

Diagnostics and Treatment of Varicose Veins of Lower Extremities in Children and Adolescents

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Abstract

Experience of diagnostics and treatment of varicose vein disease in 242 children and adolescents is presented in the article. The aim of the work is to study the experience of use of endovascular and laser technologies in treatment of varicose veins in children and adolescents.

CEAP classification was used in diagnostics. Authors applied open surgery, sclerotherapy, laser coagulation of varicose veins. All results were satisfactory good. There were no complications. Conclusions of the work: the treatment of varicose veins in children and adolescents always required individual approach; timely beginning conservative treatment allows to achieve recovery in a large group of patients; so such tactics are justified as starting in all patients; the use of compression sclerotherapy and endovascular laser obliteration allows to get recovery with best post-operative cosmetic results.

Keywords: Children, Adolescents, Varicose Veins, Laser, Coagulation, Sclerotherapy.

Introduction

Varicose veins of lower extremities are an important medical, social and economic problem. In recent years, there has been a general increase in the incidence of disease, usually in the group of people of working age; the number of complicated forms increases with the outcome of permanent disability. In many cases, the disease occurs already in childhood [8]. Annually, a high increase in new cases is noted [1, 4]. In the second half of the 20th century, significant progress was made in the diagnosis and treatment of varicose veins, but the improvement of therapeutic and diagnostic measures remains an urgent task at the present time.

In the treatment program, there is the trend of the transition from classical surgical interventions to minimally invasive and cosmetically satisfactory methods, such as laser and chemical methods of veins removal. Such a transition was impossible without perfect ultrasound technology.

Among modern methods of treatment of varicose veins, sclerosing treatment (compression

sclerotherapy) can be singled out. It is performed by the administration of liquid and foam preparations into the lumen of the vein with its subsequent obliteration [7]. Such treatment is characterized by minimal invasiveness, does not require general anesthesia, allows to avoid temporary incapacity for work. However, the use of the sclerotherapy method is accompanied by a potential risk of developing deep vein thrombophlebitis, in case of accidental penetration of the sclerosing substance in them [2]. Sclerosing treatment of varicose veins in children's surgical practice has not been worked out. Separately, it should be noted the lack of permission for use of sclerosing drugs in children, in the annotations to this drug.

The methods of percutaneous and endovascular laser coagulation of veins, which are chronologically younger, rapidly spread around the world. This is connected with their acceptable therapeutic and aesthetic results [3, 5]. In adult surgical practice, the issue of endovascular laser removal of veins has been worked out in detail, while the possibilities and peculiarities of treating adolescent patients in the literature has not been covered [6].

OBJECTIVE: To study the possibilities and generalize the experience of using intravascular and laser technologies in the treatment of varicose veins in children and adolescents.

Methods

242 patients with varicose veins of lower extremities were treated in the department of cardiovascular surgery of Children's Republican Clinical Hospital of the Ministry of Health of the Republic of Tatarstan in 2007-2013. The average age of patients was 13.4 ± 2 months. In assessing the severity of chronic venous insufficiency, the CEAP classification was used (1994). The distribution of patients by the severity of chronic venous insufficiency, according to the CEAP classification, is shown in Table 1.

Table 1. The Distribution of Patients by Severity of Chronic Venous Insufficiency (CEAP classification, 1994) (n = 242)

Degree	Number of people	Rate, %
C ₁ EpAs	182	75,2%
C ₂ EpAs	37	15,3%
C ₂ EcAs	7	2,9%
C ₂ EsAs	16	6,6%
Total	242	100

As can be seen from Table 1, C₁EpAs pathological veins - the reticular varicose veins of the subcutaneous system of a primary nature –were predominant.

In all cases, the initial tactic of treatment was an outpatient prescription of a conservative program in the form of phlebotonics + local ointment treatment +

compression therapy. Also in all cases, the ultrasound of veins of the lower extremities and the subsequent determination of the need for an operative treatment program were carried out.

The distribution of patients by the type of performed treatment is presented in Table 2.

Table 2. Distribution of Patients by the types of Treatment (n = 242) *

Type of treatment	Number of people	Rate, %
Conservative program of treatment	242	100
Traditional phlebectomy	32	13,2
Miniflebectomy	12	5
Nd: YAG laser 1064 nm, percutaneous access	26	10,7
Nd: YAG laser 1064 nm, endovascular access	2	0,8
Compression sclerotherapy	7	2,9
The source of broadband light IPL, 560 nm	5	2

* in a number of cases, two or more different types of treatment were combined

A number of patients were not operated because of parents' refusal or due to the transition to an adult network.

The study was conducted according to the program for the implementation of the grant of the President of the Russian Federation MD-809.2013.7 "Minimally invasive technologies in the surgical treatment of varicose veins of the lower extremities in children and adolescents" 2013-2014.

The devices Quantum (USA) and Fotona (Slovenia) were used for laser and light treatment. Regeneration of the skin after laser procedures was stimulated with the use of cream dexpanthenol. An important feature of the Nd:YAG laser was the selection of pulse parameters and radiation powers, that allowed to coagulate the veins confidently, up to 4 mm in diameter percutaneously, while intravascular introduction of light guide allowed to coagulate the veins up to 15 mm in diameter.

