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MINIMALLY INVASIVE TREATMENT METHODS OF LOWER LIMB VARICOSITY OF C5-C6 CLASSES (CEAP)

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Цель. Оценить результаты миниинвазивных методов лечения хронической венозной недостаточности у пациентов клинического класса C5-C6.

Материал и методы. На протяжении 2015 года пролечилось 79 пациентов с хронической венозной недостаточностью (клинический класс C5-C6 по классификации CEAP). Пациенты были разделены на 2 группы: I группа – 45 (60,7%) пациентов, клинический класс C5 (зажившая язва); II группа – 34 (39,3%) пациента, клинический класс C6 CEAP (открытая язва). Термооблитерация проводилась по 2 методикам: радиочастотная облитерация (VNUS closure fast) и эндовазальная лазерная облитерация (ELVES – 1470 nm). Термооблитерация венозных стволов была проведена у 69,6% из них. Повторная кроссэктомия по причине рецидивного варикоза проводилась у 6,3%, минифлебэктомия – у 25,3% пациентов. Склеротерапия несостоятельных перфорантных вен проводилась у 16,5%, а хирургическая перевязка перфорантных вен – у 11,4% пациентов.

Результаты. У 26 пациентов (76,5%) II группы в послеоперационном периоде на протяжении 4-6 месяцев наблюдалось полное заживление трофической язвы. У 3 пациентов с циркулярным дефектом больших размеров после 3-4 месяцев с момента инвазивного лечения отмечалось уменьшение площади трофической язвы более чем на 50%. У 4 пациентов, в связи с возникновением рецидивной язвы, через 5 и 7 месяцев после радиочастотной облитерации была проведена трансфациальная склеротерапия перфорантных вен на голени.

Заключение. Эндовенозные методы лечения варикозной болезни нижних конечностей у пациентов с трофическими язвами позволяют достичь хороших послеоперационных результатов. Полное заживление трофической язвы наблюдалось у 76,5% пациентов. У пациентов с активной язвой для достижения позитивного результата, кроме ликвидации венозных рефлюксов, необходимым является местное лечение ран и адекватная компрессионная терапия.

Ключевые слова: хроническая венозная недостаточность, варикозная болезнь, радиочастотная облитерация, эндовазальная лазерная облитерация, трофические язвы, компрессионная терапия, полное заживление

Objectives. To evaluate the results of minimally invasive methods for treatment of chronic venous insufficiency in patients with trophic ulcers.

Methods. In 2015 79 patients with chronic venous insufficiency (CVI) stages C5-C6 according to the CEAP classification had been treated. All the patients were divided into 2 groups. Group I included 45 (60.7%) patients with CVI according to CEAP class C5 (healed venous ulcer). Group II included 34 (39.3%) patients with CVI according to CEAP clinical stage C6 (active venous ulcer). Two types of thermal obliteration procedures: radiofrequency obliteration (VNUS ClosureFast) and endovenous laser obliteration (ELVES – 1470 nm) were used. In general, thermal obliteration of the venous trunks was performed in 69.6% of studied patients. Recrossectomy for recurrent varicose veins was performed in 6.3% of patients; mini-phlebectomy was carried out in 25.3% of cases. 16.5% of patients with incompetent perforating veins underwent sclerotherapy; surgical ligation of incompetent perforating veins was performed in 11.4% of patients.

Results. In the postoperative period within 4-6 months the complete healing of trophic ulcer was observed in 26 (76.5%) patients of group II (CEAP stage C6). In 3-4 months after surgery the reduction of the trophic ulcer area by more than 50% was observed in 3 patients with a large circular defect. Transfascial sclerotherapy of tibial perforating veins due to recurrent ulcer 5 and 7 months after radiofrequency obliteration was performed in 4 patients.

Conclusion. Endovenous methods of treatment of lower extremity varicose vein in patients with trophic ulcers allow to achieve good postoperative results. Complete healing of trophic ulcer was observed in 76.5% of patients. The performance of the local treatment of wounds and adequate compression therapy allowing to achieve the positive results and to eliminate the venous reflux for patients with active ulcer.

