

THE EFFECTS OF REDUCTION OPERATION WITH GENITAL LYMPHEDEMA ON THE FREQUENCY OF ERYSIPELAS AND THE QUALITY OF LIFE

M. Zvonik, E. Földi, G. Felmerer

Division of Plastic Surgery (MZ,GF), Department of Trauma Surgery, Plastic and Reconstruction Surgery, University Hospital Goettingen, Földi Clinic (EF), Hinterzarten, and Department of Plastic and Hand Surgery (GF), University Hospital Freiburg, Germany

ABSTRACT

Genital lymphedema represents a severe disability for patients particularly when complicated by erysipelas, the most frequent complication. The objectives of this study were: to investigate the frequency of erysipelas in patients with genital lymphedema and genital lymphatic cysts who underwent evaluation for surgical treatment, to observe the influence of resection operations on the frequency of erysipelas, and to measure changes in the quality of life due to the resection. A total of 93 patients with genital lymphedema were studied. All patients underwent integrated care treatment in the Földi Clinic, Hinterzarten and the Department of Plastic and Hand Surgery of the University Hospital Freiburg during the period between 1997 and 2007. 44 of these patients underwent surgical treatment of genital lymphedema. The results indicate that lymphatic cysts were the most important risk-aggravating factor for recurrent erysipelas with lymphorrhoea in the genital region ($p < 0.001$). Following the resection operation, however, the number of erysipelas incidents significantly decreased ($p < 0.001$). In addition, the antibiotic dose could be reduced after surgery ($p = 0.039$) and an improved quality of life was achieved ($p < 0.001$).

Keywords: genital lymphedema, erysipelas, resection operation, quality of life

As with lymphedema in general, the appearance of genital lymphedema can be separated into primary and secondary. Primary forms result from maldevelopment of the lymphatic vessels. The initial primary lymphedema can worsen significantly after capacity overload of the lymphatic transport system induced by recurrent erysipelas or acne inversa. Secondary forms result mainly from treatment of malignant tumors of urogenital tract (extraction and/or radiation including the iliac and inguinal lymph nodes, for example, in carcinoma of prostate, bladder, testicles, penis, cervix, vulva or rectum). Another reason for secondary lymphedema can be chronic-obstructive infections of lymph vessels and lymph nodes, e.g., resulting from bacterial or viral infections, mycosis or filariasis.

Genital lymphedema represents a severe strain for the patients affected. Pain during urination, ambulation, and sexual intercourse is the principal problem, and a restriction of the quality of life is inevitable. Erysipelas infection is the most frequent complication of genital lymphedema (*Fig. 1*).

In the normal population, the incidence of the erysipelas is approximately 100 cases



Fig. 1: a) Erysipelas in the crural and foot regions; b) Erysipelas in the mons pubis region.

per 100,000 persons per year (1). According to Caetano and Amarin, an already existing lymphedema is a provocative factor for erysipelas (2).

Therapy of an erysipelas infection consists of systemic antibiotic treatment and symptomatic treatment. Therapy with penicillin is described as the gold standard for the treatment of an erysipelas infection (2). Macrolides (e.g., roxithromycin) or clindamycin are alternative preparations if there is a penicillin allergy.

As genital lymphedema frequently occurs together with edema of the extremities, therapy must take this factor into consideration. In the majority of patients with lymphedema, the therapeutic method of greatest promise is “complex decongestive physiotherapy.” With this method, the skin is sanitized, followed by manual lymph drainage, special compression bandages, and decongestive physiotherapy in the form of physical exercises (3,4). Genital lymphedemas can be treated with this method, but not the lymphatic cysts with consecutive lymphorrhea. For cases where the lymphocutaneous or chylocutaneous fistulas remain in spite of complex decongestive physiotherapy, an operative intervention is necessary.

The first information about the excision of scrotal lymphedemas was published by Larrey in 1803. A detailed report about the

radical resection of the indurated “scrotal mass” followed in 1820 (5). Over the last decades, a number of surgical methods have been described for genital lymphedemas (6-11).

