Proceedings of the
9th International Congress of the
Central European Vascular Forum
CEVF

Rome, Italy
(October 16-18, 2014)
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The heart and venous thromboembolism: practical issues

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Aim

The interrelation heart-venous thromboembolism (VTE) seems to be bidirectional: heart damage is present with variable intensity in the patients with VTE and vice versa, heart disease is often complicated by a venous disorder. We aimed to assess this interrelationship in casuistry of a Cardiology Clinic.

Materials and methods

We selected a total of 105 patients (p) from the hospitalized cases within 1 year in a Cardiology Clinic, with NYHA III and IV heart failure of ischemic cause 39p, 26p with valvular diseases, cardiomyopathy 19p, 21p with hypertension and 51 patients hospitalized for pulmonary embolism (PE) diagnosed according to current guidelines (angioCT). A lot of 10p without symptomatic heart failure were also further explored by using venous ultrasound.

Cardiological assessment was completed by: history, physical examination, ECG, chest radiography, echocardiography examination, venous ultrasound, abdominal ultrasound, biological examinations (ordinary tests, including proBNP, troponin). We followed up the patients also by clinical, ECG and venous ultrasound surveillance for a period of 45 days.

Results

In control group we found two situations with discrete backward flow in vena cava and in great veins of the upper limb and in 3p pulsatile changes in the venous system associated with the cardiac cycle. In 42p with severe heart failure accompanied by severe tricuspid insufficiency and in 21p with associated cor pulmonale we documented an increase in transmission of changes in pressure and flow in the venous caval system (Fig. 1) and one of the lower limbs.

Casuistry hospitalized with PE was divided into clinical forms - microembolism (19p), moderate pulmonary embolism (21p) and severe pulmonary embolism (11p). Analysis of risk factors (Table I) reveals the presence of heart failure in a significant proportion (73%) in microembolism, 57% in moderate and 45% in massive embolism.

Deep venous thrombosis (DVT) has been associated in 21% in microembolism, 66% in moderate forms and 90% in massive forms, and a history of pulmonary embolism in 10%, 18% and 54%, respectively. Prolonged bed rest in postsurgical casuistry is a third reason for DVT and PE. ECG abnormalities were: right axis deviation, right bundle branch block (RBBB), pseudoinfarct, ST abnormalities, negative T waves; 10p with pulmonary pressures below 40 mmHg had normal ECG; S1Q3T3 and RBBB were associated with high pressures and severe clinical forms.

In 12p. the ECG abnormalities improved in 7-14 days and in 10p. improved in 45 days after the reduction of pulmonary pressure and the improvement of right ventricular function.

Discussion

From hemodynamically point of view, central venous pressure reflects pressional changes in the right atrium; there are two moments of increased venous inflow in atria: during ventricular systole and after opening the atrioventricular valves, respectively two moments in which the venous flow is reduced: after atrial contraction and during the last part of ventricular systole.1 Reversing of the flow toward venous system is generally not obvious given its high distensibility and compression mechanisms. In few controls we have noticed pulsatile changes and discrete reflux in upper limbs, that can be non-pathological.

In patients with severe heart failure or cor pulmonale and tricuspid regurgitation we detected an increase in the transmission of changes in pressure and venous flow.
direction in cava and the lower limbs. The flow wave is like the arterial wave but with a less accurate periodicity, the direction of flow is different and lacks the characteristic triphasic appearance of arterial wave.1 Heart failure is an important risk factor for VTE, lower limb edema favoring increased venous pressure.2 Cor pulmonale and even exacerbation of COPD is often associated with VTE.2 2/3 of patients with pulmonary microembolism has associated heart failure while DVT was documented in 90% of p. with massive pulmonary embolism. Electrocardiographic abnormalities were ST, RBBB, S1Q3T3 at p. with increased pulmonary pressure and elevated right ventricular end-systolic pressure (Fig. 2). Normalization of electrocardiogram was obtained at most in 7-14 days after the reduction of pulmonary pressure with improvement of right ventricular function and relatively in parallel to the resumption of venous flow in agreement with the literature.3-6 Echocardiography is an essential objective exploration in the clinical evaluation (Figs. 3, 4)7,8 and the angio-CT remains the “gold standard” (Fig. 5).

**Conclusion**

Transmision of cardiac pulsations and venous reflux in the atrium and peripheral venous circulation tricuspid insufficiency are common in heart failure or cor pulmonale with tricuspid insufficiency. Heart failure is an important risk factor for VTE. Electrocardiographic and echocardiographic abnormalities in VTE are reversible after the reduction of pulmo-

| Table I. – Risk factors in different clinical forms of VTE. |
|---------------------------------|-----------------|-----------------|-----------------|
| Risk factors:                    | Micro embolism (n=19) | Moderate pulmonary embolism (n=21) | Massive pulmonary embolism (n=11) |
| Deep venous thrombosis           | 4 (21.05%)        | 14 (66.67%)      | 10 (90.90%)      |
| History of pulmonary embolism    | 2 (10.52%)        | 18 (85.71%)      | 6 (54.54%)       |
| Chronic venous insufficiency     | 9 (47.36%)        | 16 (76.19%)      | 6 (54.54%)       |
| Obesity                          | 9 (47.36%)        | 17 (80.95%)      | 5 (45.45%)       |
| Heart failure                    | 14 (73.68%)       | 12 (57.14%)      | 5 (45.45%)       |
| Cancer                           | 1 (5.26%)         | 0                | 0                |
| Surgery                          | 0                | 3 (14.28%)       | 0                |
nary pressures and the improvement of right ventricular function.
Interrelation heart-venous system is complex, bidirectional and not insignificant.