Keywords: chronic venous insufficiency, varicose vein disease, venous reflux, radiofrequency obliteration, trophic ulcers, compression therapy, complete healing

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Minimally Invasive Treatment Methods of Lower Limb Varicosity of C5-C6 Classes (CEAP)

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Introduction

Chronic venous diseases (CVD) represent a wide spectrum of morphological and functional abnormalities of the venous system in the lower limb – ranges from mild telangiectasias to trophic ulceration [1]. All these forms of chronic venous insufficiency cause significant social and economic impact on the patient's life quality.

[2]. Long-lasting ignoring a chronic venous insufficiency leads to clinical-morphological changes in the lower limbs such as edema, hyperpigmentation, lipodermatosclerosis and development of trophic changes. [3]. Nowadays the mainstay of treatment of chronic venous insufficiency involves compression therapy, venotonic drugs, classical venous surgery, radioobliteration, sclerotherapy and the choice of treatment depends on the stage of chronic venous insufficiency (CVI). [4]. The patients with trophic ulcers (clinical classes C5-C6 according to CEAP international classification) are considered to be the most difficult group, where appropriate to apply the combined treatment of CVI. [1]. The main cause for the development of trophic skin changes is the formation of a stable pathological reflux in the deep and superficial venous system, as well as the occurrence of reflux at the level of communicating and perforating veins, which are located in the lower third of the leg [4]. Therefore, considering the pathogenesis of trophic ulcers formation, treatment of patients with CEAP class C5-C6 remains a major problem.

Objectives. To evaluate the results of minimally invasive methods for treatment of chronic venous insufficiency in patients with trophic ulcers of CEAP class C5-C6.

Material and methods

In the vascular center «IMEA CC», Kosice, the Slovak Republic, during the period of 2015, 79 patients with CVI of CEAP class C5-C6 were being treated. Among them 44 (55,7%) were women and 35 (44,3%) were men with an average age $55,4 \pm 3,5$ years ($M \pm \sigma$). The patients were subdivided into 2 groups: I group – 45 (60,7%) patients with CVI of CEAP class C5 (healed ulcer). II group – 34 (39,3%) patients with CVI of CEAP class C6 (open ulcer). Age and sex criteria were not taken into consideration in those groups. In group II the surface area, volume and depth of ulcer were addition-

ally described. Ulcerative lesions (ulcer locations) classified according to the depth of involvement: I degree - superficial skin ulcers (within the dermis); II degree – ulcer involving the epidermis, dermis, subcutaneous tissue; III degree – ulcer penetrating up to fascia or even deeper, to subfascial structures. Ulcers surface classified: small– up to 5 cm², medium – from 5 to 20 cm², extensive (giant) – more than 20 cm². Distribution of patients according to the invasion depth, length and breadth of the ulcer changes is presented in the Table 1.

In group I (n=45) the venous trunk thermal obliteration was performed in 22 patients; in 16 cases – the great saphenous vein (GSV); in 5 – small subcutaneous vein (SSV); in 1 case – accessory subcutaneous vein (ASV). In 14 patients combined with thermal obliteration was performed simultaneously miniphlebectomy according to Varady's technique as well as the obliteration of incompetent perforator vein using sclerotherapy or classical surgical technique. The patients of group I (n=17) had already surgical treatments for chronic venous insufficiency in anamnesis. The thermal obliteration of great saphenous vein was carried out in anamnesis in 4 cases and also, according to ultrasound data the great subcutaneous vein was not removed during the first surgery. In 5 patients thermal obliteration of accessory subcutaneous vein was performed (great saphenous vein was removed at the first surgery).

Recrossotomy was carried out in 3 patients. 5 patients underwent the ligation or sclerotherapy of the perforating veins on the leg. Six patients (group I) refused to be radically treated. They were administered the conservative treatment (compression stockings, venotonics). Thermal obliteration of the venous trunk (group II (n=34) was performed in 14 patients, namely: in 7 cases - great saphenous vein (GSV); in 5 – small subcutaneous vein (SSV); in 2 cases – accessory subcutaneous vein (ASV). In 19 patients, simultaneously with thermal obliteration, mini-phlebectomy according to Varady's technique and the obliteration of perforating veins using sclerotherapy or classical surgical methods had been performed. 13 patients (group II) have already had the history of surgery on the superficial venous system due to CVI. In 5 cases the thermal obliteration of great subcutaneous vein or accessory subcutaneous vein was performed due to incomplete crossotomy during the first operation.

In 4 patients the thermal obliteration of SSV was done (GSV was removed at the first operation).