The objectives of this study were to investigate the frequency of erysipelas in patients with genital lymphedema and genital lymphatic cysts, to observe the influence of resection operation on the frequency of erysipelas, and to document changes in the quality of life due to the resection operation.

PATIENTS AND METHODS

A total of 93 patients (47 male, 46 female) with genital lymphedema were studied. All patients underwent integrated care treatment at the Földi Clinic, Hinterzarten and the Department of Plastic and Hand Surgery of the University Hospital Freiburg during the period between 1997 and 2007 (Table 1). The data were collected from the hospital archives. Additionally patients were asked for information by a written survey sent to them after treatment.

Trained clinicians with lymphological experience from the above named institutes diagnosed the genital lymphedema using clinical examination and medical history. In some cases ultrasound examination or MRI lymphography were used to get a more

TABLE 1
Demographics

	Men	Women	Total
Number (percent)	47 (50.5%)	46 (49.5%)	93 (100%)
Mean age (SD)	58.98 (15.13)	52.67 (13.31)	52.32 (14.19)
Range of ages	18-83	19-83	18-83
Genital lymphedema			
* Number of primary (%)	22 (23.6%)	17 (18.3%)	39 (41.9%)
* Number of secondary (%)	25 (26.9%)	29 (31.2%)	54 (58.1%)

accurate differential diagnosis and to exclude diagnoses such as lymphangioma, lymphocutaneous, or chylocutaneous reflux (12).

To date, precise indications for genital surgery do not exist. In our study, indications for the operation were the existence of genital lymphedema, lymph cysts, lymphorrhea, scars in the genital region, and hydrocele in combination with related complaints like pain, itching and recurrent erysipelas. 44 of the 93 eligible patients agreed to the surgical therapy.

In these cases, the operation was performed following a successful intensive complete decongestive therapy of the genitalia and of the frequently concomitant lymphedema of the leg (11). For a distinct genital lymphedema in combination with an edema of the mons pubis and a buried penis, the reconstruction of the genital region was necessary. Here, the resection of the tissue alteration due to the lymphedema in the mons pubis and the repositioning of the penis were inescapable.

The s-shaped incision on the ventral side of the penis is important for the prevention of a cicatricial contracture (*Fig. 2*).

The resection of the female labia is limited to a spindle-shaped excision of the skin and the perineal fatty tissue altered due to the lymphedema. In most cases, only one or two labia majora are affected. In the case of a swelling of the major and minor labia, it is recommended that all four be separately

resected and sutured (*Fig. 3*). The remaining individual lymphatic cysts were separately excised. Precise dissection of the lymphatic capillary supplies and their cauterization is recommended. Operative treatment of genital lymphedemas in patients with chylous cysts and chylorrhea is combined with at least two weeks preoperative medium-chain triglyceride (MCT) diet. Patients continue the diet postoperatively for one year.

Evaluation was performed with the SPSS 11.0.1 statistics package for Windows®. Depending on the data level, the Chi-square test, binary regression or the T-Test was applied.

RESULTS

Erysipelas Frequency

In the total group with genital lymphedemas (n=93), 85% of the patients had one or more erysipelas infections per year. Of these, 52.3% (n=49) experienced erysipelas on the average one to three times per year, 9% (n=8) four to six times per year, and 23% (n=21) more than six times per year.

Provocation Factors

The following groups of factors were investigated in connection with their influence on the frequency of erysipelas: concomitant symptoms such as lymphedema

