UDK 617 - 089

ISSN (print) 1845 - 2760
ISSN (online) 1848 - 5367

# Acta Chirurgica Croatica

OFFICIAL JOURNAL OF THE CROATIAN SOCIETY OF SURGERY, CroMA

## THE XXIX CONGRESS OF THE MEDITERRANEAN LEAGUE OFF THE ANGIOLOGY AND VASCULAR SURGERY (MLAVS)

**November 7 – 9, 2019**
Zagreb, Croatia

# BOOK OF ABSTRACTS

www.mlavs-croatia2019.com

Vol. 16 Suppl. 3 Zagreb 2019.


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# IMPRESSUM

**Publisher**
Croatian Society of Surgery – Croatian Medical Association
Department of Surgery, University Hospital Center Zagreb



**Graphic design and print**
BTravel d.o.o., Zagreb

**Editorial Office**
Acta Chirurgica Croatica
Department of Surgery, University Hospital Center Zagreb
Kišpatićeva 12
10 000 Zagreb
E-mail: editor@acc.hkd.com.hr

**Circulation**
200

**Official Journal of**
Croatian Society of Surgery
Croatian Society of Pediatric Surgeons
Croatian Society for Endoscopic Surgery

# Contents

## MLAVS PRESIDENTIAL ADDRESS

Dear Friends,

It is with great pleasure that I welcome you to the annual **29th Congress of the Mediterranean League of Angiology and Vascular Surgery** to be held next November in Zagreb, Croatia. President of the Organizing Committee is Dr Ivan Cvjetko, National Representative of MLAVS in Croatia.

The Mediterranean League of Angiology and Vascular Surgery has a multidisciplinary character, providing a unique forum for discussion of all critical issues concerning the management and care of vascular patients.

Furthermore, MLAVS has a mission to foster progress and mutual understanding between all professional groups dealing with vascular diseases in the Mediterranean region, and to promote research for a better understanding of genetic and environmental factors as well as molecular mechanisms of vascular diseases.

This Congress will be organised in beautiful environment of the City of Zagreb and will includ joint symoisa with Asian Society for Vascular Surgery and IUA youth committee. On behalf of the Executive Board of the Mediterranean League of Angiology and Vascular Surgery I would like to invite you to Croatia next November for a successful and productive Meeting.

Let's meet in Zagreb!

Professor **Nikos S. Angelides** MD, PhD, FRCS
*President of the Mediterranean League of Angiology and Vascular Surgery*

## LOCAL ORGANIZER WELCOME ADDRESS

Distinguished colleagues and dear friends,



It is a great honour and pleasure to extend my greetings to you on behalf of the Local Organizing Committee and invite you to participate in The XXIX Congress of the Mediterranean League of the Angiology and Vascular Surgery (MLAVS) which will take place from the 7th to the 9th of November 2019 in Zagreb, Croatia.

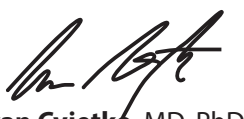
The organizers have invited numerous international speakers, with the intention to present the newest scientific knowledge in the field of vascular surgery and vascular medicine.

Lectures are designed for: vascular surgeons, endovascular surgeons and interventionalists, cardiac surgeons, cardiologist, neurologists, physicians in training, vascular scientists and nurses.

Along with the professional work, we will try to spend our time in socializing and getting to know each other, and Zagreb, the capital of Croatia will certainly allow us to do so.

With best regards and looking forward to seeing you in Zagreb!

Professor **Miljenko Kovačević**, MD, PhD
*President of CSVS*



**Ivan Cvjetko**, MD, PhD
*Organizing Committee President CSVS*
*MLAVS National Representative, Croatia*
*ESVS Council Member, Croatia*

# MEDITERRANEAN LEAGUE OF ANGIOLOGY AND VASCULAR SURGERY

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## LOCAL ORGANIZER

Croatian Medical Association, Croatian Society for Vascular Surgery (CSVS)

*Organizing Committee President*
**Ivan Cvjetko**, MD, PhD
University Hospital Merkur, Zagreb, Croatia
E-mail: ivancvjetko@yahoo.com

## CONGRESS VENUE

HOTEL INTERNATIONAL ZAGREB
Miramarska cesta 24, Zagreb, Croatia
www.hotel-international.hr

## INTERNATIONAL SCIENTIFIC COMMITTEE



## UNDER THE AUSPICES OF

- Ministry of Health of the Republic of Croatia
- Ministry of Scienece and Education of the Republic of Croatia

## TOPICS

1. Open and endovascular treatment of thoracic aorta
2. Open and endovascular treatment of abdominal aorta
3. Visceral arteries
4. Carotid artery disease
5. Peripheral arterial disease
6. Critical limb ischaemia
7. Diabets and vascular disease
8. NOACS
9. Lipid lowering therapy
10. Nutrition in Vascular surgery
11. Chronic venous insu_ciency
12. Deep venous thrombosis
13. Lymphoedema
14. Compression therapy
15. Chronic wounds
16. Infections in vascular surgery
17. Minor and major amputations
18. Vascular access
19. Free topics

## REGISTRATION FEES

| 2019 MLAVS participant | Registration fee paid until 05/10/19 | Registration fee paid after 05/10/19 | Registration fee On-site payment |
|---|---|---|---|
| MLAVS member* | € 300,00 | € 350,00 | € 400,00 |
| MLAVS non-member* | € 400,00 | € 450,00 | € 500,00 |
| IUA Youth member* / doctor under 45 years | € 100,00 | € 150,00 | € 200,00 |
| Student** | € 100,00 | € 150,00 | € 150,00 |
| Accompanying person | € 120,00 | € 130,00 | € 140,00 |

*VAT included.*

# FINAL PROGRAM

## Thursday, November 7, 2019

| | |
|---|---|
| 17:00 - 19:00 | Registration |
| 18:50 - 19:00 | **Congress opening**<br>Welcome address - Prof. **Nicos Angelides**, *president of MLAVS*<br>Welcome address - Prof. **Miljenko Kovačević**, *president of CSVS* |
| 19:00 - 19:45 | **Opening lecture - Nicos Angelides, *Cyprus:*** „Historical Overview of the Mediterranean League of Angiology and Vascular Surgery so far" |
| 19:45 - 20:15 | **Reuven Zimlichman, *Israel:*** History of Hypertension and the arterial system |
| 20:15 - 20:45 | **Stella Fatović Ferenčić, *Croatia:*** Đuro Armen Baglivi: from Dubrovnik to international scientific community |

## Friday, November 8, 2019

### HALL A

| | |
|---|---|
| 09:00 - 10:30 | **AORTIC**<br>***Chairmen:*** Miljenko Kovačević, Christian Behrendt, Ivan Burcar, Joško Bulum, Endre Kolossavary |
| | **Endre Kolossavary, *Hungary:*** Vascular registry and administrative data assessments |
| | **Christian Behrendt, *Germany:*** Impact of weekend treatment on short-term and long-term survival after urgent repair of ruptured aortic aneurysms in Germany |
| | **Jose Fernandes e Fernandes, *Portugal:*** Popliteal Artery Aneurysms: Challenges and Outcomes. |
| | **Ivan Burcar, *Croatia:*** Thoracic aorta |
| | **Joško Bulum, *Croatia:*** TEVAR |
| | **Konstantin Andreychuk, *Russia:*** Open repair of ruptured abdominal aortic aneurysms: the results in elderly patients |
| 10:30 - 11:00 | **PLENARY SESSION – BALAS LECTURE**<br>**Jose Fernandes e Fernandes, *Portugal:*** Modern Management of Aortic Aneurysms - Time for Reflection and the Education of Future Vascular Surgeons |
| 11:00 - 11:30 | *Coffee break* |
| 11:30 - 13:15 | **AORTIC**<br>***Chairmen:*** Igor Rudež, Hubert Schelzig, Mladen Gasparini, Daniel Unić |
| | **Igor Rudež, *Croatia:*** Lansac technique: best of both worlds in aortic root valve sparing surgery |
| | **Hubert Schelzig, *Germany:*** Clinical and technical considerations in patient specific aortic stengraft design |
| | **Mladen Gasparini, *Slovenia:*** Is minilaparotomy for the treatment of AAA still an option |
| | **Saleh Amro, *Russia:*** Mini-laparatomic access versus laparotomy in abdominal aortic disease treatment |
| | **Daniel Unić, *Croatia:*** Vascular access options for transcatheter aortic valve implantation |
| | **Giselle Marie Ortiz, *Panama:*** Aortic rupture with contained hematoma - endovascular management |
| | **Josip Figl, Croatia:** Case report of an emergency common carotid to subclavian artery bypass grafting after TEVAR |