References
Catheter directed thrombolysis

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Aim
Deep venous thrombosis (DVT) is a common disease with serious clinical sequelae. In acute phase it is complicated by pulmonary embolism and in chronic with post-thrombotic syndrome (PTS). PTS is characterized by several symptoms and signs, which develops during months following the acute event due to venous hypertension caused by complete or partial persistent venous occlusion or damaged venous valves. It is observed in about 30-70% of patients with previous DVT. Typical symptoms of PTS are swelling, aching, itching, heaviness, cramps and signs like edema, telangiectasia, brown discoloration, venous eczema, secondary varicoses, lipodermatosclerosis and as the most serious consequence - venous ulcer, which is detected in about 3% of patients. Probably the most important risk factor for PTS is extensive DVT affecting iliac and femoral veins, which is seldom completely recanalised with preserved venous valves distally. The other important risk factors are: not optimal anticoagulant treatment, previous ipsilateral DVT, higher body mass index, higher age, female sex. PTS is associated with reduced quality of life and its treatment results in high costs. PTS is usually progressive without preventive treatment, and therefore it is obvious that younger patients have relatively worse prognosis. Graduated knee high compression stockings for two years, were cornerstone of the additional therapy till recently, when SOX trial surprisingly did not show any benefit of compression. Because anticoagulants have no thrombolytic effect, and with presumption that when veins are recanalised - so called open vein hypothesis, the outcome is better, thrombolytic treatment has been suggested.

Materials and methods
Systemic thrombolysis used in previous years has been discouraged, because of serious adverse events - bleedings, although it was effective in restoration of blood flow. With locally administered thrombolitics, lower dosages of thrombolytic agents can be used, and systemic effects of the treatment are not so pronounced. Therefore less adverse events are expected. In recent years catheter directed thrombolysis (CDT) has been used in several centers. However only two randomized studies exist. In the first one by Elsharawy and Elzayat with 35 patients included after 6 months patency of the affected veins was better (72% vs. 12%) and less reflux was detected in CDT treated patients than in anticoagulated only patients. In Enden and coworkers study in 209 patients there was 26% relative and 14.4% absolute risk reduction of PTS after two years follow up (44.1% vs. 55.6%). There was no intracranial bleeding, but there were more clinical relevant and minor bleeds. Reviewing observational data of 7188 patients from Nationwide Inpatient Sample database Bashir et al. reported that there were more adverse events in CDT treated group, but the mortality was the same. Vedantham et al. in their analysis included 30 studies in patients with acute DVT treated with CDT. They reported at least 50% of thrombus resolution in 91% of patients and major bleedings in 2.8%, but PTS, which is probably the most important outcome, has not been assessed. With these data some societies changed the attitude towards CDT. NICE guidelines suggested usage of CDT in patients with acute extensive DVT, with good life expectancy and without bleeding risk. In ACCP consensus document authors suggest anticoagulant therapy over CDT, but they also suggest that it can be considered in experienced centers in acute extensive DVT.

Results
We present here our experiences with CDT. We treated 28 patients (18-75 years) with acute (less than 3 weeks old) extensive iliofemoropoplital DVT, with long life expectancy, and without contraindications for thrombolysis. CDT was performed by puncturing of the popliteal vein even if occluded under ultrasound guidance and catheter was placed in the thrombus and a continuous infusion of rt-PA (Actilyse, Boehringer, Ingelheim) at 1 mg/h started. The effect of CVT was assessed by x-ray phlebography at regular intervals twice daily. At that time catheter was replaced in the thrombus when partial lysis was achieved. Treatment was stopped, when complete lysis was detected or after 48 hours. All patients were treated with oral anticoagulants during follow up period and compression stockings were prescribed, too. Patients were followed by clinical evaluation (Villalta scoring for PTS) and duplex ultrasound at 6 and 12 months. Primary treatment success was detected in 21 (71%) patient. However, clinical improvement was detected in 25 (92%) patients - probably due to recanalisation of small collaterals. The follow-up results at 6 and 12 months were nearly the same. Complete ly-
sis of the affected veins assessed by ultrasound and no PTS by scoring was detected in 13 (46%) and partial success mild post-thrombotic syndrome and partial recanalisation was detected in 9 patients (36%), two patients were lost for follow-up. Only mild hemorrhages at the puncture site in 14 (56%) and no serious adverse events were registered during treatment or follow up. When we compare our results with Enden’s, we have to say that our primary succes was worse (lysis >50%: 80% against 89%). We have no enough data on PTS after two years follow up, but one year’s results (still not complete) show only mild PTS in 10 (35%) of patients, which is comparable to Enden’s study (41.4%). We did not detect any recurrent DVT or PE and we registered only minor bleedings in 4 patients on the puncture site.

Conclusion
CDT, although known for a long time, has been recently more commonly used in DVT treatment. There are still some doubts about this kind of treatment in the scientific community. Most probably because it is difficult to objectively assess the efficacy and therefore its is difficult to define the outcome itself. PTS, as the most important adverse event in DVT patients, is not present in about half of the affected patients due to spontaneous recanalisation and it develops in years following the acute event - probably with longer observation period more PTS. There is also no absolute correlation between symptoms, signs and patients’s disability. The techniques are different in different centers considering dosage of thrombolytic (tissue plasminogen activator - rt-tPA, urokinase), its application (continuous infusion, pulse spray, bolus), concomitant anticoagulant treatment (full anticoagulation, subtherapeutic, no anticoagulation during lysis). The inclusion criteria are also different, but majority includes only patients with DVT up to 3 week old. There are also a lot of contraindications: structural intracranial disease, previous intracranial hemorrhage, ischemic stroke within 3 months, active bleeding, recent brain or spinal surgery, bleeding diathesis. CDT is not indicated in fragile patients with life expectancy less than one year. Therefore only about 10% of DVT patients could be considered for CDT.

Questionable is its cost effectiveness. However, looking at recent studies it has a place in treatment of selected patients with DVT.