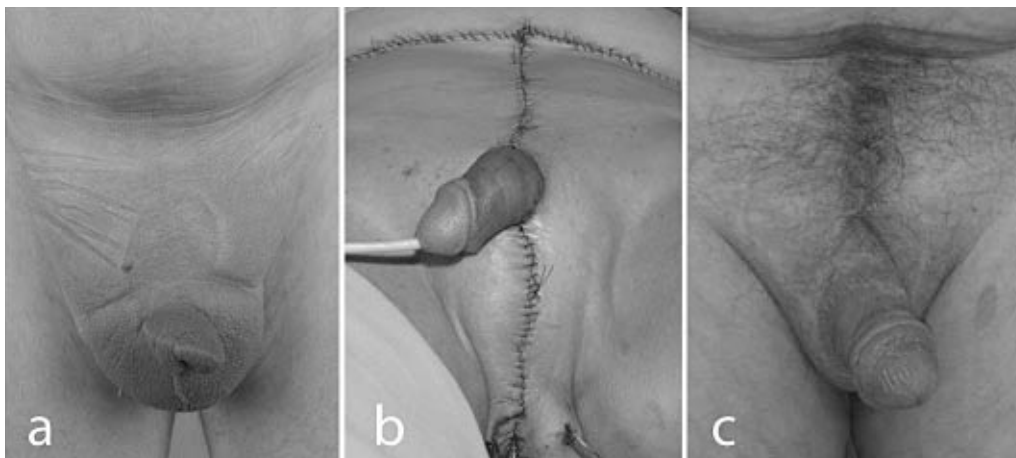


Fig. 2: Resection operation for penoscrotal lymphedema with mons pubis involvement: a) Distinct lymphedema in the region of the scrotum, penis and mons pubis; b) Intraoperatively altered tissue, following resection of the lymphedematous tissue; c) Two years following the operation.

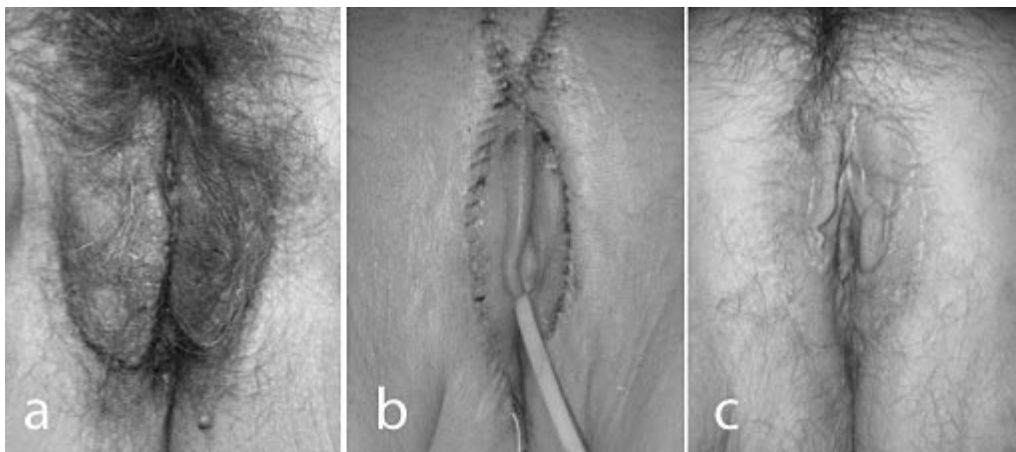


Fig. 3: Resection of the major and minor labia: a) Pre-operative, following decongestive therapy; b) Intraoperative, following resection of the major and minor labia; c) One year following the operation.

of the leg, lymphatic cysts in the genital region, lymphorrhoea in the genital region or lymphatic cysts in other regions, provocative factors such as skin lesions, chills, sexual intercourse, physical overstress, psychic overstress, alterations to the skin such as acne inversa, psoriasis, neurodermitis, athlete's foot, chronic wounds and such comorbidities as adiposity, smoking and diabetes mellitus. The dependence of erysipelas infections on the concomitant symptomatics for genital

lymphedemas was analyzed by logistical regression analysis. The calculation showed a highly significant dependence of the frequency of erysipelas on the existence of lymphorrhoea in the genital region ($p < 0.001$). This relationship is also clearly seen in *Table 2* where absolute frequencies are shown. All other factors showed no statistically significant influence.

