

## Clinical and surgical aspects of vulvar reconstruction with tensor fasciae latae flaps after en bloc radical vulvectomy

G. Gorchev<sup>1</sup>, S. Tomov<sup>1</sup>, G. Baichev<sup>2</sup>, S. Popovska<sup>3</sup>, A. Velkova<sup>2</sup>

<sup>1</sup>Clinic of Gynecologic Oncology and <sup>2</sup>Clinic of Oncological Surgery, Oncologic Center, Medical University, Pleven; <sup>3</sup>Department of Pathology, Medical University, Pleven; <sup>4</sup>Department of Social Medicine & Public Health, Medical University, Pleven, Bulgaria

### Summary

**Purpose:** The aim of this study was to assess some clinico-surgical aspects of vulvar reconstruction with m. tensor fasciae latae flaps (TFL).

**Patients and methods:** This retrospective study covers the period 1996-2002, and 51 patients with vulvar carcinoma were analyzed. Seven (13.7%) patients had undergone en bloc resection, followed by vulvar reconstruction with TFL, 28 (54.9%) radical vulvectomy with bilateral inguinofemoral lymph node dissection, and 12 (23.5%) patients simple vulvectomy.

**Results:** In 13 (25.5%) patients recurrences were found, that could not be statistically related to the type of surgical intervention ( $p=0.47$ ). The overall 2-year survival

was 82%. Factors contributing to prognosis included FIGO stage, the presence of recurrence and its type. Nine (17.6%) patients had died and the distribution by type of surgery in that group was as follows: en bloc resection with TFL reconstruction - 14.3%, radical vulvectomy with lymph node dissection - 17.9%, and simple vulvectomy - 25%. The correlation was statistically nonsignificant ( $p=0.71$ ).

**Conclusion:** The comparison of the 3 surgical methods of treating primary vulvar carcinoma showed no influence on survival, mortality rate, and type and rate of recurrences. To obtain a reliable clinico-surgical assessment, a multicenter study is necessary.

**Key words:** en bloc resection, vulvar carcinoma, vulvar reconstruction

### Introduction

Carcinoma of the vulva is a relatively rare condition, accounting for 4-5% of all gynecologic malignancies. It remains the 4th most common genital tract tumor, ranking after carcinomas of the endometrium, cervix and ovary. Although it predominantly affects older women, invasive cancer also occurs in younger

women, whereas vulvar intraepithelial neoplasia and carcinoma *in situ* are found mainly in perimenopausal women and those in reproductive age.

The standard operation for vulvar cancer is radical vulvectomy with bilateral inguinofemoral lymphadenectomy performed through 3 separate incisions.

Today, surgical treatment of vulvar malignancies is characterized by new tendencies. These include:

a) individual surgical approaches such as en bloc resection ("butterfly" method) and organ-preserving techniques such as modified radical vulvectomy and hemivulvectomy with unilateral or bilateral groin lymphadenectomy, and radical wide excision with selective inguinal lymphadenectomy [1-4]

b) introduction of methods of vulvar reconstruction after both radical and organ-preserving operations [5,6].

Reconstruction of groin and vulvar wounds can be made using skin grafts and flaps, skin-fascial and skin-muscle flaps. Skin grafts and flaps are used after organ-preserving interventions such as hemivulvec-

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Author and address for correspondence:

Slavcho Tomov, MD  
Clinic of Gynecologic Oncology, Oncologic Center  
Medical University  
Georgi Kochev street 8A  
Pleven 5800  
Bulgaria  
Tel: +359 64 886 255  
Fax: +359 64 801 603  
E-mail: slavcho\_tomov@yahoo.de

tomy, simple vulvectomy, or radical wide excision. Reconstructive techniques with myocutaneous flaps are divided into 5 groups, depending on the muscle group used:

- 1) m. tensor fasciae latae (TFL reconstruction)
- 2) m. gluteus maximus
- 3) m. gracilis in two variants: a) island flap; b) rotated flap
- 4) m. vastus lateralis
- 5) m. rectus abdominis in two variants: a) vertical flap; b) transversal flap [7-9].