References
Update on the use of anti-thrombotic therapy in acute coronary syndromes

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Introduction
Cardiovascular diseases are currently the leading cause of death in industrialized countries. Among these, coronary artery disease (CAD) is the most prevalent manifestation and is associated with high mortality and morbidity.\(^1\) It is well established that acute coronary syndromes (ACS) in their different clinical presentations share a widely common pathophysiological substrate. ACS represents a life-threatening manifestation of atherosclerosis. It is usually precipitated by acute thrombosis induced by a ruptured or eroded atherosclerotic coronary plaque, with or without concomitant vasoconstriction, causing a sudden and critical reduction in blood flow.\(^2,3\)

STE-ACS and NSTE-ACS
Acute chest pain and persistent (>20 min) ST-segment elevation (STE-ACS) generally reflects an acute total coronary occlusion. The therapeutic objective is to achieve rapid, complete, and sustained reperfusion by primary angioplasty or fibrinolytic therapy, while in acute chest pain but without persistent ST-segment elevation (NSTE-ACS) the initial strategy is to alleviate ischaemia and symptoms, to monitor the patient with serial ECGs, and to repeat measurements of markers of myocardial necrosis. At presentation, the working diagnosis of non-ST-elevation ACS (NSTE-ACS), based on the measurement of troponins, will be further qualified as non-ST-elevation MI (NSTEMI) or unstable angina. In a certain number of patients, coronary heart disease will subsequently be excluded as the cause of symptoms.

Antithrombotic therapy
a) Antiplatelet treatment
Platelet activation and subsequent aggregation play a dominant role in the propagation of arterial thrombosis and consequently are the key therapeutic targets in the management of ACS. In ST-elevation ACS (STE-ACS) and in non-ST-elevation ACS (NSTE-ACS) dual antiplatelet therapy (DAPT) with aspirin and an ADP-receptor blocker is recommended; aspirin (acetylsalicylic acid) targets cyclo-oxygenase (COX-1), inhibiting thromboxane A2 formation and inducing a functional permanent inhibition in platelets \(^4,7\). A P2Y12 inhibitor should be added to aspirin as soon as possible and maintained over 12 months, unless there are contraindications such as excessive risk of bleeding. Ticlopidine was the first thienopyridine investigated in ACS, but was replaced by clopidogrel because of side effects. Today Ticlopidine may still be used in patients who are allergic to clopidogrel. There is wide variability in the pharmacodynamic response to clopidogrel linked to several factors, including genotype polymorphisms. In the Clopidogrel in Unstable angina to prevent Recurrence Events (CURE) trial, a clopidogrel hydrogen sulfate 300 mg loading dose followed by 75 mg daily maintenance for 9-12 months in addition to aspirin reduced the incidence of cardiovascular death and non-fatal MI or stroke compared with aspirin alone (9.3% vs. 11.4%; RR 0.80; 95% CI 0.72-0.90; P, 0.001) in patients with NSTE-ACS associated with elevated cardiac markers or ST-segment depression on ECG or age 60 years with prior CAD history.\(^5,6\) Today, if no history of prior stroke/TIA, age <75 years and body weight >60 kg, prasugrel is recommended in both STE-ACS and NSTE-ACS. Prasugrel requires two metabolic steps for formation of its active metabolite, which is chemically similar to the active metabolite of clopidogrel.\(^9\) The first metabolic step requires only plasma esterases; the second step, in the liver, is mediated by CYP enzymes. Consequently prasugrel produces more rapid and consistent platelet inhibition compared with clopidogrel.\(^10\) Response to prasugrel does not appear to be affected significantly by CYP inhibitors, including proton pump inhibitors, or loss-of-function variants of the CYP2C19 gene; nor is it affected by reduced ABCB1 function.\(^11\) Ticagrelor belongs to a novel chemical class, cyclopentyltriazolopyrimidine, and is an oral, reversibly binding P2Y12 inhibitor with a plasma half-life of 12 h. The level of P2Y12 inhibition is determined by the plasma ticagrelor level and, to a lesser extent, an active metabolite.\(^12\) Like prasugrel, it has a more rapid and consistent onset of action compared with clopidogrel, but additionally it
has a quicker offset of action so that recovery of platelet function is faster. In this way ticagrelor (180-mg loading dose, 90 mg twice daily) is preferred in all patients at moderate-to-high risk of ischaemic events, regardless of initial treatment strategy and including those pre-treated with clopidogrel; while prasugrel (60-mg loading dose, 10-mg daily dose) is recommended for P2Y12-inhibitor-naïve patients (especially diabetics) in whom coronary anatomy is known and who are proceeding to PCI unless there is a high risk of life-threatening bleeding or other contraindications. Clopidogrel (300 mg loading dose, 75 mg daily dose) is recommended for patients who cannot receive ticagrelor or prasugrel. Among patients who are already treated with DAPT, the addition of a GP IIb/IIIa receptor inhibitor for high-risk PCI (elevated troponin, visible thrombus) is recommended if the risk of bleeding is low. The three GP IIb/IIIa receptor inhibitors approved for clinical use are i.v. agents belonging to different classes: abciximab is a monoclonal antibody fragment; eptifibatide is a cyclic peptide; and tirofiban is a peptidomimetic molecule. Eptifibatide or tirofiban added to aspirin should be considered prior to angiography in high-risk patients not preloaded with P2Y12 inhibitors.13