Influence of the Resection Operation

TABLE 2
Contingency Table for Distribution of the Frequency of Erysipelas in Relation to the Presence of Lymphorrhoea in the Genital Region (n=93, data for 2 subjects missing)

	Lymphorrhoea in the genital region		Total
Variants:	no	yes	
0 - 3 times per year	38	24	62
≥ 4 times per year	5	24	29
Total	43	48	91

Forty-four of the 93 patients underwent operations. These patients were treated within the scope of integrated care, i.e., pre- and post-operatively by means of complex decongestive physiotherapy in the Földi Clinic, Hinterzarten. The frequency of erysipelas infections before and after the operation was compared with data from 41 of the 44 operated patients. The erysipelas frequency was classified into four groups: none, 0 to 3 times per year, 4 to 6 times per year, and more than 6 times per year. *Fig. 4* shows the frequency distribution before and after the operation. Overall, 16 patients achieved complete freedom from erysipelas as a result of the operation. Following the operation, a significant reduction in the frequency of erysipelas in the group of 4 to 6 times per year and more than 6 times per year was found ($p < 0.001$).

Change in the Antibiotic Dose

Change in the antibiotic dose before and after the operation was also documented for 37 out of 44 patients upon operation (*Fig. 5*). A total of 34 patients were given antibiotics pre-operatively and 31 patients post-operatively. The patients were separated into four groups according to antibiotic medication. The first group was those who did not need any antibiotics (A). The second group used antibiotics irregularly just for cases of erysipelas (B). Typical therapy consisted of Phenoxymethylpenicillin (e.g., Penicillin) 1-1.5 ml IE 3 times a day for 10-14

days. Information about other kinds of antibiotics was not obtained in detail. The third group consisted of those who needed long-term medication for months or years to avoid erysipelas (C). These patients usually took Phenoxymethylpenicillin 1-1.5 ml IE daily or Benzylpenicillin-benzatin (e.g., Tardocillin) 1.2-2.4 ml IE intramuscularly every 2 to 4 weeks. The fourth group used long-term antibiotic medication with an additional treatment for erysipelas with Phenoxymethylpenicillin 1-1.5 ml IE three times a day for 10-14 days (B+C). The number of patients requiring no antibiotics (A) increased from 3 to 6 following operation. The number of patients requiring antibiotics over the long term, and the number requiring additional antibiotic therapy during ongoing prophylaxis was reduced from 16 to 10. The change in the frequency distribution was significant ($p = 0.039$). Overall, the administration of antibiotics was reduced following the operation.

Recurring Lymphatic Cysts and Lymphedemas

In 23 of the 44 patients undergoing operations, recurring lymphatic cysts or a recurring lymphedema were observed in the genital region (*Table 3*). In about 30% of the patients, the recurrences were seen within the first year following the operation. Approximately 7% suffered recurrence between the first and third year, and 16% of the patients recurred more than 3 years following the operation.

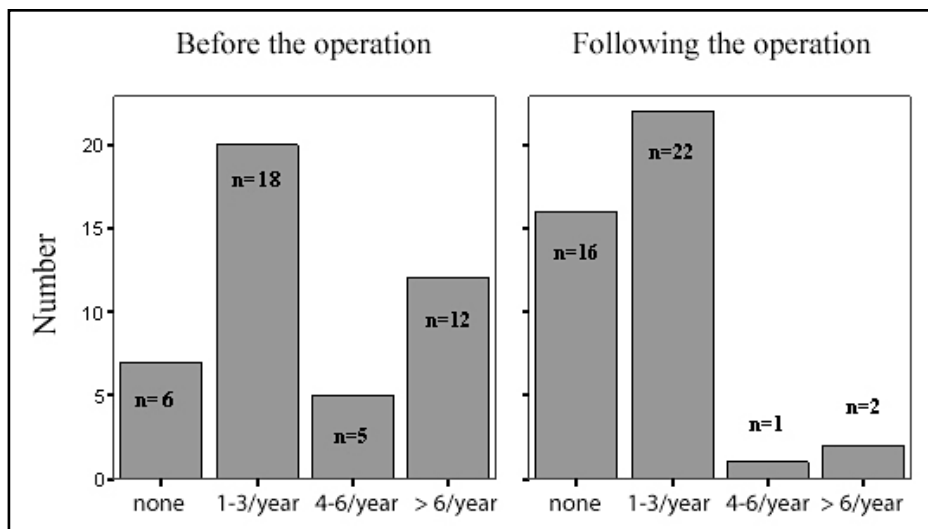


Fig. 4: Difference in the frequency of erysipelas before and after operation for patients undergoing the resection.