## Patients and methods

Fifty-one patients with cancer of the vulva were surgically treated at the Clinic of Gynecologic Oncology, Oncologic Center, Medical University, Pleven, between January 1, 1996 and December 31, 2002. Age, type of operation, FIGO stage, regional lymph node status, histological type of tumor, grade (G), recurrence and type of recurrence (local or regional), mortality and survival rates were collected and analyzed. Seven (13.7%) patients underwent en bloc resection followed by TFL reconstruction of the vulva, 28 (54.9%) patients underwent radical vulvectomy and bilateral inguino-femoral lymphadenectomy with separate incisions; in 12 (23.5%) patients simple vulvectomy was performed, and in 4 (7.8%) patients 3 types of surgical procedures were carried out (one - right hemivulvectomy with ipsilateral groin lymphadenectomy, two - radical vulvectomy without lymph node dissection, and one - radical wide tumor excision). The latter 3 surgical techniques were not considered separately in the statistical analysis because of the small number of patients.

Assessment was focused on clinico-surgical aspects of TFL reconstruction after en bloc resection, comparing TFL reconstruction to radical vulvectomy with bilateral lymph node dissection and simple vulvectomy.

Patients with positive regional nodes underwent postoperative Co60 external whole pelvic irradiation (45-50 Gy, 1.8-2 Gy per fraction), followed by boost irradiation of the inguofemoral and distal iliac lymph node chain (up to 55-60 Gy, 1.8-2 Gy per fraction). Patients with simple vulvectomy underwent radiation of the vulvar area (45-50 Gy, 1.5-1.8 Gy per fraction).

When a recurrence was diagnosed within the anatomical borders of the excised vulva, it was defined as local, whereas when it invaded the groin area it was defined as regional recurrence. All recurrences were surgically excised followed by radiation therapy in cases when such therapy had not been applied in the primary treatment.

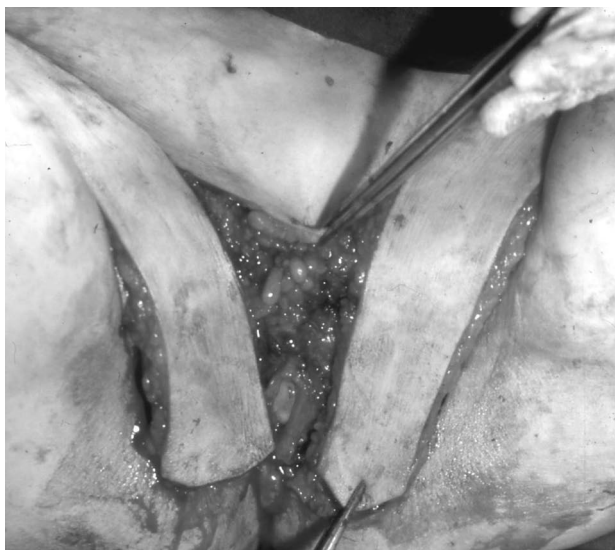
## *En bloc resection with TFL reconstruction technique*

In our clinic we have been performing en bloc resection with TFL reconstruction since 1996. M. tensor fasciae latae is referred to the posterior muscle group around the hip joint. It begins from the inferior iliac spine and is attached to the iliotibial tract of fascia lata. Good knowledge of vessels supplying the muscle is of utmost importance for the operation. The main supplying artery is a branch of the lateral circumflex femoral artery. It arises laterally from the deep femoral artery to pass between m. rectus femoris and m. vastus lateralis, and branches into ascending and descending arteries. The point where the ascending branch enters m. tensor fasciae latae is 8 cm from the superior iliac spine. In this area, special precautions should be taken to avoid injury of the above-mentioned ascending artery. The surgical procedure begins with en bloc resection. After an arched skin incision connecting the two superior iliac spines, the "butterfly" flap is partially mobilized together with superficial inguinal lymph nodes. Femoral lymph node dissection is then made, and femoral vessels are covered with m. sartorii. At this stage, the preparation of myocutaneous flaps for reconstruction is started (Figure 1). With an incision just above m. tensor fasciae latae, and reaching the fascia lata, we outline a skin flap which is mobilized together with the fascia and the muscle, preserving the ascending branch of the lateral circumflex femoral artery. Then, radical vulvectomy is performed in gynecological position. The vulva and inguinal lymph nodes are separated together en bloc. According to principles of transposition, TFL flaps are placed to cover groin, vulvar and perineum wounds (Figure 2).

Figure 3 presents a 36-year-old patient with squamous cell vulvar carcinoma after completed en bloc



**Figure 1.** Stage of en bloc resection with prepared myocutaneous flaps for transposition, and partially mobilized "butterfly" flap.



**Figure 2.** Transposition of both TFL flaps in the groin area, resected vulva and perineum.

resection with TFL reconstruction and Figure 4 shows the same patient 21 days after the operation.

### Statistics

Statistical evaluation of possible association between the type of operation and other variables was carried out by  $\chi^2$  test and  $\chi^2$  test for trend. Data on survival was analyzed using the Kaplan-Meier method and log-rank test. Computerized statistical analyses were performed with SPSS for Windows software package, version 11.0.