13:15 -13:45 **PLENARY SESSION – SPECIAL LECTURE**
**Reuven Zimlichman, *Israel:*** New hypertension Guidelines, the European, the American and their significance

13:45 - 15:00 *Lunch break*

13:30 - 15:00 **MLAVS, Meeting of the Executive Committee - KORNATI ROOM**

15:00 - 16:45 **CAROTID Joint Symposium MLAVS / CEVF**
***Chairmen:*** Salvatore Novo, Karel Rotzocil, Pavel Poredoš, Jose Fernandes e Fernandes

**Pavel Poredoš, *USA:*** Characterization of structure of carotid plaques and its clinical relevance

**Salvatore Novo, *Italy:*** Carotid preclinical atherosclerosis predicts future cardiovascular events

**Hrvoje Budinčević, *Croatia:*** The role of ultrasonography in the management of carotid artery disease.

**Jose Fernansdes e Fernandes, *Portugal:*** Carotid disease - where we stand and challenges for the future. The asymptomatic carotid disease

**German Sokurenko, *Russia:*** The influence of technique of carotid endarterectomy on results in symptomatic patients

**Christos Liapis, *Greece:*** Selected asymptomatic patients should be revascularized: Medical therapy must be optimized

**Stanislav Ordynets, *Russia:*** Determination of indications for surgical treatment with a combination stenosis and tortuosity of the internal carotid artery in acute ischemic stroke

16:45 - 17:15 *Coffee break*

17:15 - 18:45 **CHRONIC WOUNDS**
***Chairmen:*** Patrick. H Carpentier, Tanja Planinšek Ručigaj, Sandra Marinović Kulišić, Ana Jović

**Patrick. H Carpentier, *France:*** Arterial evaluation in patients with leg ulcers

**Nicos Angelides, Cyprus:** No-option CLI: Novel ways of treatment

**Ana Jović, *Croatia:*** Vascular surgeon and chronic wounds

**Tanja Planinšek Ručigaj, *Slovenia:*** Application of compression therapy in the treatment of lymphedema

**Nastja Kučišec Tepeš, *Croatia:*** Chronic surgical wounds and biofilm

**Saleh Amro, *Russia:*** The experience of successful use of Negative-pressure wound therapy in patients with infectious complications after surgery on the aorto-iliac and femoral-popliteal segments

**Tamara Sinožić, *Croatia:*** Interdisciplinary approach to the patient with hard to heal venous leg ulcer – case report



**HALL B**

09:00 - 10:30 **VENOUS**
***Chairmen:*** Louay Altarazi, Karahan Oguz, Lovro Tkalčič, Thais Duailibi

**Oguz Karahan, *Turkey:*** Sealing in varicose veins

**Lovro Tkalčič, *Croatia:*** Inpact of endovascular management of arteriovenous fistula malfunction in preserving hemodyalises access

**Oguz Karahan, *Turkey:*** Interventional treatment of deep venous thrombosis. Which patient?

**Tankut Akay, *Turkey:*** Surgical treatment of Tumors in big veins

**Thais Duailibi, *Brazil:*** Endovascular treatment of thoracic central vein occlusion stent (previous intervention) with a parallel stent

**Louay Altarazi, *Syria:*** Fluoroscopy guided blocked Saphenous veins sclerotherapy, another point of view

10:30 - 11:00 **PLENARY SESSION – BALAS LECTURE, *HALL A***
**Jose Fernandes e Fernandes, *Portugal:*** Modern Management of Aortic Aneurysms - Time for Reflection and the Education of Future Vascular Surgeons

11:00 - 11:30 *Coffee break*

11:30 - 13:15 **PAD**
***Chairmen:*** Tanku Akay, Tomislav Šipić, Angmapally Rajeev, Nicola Troisi

**Tankut Akay, *Turkey:*** Pulmonary endarterectomy for CTEPH (chronic thromboembolic pulmonary hypertension)

**Sandeep Raj Pandeey, *Nepal:*** Endovascular management of SFA disease

**Angmapally Rajeev, *USA:*** Diabetic ischemic foot...Recognize, revascularize to prevent amputation

**Tomislav Šipić, *Croatia:*** PTA procedures after previous vascular surgery

**Leonid Magnitskiy, *Russia:*** Superficial femoral and popliteal arteries long occlusions. Another way of revascularization

**Tankut Akay, *Turkey:*** Critical leg ischemia, the ultimate debate, open versus endovascular

**Nicola Troisi, *Italy:*** Pedal arch in diabetic patients

13:15 - 13:45 **PLENARY SESSION – SPECIAL LECTURE, *HALL A***
**Reuven Zimlichman, *Israel:*** New hypertension Guidelines, the European, the American and their significance



13:45 - 15:00 *Lunch break*

15:00 - 16:45 **ABBOTT - Satelite symposium, Nutrition**

**Ante Ivkošić, *Croatia:*** Correlation of nutritional interventions and pathophysiology of chronic wounds

**Ante Kanjer, *Croatia:*** Specific nutritional interventions in the healing of chronic wounds

16:45 - 17:15 *Coffee break*

**HALL C**

11:30 - 13:15 **NOACS**
***Chairmen:*** Pavel Poredoš, Pier Luigi Antignani, Ingrid Prkačin, Matija Kozak

**Reuven Zimlichman; *Israel:*** Cardiovascular effects of the tobacco Heating System (THS) compared with continued smoking

**Pavel Poredoš, *USA:*** Inflammation and venous thrombosis: what is the connection?

**Ingrid Prkačin, *Croatia:*** NOACS in VTE and PAD

**Pier Luigi Antignani, *Italy:*** Can we reduce the incidence of PTS?

***Matija Kozak, Slovenia:*** Thrombolytic treatment of pulmonary embolism

**Petra Pervan, *Croatia:*** Beeding as a major cause of emergency attendance in patients on different oral anticoagulants

| | |
|---|---|
| 13:15 -13:45 | **PLENARY SESSION – SPECIAL LECTURE, *HALL A***<br>**Reuven Zimlichman, *Israel:*** New hypertension Guidelines, the European, the American and their significance |
| 13:45 - 15:00 | *Lunch break* |
| 15:00 - 16:45 | **NEWS IN PHLEBOLOGY**<br>***Chairmen:*** Louay Altarazi, Pandeey Sandeep Raj, Sorin Oliaru, Larisa M. Chernukha, Christopher R Lattimer<br>**Sorin Oliaru, *Romania:*** Endovascular treatment of chronic venous disease (foam, laser, RF and glu)<br>**Francesco Zini, *Italy:*** SFALT: new proposal for the treatment of varicose veins<br>**Louay Altarazi, *Syria:*** Pelvic congestion syndrome unknown aspects<br>**Christopher R Lattimer, *UK:*** Chronic venous obstruction: what is it and how can we measure it?<br>**Sandeep Raj Pandeey, *Nepal:*** Endovenous heat induced thrombosis<br>**Larisa M. Chernukha, *Ukraine:*** Cancer related DVT: what's news?<br>**Boštjan Leskovar, *Slovenia:*** (Re)construction of arteriovenous fistula with cormatrix |
| 16:45 - 17:15 | *Coffee break* |
| 17:15 - 17:45 | **CHRONIC VENOUS INSUFFICIENCY TREATMENT: SYNERGY OF VENOACTIVE DRUGS AND SURGERY**<br>***Chairmen:*** Miljenko Kovačević, Ante Kanjer, Damir Flam, Ivan Cvjetko<br>**Ivan Cvjetko, *Croatia:*** Benefits of venoactive drug therapy in surgical or endovenous treatment for varicose veins<br>**Ante Kanjer, *Croatia:*** Case report 1: MPFF therapy in surgical treatment<br>**Damir Flam, *Croatia:*** Case report 2: MPFF therapy in endovenous treatment<br>**Dinko Lupi, *Croatia:*** Challenges of venoactive drug producers |



