneous flaps, myocutaneous flaps [20]. Skin grafting is not usually suitable according to the nature of the area and interference with function and cosmesis. Free flaps can provide the tissue necessary for immediate repair, but they are not considered first choice because of their problematic management [21]. Local flaps involve mobilising tissue adjacent to the defect. Rotation flaps and transposition flaps can be used for moderate defects. Larger diseases require regional flaps created by mobilising a nearby island of tissue (e.g., the gluteal fold flap), or distant pedicled flaps obtained from the thigh (gracilis) or abdomen (TRAM, transverse rectus abdominis muscle). Vulvar reconstruction with an immediate single-staged sensate flap that provides reliable and durable coverage is the ideal choice [20]. Post-ablative reconstruction of vulvar defects has generally used local flaps, such as pudendal thigh flaps, gluteal fold flaps or V–Y flaps. Although simple to perform with minimal donor-site morbidity, local flaps carry a high incidence of delayed wound healing as they may redistribute but not eliminate local wound tension [21]. Myocutaneous skin flaps employed during vulvar surgery may be obtained from a number of different regions. Defects in the inguinal region or lesions in the anterior section of the vulva would be typical indications for taking grafts from the musculus tensor fasciae latae [22]. The gracilis flap is probably the best known and most commonly used of the myocutaneous flaps [20]: such flaps may be up to 30 cm in length, and their apical sections are vulnerable to the development of

necroses. Larger group of patients treated using gracilis flaps also revealed an uneven degree of success so this method is not used anymore. In contrast, taking flaps from the musculus rectus abdominis, the counterpart of the TRAM (transverse rectus abdominis muscle) flaps that are frequently used for plastic surgery of the breast, has proved to be a reliable procedure for routine clinical interventions aimed at repairing defects in the anterior vulvar regions, at which site they may, depending on the indications, be chosen in preference to tensor fasciae latae flaps [22]. Vulvar reconstruction with myocutaneous flaps has numerous disadvantages when compared with the fasciocutaneous flaps: more difficult preoperative management, more difficult operation, greater extension of scars into the donor site, more changes of position during operation, necessity of a greater ability by the surgeon and more difficult application in older patients. Moreover, it involves the sacrifice of important functional muscles [20]. Fasciocutaneous flaps represent an excellent tool for vulvar reconstructions: the most used ones are mobilised from the perineal region due to their high vascularisation and wide mobility: lotus petal flap, VY flap from the pubic region, VY advanced flap from the gluteal fold and from the medial thigh and pudendal thigh flap. The most frequently used regional flaps were gluteal thigh flaps, whose application has, in recent years, increasingly become a matter of clinical routine [21]. This type of operation has a number of clinical advantages: in terms of healing results at the primary operative site it offers a high level of reliability. Thanks to the possibility of bilateral preparations, even very large posterior defects can be covered, while the complete vulva can be reconstructed using parts of the posterior vagina. More recently, the anterolateral thigh pedicled fasciocutaneous flap has been proposed for perineal reconstruction, with good results in severe defects [3]. Finally, local fasciocutaneous flaps are preferred for vulvar reconstruction because of their characteristics in terms of thickness, reliability and low morbidity [13]: they can be tailored to the shape of the defect without difficulty, providing an excellent design flexibility, and no functioning muscle must be resected [21].

Conclusion

Vulvar cancer (VC) is not a very common disease whose incidence is increasing over the last decades. The modern management of VC has evolved during the past 60 years, including surgical, radio and chemotherapeutical option. Advanced disease is a challenge for clinical management and requires an individualised approach: surgery is the cornerstone of the treatment in VC but in recent years a more conservative and less radical surgery and the new

reconstructive plastic techniques has led to a favourable oncological outcome as well as excellent cosmetic results. Following these complementary approaches, physical and psychological morbidity has been significantly decreased.

Conflict of interest The authors declare that they have no conflict of interest.

Ethical standard The study was approved by the Ethics Committee of the Department and conformed to the ethical guidelines of the Helsinki Declaration (as revised in Tokyo 2004). No study advertising was made and no remuneration was offered.

Research involving human participants or animals This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent No informed consent is required.

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