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Mitochondrial DNA Impairments Affect Mitochondria's Functional State in Varicose Veins

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Background: Molecular pathogenesis of varicose vein disease is far from being understood. In our previous studies we showed the decreased mitochondrial DNA (mtDNA) copy number and its impaired integrity in varicose veins. There is an evidence of the link between mtDNA copy number, mitochondrial membrane potential, oxygen consumption, and ATP synthesis. Varicose veins are characterized by endothelial dysfunction and reduction of smooth muscle cells' contractile function. We aimed at investigating possible alterations of mitochondria functions (in in terms of mitochondrial membrane potential of the vein wall constituents: endothelial cells (ECs) and smooth muscle cells (SMCs) of t. intima and t. media layers, correspondingly) in varicose veins.

Methods: The study was conducted according to the principles written in the Declaration of Helsinki and approved by our institutional committee. Post-operation material of paired GSV samples (varicose (VV) and non-varicose (NV) vein segments left after surgery from a corresponding patient, C2-C4 CEAP classes) was placed in cell culture media and subjected to live-staining with mitochondrion-selective fluorescent probes: mitochondrial membrane potential-dependent TMRM and -independent MitoTracker Deep Red, as well as with nucleus-selective probe NucBlue. To visualize a particular vein wall layer, images were taken at different z-axis series using laser scanning confocal microscopy. Measurements of signal intensities were performed using ZEN 3.1 (blue edition) software (Zeiss, Germany). Relative levels of mitochondrial membrane potential were calculated as the [mitochondrial membrane potential-dependent/mitochondrial membrane potential-independent intensities] ratios within each cell/image field/sample. Statistical analysis was performed in Excel and STATISTICA packages, using Student's t-test (for comparison between multiple cells/image fields within a subgroup) and Wilcoxon-signed rank test (for comparison between paired NV and VV segments).

Results: We found that that mitochondrial membrane potential was decreased in ECs and SMCs of VV compared to NV segments 2.98- and 5.08-fold, correspondingly ($n=5$, $p<0.05$). The representative images are shown in Figure 1. More thorough analysis will be performed in the nearest future.

Conclusion: Though preliminary, these findings provide a possible link between vascular ECs and SMCs functional activity and their mtDNA content in varicose veins. The work was supported by the Russian Science Foundation (project No. 22-25-00832).

Keywords: varicose veins, endothelial cells, smooth muscle cells, mitochondrial membrane potential

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Background: The Superficial Venous Insufficiency currently has many therapeutic options to treat it without the need of the saphenous extraction due to the minimally invasive endoablative techniques. A long the time, We have progressed using thermal methods and today we come to the non-thermal and non-tumescent techniques like to the Mechano-Chemical Ablation with two kind of catheters obtaining significant results in our patients with a very low incidence in complications demonstrating favorable therapeutics benefits. Our mean objective is to demonstrate the benefits that MOCA or Non-Thermal and Non-Tumescent ablation of the great saphenous vein in our second study using a retractable cutting elements catheter together with sclerosant foam release; Offering a safe procedure to our patients; Reduce the low incidence of the complications and Demonstrate similar results in a shorth term in comparison with thermal methods.
Methods: We conducted a retrospective review of the second clinical study of Mechano-Chemical Ablation of the great saphenous vein.Technique: Insite the procedures gate or medical office with sterile technique previously with an ultrasound mapping we started the procedure placing local anesthesia with lidocaine 2%.Ultrasound-guided puncture and place the sheath 6 Fr in GSV, then Introduces the Flebogrif catheter through sheath on the guide wire and locate the catheter tip 3cm from SFJ. We started the ablation mechanically, releasing the cutting elements pulling the device constantly and after the first 10mm of cut, started the chemical ablation releasing 3% polidocanol foam until we reached the sheath. The catheter, guide wire and sheat were removed and local compression was applied. The distal segment of the GSV was treated with foam sclerotherapy. At the end of the procedure the compression stoking grade II was applied and the patient walks freely.
Results: The 1st cut to our initial group was 120 Great Saphenous Veins of which 60% were left and 40% were right. The GSV Occlusion rate under ultrasound control was 96% in the first month and 94% in the third and sixth month and finally GSV Total occlusion at 12 months.The Main Complications was in 1.66% with a Thrombosis in the SFJ. The minor events like to bruises, ecchymosis, phlebitis and hyperpigmentation were in at least 10% of the cases.
Conclusion: The Non-Thermal ablation with Flebogrif catheter is safe and comfortable to our patients with a high venous total occlusion rate without neurological and skin damage.We obtained a slightly higher occlusion rate compared to thermal methods with a low complication rate.
Keywords: Mechano-Chemical Ablation, MOCA, Great Saphenous Vein, Sclerosis Agent, Ablation Catheter

The Role And Value Of Endovascular Treatment In Patients With Acute Deep Vein Thrombosis Of Lower Extremities

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Background: One of the causes of high mortality from cardiovascular diseases is acute deep vein thrombosis of lower extremities (ADVTLE). One of the outcomes of ADVTLE is a post-thrombophlebitic syndrome of the lower extremities, which reduces the quality of life and often disables patients. The purpose of the study was to improve the results of treatment of patients with ADVT by improving endovascular interventions.
Methods: The results of treatment of 105 patients with ADVTLE treated in the multidisciplinary clinic of Tashkent Medical Academy during 2014-2019 were analyzed. All patients underwent catheter-directed mechanical thromboaspiration and thrombolysis. The mean age of patients was 55±7.2 years. Patients were divided into 2 groups: group 1 - 55 (52%) patients, who underwent endovascular interventions by popliteal access, group 2 - 50 (48%) patients, access was performed at the level of distal the end of the thrombus. For diagnosing, ultrasound, MRI phlebography were used.
Results: In the 1st group after thrombolysis, complete venous recanalization occurred in 27 (49.1%) patients, partial in 19 (34.5%) patients, minimal in 9 (16.4%) patients. In 3.6% of patients, early retrombosis occurred on the 3rd day after thrombolysis. In 2 (3.85%) cases, retrombosis developed on the 6th month, and in 2 (3.85%) patients after a year. A hematoma developed in 2 patients, which required conservative correction. In group 2, 45 (90%) patients achieved clinical success after thrombolysis therapy. Complete venous recanalization occurred in 33 (66%) patients, partial in 12 (24%) patients, minimal in 5 (10%) patients. In long-term period of treatment (6-12 months), 94% of patients had stable recanalization at the range of 50-95%-95-100%. The number of patients with recanalization up to 50% increased to 5 (10.6%). Rethrombosis was observed in 1 (2.0%) patient. The used technique resulted to shorten the length of thromboaspiration from 40±4 min to 30±3 min and thrombolysis from 360±14 min to 300±10 min, a decrease in the dose of fibrinolytic from 2.8 million U to 2.0 million U.
Conclusion: Endovascular treatment of ADVTLE is the method of choice, while access to thromboaspiration and thrombolysis therapy is considered an important point. In case of shin deep vein thrombosis for endovascular intervention, the veins of the shin should be catheterized, in case of thrombosis of the popliteal-femoral segment - to catheterize the popliteal vein, in case of iliac veins thrombosis - femoral vein should be catheterized. So, thromboaspiration and thrombolytic therapy are recommended to start from the distal end of the thrombus.