## Saturday, November 9, 2019

### HALL A

| | |
|---|---|
| 09:15 - 09:30 | **PLENARY SESSION – SPECIAL LECTURE**<br>**Nicos Angelides, *Cyprus:*** The use of a nine step therapeutic ladder in PAD and CLI |
| 09:30 - 10:45 | **PAD AND RADIATION PROTECTION**<br>***Chairmen:*** Nicos Angelides, Jose Fernandes e Fernandes, Tomislav Krčmar, Bahare Fazeli<br>**Pavel Poredoš, *USA:*** Secondary prevention of PAD<br>**Jose Fernandes e Fernandes Jose, *Portugal:*** Peripheral arterial disease in hospital admissions in Portugal and the impact of endovascular technology. When is open surgery still the best solution available?<br>**Bahare Fazeli, *Iran:*** Angiogenesis induction in Buerger's disease: a disease management double-edged sword?<br>**Tomislav Krčmar, *Croatia:*** Radial access for peripheral vascular interventions and diagnostics<br>**Jelena Popić, *Croatia:*** Radiation protection in vascular surgery<br>**Nicos Angelides, *Cyprus:*** Radiation exposure risk during endovascular procedures |

**HALL B**

09:15 - 10:45 **UEMS/ YOUTH session IUA /ESVST**
***Chairmen:*** Marko Ajduk, Steffano Ancetti, Leonid Magnitskiy, Amir Arnautović

**Vojko Flis, *Slovenia:*** Vascular and endovascular surgery in Slovenia

**Amir Arnautović, *Germany:*** How to become a vascular and endovascular surgeon as well as endovascular specialist in Germany

**Marko Ajduk, *Croatia:*** Vascular surgery in Croatia

**Stefano Ancetti, *Italy:*** Improving training opportunities Europe: European vascular surgeons in training (EVST)

**Leonid Magnitskiy, *Russia:*** The European vascular Surgeons in training (EVST), call for Croatia

**Kristina Tomašić, *Croatia:*** Symptomatic AAA and chronic Stanford A Dissection

11:00 Professor ŠOŠA Award Congress Closure

12:00 Transport to Opatija *(excursion for invited speakers)*

# POSTERS

1. LIMB SALVAGE PROCEDURE VERSUS AMPUTATION – THE CREDIBILITY OF MANGLED EXTREMITY SEVERITY SCORE (MESS) IN SEVERELY INJURED LIMBS
**Ali Allouch**, Damir Koprek, Neven Mesar, Victor Allouch, Zrinka Sudar-Magaš, Branko Fila;
*General Hospital Bjelovar, Bjelovar, Croatia*

2. IN SITU ABDOMINAL AORTIC RECONSTRUCTION WITH CRYOPRESERVED ALLOGRAFT IN SETTING OF GRAFT INFECTION
**Evgeniya Bulda**, A Koren, G Sivak; *Rabin Medical Center, Campus Beilinson, Petah Tikva, Israel*

3. OPEN SURGERY REPAIR OF RUPTURED GIANT INTERNAL ILIAC ARTERY ANEURISM: A CASE REPORT
**Muhamed Djedovic**[1], A Hadzimehmedagic[1], H Vranic[1], D Totic[1], B Imsirovic[2];
*[1]University Clinical Center of Sarajevo, Sarajevo, Bosnia and Herzegovina,*
*[2]General Hospital "Prim.dr. Abdulah Nakas" Sarajevo, Sarajevo, Bosnia and Herzegovina*

4. LOWER LEG COMPARTMENT SYNDROME IN A PATIENT USING DABIGATRAN
**Inga Đaković Bacalja**[1], Damir Koprek[1], Tomislav Krejčir[1], Dejan Baljak[1], Mirjana Gracin[2], Tomislav Meštrović[3];
*[1]General Hospital Bjelovar, Bjelovar, Croatia, [2]Special Hospital for Pulmonary Diseases, Rockfellerova, Zagreb, Croatia, [3]University Hospital Centre Zagreb, Zagreb, Croatia*

5. DOSE DEPENDENT DRUG-DRUG INTERACTIONS WITH DABIGATRAN
**Juraj Jug**[1], Ingrid Prkačin[2];
*[1]School of Medicine, Zagreb, Croatia, [2]Clinical Hospital Merkur, Zagreb, Croatia*

6. MODIFIED METHOD OF EVERSION CAROTID ENDARTERECTOMY IN PATIENTS WITH EXTENSIVE ATHEROSCLEROTIC DISEASE OF CAROTID BIFURCATION: SHORT-TERM RESULTS
**Vladislav Panfilov**[1], Anatoly Virgansky[1], Konstantin Romanenko[2], Konstantin Siniakin[2];
*[1]Pirogov Russian National Research Medical University, Department of Faculty Surgery, Moscow, Russian Federation, [2]Vinogradov City Hospital, Department of Vascular Surgery, Moscow, Russian Federation*

**The XXIX Congress of the Mediterranean League off the Angiology and Vascular Surgery (MLAVS)**

November 7 – 9, 2019, Zagreb, Croatia

# ABSTRACTS



## Oral presentations

## THE HISTORY OF HYPERTENSION AND THE ARTERIAL SYSTEM

**Reuven Zimlichman**

*Director of the Brunner institute for Cardiovascular Research, Tel Aviv University, Tel Aviv, Israel*

***zimlich@bezeqint.net***

The interest in studying the blood vessels, the heart and the pressure within the blood vessels, started at very early stages of medical research and efforts of understanding the human body. These are mentioned by historians, about 3-4 thousands of years B.C. in the Egyptian papyri and in ancient Chinese records. During the years, additional information gradually accumulated, the structure and function of the closed circulatory cycle was understood and described. Then the efforts concentrated on development of an accurate, convenient and reliable device for blood pressure measurement, which will be used in all doctors' in their clinics. In the beginning of the 19th century several convenient, portable and reliable devices were developed. In these times, huge amounts of data accumulated mainly in the hands of the insurance companies, which needed used these data for estimation of morbidity and mortality induced by elevated blood pressure in order to determine the prices of insurance policies. In the next years, blood pressure measurements became a routine in all physical examinations and became compulsory for issuing an insurance policy.

At this stage, a great discrepancy was present by the "insurance medical world" and between the "real medical world". At that stage, insurance companies already started to charge extra cost in those with mildly elevated blood pressure while the medical world still disputed whether elevated blood pressure should be treated at all. Then, severely elevated blood pressure levels were started to be treated but with very few medications which had severe side effects. At later stages, new medications appeared and the blood pressure of many hypertensive could be balanced with a favorable side effect profile. Today, after thousands of years we are still in dispute about the definition of normal blood pressure, goal blood pressure and the proper therapeutic approach to various subgroups of hypertensive patients.

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## ĐURO ARMEN BAGLIVI: FROM DUBROVNIK TO INTERNATIONAL SCIENTIFIC COMMUNITY

**Stella Fatović Ferenčić**

*Head of the Department for the History of Medical Sciences,¨Croatian Academy of Sciences and Arts*

***Zagreb, Croatia***

The physician, born in Dubrovnik of an Armenian family naturalized Italian, Đuro Armen Baglivi (1668 - 1707) represents the noticeable member of 17th century medicine.

After his graduation in Salerno in 1688, Italian medical centers of excellence such as Padua, Florence, Pisa and especially Bologna opened him the doors frequented by the best known figures in the medical milieu of the time.