Таблица 1

| Distribution of patients according to the invasion depth, length and breadth of the ulcer changes | | | | |
|---|---------------------|------------------------|----------------------|------------|
| Trophic changes | II group (n=34) | | | % |
| | < 5 cm ² | 5 – 20 cm ² | > 20 cm ² | |
| I degree | 7 (20,6%) | 3 (8,8%) | – | 10 (29,4%) |
| II degree | 2 (5,9%) | 11 (32,4%) | 5 (14,7%) | 18 (52,9%) |
| III degree | – | 4 (11,8%) | 2 (5,9%) | 6 (17,6%) |
| % | 9 (26,5%) | 18 (52,9%) | 7 (20,6%) | |

Таблица 2

| Methods of the lower limb varicosity treatment in the examined patients | | |
|---|--------------|--------------|
| Types of surgical interventions | Group (n=45) | Group (n=34) |
| Thermal obliteration of great saphenous vein | 14 (31,1%) | 7 (20,6%) |
| Thermal obliteration of small saphenous vein | 6 (13,3%) | 5 (14,7%) |
| Thermal obliteration of accessory saphenous vein | 1 (2,2%) | 3 (8,8%) |
| Recrossectomy | 3 (6,7%) | 2 (5,9%) |
| Venous trunk thermal obliteration due to varicosity recurrence | 9 (20,0%) | 10 (29,4%) |
| Miniphlebectomy according to Varady's | 12 (26,7%) | 8 (23,5%) |
| Scleroobliteration of perforating veins | 8 (17,8%) | 5 (14,7%) |
| Perforators' stimulation by an open surgical technique | 6 (13,3%) | 3 (8,8%) |

In 3 patients, recrossectomy was conducted. In 8 patients in this subgroup sclerotherapy or the ligation of leg perforating vein was additionally performed. 4 patients (group II) were administered the topical treatment of venous ulcers due to their refusal to undergo the invasive therapy.

Characteristic of the performed interventions is presented in the Table 2.

Thermal obliteration was performed according to 2 methods: radiofrequency obliteration (VNUS closureFast); endovasal laser obliteration (ELVES – 1470 nm). The puncture place of the venous trunk was chosen individually and depended on the local parameters and the venous bed status for the catheter passage into the sapheno-femoral anastomosis to eliminate reflux. In patients with recurrent varicosity to perform thermal obliteration the mandatory basis was occurrence of a vein with reflux having sufficient diameter to permit passage of the catheter therethrough.

Picture 1. Female patient with CVI of C6 clinical class (active ulcer for 15 years). The first day after GSV thermal obliteration and miniphlebectomy. The arrow specifies the place of VSM puncture and catheter setting).



In patients after recent surgery in anamnesis the reflux through collateral veins was detected in ultrasonography and the venous trunk, optimal for radioobliteration, was visualized by 10–12 cm distal to the anastomosis. In such cases, sclerotization of the collateral at the site of anastomosis was performed under ultrasound guidance, and the thermal obliteration of venous trunk was carried out via the lowest point of the venous insufficiency. If the venous trunk in the area of trophic changes, the puncture was always performed above the active ulcer.

In the area of trophic ulcers no any incisions and removals of varicose veins were done. The method of choice was sclerotherapy of the perforating veins in case of their insufficiency. Local treatment of venous ulcers was carried out according to the principles of wet therapy with the imposition of absorbent dressings (Aquacel, Askinafoam, Actillite). Results of treatment of the lower limb varicosity in patients with trophic ulcers were evalu-

Picture 2. Trophic ulcer area reduction for more than 50% 3 months after GSV thermal obliteration in the CVI patient of C6 CEAP.



ated using the 3-point scale:

1. Good – complete healing of trophic ulcer for 3-6 months after the operation, the elimination of venous refluxes;
2. Satisfactory – the reduction of the area of trophic ulcers for more than 50% within 3-6 months;
3. Unsatisfactory – the presence of venous reflux after surgery, the disclosure of an active ulcer within 3-6 months.

Results

In one patient (group I) after the surgical ligation of perforating veins two weeks later an active ulcer was opened. 6 months after the operation in two patients (CEAP stage C5) who were treated conservatively, during the control examination, the active ulcer was also diagnosed. Seven patients had a feeling of discomfort and burden in the area of the obliterated venous trunk. In the incisional period within 4-6 months in 26 patients (76,5%) with CEAP class C6 (group II), a complete healing of venous ulcers was observed. 3-4 months after the invasive treatment in 3 patients with the large circular defect the reduction of trophic ulcer area was registered for more than 50%.