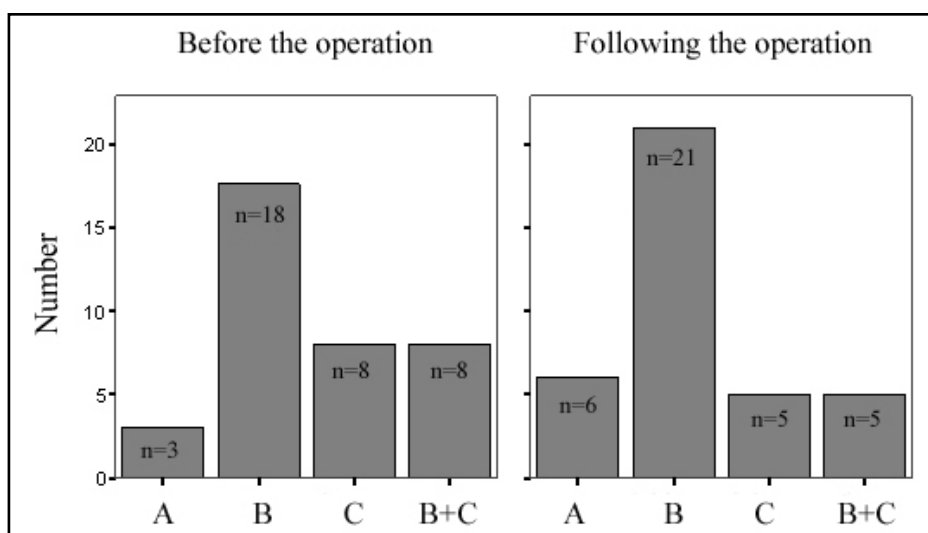


Fig. 5: Difference in the antibiotic dose before and after operation for patients undergoing resection: A = none, B = Therapy as required, C = Long-term antibiotic therapy, B+C = Long-term antibiotic therapy+additional antibiotic therapy.

Patient Satisfaction

In spite of the relatively high number of recurrences, the level of patient satisfaction with the operation was quite high. The patients were asked to indicate their satisfaction on a scale from 0 to 10 with 0 corresponding to extremely dissatisfied and

10 for absolutely satisfied with the result of the operation. Forty-two out of 44 operated patients answered this question. Fig. 6 shows the frequency distribution of the answers with a mean level of satisfaction with the operation at 8.26.

Change in the Quality of Life

TABLE 3
Time to Recurrence of Lymphedema Following Operation

	Number	%
Within one year	13	29.5%
Between 1 and 3 years	3	6.8%
Longer than 3 years	7	16%
Total	23	52.3%

Quality of life was investigated at three points in time over the period of observation: the lymphedema-free time (before the development of the genital lymphedema), the time with the disorder, and the time following operative intervention. The patients were requested to indicate their quality of life on a scale of 0 to 10 for all three points in time with 0 corresponding to maximum impairment of the quality of life and 10 to unimpeded quality of life in respect to psychological and physical endurance and problems with sexual intercourse (*Fig. 7*).

A distinctly better mean quality of life (mean value 8.04 before lymphedema) compared with the time after genital lymphedema appeared (mean value 3.94) is evident. This difference was highly significant ($p < 0.001$). Moreover, an improvement in the mean quality of life for the time following the resection operation (mean value 6.93) was found and this difference was also highly significant ($p < 0.001$).

DISCUSSION

In the total group of 93 patients with genital lymphedema investigated, 85% of the patients had one or more erysipelas infections annually. Twenty-three percent of the patients suffered from erysipelas every second month or more often. These results confirm that erysipelas infection is a frequent complication with also genital lymphedema.