This presentation will illustrate his production ranging from the De praxi medica to the De fibra motrice, which played an important role in further development of medical science and were further cited in European literature well into the 19$^{th}$ century.

*AORTIC*

## VASCULAR REGISTRY AND ADMINISTRATIVE DATA ASSESSMENTS

**Endre Kolossvary**, Ferenci Tamás, Kováts Tamás

*St Imre University Teaching Hospital, Dept. of Angiology, Budapest, Hungary*

***kolossendre@gmail.com***

**Keywords:** Big data, Vascular Registries, Healthcare Administrative Data Analysis

Although prospective randomized-controlled trials are considered as the most reliable form of scientific evidence, these trials often cannot be conducted because of ethical, financial, and practical reasons. They support only partially the existing treatment guidelines on vascular field. Research based on vascular registries and administrative datasets represents a significant change in addressing scientific questions on population scale. A large sample size typically represents a larger proportion of the population of interest, thereby reducing sampling error and increasing external validity. Additionally, several other virtues can be recognized favoring this kind of research as the possibility to assess rare conditions, lower-cost demand, more extended data capture, the inclusion of spatial data for analysis. However, numerous methodological issues may question the value of the results and arouse doubts regarding the interpretation of the analysis. In many aspects, these methodological problems are different compared to the traditional approach of epidemiological research. The presentation aims to summarize the characteristics and limitations of research on vascular registry and healthcare administrative data.

Raising consciousness on the virtues and shortcomings of the population scale assessments of these kinds is inevitable to leverage these promising resources.

*AORTIC*

## IMPACT OF WEEKEND TREATMENT ON SHORT-TERM AND LONG-TERM SURVIVAL AFTER URGENT REPAIR OF RUPTURED AORTIC ANEURYSMS IN GERMANY



**Christian-Alexander Behrendt**[1], Art Sedrakyan[2], Thea Schwaneberg[1], Tilo Kölbel[1], Konstantinos Spanos[1], Eike Sebastian Debus[1], Henrik Christian Rieß[1]

[1]*Hamburg, Germany*
[2]*New York, NY*

***ch.behrendt@uke.de***

**Keywords:** Rupture; Aortic aneurysm; Weekend effect; Survival analysis; Health insurance claims

**Objective:** There is some evidence that weekend admission to the hospital is associated with worse outcomes compared with weekday admission. However, only a few studies have focused on weekend vs weekday surgery outcomes. This study aimed to determine whether there is a weekend effect on outcomes in the treatment of ruptured aortic aneurysms in Germany.

**Methods:** Health insurance claims of Germany's third largest insurance provider, DAK-Gesundheit, were used to investigate short-term and long-term mortality after weekend vs weekday treatment of ruptured aortic aneurysm. Patients undergoing endovascular repair (ER) or open surgical repair (OSR) between January 2008 and December 2016 were included in the study. Both propensity score matching and regression methods were used to adjust for confounding.

**Results:** Therewere 1477 patients in the cohort, of whom 517 (35.0 %) underwent ER and 960 (65.0 %) OSR. Overall, 995 (67.4 %) patients underwent an operation on week days (Monday to Thursday), and 482 (32.6 %) patients underwent an operation on a weekend (Friday to Sunday). In multivariable models,

patients who underwent an operation on a weekend were at higher risk of in-hospital death after OSR (49.2 % vs 38.0 %; odds ratio [OR], 1.61; P Ľ .001), and there was a trend toward higher in-hospital mortality after ER (29.5 % vs 21.2 %; OR, 1.55; P Ľ .056). The ER of thoracic or thoracoabdominal aortic ruptures was associated with significantly higher in-hospitalmortality compared with ER of abdominal aortic aneurysm (OR, 1.69; P Ľ .026).

**Conclusions:** Weekend repairs of ruptured aortic aneurysms are associated with worse in-hospital survival compared with weekday surgery. ER of thoracic or thoracoabdominal aortic ruptures is associated with worse in-hospital survival compared with ER of ruptured abdominal aortic ruptures. This might be an international phenomenon requiring joint learning and action in times of centralization of aortic procedures. (J Vasc Surg 2019;69:792-9.)

*AORTIC*

## POPLITEAL ANEURYSMS - CHALLENGES AND OUTCOMES. IS OPEN REPAIR STILL THE GOLD STANDARD? AND WHAT APPROACH IS BEST – MEDIAL OR POSTERIOR?

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Popliteal artery aneurysms (PAA) are the most common peripheral aneurysms, frequently bilateral and in 30% to 50% associated with abdominal aortic aneurysms and represent if untreated a major cause of very severe ischemia and major amputation.



Embolization from sac thrombotic material, acute thrombosis and concomitant presence of occlusive disease are major challenges for a successful treatment. Indications for intervention on PAA are size > 2.0 cms, presence of intra-sac thrombus, compression of adjacent anatomic structures such as nerves or popliteal vein, evidence of distal embolization and rupture, a much rare event when compared with aortic aneurysms. PAA location can be diffuse with involvement of the entire popliteal artery, segmental in the middle third of the artery where it can be associated with extrinsic compression like the popliteal entrapment syndrome or can be part of a multi-aneurysmal disease involving other major arteries.

Diagnosis is based on modern imaging technologies like EcoDoppler, CT-Angio and angiography still required for a better identification of associated occlusions essential for the best choice of treatment.

Open repair has been the first line of treatment based on exclusion of the aneurysm through the medial approach or resection of the aneurysm through the posterior approach plus revascularization with adequate conduit, long saphenous vein being the best and most durable alternative.

Endovascular technology has introduced a new treatment strategy and became a solid alternative in asymptomatic aneurysms, with suitable anatomy and absence of distal occlusive disease.

We reviewed our experience of 97 patients, 140 popliteal artery aneurysms (PAA) in which 79% were managed by an open procedure and 21% by an endovascular procedure and compared the early and late outcomes in terms of survival, primary and secondary patency rates, limb preservation and freedom from reintervention, concluding that open repair offers excellent results when performed with a suitable venous conduit. Endovascular technology in selected patients may offer a valid alternative provided there is adequate proximal and distal landing zones and in the absence of associated distal arterial occlusions. In acute thrombosis no evidence has yet proved the efficacy of endovascular repair associated with thrombolysis when compared to conventional open repair.

*AORTIC*

## OPEN REPAIR OF RUPTURED ABDOMINAL AORTIC ANEURYSMS: THE RESULTS IN ELDERLY PATIENTS

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**Keywords:** abdominal aneurysm, elderly patients

Objective: Immediately repair is the only potentially life-saving procedure for patients with ruptured abdominal aortic aneurysms (RAAA). Otherwise, the advanced age is an independent and significant predictor of poor outcome, especially for emergency repair. It is thought that such major procedure, even successful, doesn't increase a life time in elderly persons, but impairs the life quality and is unreasonably cost-intensive. This circumstance can restrict not only referral for surgery from general physicians, but also a decision of open repair by vascular surgeons in absence of capability for emergency EVAR. The aim of this study was the analysis of long-term results of open repair in elderly patients.

**Methods:** During fifteen years 103 patients aged 76 and older underwent open repair of RAAA in our center. 58 of them survived 30 days after surgery minimally and were discharged. All of them were included in this analysis, 16 octogenarians and 4 nonagenarians at the time of baseline included. The duration of long-term follow-up amounted to 151 months.

**Results:** A median survival after the baseline as a main criterion was evaluated. The common median for all included patients amounted to 74 months. The longest survival life (88 months) time was for persons up to age 79 inclusive. The median survivals for octogenarians and nonagenarians were 29 and 14 months respectively. Cardiovascular events were the main cause of death. In addition, the assessment of health-related quality of life (HRQoL) indicators through the use of SF-36 was performed for definition of social value of life time increase. The results of assessment demonstrated to 'non-repaired' population comparable results for Physical Health (PH) and exceeding results for Mental Health (MH).

**Conclusion:** The results of this study provide sufficient grounds to believe that open repair of RAAA can be allowable choice in selected cases even for elderly patients.