**Figure 3.** A 36-year-old patient with squamous cell vulvar carcinoma after completion of en bloc resection with TFL reconstruction.



**Figure 4.** The patient of Figure 3, 21 days after the operation.

### Results

The average patient age was 68 years (range 36-84). Patients in the 70-79 age group prevailed (41.2%), 8 (15.7%) patients were under 60, and the youngest was 36. The average age of patients according to type of surgical method was as follows: en bloc resection with TFL reconstruction - 60 years (patients under 60 prevailed); radical vulvectomy with inguinofemoral lymph node dissection - 67 years; simple vulvectomy - 74 years.

Table 1 presents data on the group investigated according to FIGO stage, histological type and grade of the tumor. No patient had distant metastases (M1). Seven (14%) patients had locally advanced tumors that invaded distal urethra and vagina (T3), and in the rest the tumor was T1 (43%) and T2 (43%), according to UICC criteria.

Unilateral positive regional lymph nodes (N1) were found in 8 (15.7%) cases and bilateral (N2) in 2 (3.9%) cases.

Recurrences were diagnosed in 13 (25.5%) patients. They were local in 8 (15.5%) cases, and in 5 (9.8%) cases they were in the groin area.

The distribution of recurrences according to FIGO stage was as follows: I - 7.7%, II - 30.8%, III - 61.5%. Because of the small number of cases in the FIGO IV stage, this stage was not included in the analysis. With increasing stage, the incidence of recurrences increased significantly ( $\chi^2=14.002$ ;  $p=0.003$ ) and there was an association between incidence of recurrences and local spread of the tumor ( $\chi^2=10.92$ ;  $p=0.004$ ). The grade of the tumor in patients with recurrences was G1 in 5 (38.5%) women and G2 in the remaining 8 (61.5%) ( $\chi^2=2.48$ ,  $p=0.001$ ; Table 2).

The incidence of recurrences according to the type of operation was as follows: en bloc resection

**Table 1.** Patient and tumor characteristics

Characteristic	No. of patients (%)
Age (years)	
Median (range)	68 (36-84)
Age groups	
> 50	2 (3.9)
50-59	6 (11.8)
60-69	18 (35.3)
70-79	21 (41.2)
≥ 80	4 (7.8)
FIGO stage	
I	20 (39.2)
II	16 (31.4)
III	13 (25.5)
IVA	2 (3.9)
Histologic type	
Squamous cell carcinoma	47 (92.2)
Verrucous carcinoma	2 (3.9)
Basal cell carcinoma	2 (3.9)
Grade (G)	
G1	36 (70.6)
G2	12 (23.5)
G3	3 (5.9)

with TFL reconstruction - 14.3%; radical vulvectomy with inguinofemoral lymph node dissection - 32.1%; simple vulvectomy - 25%. The analysis showed that

**Table 2.** Relationship between recurrences and FIGO stage, grade of malignancy, type of operation and age group

	Recurrences No. of patients (%)	p-value
FIGO stage		
I	1 (7.7)	p=0.003
II	4 (30.8)	
III	8 (61.5)	
Grade (G)		
G1	5 (38.5)	p=0.001
G2	8 (61.5)	
G3	0 (0)	
Type of operation		
En bloc resection with TFL reconstruction	1 (14.3)	p=0.473
Radical vulvectomy with bilateral groin node dissection (separate incisions)	9 (32.1)	
Simple vulvectomy	3 (25.0)	
Age groups (years)		
> 50	1 (50.0)	p=0.402
50-59	0 (0)	
60-69	5 (27.8)	
70-79	5 (23.8)	
≥ 80	2 (50.0)	

**Table 3.** Relationship between mortality rate and FIGO stage, lymph node status, grade, recurrence, and type of recurrence

	Mortality rate No. of patients (%)	p-value
FIGO stage		
I	1 (5.0)	p=0.055
II	3 (18.8)	
III	5 (38.5)	
Lymph node status (N)		
N0	6 (14.6)	p=0.151
N1	3 (37.5)	
N2	0 (0)	
Grade (G)		
G1	4 (11.1)	p=0.029
G2	5 (42.0)	
G3	0 (0)	
Recurrence		
present	2 (5.3)	p=0.001
absent	7 (53.8)	
Type of recurrence		
No recurrence	2 (5.3)	p=0.001
local	4 (50.0)	
regional	3 (60.0)	