As documented in a number of different publications (2,13- 16), general medical and

dermatological findings play a decisive role in the development of erysipelas. In the group of patients investigated, the following disorders occurred in combination with genital lymphedema: lymphedema of the leg in 88% of the cases, lymphatic cysts in 63% of the cases, lymphorrhea in the genital region in 53% of the cases, and lymphatic cysts in other regions in 13% of the cases (*Table 2*). A highly significant dependence of the frequency of erysipelas on the presence of lymphorrhea in the genital region was statistically confirmed ($p < 0.001$). Lymphorrhea in the genital region should therefore be viewed as a risk factor for recurring erysipelas. This relationship can possibly be explained as a manifestation of an already advanced stage of the disorder. According to Földi et al, lymphorrhea represents a serious complication of lymphedema in the presence of lymphatic cysts in the genital region (17). The existence of lymphatic cysts in the genital region (in 63% of the cases) should therefore not be underestimated, as a worsening of the findings following the rupture of the lymphatic cysts can quickly lead to lymphorrhea.

An important change for the patients was the reduction of erysipelas infections in the genital region following the resection. Overall, 16 patients (39%) achieved complete freedom from erysipelas as a result of the operation. Twenty-two patients still suffered from erysipelas 1 to 3 times per year. Following the operation, only one patient still suffered erysipelas 4 to 6 times per year and, in two

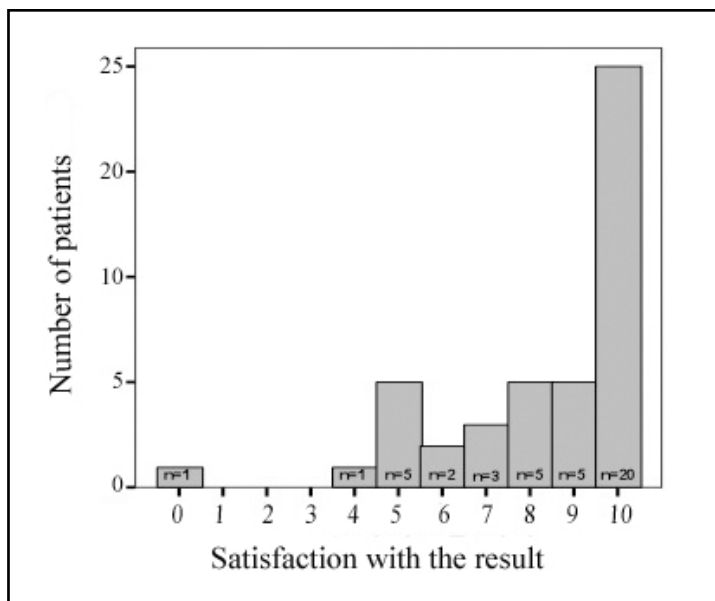


Fig. 6: Patient satisfaction with the operation (frequency of scale values reported, 0 - extremely dissatisfied to 10 - absolutely satisfied).

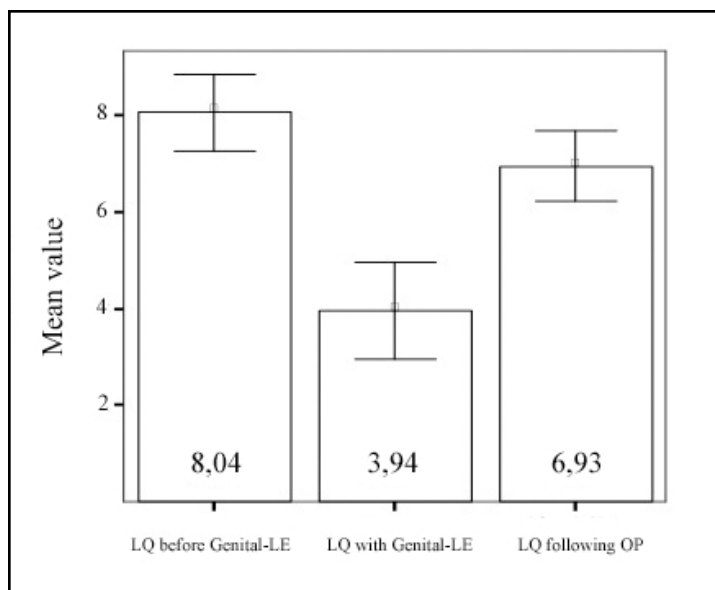


Fig. 7: Quality of life before the development of the genital lymphedema (LQ before Genital-LE), in the presence of the genital lymphedema (LQ with Genital-LE) and following the operation (LQ following OP).

patients, the frequency of erysipelas of more than 6 times per year could not be reduced even after the operation (Fig. 4).