The fastest healing of the trophic ulcer (6×7 cm) was observed in a 72-year-old patient during 8 weeks after GSV radioablation. In 4 patients because of the ulcer recurrence 5 and 7 months after radioablation, trans fascial sclerotherapy of the perforating veins in the lower leg was performed. Three patients complained of the feeling of a heavy leg in the area of the obliterated trunk.

Discussion

Endovenous treatment methods of the lower limb varicosity combine a wide range of interventions, the main aim of which is considered to be the obliteration of the venous trunks and the main venous tributaries with minimal invasive puncture access under sonographic guidance. [5].

In the 90-s of the last century minimally invasive techniques have started to be used and they can be divided into 3 groups: thermal, chemical, mechanical [6]. In comparison with the surgical methods of treatment, endovascular interventions have their own advantages, namely: less traumatism, faster rehabilitation, ambulatory admissions. [3].

However, it is difficult to compare objectively the long-term results (within the period of 10-15 years) of surgical and endovenous treatment methods of CVI [4]. Both surgical and endovascular interventions are thought to be effective methods of treatment if all procedures are done correctly.

To achieve good treatment results it is important to take into consideration hemodynamic disturbances for each individual patient with varicose veins that can be revealed under ultrasonography guidance.

A special place is occupied by patients with active trophic venous ulcers, where a local therapy is an important step, except of solving the problem of reflux. [1]. Many discussions are being held regarding the performance of biological neurectomy, vacuum therapy, autodermoplasty [1].

When forming the treatment algorithm for patients with CVI of CEAP stage C5-C6 the following approach was guided: ultrasound-guidance of the superficial and deep venous system of the lower limbs had been done; determination of the localization of venous reflux and the occurrence of incompetent perforating veins.

When choosing thermal obliteration techniques (radiofrequency obliteration or endovascular laser obliteration) it was necessary to take into account the diameter of the venous trunk. At GSV diameter of 1 cm radiofrequency obliteration was preferred. With GSV diameter larger than 1 cm endovascular laser obliteration was performed.

A matter of dispute is the tactics for treating incompetent perforating veins. According to V.I. Rusin et al. [4] the indication for scleroobliteration are incompetent perforating vein diameters of 3.5 mm or larger with the pathological horizontal reflux of the blood.

The advantage of perforating veins sclerotherapy using ultrasound-guidance allowed better anatomic visualization and the obliteration of collateral veins, which can be communicated with other perforating veins [3].

The disadvantage of sclerotherapy is quite a high probability of recanalization of perforating veins and the complexity of obliteration due to impossibility of compression of fibrously altered perforating veins [1]. In such cases, the method of choice is surgical ligation of perforating vessels. The disadvantage of surgical treatment of perforating veins is a high traumatism of surrounding tissues, especially in patients with trophic changes relating to chronic venous insufficiency. Furthermore the preoperative marking of perforating vessels is thought to be obligatory prior to operation or intraoperative use of ultrasound.

There are some reports where the simultaneous radioablation of the venous trunk and sclerotization of the perforating veins and peripheral varicose veins have been described [7].

2 stages of treatment have been conducted. During the first stage radioablation of the venous trunk was carried out, and during the second – sclerotherapy. Simultaneously the radioablation and microveinectomy or surgical ligation of perfo-

rating veins have been performed.

A choice of local treatment technique of trophic ulcers depends on their clinical course. Ulcer debridement was performed by "Prontosan". In case of weeping ulcers, the silicone dressings Silfex, Sorbion S were applied. The mandatory basis for successful treatment of the venous ulcers is an adequate compression therapy. In the incisional period the patients with active ulcers were prescribed antibiotics for 10 days and low molecular weight heparin – for 10-14 days. According to data of the randomized trials, the probability of venous ulcers healing when using low molecular weight heparin increases by 20% [8]. I

Conclusion

Minimally invasive endovenous treatment techniques of the lower limbs varicosity in patients with trophic ulcers enable them to achieve better clinical postoperative results. Complete healing of trophic ulcers was observed in 76.5% of patients. To achieve positive results of treatment of an active ulcer combined with the venous reflux elimination a local treatment of wounds and adequate compression therapy which seems to promote ulcer healing should be performed.

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