*AORTIC*

## LANSAC TECHNIQUE: BEST OF BOTH WORLDS IN AORTIC ROOT VALVE SPARING SURGERY

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**Keywords:** Aortic root surgery, Valve sparing procedures

Valve sparing aortic root surgery for aortic regurgitation is still technicaly challenging and demanding. Two widely accepted methods (Yacoub' and Davis's technique) have serious drawbacks in certain population of patients, and are not applicable for all. Surgical technique proposed by Emmanuel Lansac in step-by-step approach combines the best of both worlds, and seems to offer durable solution not only for patients with enlarged aortic root, but for patients with isolated aortic valve regurgitation as well.

*AORTIC*

## CLINICAL AND TECHNICAL CONSIDERATIONS IN PATIENT SPECIFIC AORTIC STENGRAFT DESIGN

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Since experimental findings through the Ucrain surgeon Volodov utilizing EVAR, evolution in minmalinvasive aortic repair is still ongoing. The aim of this talk is not only to introduce technical but as well clinical prerequisites for successful repair of complicated aneurysm disease.

Planning strategy of custom made devices, central parts of equipment, shaping and specification of fenestrated and branched stengrafts will be discussed.

Finally, ongoing evolution and potential developments in minimal invasive aortic surgery will be presented.

*AORTIC*

## IS MINILAPAROTOMY FOR THE TREATMENT OF AAA STILL AN OPTION?

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**Key words:** minilaparotomy, abdomnal aorta, aneurysm, surgery, open repair

For many years open surgery has been the gold standard for the treatment of patients with abdominal aortic aneurysm (AAA). But in the last 25 years endovascular methods have evolved remarkably so that the current guidelines suggest endovascular aneurysm repair (EVAR) as the method of choice for patients who meet the anatomical criteria and have a reasonable life expectancy. However, almost half of the patients who are candidates for AAA repair are unsuitable for endovascular repair. In these patients open surgery is still a valid option for abolish the risk of AAA rupture especially in younger, fit patients.

The standard open repair approach is done through a xypho-pubic laparotomy which causes significant trauma and has been associated with prolonged and potentially complicated postoperative recovery. To limit the surgical damage of total laparotomy different approaches through minimal incisions have emerged as an alternative. The most widely used are the midline longitudinal minilaparotomy, transverse minilaparotomies and the retroperitoneal approach.

A midline reduced laparotomy (minilaparotomy) through an 8 to 10 cm paraumbilical incision has been proposed 20-years ago by Cerveira as a feasible alternative to the total laparotomy for AAA repair. It offers sufficient exposure of both anastomotic sites through the manipulation and retraction of the small bowel. Studies comparing total laparotomy with minilaparotomy for the treatment of AAA found a significantly shorter period of recovery for the later without repercussion on the patient safety and clinical outcomes.

With the exception of patients with an iliac artery aneurysm extending to the external or internal iliac artery, minilaparotomy repair should be considered for the elective treatment of patients with aortic disease.

*AORTIC*

## MINI-LAPARATOMIC ACCESS VERSUS LAPAROTOMY IN ABDOMINAL AORTIC DISEASE TREATMENT

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**Keywords:** mini-laparatomic access, Leriche syndrom, infrarenal abdominal aortic aneurysm,

We hypothesized that using mini-laparatomic approach would present a better outcome than total laparotomy in abdominal aortic disease treatment. Aim of the study is to improve the results of surgical treatment for Leriche syndrome and infrarenal abdominal aortic aneurysms by applying mini-laparatomic access.

**Material and Methods:** 140 patients with infrarenal aortoiliac occlusion (TASC II C or D) and infrarenal abdominal aortic aneurysms were observed from January 2013 to September 2019. To perform an aorto-bifemoral bypass were compared the classic laparotomic access and mini-laparotomy. 75 (46.4%) patients underwent reconstructive surgery on the abdominal aorta using full laparotomy access, 65 (53.6%) patients contained mini-access. The parameters of access (wound depth, angle of operative action, angle of inclination) were determined using intraoperative and CT data. Patients were approached according to demographic data and cardiovascular risk factors. Surgery and anesthesia duration, bleeding volume were compared. In postoperative period severity of pain, duration of intestinal paresis, in-hospital length stay were measured.

**Results:** Preoperatively estimated parameters allowed to perform the mobilization of infrarenal aorta, renal arteries, the Inferior mesenteric artery using mini-laparatomy access. Mean duration of mini-access surgery was 3:50 hours against 4:35 hours using traditional laparotomy access. Average blood loss was 228 ± 120 ml in mini-laparatomy groupe against 472 ml in classic laparatomy group. Besides, there was a significant decrease of drugs volume used during anesthesia in mini-access group. Postoperative intestinal paresis duration in mini-access group was 1.20 ± 0.05 days. Bowel paresis resolving in traditional access group was 2.20 ± 0.1 days. In-hospital stay length during postoperative period in mini-access group was 4-7 days against 10-14 days in classic laparatomy access group.

**Conclusion:** Mini-laparatomy access has significant advantages over standard laparotomy access to the abdominal aorta, provides minimal damage during surgery, ease the postoperative period.



*AORTIC*

## VASCULAR ACCESS OPTIONS FOR TRANSCATHETER AORTIC VALVE IMPLANTATION

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Transcatheter aortic valve impmantation (TAVI) has emerged as an alternative option in patients with high surgical risk. Over the time a shift towards low-risk patients has made “non-femoral” vascular sccess more attractive than transapical. Trans-subclavian, trans-carotid and direct aortic access are described and results discussed as well as transcaval.

*AORTIC*

## AORTIC RUPTURE WITH CONTAINED HEMATOMA: ENDOVASCULAR MANAGEMENT

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**Keywords:** thoracic aorta, aortic rupture, endovascular repair

Non-traumatic aortic rupture is a challenging, very rare and life threatening disease. Rapid diagnosis and management are crucial to maximize patient's survival. A 78-year-old female with history of arterial hypertension and recent diagnosis of myelodysplastic syndrome was being treated with antibiotics due to a lower respiratory tract infection for several days at other institution; when discharged, she developed sudden chest pain, dyspnea and hemodynamic instability. The patient was attended in the Emergency Room, where chest X ray showed a mass-like radiopacity displacing the mediastinum. Chest CT angiography revealed extravasation of contrast media due to rupture of descending thoracic aorta 1.9 cm after the left subclavian artery and a contained hematoma displacing the left lung's superior lobe. Immediate and successful endovascular repair was made with Cook Zenith TX2 thoracic endograft (34×202 mm) under local anesthesia, without complications. In the postoperative period she required 2 RBC transfusions and complaints of intermittent and mild pleuritic pain where described by the patient. She was discharged 4 days after, with no signs of neurologic deficits. Conservative management of hematoma was given; in control angioCT performed 1 month later there were no signs of endoleak and slight reapsortion of the hematoma was seen. She is currently stable and receiving hydroxyurea for the treatment of her leukemia.

*AORTIC*

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## CASE REPORT OF AN EMERGENCY COMMON CAROTID TO SUBCLAVIAN ARTERY BYPASS GRAFTING AFTER TEVAR

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**Keywords:** TAAA, TEVAR, vertebral artery, acute left arm ischemia, emergency common carotid to subclavian artery bypass grafting

We present a case of the need for urgent surgical revascularization of the left arm due to the development of an acute left arm ischemia after endovascular treatment of the saccular aneurysm of the descending thoracic aorta (TEVAR) that has covered the origin of the left subclavian artery. After the emergency common carotid to subclavian artery bypass grafting was done, the arm completely recovered. The reason for the need for revascularization is the aberrant origin of the left vertebral artery from the aorta instead of from the left subclavian artery. In cases like this, after TEVAR, the indication for the revascularization is much more often neurological impairment, rather than acute ischemia.