A possible explanation for the recurrence

of erysipelas may be found in the residual lymphatic system that could not be removed during the operation or was so small that it was not perceived by the patient or the

surgeon. This residue can lead to the development of lymphorrhoea and erysipelas. In fact, 15 of the 44 patients undergoing operations complained of residual lymphatic cysts in the genital region, discovered only some time after the operation. However, the number of cases was too small for statistical verification of this theory.

A comparison of the frequency of erysipelas before and after the operation made clear that, overall, the number of erysipelas incidents was considerably reduced following the operation. Statistically, a highly significant difference in the frequency of erysipelas was found before and after the operation ($p < 0.001$). The resection operation should therefore be viewed as a meaningful method of erysipelas prophylaxis.

It was also investigated whether there was an overall post-operative reduction in antibiotic therapy. A visual comparison (*Fig. 5*) showed a reduction in long-term prophylactic antibiotic therapy. Statistical analysis indicated a significant change in the antibiotic distribution following the operation ($p = 0.039$). Overall, the antibiotic dose could therefore be reduced in the patients undergoing the operation. This effect can be understood in connection with the post-operative reduction of the frequency of erysipelas. The lower antibiotic requirement can be viewed as another positive result of the resection operation.

The high rate of recurrence suggests that the resection operation is only palliative. In theory, the operation is expected to influence the extent of scar formation in the genital region and therefore prevent the formation of new lymphatic cysts and lymphorrhoea. Nevertheless, until now there is neither scientific nor histopathological evidence in support of this conclusion.

In spite of recurrence of lymphedema and lymphatic cysts, the level of patient satisfaction following the operation was quite high (*Fig. 6*). The mean value of 42 answers was 8.26, with a standard deviation of 2.3. This high value indicates that most of the

patients profited from this operation. This improvement can be seen in the reduction in frequency of erysipelas or to the – at least temporary – regression of lymphatic cysts associated with lymphorrhoea, pruritus, pain, hygienic problems and problems with sexual intercourse, which worsen the quality of life (18).

For patients with genital lymphedema, a significant improvement was also found in the mean quality of life from 3.94 before the operation to 6.93 following the operation ($p < 0.001$). This corresponds to expectation, as a regression of the lymphorrhoea and a reduction in the frequency of erysipelas are achieved following this operation (*Fig. 7*). The resulting improvement in the quality of life can be seen in a broader sense as an objective of the resection operation. The quality of life during the lymphedema-free time (mean value 8.04) is, however, not achieved by the operation (mean value 6.93). This difference was also found to be statistically significant ($p < 0.001$). From the point of view of the patient, this is indeed understandable. While the resection operation leads to a distinct improvement in the stress caused by the genital lymphedema, the original state of the external genitalia cannot be fully reconstructed. Moreover, the required post-operative measures, such as regular control examinations, wearing compression pieces, additional lymph drainages, and scar formation, continue to influence the quality of life.

CONCLUSION

Following an evaluation of the results, it is clear that the problem of swelling of the external genitalia in men and women is of considerable importance, regardless of the cause, and substantially impairs quality of life. Lymphatic cysts with lymphorrhoea were identified as relevant factors influencing the frequency of recurrent erysipelas infections. It also clearly emerged that antibiotic prophylaxis plays a decisive role in the reduction of this frequency. The essentially

palliative measure of resecting the diseased genital tissue appears to be meaningful, because this debulking eliminates the lymphedema-altered volume with lymphatic cysts and therefore pain, pruritus, unpleasant odors and problems with sexual intercourse. The operation itself was positively judged by the patients. The quality of life in respect of psychological and physical endurance and also satisfaction with sexual intercourse were, in the opinion of the patients, clearly better following the operation.