Recently, a new anti-platelet drug Vorapaxar has been tested in patients with atherosclerotic vascular disease or previous myocardial infarction who were receiving standard antiplatelet therapy. Vorapaxar sulfate is part of the protease-activated receptor 1 (PAR-1) antagonist family, a new class of anti-platelet drug. It functions by inhibiting thrombin-related platelet aggregation and this mechanism works by a different pathway than other anti-platelet medications such as aspirin and P2Y12 inhibitors. TRA 2°P-TIMI 50 (Trial to Assess the Effects of Vorapaxar in Preventing Heart Attack and Stroke in Patients With Atherosclerosis-Thrombolysis In Myocardial Infarction 50) study of Vorapaxar was carried out in patients who had previously experienced a myocardial infarction, stroke, or who had peripheral arterial disease (PAD). The addition of Vorapaxor to standard of care (aspirin and/or an ADP antagonist such as clopidogrel) significantly reduced the risk of the primary composite endpoint of cardiovascular death, myocardial infarction, stroke or urgent coronary revascularization compared to placebo plus standard of care.14 Among patients with a history of myocardial infarction, lower occurrence of cardiovascular death, myocardial infarction, or stroke occurred was shown in the group taking Vorapaxor compared with the placebo group. In the same subgroup, adding Vorapaxor to standard of care was associated with an increased rate of GUSTO moderate or severe bleeding compared to adding placebo. Rates of TIMI clinically significant bleeding and rates of TIMI major bleeding not related to coronary-artery bypass grafting were also both significantly increased in the Vorapaxor group as compared with the placebo group; instead there was no statistically significant increase in intracranial hemorrhage and fatal bleeding in the same subgroup.14

b) Anticoagulant treatment

Anticoagulants are used in the treatment of NSTE-ACS to inhibit thrombin generation and/or activity, thereby reducing thrombus related events. There is evidence that anticoagulation is effective in addition to platelet inhibition and that the combination of the two is more effective than either treatment alone. Several anticoagulants, which act at different levels of the coagulation cascade, have been investigated or are under investigation in ACS: indirect inhibitors of coagulation (need antithrombin for their full action): indirect thrombin inhibitors (UFH, LMWHs); indirect factor Xa inhibitors (LMWHs, fondaparinux); direct inhibitors of coagulation: Direct factor Xa inhibitors (apixaban, rivaroxaban, atomixaban); direct thrombin inhibitors (bivalirudin, dabigatran).15 In primary PCI an injectable anticoagulant must be used: Bivalirudin (with use of GP IIb/IIIa blocker restricted to bailout) is recommended over unfractionated heparin and a GP IIb/IIIa blocker. Enoxaparin (with or without routine GP IIb/IIIa blocker) may be preferred over unfractionated heparin, but fondaparinux is not recommended for primary PCI. In a NSTE-ACS fondaparinux (2.5 mg subcutaneously daily) is recommended as having the most favorable efficacy-safety profile with respect to anticoagulation. In the OASIS-5 study, 20 078 patients with NSTE-ACS were randomized to receive 2.5 mg of subcutaneous fondaparinux once daily or subcutaneous enoxaparin 1 mg/kg twice daily for 8 days maximum (average 5.2 vs. 5.4 days, respectively). The primary efficacy outcome of death, MI, or refractory ischaemia at 9 days was 5.7% for enoxaparin vs. 5.8% for fondaparinux (HR 1.01; 95% CI 0.90-1.13), fulfilling the criteria for non-inferiority.16 At the same point, major bleedings were halved with fondaparinux: 2.2% compared with 4.1% with enoxaparin (HR 0.52; 95% CI 0.44-0.61; P=0.001). Major bleeding was an independent predictor of long-term mortality, which was significantly reduced with fondaparinux at 30 days and at 6 month. At 6 months the composite endpoint of death, MI, or stroke was significantly lower with fondaparinux vs enoxaparin. In the population submitted to PCI, a significantly lower rate of major bleeding complications (including access site complications) was observed at 9 days in the fondaparinux group vs. enoxaparin (2.4% vs. 5.1%; HR 0.46; 95% CI 0.35-0.61; P<0.001).

c) New oral anticoagulants

After a recent acute coronary syndrome, patients remain at risk of recurrent events. Rivaroxaban, co-ad-
ministered with acetylsalicylic acid (ASA) alone or with ASA plus clopidogrel or ticlopidine, is indicated for the prevention of atherothrombotic events in adult patients after an acute coronary syndrome with elevated cardiac biomarkers. It is the only NOA with phase III positive data. As shown in the ATLAS ACS 2 - TIMI 51 trial, Rivaroxaban 2.5 mg BID, in patients treated also with ASA and Thienopyridines, reduced the risk of the composite end point of death from cardiovascular causes, myocardial infarction, or stroke (-15%, P <0.01), cardiovascular deaths (-38%, P <0.001), and all causes of death (-36%, P <0.001). Furthermore, Rivaroxaban increased the risk of major bleeding and intracranial haemorrhage but not the risk of fatal bleeding. 13

Conclusion
In the course of a few years, the antithrombotic treatment of patients with SCA has been revolutionized by the availability of multiple drugs, sometimes complementary and sometimes alternative to each other. The plethora of alternative therapies requires greater attention to the specific characteristics of individual agents in order to maximize the risk benefit and cost/benefit.

References
The cure of varicose veins by cryostripping

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Aim

The modern cure of varicose veins is represented by venous reflux surgery. Whether it is about a longitudinal or transverse reflux it should be interrupted. The dilated superficial varicose vein must be excised or removed. Surgical procedures have been diversified. In addition to classic stripping occurred endothermal and cryostripping methods.

The aim of the study is the presentation of a new surgical technique that we used in the cure of varicose veins the cryostripping.

Materials and methods

The principle of this method consists in venous catheterization with a special probe which is cooled to -85 °C and makes a good adherence to the vein and thus can be removed. In technical terms, the surgery begins by crossectomy. The approach is by a minimum incision in inguinal fold. We cut the vein from the beginning. Thus by traction on the proximal stump, from confluence of femoral vein, we put in tension collaterals that could be more easily highlighted and legated. The ligation and section of the saphenous cross we have make it at the entrance to the femoral vein.