Sclerotherapy of veins was carried out within the framework of the one-center, open, non-comparative,

prospective scientific research "Evaluation of the effectiveness and safety of treatment of children and adolescents with varicose veins of the lower extremities by sclerotherapy", including the coordinating use of off-label drugs. Lauromacrogol 400 and sodium tetradecyl sulfate in concentrations of 1% -3%, in liquid and foam forms of administration were used as sclerosing agents. The method of sclerotherapy of veins of lower extremities, developed by us (a priority certificate for invention № 2013111245, dated 12.03.2013), was also used. It minimizes the potential risk of unwanted penetration of the sclerosing drug into the deep vein system.

For a number of patients, a combination of two or more different types of treatment was used.

The distribution of patients of the operational program according to the types of anesthesia is presented in Table 3.

Table 3. Distribution of Patients by the Types of Anesthesia (n = 242) *

Type of Anesthesia	Number of people	Rate, %
Premedication (anxiolytic + analgesic + antihistaminic)	23	9,5
Regional anesthesia	15	6,2
General anesthesia (intravenous, intubation anesthesia)	17	7
Local anesthesia with EMLA cream	11	4,5
Local anesthesia (tumescent, infiltration)	2	0,8

* in a number of cases, two or more different types of anesthesia were combined

From the beginning of 2013, the place of laser application has been cooled (Zimmer-Cryo, Slovenia).

To evaluate the results of the treatment, a series of digital photographs, taken before and after treatment (Nikon D3100), ultrasound investigations (apparatus Acuson Sequoia, Sonosite M-turbo) were used.

Results and Discussion

The tactics of individual determination of therapeutic and diagnostic methods allowed to provide each patient with an adequate treatment.

In particular, it was found, that a timely beginning conservative treatment program allowed to achieve the recovery/mend in 33 (13.6%) patients and the stabilization of process - in 73 (30.2%) patients. These indicators are significantly higher than those in adult patients.

The mend was observed in all operated patients, including cases of applying the laser technologies and sclerosing treatment. Thus, all patients, who had received treatment, were transferred to the stage C₀ CEAP and all the obtained results can be assessed as good.

There were no complications.

It should be emphasized, that the age-specific features of etiopathogenesis and clinical course of varicose veins of the lower extremities in children and adolescents determine a special therapeutic and diagnostic tactics. As the study showed, a significant proportion of patients were people, whose improvement was achieved only through the conservative program. At the same time, the introduction of modern, minimally invasive, cosmetically acceptable methods for the removal of varicose veins facilitates the task of the doctor in choosing the method of treatment. In addition, a group of patients with a congenital nature of chronic venous insufficiency was identified, when traditional surgical and modern high-tech methods proved to be ineffective in controlling further disease progression. The development of a medical diagnostic algorithm with the selection of criteria for the adoption of key tactical decisions is seen as a serious task, the solution of which requires additional researches.

Summary

1. Treatment of varicose veins of the lower extremities in children and adolescents always requires an individual approach;

2. Timely beginning and carefully organized conservative treatment allows to achieve recovery/mend in a large group of patients; in

connection with this such tactics are justified as starting in all patients.

3. The use of compression sclerotherapy and intravascular laser obliteration allows to achieve recovery with the best post-operative cosmetic results;

Conclusion

Performing of conservative treatment program is more effective in the adolescent group of patients, where the stabilization of the disease occurs more often by 4.25 times than in adult patients, and in 13.6% complete cure is achieved. In the treatment of adolescent patients, EVLA provides an effective and safe occlusion of varicose veins.

The introduction of new method of stem sclerotherapy of varicose veins and the optimization of the use of endovenous laser ablation allow to achieve recovery with a reliable improvement in the quality of patients' life.

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References

- [1] Callejas, J.M., Manasanch, J., ETIC Group, *IntAngiol*, 2004, Vol. 23(2), pp. 154-63.
- [2] Cavezzi, A., Parsi, K., *Phlebology*, 2012, Vol. 27 Suppl 1, pp. 46-51.
- [3] Johnson, C.M., McLafferty, R.B., *Vascular*, 2007, Vol. 15(5), pp. 250-4.
- [4] Nelzén, O., Fransson, I., *Eur J.Vasc.Endovasc. Surg.*, 2007, Vol. 34(5), pp. 605-12.
- [5] Rasmussen, L.H., Lawaetz, M., Bjoern, L., Vennit,s B., Blemings, A., Eklof, B., *Br. J. Surg.*, 2011, Vol. 98(8), pp. 1079-87.
- [6] Rass, K., Frings, N., Glowacki, P., Hamsch, C., Gräber, S., Vogt, T., Tilgen, W., *Arch Dermatol*, 2012, Vol. 148(1), pp. 49-58.
- [7] Schadeck, M., *Phlebologie*, Vol. 45(4), pp. 509-12.
- [8] Weindorf, N., Schultz-Ehrenburg, U. *Phlebologie*, 1990, Vol. 43(4), pp.573-7.
- [9] Moffatt C.J., Franks P.J., Doherty D.C. Prevalence of leg ulceration in a London population. *QJM*. 2004. – Vol.97. – Pp.431-37.
- [10] Nelzen O., Dergan J.J., Shortell C.K. *Epidemiology of venous ulcers*. Elsevier. 2007. – Pp.27-41.