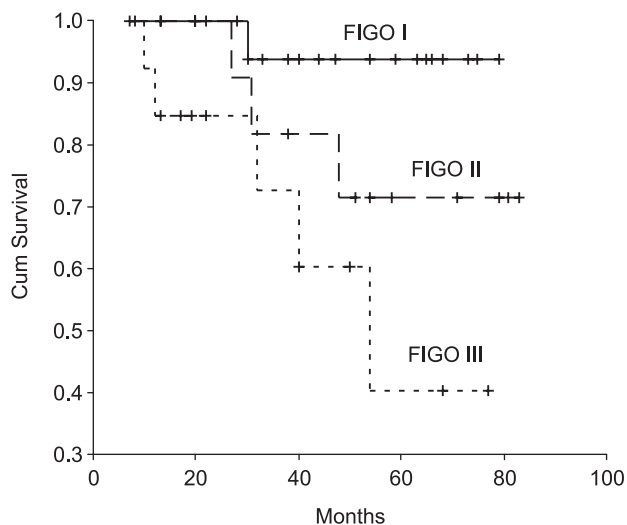
recurrences could not be associated with the type of operation ( $\chi^2=2.48$ ;  $p=0.47$ ; Table 2). No association was found between relapses and involvement of regional inguinal and femoral lymph nodes ( $\chi^2=3.48$ ;  $p=0.175$ ).

The average survival period was 41 months (range 2-83). The overall 2-year survival rate was 82%. Significant factors for the prognosis included FIGO stage and presence and type of recurrence.

Patients in FIGO I stage were with the best prognosis (cumulative survival 94%), whereas it was 72% and 48% for those with FIGO II and FIGO III stages, respectively ( $z=8.61$ ;  $p=0.035$ ). If a recurrence occurred, the survival rate dropped significantly ( $z=13.21$ ;  $p=0.0003$ ). Prognosis was best in cases with no recurrence (cumulative survival 92%), less favorable in the presence of a local recurrence (cumulative survival 50%), and least favorable in the presence of a regional lymph node recurrence (cumulative survival 25%). The observed differences in survival functions were significant ( $z=14.71$ ;  $p=0.0006$ ). Two-year survival rate in patients who underwent en bloc resection with TFL reconstruction, radical vulvectomy with bilateral groin node dissection and simple vulvectomy was 83%, 80% and 57%, respectively, and did not differ significantly ( $z=1.96$ ;  $p=0.58$ ).

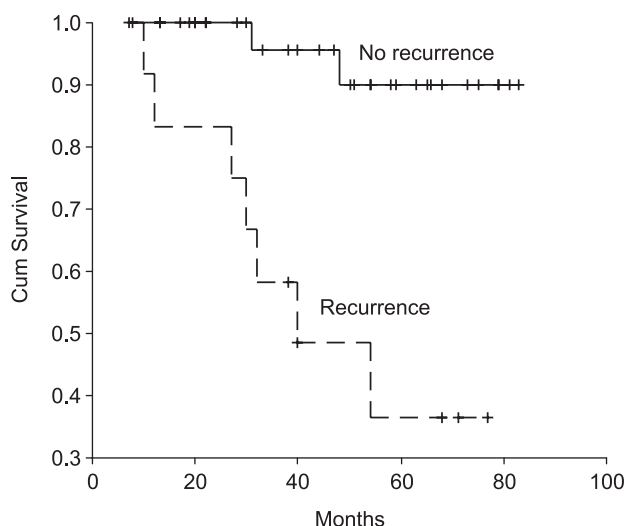
Figures 5, 6 and 7 show the relationship between overall survival and the clinical stage, the presence and type of relapse (local/regional).