We performed then the distal vein catheterisation, retrograde from thigh to the lower leg in case of saphena magna (Fig. 1) and from popliteal fossa to malleolus, in case of saphena parva. The probe is smooth (Fig. 2) and can be easily inserted even if saphena path is tortuous, helping us with flexion and extension movements of light leg on the thigh. By connecting the probe to the device ERBO-CRYO, the cooling occurs at -85 °C. When the vein becomes adherent to the probe we extracted it by repeated traction at every 4-5 seconds, time needed for cooling the probe. The complete stripping takes 45-60 seconds (Fig. 3). When it was necessary phlebectomies using Varady hook were performed. We lined the inguinal wound and microincisions by sticking with steri-strips. Depending on the number of phlebectomies the entire procedure takes 30-45 minutes.

Results

We performed 212 surgeries from September 2013 until now. Distribution by age and sex are shown in table 1. Most operated cases were women included in the decade of 3rd and 4th of life. We had no major complications. The average duration of intervention was 40±10 minutes. The mean duration of hospitalization was 1.3 days. In 8.4% (18 cases) were a postoperative hemato-
ma. Postoperative pain was insignificant. Mobilization was early, a few hours after surgery according practiced anesthesia (local, or regional).

**Discussion**

The treatment of hydrostatic varicose veins by cryostripping was practiced for the first time in 1987. Since 1990 it is currently practiced in some phlebological centers from Germany. As national premiere we introduced it in the Surgical Clinic I of Timisoara in 09.09.2013. The principle of action is the Joule Thomson effect: by the action of low temperature, -85 °C, vein joins the probe tip and by traction invaginates over the probe (Fig. 4). Low temperature is obtained with nitrogen oxide. Adherence is extremely strong, thus the vein is practically glued to the probe. So we can practice vein stripping when has been withdrawn the probe. The literature describes the introduction of the probe by guided percutaneous. We have not used this method.

The cryostripping presents a series of advantages. First is a minimally invasive method because it is only practiced with a minimal incision in the inguinal fold for the crossectomy. When the phlebectomies are necessary these are performed by microincisions which not require subsequent sutures. The procedure removes safety the compromised veins and refluxes, thus respecting the surgical principles of varicose veins. Cryostripping is a superior method then classic stripping because the latter is achieved through several incisions that have the risk of interception the nerves (saphenous, sural) and was accompanied by postoperative hematoma. Unlike endothermal procedures (EVLT, VENEFIT) the cryostripping avoids thermal injury of skin, eradicates diseased vein so there is no risk of relapse by ripermeabilisation of the vein. Crossectomy is properly done and the collaterals are interrupted. The method is cheaper from the economic point of view, because cryoprobe it is sterilise opposed to radiofrequency and laser fiber, which are disposable and have a higher cost. Cosmetic results are comparable to those of the endothermal methods (single microincision) and skin or subcutaneous lesions are absent in a study of 6,000 patients. The same study reported nerve damage less than 1%. Regarding postoperative hematoma, they have a much lower incidence compared with classic stripping due to spasm of collateral disconnected, drainage selectively and applying external compression immediately after

**Table I.** – Age and sex distribution of operated batch.

<table>
<thead>
<tr>
<th>Age</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
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<td>29</td>
<td>14</td>
<td>7</td>
<td>212</td>
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</tbody>
</table>

**Figure 4.** – Appearance of the vein extracted by invagination on top of the probe.

**Table II.** – Comparative advantages and disadvantages of classic stripping, cryostripping and endothermal procedures.

<table>
<thead>
<tr>
<th></th>
<th>Classic stripping</th>
<th>Cryostripping</th>
<th>Endothermal procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic effect</td>
<td>±</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Recurrence</td>
<td>-</td>
<td>-</td>
<td>± 11</td>
</tr>
<tr>
<td>Nerves damage</td>
<td>+</td>
<td>±</td>
<td>±</td>
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<tr>
<td>Day surgery</td>
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</table>
stripping. Other advantages of the method are the short execution time and slightest postoperative pain because the procedure is minimally invasive and atraumatic. Recovery and social reintegration are faster because the intervention is suitable for day surgery conditions. In table II the advantages and disadvantages of the three types of varicose vein approach: stripping classic cryo-stripping and endothermal processes are presented.

The cryostripping indications are: all cases of valvular insufficiency requiring saphenectomy (internal, external); all cases with reflux on collaterals cross or trunks of saphenous veins; in all stages of disease progression; at patients with distal lower limb edema - an indication of choice; associated with endoscopic ligatures of perforating veins, in case of trophic ulcers of lower leg.

**Conclusion**

Cryostripping is an effective therapeutic method. It is applicable in day surgery. Combine the advantages of classic stripping with those of the endothermal procedures. Combine the radicality and efficiency of surgery with mini invasiveness and cosmetic advantage of endothermal procedures. Perfectly adapted to the economic conditions of the health system in Romania.

**References**

Sclerotherapy technique using endovenous catgut inclusions

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Aim

Sclerotherapy is a conservative method in the IVC treatment, which is the recommended for the small and middle caliber varicose veins, the remaining varices after saphenectomy and recurrent varices.1,2 Sclerotherapy uncombined with the surgical interruption of the pathologic reflux is inefficient, for that reason we use often sclerotherapy and a surgical method.3