*PLENARY SESSION – SPECIAL LECTURE*

# NEW HYPERTENSION GUIDELINES, THE EUROPEAN, THE AMERICAN AND THEIR SIGNIFICANCE

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Development of treatment guidelines is based upon clinical evidence of morbidity and mortality change after therapeutic intervention. Generally, it is well accepted that the higher the blood pressure the higher morbidity and mortality. Thus, decisions to treat significantly increased blood pressure are well accepted, based on clinical studies in the 1950's.

However, lower blood pressure and borderline levels and the prehypertensive range cause less morbidity and mortality and the beneficial effect of medical treatment in these subjects are more difficult to prove. While attempting to prove beneficial effect of medical intervention in borderline blood pressure levels, bigger and longer clinical studies have to be performed. In this group, cost- benefit ratio and number needed to treat are the parameters that have to be determined and affect treatment decisions. During the last decade, target blood pressure levels have been decreased gradually and the term Prehypertension (Although disputed) had been added. During the recent years, the ACCORD and the SPRINT studies have been performed, aiming to evaluate the effect of intensive therapy achieving lower blood pressure target levels. These studies, with somehow contradicting results, affected the hypertension guidelines and intensified the dispute about the recommended definitions of blood pressure target levels and the therapeutic approach.

*CAROTID JOINT SYMPOSIUM MLAVS / CEVF*

# CHARACTERIZATION OF STRUCTURE OF CAROTID PLAQUES AND ITS CLINICAL RELEVANCE

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**Keywords:** Circulating markers of atherosclerosis; cardiovascular risk; endothelial dysfunction; intima-media thickness

The estimation of risk for atherosclerotic and cardiovascular events based only on the presence of classical risk factors is often insufficient. Therefore, efforts have been made to find markers that indicate the presence of preclinical disease in individual subjects: blood markers of atherosclerosis and preclinical deterioration of the arterial wall. Elevated levels of several inflammatory mediators have been found in subjects with atherosclerosis. Increased basal levels of cytokines, the cell adhesion molecules, selectins and acute-phase reactants such as high sensitive C-reactive protein (hsCRP), fibrinogen, and serum amyloid A are related to an increased risk of cardiovascular events. For clinical purposes, the most promising inflammatory biomarker appears to be hsCRP. In the last decade, markers of plaque stability and unstable coronary artery disease have been sought. Further, markers of endothelial dysfunction, like circulating molecules as well as indicators of functional deterioration of the arterial wall were identified. It was shown that endothelial dysfunction is closely related to different risk factors of atherosclerosis, and to their intensity and duration. Intima-media thickness measurement has emerged as one of the methods of choice for determining the anatomic extent of preclinical atherosclerosis and for assessing cardiovascular risk.Determination of markers of preclinical atherosclerosis improve individual risk determination and could influence the decision of a clinician to intervene with medication and to use more aggressive treatment of risk factors in high risk subjects and in patients with atherosclerotic disease.

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# CAROTID PRECLINICAL ATHEROSCLEROSIS PREDICTS FUTURE CARDIOVASCULAR EVENTS

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Several years ago, we demonstrated that risk factors and aging influence the appearance of asymptomatic carotid lesions, in particular the arterial hypertension, hypercholesterolemia and diabetes (Novo S et al. Advances in Vascular Pathology 1997, Elsevier Science, Excerpta Medica, Amsterdam, 1997, pp. 33-44).

Then, we demonstrated that preclinical carotid atherosclerosis enhances the global cardiovascular risk and increases the rate of cerebro- and cardiovascular events in a five-year follow-up (Novo S, Carità P et al. Atherosclerosis 2010; 211: 287-90) as well as in ten years follow-up (Novo S et al. Eur J Cardiovasc Prev Rehabil. 2010; 17: 514-8).

Moreover, sub-clinical ATS of carotid and MetS increase cardio- and cerebro-vascular events rate in a 20-years follow-up (Novo S et al. Cardiovasc Diabetol. 2013; 23: 155-62) and high plasma levels of endothelin-1 enhance the predictive value of preclinical atherosclerosis for future cerebrovascular and cardiovascular events in a 20-years prospective study (Novo G, Novo S et al. J Cardiovasc Med 2014; 9: 696-701).

The value of preclinical carotid atherosclerosis on global cardiovascular risk stratification and events in a 10-year follow-up is confirmed also comparing the algorithms of the Framingham Heart Study, the European SCORE and the Italian 'Progetto Cuore' for the stratification of the global cardiovascular risk (Novo S, Carità P, Lo Voi A et al. J Cardiovasc Med 2019; 20: 91-6).

Recently, these data were confirmed by Palanca and al. (Subclinical atherosclerosis burden predicts cardiovascular events in individuals with diabetes and chronic kidney disease, Cardiovasc Diabetol. 2019; 18: 93) and by Roumeliotis A et al. in patients with CKD (Ren Fail. 2019; 41: 131-8) on cardiovascular morbidity and mortality, and again in individuals with type 2 diabetes from the Rio de Janeiro type 2 diabetes cohort study (Cardoso CRL et al. Cardiovasc Diabetol. 2019; 18: 2), in the MESA Study (Mitchell CC et al. J Am Heart Assoc. 2019; 8: e010875) as well as in a large asymptomatic American population (Sillesen H, Fuster V et al. Eur Heart J Cardiovasc Imaging. 2018; 19:1042-50).

Moreover, it is well established that markers of inflammation may predict future cardiovascular events as we demonstrated for increased levels of soluble CD40L and cardiovascular risk in asymptomatic low-grade carotid stenosis (Novo S et al. Stroke. 2005; 36: 673-5), for increased levels of C-reactive protein and fibrinogen on the risk of vascular events in patients with NIDDM (Coppola G, Novo S. et al. Int J Cardiol. 2006; 106: 16-20), for increased markers of inflammation and infection influencing the outcome of patients with baseline asymptomatic carotid lesions: a 5-year follow-up study (Corrado E, Novo S. et al. Stroke. 2006; 37: 482-6) and for increased plasma levels of fibrinogen in acute and chronic ischemic coronary syndromes (Abrignani MG, Novo S et al. Cardiologia. 1999; 44: 1047-52).

On the other hand, these data are confirmed in the Women Health Study (Comparison of C-reactive protein and low-density lipoprotein cholesterol levels in the prediction of first cardiovascular events, Ridker PM et al. N Engl J Med. 2002; 347: 1557-65) in which the rate of CV events is higher in patients with highest levels of CRP or LDL-cholesterol or both. On the other hand Rosuvastatin, a statin that reduce consistently the levels of CRP, prevent vascular events in men and women with elevated C-reactive protein (Ridker PM et al for the JUPITER Study Group. New Engl J Med 2008; 359: 2195-207).

Markers of inflammation are associated with plaque progression and instability in patients with carotid atherosclerosis (Ammirati E, Camici PG et al. Mediators Inflamm. 2015; 2: 2015-8) and drugs that reduce markers of inflammation such as Il-6 and CRP can be used as anti-inflammatory therapy as demonstrated in the CANTOS Study in which Canakinumab, in secondary prevention after AMI, reduced primary and secondary outcome (Ridker PM et al. for the CANTOS Trial Group. N Engl J Med. 2017; 377: 1119-31

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## THE ROLE OF ULTRASONOGRAPHY IN THE MANAGEMENT OF CAROTID ARTERY DISEASE

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**Keywords:** Carotid artery disease, stroke, carotid ultrasonography, transcranial doppler ultrasonography, atherosclerosis

Carotid artery disease causes up to 15% of all ischemic strokes. Carotid artery disease might be easily accessed by ultrasonography (carotid ultrasonography for evaluation of extracranial portion of carotid arteries and transcranial Doppler ultrasonography for evaluation of large intracranial arteries). Other imaging modalities include: computed tomography angiography, magnetic resonance angiography and digital subtraction angiography. Ultrasonography of the carotid arteries is the modality of choice for diagnosis, monitoring and management of carotid artery disease patients. Carotid/ neck ultrasonography is routinely used for the estimation of carotid stenosis, plaque morphology and volume, and measuring intima-media thickness (useful biomarker for atherosclerosis). Carotid ultrasonography is also useful for assessment of non-atherosclerotic diseases such as cervical artery dissection and arteritis. Transcranial Doppler ultrasonography is a tool for evaluation of intracranial circulation, mostly for collateral circulation assessment, intracranial stenosis and emboli detection, and cerebral vasomotor reactivity. The management of carotid artery disease is mostly based on the severity of the disease (percent stenosis) and clinical presentation (asymptomatic vs symptomatic). Plaque morphology and integrity of intracranial circulation should be accounted in the decision-making process regarding management too. Current therapeutic options of carotid artery disease include medical/pharmacological treatment, carotid surgery and endovascular treatment (stenting).