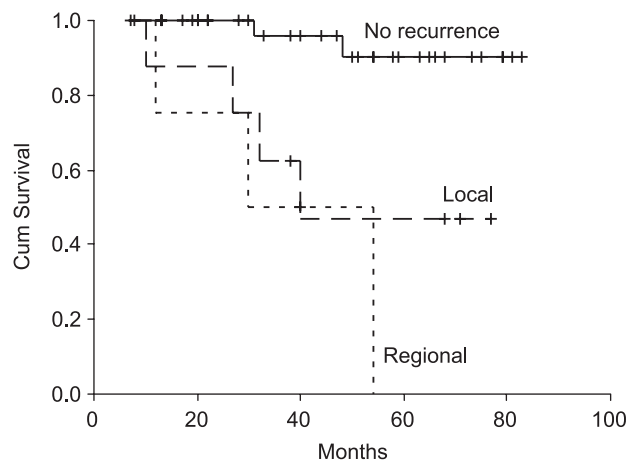


**Figure 5.** Overall survival according to FIGO stages I, II, and III ( $p=0.035$ ).

As of December 31, 2002, 9 (17.6%) patients had died. Their distribution by the surgical technique applied was as follows: en bloc resection with TFL reconstruction - 14.3% (1 patient); radical vulvectomy with lymph node dissection - 17.9% (5 patients); simple vulvectomy - 25% (3 patients). The type of surgery had no effect on mortality rate ( $\chi^2=1.35$ ;  $p=0.71$ ). Moreover, neither FIGO stage nor status of the regional lymph nodes had an impact on the mortality rate. Significant factors were tumor grade (G1-11%, G2-42%), presence of relapse and the type of relapse. Mortality rate was highest in patients with regional recurrences (60%), lower in cases of local recurrences (50%), and lowest in patients with no recurrence (5.3%) ( $\chi^2=15.94$ ;  $p=0.001$ ; Table 3).



**Figure 6.** Overall survival according to presence or absence of recurrence ( $p=0.0003$ ).



**Figure 7.** Overall survival according to type of recurrences (local/regional) ( $p=0.0006$ ).

## Discussion

Individual surgical approach in vulvar cancer is based on initial prognosis. Advanced age and presence of associated diseases (diabetes mellitus, arterial hypertension, coronary heart disease, obesity) are additional factors that should be considered [1,7]. These additional factors characterize also the individual approach, but not the prognosis.

According to Kohler et al. significant prognostic factors include FIGO stage (I vs. II vs. III/IV), localization of tumor (poorer prognosis for clitoral localization and multifocal lesions), tumor grade (G1 vs. G2/G3), involvement of groin lymph nodes (pN+ vs. pN-), and degree of tumor resection in "healthy" margins ( $\geq 2$  cm vs.  $< 2$  cm) [10]. In a review discussing the therapeutic approaches in recurrent vulvar cancer, Salom and Penalver point that the regional recurrences to the inguinal and pelvic lymph nodes have been shown to have a poor prognosis with a high mortality rate [11]. In our investigation, we found FIGO stage, presence of recurrence and type of recurrence as statistically significant factors for prognosis.

Our data for the recurrence rate (25.5%, 13 patients) are close to the data of Oonk et al., who in a group of FIGO stage I-IV 238 patients reported 65 (27%) cases with recurrent disease [12].

In a retrospective study (1986-1997) including 138 patients with squamous vulvar cancer and median follow-up 48 months Nordin et al. found that all patients with groin recurrence (9 cases) died [13]. Local relapses at the site of the primary tumor or skin bridge recurrences are strong predictors for cancer-related death, but local relapse at a distant site is not [14]. Analysis of the mortality rate in our group of 51 pa-

tients showed as significant factors grade (G2 vs. G1), the presence of recurrence and the type of recurrence. The highest mortality rate is reported for cases with regional recurrences (60%), followed by local recurrences (50%), and the lowest – for the patients without recurrences (5.3%) ( $\chi^2=15.94$ ;  $p=0.001$ ; Table 3).

Recently, reconstructive surgery has been widely accepted in oncological practice, and it helps eliminate morbidity related to extended surgical interventions. Besides physical health, social integration, sexual function and mental well-being of patients should also be considered.

Closure of groin and vulvar wounds using reconstructive techniques involves moving a block of expandable tissue from some nearby site into the deficient area. Flaps are classified according to what layers of tissue include and their blood supply. Myocutaneous flaps make use of a muscle with its intact overlying fascia and cutaneous tissue [15]. The application of these flaps for vulvovaginal reconstruction started after the report in 1976 by McCraw et al. [16].

We utilize the technique for TFL myocutaneous flaps transposition. Together with standard surgical techniques for the treatment of vulvar cancer, en bloc resection with TFL reconstruction is a safe and reliable method for treating this cancer. It could provide better quality of life, giving chances for proper morphofunctional reconstruction. TFL reconstruction does not make rough cicatrices that could inhibit motion, and yields satisfactory aesthetic results. It allows for rehabilitation of sexual function, and gives patients a positive physical disposition. This method is recommended in younger, physically fit women without atherosclerosis of peripheral blood vessels, diabetes mellitus and obesity.

Comparison of the 3 methods for surgical treatment of vulvar cancer - en bloc resection with TFL reconstruction, radical vulvectomy with bilateral groin node dissection and simple vulvectomy, showed that none of them influenced survival, mortality, presence of recurrences and type of recurrences. To obtain a more comprehensive clinico-surgical assessment, a multicenter prospective study is necessary.

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