Materials and methods

In the Surgical Clinic no.1 a personal technique of sclerotherapy (Brinzeu) is represented by the sclerotherapy with surgical threads dipped in iodine solution, by means of which, we can have through its endovenous inclusion, a good therapeutically effect.4,6 As a co-treatment, we have associated sclerotherapy with iodinated wires inclusions in the case of 206, out of 1331 patients, diagnosed with chronic venous insufficiency CEAP III-VI operated on between 2009-2014. As a complementary treatment method, the endovenous inclusions has been used in the case of 368 patients in CEAP C VI stage (11.30% out of the venous leg ulcers treated in the same period of time) out of which 89 cases (24.18%) as a single therapy. Sclerotherapy must be preceded by a clinical exam, echo-Doppler examination, mapping out the varices and pointing out the reflux points. Indications of this technique: postoperative remaining varicose veins, recurrent varicose veins, recurrent varicose veins associated with leg ulcer, recurrent varicose veins with clinical perforated veins, varicose veins in congenital syndroms, periulcercous varicose veins.7-9 Technique: surgical instruments: multifunctional treatment table (operation table), sterile isolation material, sterile swabs, antisepctic solution, anesthetic solutions (local anesthesia or peridural, rahidian, general or short - term) 1-2 port-swat clip, 1-2 port-needles, 1-2 anatomical clamps, 1-2 Kocher clamps, syringes 2-5-20 mL, depending on the anesthesia, needles loaded with iodinated nylon threads in variable sizes. The patient is placed in dorsal decubitus, mapped, anesthetized. Pius Brinzeu implemented 3 different variants of inclusions of catgut or iodinated threads in the varicose veins 4 (Fig. 1). We prefer the aesthetic technique, “hidden steps” which is obtained by inserting the needle starting with the 2nd puncture through the exit point made during the previous step. The thread passed with a rounded needle causes tegumentary lesions of 1-2 mm long. The procedure is repeated on the whole length of the vein that was inserted with iodinated wire, obtaining consequently high venous endothelial lesions. By pulling the ends of the nylon wires we can obtain a segmentary stenosis of the vein, blocking its filling with blood. Performing the sclerotherapy in the Trendelenburg position ensures an empty-blooded vein. Postoperatory we use an external elastic compression, applying a single layer bandage or elastic stockings.10 The wires are removed after 24-48-72 hours, by pulling them out, after sectioning the tegumentary curl and the inflammatory perivenous reaction will gradually diminish.

Results

Rarely, at the passage point of the wire through the varicose vein, transitory inflammatory processes may take place, such as induration or inflammatory nodules. Very rarely, the inserted wire has no particular effect.3 Generally, using the Pius Brinzeu aesthetic technique, with an empty blooded vein, we have not noticed any inflammatory or indurative process (Fig. 2 A-C). The histological changes subsequent to this sclerotherapy method, are due to the mechanical and chemical process, with a thrombogenic effect on the circulatory blood and destructive action on the venous endothelium, which develops a sclerosus atrophy process of the target vein; tunica media and venous endothelium are replaced by a fibrous layer. Perivenously, an unspecific limphoplasmocitary invasion process occurs.
When the treatment is efficient, varicose veins disappear and the clinical and eco-Doppler exams show the flux and reflux venous absence. Our results were generally very good and long-lasting (66.7%), good (23.8%). Poor results (9.5%) were due to repermeabilisation and the relapse of the pathology owing to the persistence of the pathological reflux.

Some of the varicose veins that resulted through phlebectomy after sclerotherapy have been examined histologically. The veins fixed in formalin solution and stained using hematoxilin-eosine (HE) were examined microscopically. The morphological examination of the varicose veins which underwent sclerotherapy and were removed at different time intervals have highlighted the following: contraction of the venous wall, which does not give in at its immersion in SF 0.9%, at 37 °C; the obvious thickening of the venous wall, having the tendency of destroying the lumen; the section of the intima shows rugosities, fibro-hematic deposits, sometimes thrombi. The studies of histology and the histochemistry confirms the disappearance of the venous endothelium, the thickening of the venous wall media with a major accumulation of inflammatory - type cells and the unorganized thickening of the collagen fibers. Macro and microscopic changes after sclerotherapy confirm the further possibilities of venous changes into a fibrous cord, without a lumen.5

Contraindications of the method: deep venous thrombosis, local or systemic infection, edema, pregnancy, estro-progestative medication. Incidents, accidents and complications: perivenous hemorrhagic suffusion, gradually resorbed under compressive bandage. Some patients had violet microscars, 1-2 mm long, for up to 6 months. 1 years after, the scars were pale, hardly obvious (Fig. 3).

The advantages of the method: easy to perform, shortens the treatment time, reduced costs, all the varices may be sclerosed in one session 2 ensures the morphological, physiopathological and esthetic objectives in the inferior limb treatment.

Discussion

In CEAP C VI, in the presence of the calf ulcer, sclerotherapy represents a complementary treatment method, used more often in the varicose ulcer, than in the post-trombotic ulcer. This method completes the pathologi-
cal reflux interruption surgery, by resolving the restant ulcers. Sclerotherapy may suppress the reflux of the perforating veins having a small, or medium flow, which cannot be used in massive refluxes. Considering the localization of the trophic disorders and the pathological reflux, the sclerotherapy indication, in the presence of the varicose ulcer, is as follows: elapsing or residual varices, with moderate reflux, due to an incomplete saphenectomy, to some anterior, or posterior accessory saphenous veins, or some collaterals with separate anastomosis, popliteal fossa varices by means of the moderate reflux of perforating veins, the posterior vein of the calf (Leonardo’s vein), left after saphenectomy, maintained by a minor or medium reflux, the remaining anterior saphenous vein of the calf, the extrasaphenous varicose veins of the calf. We are not using sclerotherapy in the anatomical regions presenting advanced trophic lesions in order to avoid infectious, ulcerative and necrotic complications. We consider the varicose relapse as being the appearance of the varicose vein on the same anatomical tracts, usually through venous repermeabilisation, following sclerotherapy. Considering the varicose disease as an evolutive disease, where new varicose veins occur, usually in the neighboring territories of sclerotherapy, we cannot include them in the varicose relapse category. Starting with 1962, when Pius Brinzeu introduced sclerotherapy with catgut inclusions, this method has been performed as a complementary peroperatory therapy for the remaining or relapsing varices.

Conclusion

Sclerotherapy through endovenous inclusion is an alternative method of chemical sclerosis, safe, efficient, faster and shorter in terms of treatment duration and recuperation. It is a Romanian technique imagined and implemented by Timisoara’s phlebological school. Both, surgical and sclerotherapy methods are pathogenical treatments not etiological, as only the consequences of the varicose disease are removed.