*CAROTID JOINT SYMPOSIUM MLAVS / CEVF*

## CAROTID DISEASE - WHERE WE STAND AND CHALLENGES FOR THE FUTURE. THE ASYMPTOMATIC CAROTID DISEASE DILEMMA

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Stroke continues to be a health burden in modern societies and carotid bifurcation disease represents the cause of 25% of all strokes, which in approximately 10-15% come from previously asymptomatic disease. These events could have been prevented through a greater awareness of appropriate symptoms of neurological and ocular dysfunction and a timely and properly conducted carotid intervention after the index event when the stroke risk is higher, plus early diagnosis in high-risk groups with asymptomatic disease through properly conducted selected screening for carotid are fundamental tools to reduce the ravage consequences of stroke.

Better management of risk factors, optimization of medical treatment contributed to diminish the atherosclerotic burden which in association with reduction of the number of asymptomatic patients being treated may explain the observed reduction in the number of carotid interventions being performed in the last decade.

After a brief review of the indications and timing of intervention in symptomatic patients through clinical examples from our series confirming the importance of early intervention after index event without increased neurological risk, plus comparison in published trials of the efficacy of endarterectomy

(CEA) with stenting (CAS), we conclude that CEA continues to be the best choice for the appropriate treatment of symptomatic patients, preferably within the first week after the index neurological event with better outcomes than CAS.

Published guidelines from the ESVS and other scientific societies still recommend carotid intervention for asymptomatic carotid stenosis > 70% provided the surgical risk is less than 3%, but this orientation has led a to an excessive number of unnecessary interventions. Better control of risk factors with optimization of best medical treatment has significantly reduced the risk of stroke in asymptomatic stenosis and this reality has contributed to a reuction in the number of procedures performed in the last years. A better selection of patients with a higher risk group for stroke > 4 to 6% / yearly that may effectively benefit of carotid intervention can be achieved by carotid plaque structure analysis, better identification of clinical features such as diabetes and contralateral neurological symptoms, presence of appropriate hemispheric silent brain infarcts, embolization on transcranial Doppler examination thus providing better identification of this high-risk group that really could benefit from carotid intervention, either by CEA or CAS, improving the selection of patients to intervention and reducing the excessive number of asymptomatic carotid stenosis being treated by invasive procedures CEA or CAS.

*CAROTID JOINT SYMPOSIUM MLAVS / CEVF*

## THE INFLUENCE OF TECHNIQUE OF CAROTID ENDARTERECTOMY ON RESULTS IN SYMPTOMATIC PATIENTS

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**Keywords:** carotid endarterectomy, symtomatic carotid stenosis

**Objective:** The eversion carotid endarterectomy (CEA) is one of the fist-line procedures for atherosclerotic carotid stenosis. However, procedure-related haemodynamic changes and its following complications may prolong hospitalization and increase procedure-related morbidity and mortality. The typical, widely used, technique (T-CEA) requires to separate and invite destruction of carotid glomus. We are using the glomus-sparing technique (GS-CEA) because we surmise such would prevent procedure-related haemodynamic changes. The aim of this study was to investigate the influence of the different eversion techniques in basic perioperative results and the incidence of postoperative complications.

**Methods:** Three hundred sixty-seven CEAs (254 T-CEAs, and 113 GS-CEAs) were performed on 354 patients over a seven-years period. The choice of CEA-technique was not randomized. All of procedures were performed under general anesthesia with systemic heparinization. The majority of patients in both groups be treated with antiplatelet drug continuously. Perioperative course, blood pressure deviation, antihypertensive drug demand and the incidence of postoperative complications, as well as re-stenosis rate were evaluated.

**Results:** No significant differences in the number ischemic complications (1.6 % vs. 0%; 0.052), the restenosis rate (3.4% vs. 2.6%; 0.087), but a difference in favour for T-CEA-group in the length of the surgery (56.5±14.9 minutes vs. 62.0±11.5 minutes; 0.020) and in the time of clamping (12.1±4.9 minutes vs. 17.3±4.5 minutes; 0.031) were revealed. At the same time, the other criteria disclosed the advantages of thereof in the prevention of postop hypertension (p=0.008) and as a natural result, in the amount of postop drainage (0.011), local hemorrhage (0.009), incl. re-op (0.001) and re-intubation (0.001) cases. In GS-CEA-group the rate of postoperative brain edema and its following encephalopathy were significant (0.017) lower too. Eventually, the total number of postop complications was significantly less in the GS-CEA (0.011).

**Conclusion:** The results of this study suggest that glomus-sparing eversion endarterectomy may be worthy alternative to typical procedure for prevention of postoperative complication.

*CAROTID JOINT SYMPOSIUM MLAVS / CEVF*

## SELECTED ASYMPTOMATIC PATIENTS SHOULD BE REVASCULARIZED: MEDICAL THERAPY MUST BE OPTIMIZED

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The identification/selection of appropriate patient subgroups with asymptomatic carotid artery stenosis and the performance of prophylactic carotid endarterectomy (CEA)/carotid artery stenting (CAS) exclusively on these asymptomatic patient subgroups is currently one of the "hottest" topics in vascular surgery. It is now clear that offering CEA/CAS to asymptomatic carotid patients based only on the degree of carotid stenosis is unjustified and scientifically flawed. On the other hand, offering only best medical therapy to every asymptomatic patient, irrespective of certain high-risk criteria (such as the detection of microemboli by transcranial Doppler, intraplaque hemorrhage, silent embolic infarcts on brain computed tomography/magnetic resonance imaging, elevated biomarkers, family history), is equally wrong. The validation of specific measures to identify those asymptomatic patients at high risk for developing symptoms is crucial to achieve optimal use of carotid interventions and avoid wasting stroke prevention resources. At the same time the optimization of medical therapy including tests to identify patients' resistance for antiplatelets and intolerance to statins is of paramount importance.

*CAROTID JOINT SYMPOSIUM MLAVS / CEVF*

## DETERMINATION OF INDICATIONS FOR SURGICAL TREATMENT WITH A COMBINATION STENOSIS AND TORTUOSITY OF THE INTERNAL CAROTID ARTERY IN ACUTE ISCHEMIC STROKE



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**Keywords:** Acute stroke, internal carotid artery, carotid stenosis, endarterecromy

Ischemic stroke (IS) is one of the main reasons of morbidity, mortality and disablement all over the world. The study of the acute phase of disease has fundamental meaning of medical assistance development for the stroke sufferers.

The palindromia risk for stroke sufferers amounts from 5 to 20 percent within the first 30 days (the risk factors are severe stenosis, kinking, unstable plaque, floating thrombus).

**Study purpose:** to prove the surgical treatment effectiveness of the combination of stenosis and carotid artery pathological deformation in comprehensive rehabilitation of patients in acute phase of ischemic stroke.

**Materials and techniques:** From 281 patients operated for acute IS, 112 (39,9%) had associated atherosclerotic stenoses with kinking of the internal carotid artery.

In case of combined pathology the risk of recurrent stroke is rising steeply. In spite of modern level of carotid surgery, the risk of conversion from the ischemic lesion into the hemorrhagic infarction focus remains as the main argument to delay operation.