Essentially, on the basis of these results, a therapy concept can be formulated for patients with genital lymphedema. Here, it is important that those affected or potentially affected (e.g., patients still in the stage of battling an urogenital tumor) are informed early on about the course of the possible disorder, possible complications, and possible therapeutic options. In addition to the available conservative therapy and antibiotic prophylaxis, operative treatment of the genital lymphedema should also be outlined.

Here, it should also be made clear that the present study represents an initial investigation of the resection operation for male and female genital lymphedema and its effects on the frequency of erysipelas infections and the quality of life of the persons affected.

REFERENCES

1. Veyssier-Belot, C, F Lecomte: Consensus conference on erysipelas and necrotizing fasciitis, Tours, January 26, 2000. *Rev. Med. Interne* 21 (2000), 655-658.
2. Caetano, M, I Amorin: Erysipelas. *Acta Med. Port.* 18 (2005), 385-393.
3. Casley-Smith, JR: Modern treatment of lymphedema. I. Complex physical therapy: The first 200 Australian limbs. *Australas J. Dermatol.* 33 (1992), 61-68.
4. Földi, E: The treatment of lymphedema. *Cancer* 83 (1998), 2833-2934.
5. McKay, HA, WL Meehan, AC Jackson, et al: Surgical treatment of male genital lymphedema. *Urology* 9 (1977), 284-287.
6. Altchek, ED, H Hecht: A modification of the Standard technique for repair of scrotal elephantiasis. *Plast. Reconstr. Surg.* 60 (1977), 284-286.
7. Jones, HW, RA Kahn: Surgical treatment of elephantiasis of the male genitalia. *Plast. Reconstr. Surg.* 46 (1970), 8-12.
8. Latifoglu, O, R Yavuzer, Y Demir, et al: Surgical management of penoscrotal lymphangioma circumscriptum. *Plast. Reconstr. Surg.* 103 (1999), 175-178.
9. Mallroy, TR, AJ Wein, P Gross: Scrotal and penile lymphedema: Surgical considerations and management. *J. Urol.* 130 (1983), 263-265.
10. Martínez, RE, SH Couchell, B Raffel, et al: Primary lymphedema of the scrotum: Surgical treatment and reconstruction. *Ann. Plast. Surg.* 21(1988), 354-357.
11. Lang, EM, BI Munder, C Andree, et al: A modified therapeutic option for a long lasting success in the treatment of genital lymphedema. *Eur. J. Plast. Surg.* 29 (2006), 13-18.
12. Lohrmann, C, E Foeldi, O Speck. et al: High-resolution MR lymphangiography in patients with primary and secondary lymphedema. *Am. J. Roentgenol.* 187 (2006), 556-561.
13. Braun-Falco, O, HH Wolff, M Landthaler, et al: *Dermatologie und Venerologie*. Fünfte Aufl. Springer, Berlin, 2005.
14. Vaillant, L, N Gironet: Infectious complications of lymphedema. *Rev. Med. Interne* 23 Suppl (2002), 403-407.
15. Rassner, G: *Dermatologie. Lehrbuch und Atlas*. Achte Aufl. Urban & Fischer bei Elsevier, München, 2007.
16. Pavlotsky, F, S Amrani, H Trau: Recurrent erysipelas: Risk factors. *J. Dtsch. Dermatol. Ges.* 2 (2004), 89-95.
17. Földi, E, A Sauerwald, B Hennig: Effect of complex decongestive physiotherapy on gene expression for the inflammatory response in peripheral lymphedema. *Lymphology* 33 (2000), 19-23.
18. Muehlberger, T, HH Hofmann, C Kuhnen, et al: Ätiologie, Klinik und Therapie des penoskrotalen Lymphödems. *Chirurg*, 72 (2001), 414-418.

Mikhail Zvonik, MD
Division of Plastic Surgery
Department of Trauma Surgery,
Plastic and Reconstruction Surgery
University Hospital Goettingen
Robert-Koch- Str. 40
37075 Goettingen, Germany
E-Mail:
mikhail.zvonik@med.uni-goettingen.de
Tel.: +49-551 39 6150
Fax: +49-551 39 12199