References

14 years experience in endovascular treatment of complicated acute thoracic aorta dissection type B

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Aim

The exact reason of aortic dissection is not full discovered yet but we known well it risk factors. Dissection is connected with genetic disorders like Marfan or Ehlers Danlos Syndrome and accompanied by uncontrolled hypertension. In 60% affects young man, seldom is related to artherosclerosis. May be even diagnosed in pregnant woman especially in last months of pregnancy as a complication of hypertension. Acute dissection of thoracic aorta was also found in cocaine addictive patients. First time was described in 1761 by Morgagieo. According to simplest Stanford classification by Garson i Edward dissection is divided in two group. Stanford A(St A) is described if primary entry is localised in ascending aorta and type St B if dissection starts below left subclavian artery. Statistically in more than 70% cases dissection type A is diagnosed. More often is connected with genetic disorders, in Marfan syndrome in almost 90% cases. Dissection is described as acute if time lasting from onset to diagnose is shorter than 14 days. After this period of time dissection become chronic.\(^1,2\)

Distal progression of dissection toward abdominal aorta may provide to symptoms of malperfusion of internal organs or ischemia of legs. This group of patients required urgent operation. Asymptomatic dissection usually are treated conservatively by lowering blood pressure. First classical operation of dissection type B was described by DeBakey in 1950 year but open procedure is connected with high risk of complication. In 1994 Dake first time used stent-graft for endovascular treatment of dissection and in time this method become golden standard as less invasive.\(^3\)

Materials and methods

Between 2000-2014 in General and Thoracic Surgery Dept. 86 patient were operated due to acute complicated dissection type St B. Majority (83%) were man. All patients at the time of admittance presented acute pain in chest radiating to back accompanied by uncontrolled hypertension. 9 patient were admitted because of hypovolemic shock due to massive bleeding from ruptured dissection. In 77 cases malperfusion was diagnosed caused by heavy stenosis of true lumen by the false one and despite lowering blood pressure constant back pain requiring narcotic analgesics. 10 patients presented heavy ischemia of the organs - in 4 cases ischemia of the right leg, in 3 ischemia of kidneys: two left, one right, in 3 patients ischemia of the viscera: two stomach and bowels in one liver and bowels. According to ASA classification 12 (14%) patients were in ASA2, 47 (54.6%) in ASA3, 18 (21%) ASA4, 9 patients (10.4%) with ruptured dissection were classified as ASA5. Among concomitant diseases - all patient were hypertensive 11 (12.8%) suffering from ischemia of the heart, 4 had myocardial infract between them two had coronary by-pass, one PTCA. Three had been before classically operated on abdominal aneurysm, in two abdominal aneurysm was diagnosed. 4 were diabetic, 5 had renal insufficiency, 5 hypothyroidism.

In all patients angio-CT was done before operation. Operations were performed in the operating theatre under the guidance of fluoroscopy. Patients before operations were given wide spectrum antibiotics. 50 (58.2%) patients were operated under spinal, 27 (31.4%) under local, 9 (10.4%) under general anaesthesia. In majority cases - 77 (89.6%) patients approach was from right side by surgically exposed right femoral artery. In 9 (10.4%) cases due to dissection or heavy stenosis of right iliac artery stentgraft was introduced through left femoral artery. In 58 (67%) patients stentgraft was deployed below left subclavian artery but in 28 (33%) cases due to short distance between LSA and primary entry we had to cover it origin. In 1 case due to localization stent-graft was deployed very low at the level of diaphragm. In 1 patient with ruptured dissection drainage of cerebro-spinal fluid was provide to avoid spinal cord ischemia.
Early results

In all cases stent-graft was deployed as was planned. We do not experienced any technical problem with passing stent-graft through iliac arteries. Angiography performed after stent-graft deployment confirmed completely exclusion of false lumen in chest in 82 patients (95.3%). One patient on next day after stent-graft operation was reoperated due to early endoleak type II and heavy back pain -another segment of stent-graft was inserted distally. In 3 patients endoleak type IB was seen -back flow from secondary entry at the level of left renal artery - but did not required operation. Three (3.5%) patients had been reoperated due to heavy organs ischemia despite widening true lumen and improving blood flow.

Two patients who had been operated due to ischemia of the viscera, perforation of the stomach and small bowel were diagnosed.

In one case cross-over fem-fem by-pass was performed due to ischemia of the right leg.

One patient operated due to ruptured dissection required hemodialysis because of acute kidney failure. None of this patient revealed symptoms of spinal cord ischemia.

6 patients died (6.9%).

One patient operated on ruptured dissection of thoraco-abdominal aorta died due to irreversible shock and multiorgan failure.

One patient who had stent-graft deployed below left subclavian artery died due to ruptured retrograde dissection and massive bleeding.

Four patients died on cardiac failure after myocardial infarct.

Long-term follow-up

In our out-patient clinic we follow-up 54 patients (67.5%) among 80 who survive operation and further treatment.

In 52 (96.3%) cases remodelling of thoracic aorta is noticed in angio-CT but in only 7 patients with completely healing of abdominal aorta.

In 47 patients dissection in abdominal part persists, in 42 is stable in time, in 5 cases abdominal aorta tens to grow and 2 patient required elective AAA repaired with stent-graft.

In 3 patients enlargement of thoracic aorta above stent-graft with endoleak type IA was diagnosed. In two cases implantation of the proximal extension was necessary but one patient with aeurysm of the arch was send to cardiac surgeons for aortic arch replacement.

In one patient with covered LSA by stent-graft, one week after operation carotid- subclavian by-pass was performed due to ischemia of the left hand.

Three patients died. One with HIV positive died on AIDS complications.

Two patients had been operated on ruptured abdominal aeurysm and died due to multiorgan failure.

Discussion

Acute thoracic aorta dissection is life-threatening condition. Untreated provided to death during first day in rate 1-2% cases per hour, only 10% survive first three days.4 As much as 60% deaths are caused by rupture, in majority of false lumen.3

If dissection is asymptomatic might be treated conservatively by hypotensive drugs like b-blockers and pain killers.6 14-days survival rate for conservative treatment of uncomplicated acute dissection is 85-90%. 5-years survival is 50% but with 25% risk of developing dissecting aneurysm.7

Unfortunately statistically more often dissection is symptomatic presenting pain in chest radiating to back with accompanying hypertension.2,3,8

All our patients at the admittance to the hospital complained on stabbing, shooting pain with high blood pressure. Quite often first symptom might be ischemia of the organs due to malperfusion caused by narrowing of the right lumen squeezed by the false one.

In our material 11.6% patients presented heavy ischemia of the kidneys (3.5%) bowel (3.5%) or legs (4.6%). In IRAD report 9.2% patients had pulse deficit in the groin.

In paper presented by Okita ischemia of the legs was reported in 52%, ischemia of the kidney in 39%. Fann mentioned that 31% patients with acute dissection type A and B had ischemia in one or more systems.9

In none of our patient paraplegia due to spinal cord ischemia was diagnosed. In literature this symptom is described in 9%.

All authors agreed that symptomatic dissection should be treated surgically.

Open operations are connected with high mortality rate. Results published in 1997 by Gysi from 15 years of follow-up mortality was 21% by after careful analysis in time declining trend is seen. Between 1980-1984 was 30% high but between 1993-1995 only 12%.10

Dake in 1999 reported 50% mortality rate but in case complicated by severe organs ischemia.3

Analysing cause of death Fann reported 100% mortality rate among patients with paraplegia, 50% mortality rate in patients with distal tissue ischemia, 67% in ischemia of the kidney, 50% in malperfusion of viscera.1

Looking for different less invasive methods in treatment of ischemia caused by dissection Slonim performed fenestrated graft and stent implantation to the main branched of abdominal aorta for stabilization of blood circulation. In 93% improvement of blood flow was reached but in 22% complications occurred. 25% patients died early after procedure and 16.7% in long-term follow-up.11
In 1994 Dake first time used stent-graft in the treatment of thoracic aorta dissection to get widening of true lumen and improved circulation in ischemic tissue. The main goal in endovascular treatment of dissection is occlusion of primary entry. In our material this was reached in 95.3% of cases confirm by angiogram performed during operation, what is comparable with other publications -94.4% by Shimono. In long-term follow-up in 96.3% cases we observed completely remodelling of thoracic aorta. This ranged in publications by different authors between 79-95%, with 93.3% widening of true canal in abdominal aorta. Of thoracic aorta reported by Shimano and Song. In our long-term results 3 (5.5%) endoleaks were diagnosed required LSA transposition and in one patient endoleak type II from LSA. He agreed that LSA occlusion is well tolerated and reconstructive operations might be performed later on if symptoms appears. Wheatley did transposition in first one third of his patients but in time changed opinion that it is not necessary and even transposition operation creates more complication itself than occlusion of LSA by stent-graft. Among our patients in early postoperative period 6 (6.9%) patients died, mainly due to complications after heart attack. In literature mortality rate is reported in 6.3%, 12, 14, 18

In early postoperative period we observed complications in 3 (3.5%) patients. In 2 cases due to ischemia of the gastrointestinal tract we had to performed laparotomy with small bowel resection, in one case fem-fem bypass because of ischemia of the right leg. Shimano reported 10.8% complications after endovascular operations of symptomatic thoracic aorta dissection. We do not observed paraplegia after stent-graft operation, only one patient required cerebro-spinal fluid drainage as protection of spinal cord ischemia. Many authors stress that risk of paraplegia after endovascular procedure in dissection is very low 1.5-3%, even in case when stent-graft is deployed low down at level of Th9 in descending aorta so routinely CSF is not advised. In some cases aorta dissection coexist with arteriosclerosis and that may cause problem with passing stent-graft through narrow iliac arteries. In heavy stenosis or even occlusion surgical cuff must be inserted above. Kaya report in 3.6% cases he had access difficulty. In all our patients stent-graft was introduced through surgically exposed femoral arteries. In our long-term results 3 (5.5%) endoleaks were diagnosed in angio-CT. All patients had been operated. Two had proximal extension, one was operated by cardiac surgeons due to aneurysm of the arch. In large Eurostar report 2.8% endoleaks were reported. There is still open discussion regarding LSA occlusion during endovascular procedure. In 28 (33%) patients with LSA covered by stent-graft only in one case (3.5%) carotid-subclavian by-pass was necessary because of ischemia of the left hand. That confirm our opinion that by-pass is not obligatory prior to endovascular operation with LSA covered and reconstructive procedure could be done if symptoms appears. Fanelli stated that in case of intentional occlusion of LSA by stent-graft, reconstructive operation should be performed if symptoms of ischemia of the brain or hand occurs. There is one exception - patients with anatomical abnormality in the arch. Song covered LSA in 26% patients with acute dissection and did not observed ischemia of the hand but 2 patients developed stroke. In Kaya LSA was covered in 43% acute cases, in 2 patients steeling syndrome was diagnosed required LSA transposition and in one patient endoleak type II from LSA. He agreed that LSA occlusion is well tolerated and reconstructive operations might be performed later on if symptoms appears. Wheatley did transposition in first one third of his patients but in time changed opinion that it is not necessary and even transposition operation creates more complication itself than occlusion of LSA by stent-graft. Among our patients in early postoperative period 6 (6.9%) patients died, mainly due to complications after heart attack. In literature mortality rate is reported in 6.3%, 12, 14, 18

In long-term observation 3 more patients died. Two died due to complications after emergency operation of ruptured abdominal aortic aneurysm. One with HIV positive died on AIDS.

Conclusion
Endovascular procedure is a golden standard in patients with complicated acute aortic dissection. Covering primary entry stent-graft helps in thoracic aorta remodelling. Due to possible complication patients required intensive clinical observation and follow-up.

References