There were 3 groups defined: I group – patients, who had IS or transient ischemic attack and who were operated within 2 weeks from the beginning of acute cerebrovascular accident – 47 (42%) patients, 31 (66%) male, 16 (34%) female were among them. II group – patients, who had IS or transient ischemic attack and who were operated from 2 to 4 weeks from the beginning of acute cerebrovascular accident – 10 (8,9%) patients, 8 (80%) male, 2 (20%) female were

among them. III group – patients, who had IS and who were operated later than one month from the beginning of acute cerebrovascular accident – 55 (49,1%) patients, 34 (61,8%) male, 21 (38,2%) female were among them.

For the operative treatment preference was given to the method of the resection of internal carotid artery with its redressement and reimplantation upon specific indications. Contraindications to this surgery were: intimal proliferation in the area of maximum bending – "septal kinking" and expressed degenerative changes in the area of this bending, which impede to spread vessel adequately during redressement attempt or microaneurysmal changes in the arterial wall. In case of kinking with septal stenosis the resection of the crimp zone with anastomosis end to end was perfirmed.

**Research results:** For surgery safety evaluation perioperative complications were taken into account, first of all from the position of the evaluation of the risk of hemorrhagic transformation of ischemic stroke after restoration of blood flow through the early carotid reconstruction, made in different periods of acuity. Results evaluation was made in condition of such characteristical identity of the groups as sex, age, co-morbidity, nature of kinking, degree of stenosis, severity of neurological deficit, etc.

The positive dynamics of neurological symptoms was observed in group I for 46 (97,9%) patients, in group II for 8 (80%) patients, in group III for 43 (76,2%) patients. It should be noted that full recovery had almost every third patient in group I and II.

The neurological complications had 1 patient (group III) and lethality had 1 patient (group III). Hemorrhagic transformation of brain infarction focus after carotid artery reconstruction wasn't observed in our research.

To determine the operation time, the severity of neurological disease and co-morbidity should be taken into account. For the patients with severe neurological deficit and for patients who had IS, early reconstruction of carotid artery increase the efficiency of the functional recovery, broken during stroke due to improved cerebral perfusion and activation of neuroplasticity in the early stages of acute cerebral ischemia ($p<0,05$). The beneficial effect after reconstructive surgery on carotid artery of patients with moderate or severe neurological deficit is more pronounced than in the absence of neurologic symptoms or when the minor severity.

Taking into account international recommendations, in the acute period of IS the reconstruction of carotid artery with the value of the NIHSS scale more than 12 wasn't performed. It was determined that the most effective terms of reconstructive operations on carotid arteries are the first 2 weeks from the beginning of the development of the brain catastrophe.

**Conclusion:** Considering the analysis of frequency of postoperative complications, we determined that the patients with combined stenosis and kinking of the internal carotid artery who were operated without significant delay, have higher probability of the complete regression of neurological symptoms and consequently, disability reduction and restoration of the original employability in comparison with patients who were operated it terms of 4 or more weeks after the first symptoms appearance.

*CHRONIC WOUNDS*

## ARTERIAL EVALUATION IN PATIENTS WITH VENOUS LEG ULCERS

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In spite of the many progresses in the management of chronic venous disorders, the annual incidence of leg ulcers remains as high as 0.5 to 0.7% in the population of industrialized countries, and their mean healing time close to 6 months. Their occurrence in the elderly patients makes it likely that a large proportion of these patients also have coexistent clinical or subclinical significant peripheral arterial disease, with an increasing proportion of mixed or multifactorial ulcers in the recent series.

Even if endovascular correction of superficial vein refluxes and deep vein obstruction has improved our capabilities in treating these patients, the compression therapy remains the mainstay of their treatment, and it has to be adapted or even can be contra-indicated in case of coexisting untreatable arterial disease.

This situation makes it important to detect and quantitatively assess the severity of arterial disease in all patients with leg ulcers, even if their venous origin seems to be clear. Ankle Brachial Index is the test recommended by most guidelines for such an arterial evaluation, but its measurement in patients with leg ulcers is not without pitfalls.

This presentation will discuss all these aspects, as well as alternative arterial tests for the evaluation of such patients.

*CHRONIC WOUNDS*

## NO-OPTION CLI: NOVEL WAYS OF TREATMENT

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Recently, it has been demonstrated that the use of stem cells alone or in combination with gene therapy can provide benefit in terms of relieving rest-pain and healing ischaemic ulcers. The use of stem cells is based on holistic medicine which considers a person as a functional unit. By activating the body's ability of self-regulation this may allow the body to use its own powers of self-healing to overcome the problem.

Stem-cell therapy utilizes the following steps: (a) Harvesting of stem cells. (b) Separation of stem cells and replacement of the damaged cells by stem cells). (c) Activation of stem cells. (d) Administration of stem cells through infusion to the patient. (5) Improvement of patient's condition (less pain, better healing of ulcerations, better standing and walking. Bone marrow aspiration is the usual method of harvesting the stem cells. This can be performed from the greater tuberosity during shoulder arthroscopy or from the iliac bone. Therapeutic administration of stem cells can also be performed by harvesting from adipose tissue and umbilical cord.

Arteriogenesis can be considered as the transformation of pre-existent collateral arterioles into functional collateral arteries. Several studies have shown that cellular mediators and tissue-specific chemokines may facilitate selective recruitment of bone marrow stem and progenitor cells influencing arteriogenesis and restoring blood flow in limbs, retina and myocardium. It has been demonstrated that the injection of bone marrow mononuclear cells (BM-MNCs) significantly improves pain-free walking time, rest pain, and tissue oxygen pressure, on average 6 months after treatment, whereas injection of peripheral blood mononuclear cells did not lead to similar significant effects. Recent discoveries showed that stem cells have been detected in organs such as brain and muscles that were thought to lack regenerative potential. Also, resent discoveries on stem biology have shown that organ-specific stem cells appear to display much more plasticity and can

differentiate from one tissue into a variety of unrelated cell types and tissues. Also, it has been demonstrated that human embryonic stem cells can be isolated from early fetuses and differentiated in vitro into a wide variety of cell types. Finally, it has been found that regions of severe oxygen deprivation (hypoxia) arise in tumors due to rapid cell division and aberrant blood vessel formation.

In parallel, gene therapies represent a new field for the treatment of a wide variety of inherited and acquired human diseases. Gene therapy can be defined as the genetic modification of cells to produce a therapeutic effect. Such modification can be carried out either in vivo or in cultured cells ex vivo, which then are administered to the patient. Progress in the areas of gene therapy implies (1) The genes' discovery, (2) The vector's development, and (3) The transgene regulation. However, much work remains to be done before human gene therapy is beyond any doubt safe and effective, In particular, vectors are needed so that they can safely target specific cell types. These vectors must be easily produced at high titers and in large quantities. Also devices are needed in order to efficiently deliver vectors in vivo. Finally, a better understanding is needed of normal cell biology and of the biochemical and genetic responses of human diseases. Nowadays, are in progress combinations of gene and stem therapies and several pre-clinical studies are on the way. It seems that combination of these two methods is useful in patients with poor outflow and other comorbidities which do not allow any revascularization procedure to be carried out, as well as in patients who had previously several failed therapeutic attempts. These patients represent a population where a high rate of limb loss and death are occuring.

Like many novel therapeutic approaches, gene- and stem-cell therapies raise a number of important ethical issues and concerns. Some are common to any new therapy involving human experimentation. Others are more unique and apply to specific methods used in gene- and stem-cell therapies. Nevertheless, such ethical debates will continue to represent an important determinant of the progress and use of novel therapies in the future.

*CHRONIC WOUNDS*

## VASCULAR SURGEON AND CHRONIC WOUNDS

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Chronic wounds represent a significant burden to patients, health care professionals, and health care system. Internationall studies estimate the prevalence of current chronic leg ulcers to be approximately 1% and up to 9.8% for both healed and nonhealed ulcers in persons older than 70 years. Of these, most (approximately 80%) are thought to be caused by venous disease rather than arterial disease. Common chronic skin and soft tissue wounds include the arterial ulcer, the venous stasis ulcer, the diabetic foot ulcer, the pressure ulcer.

Ulceration due to vascular causes is often multifactorial and can be caused by both arterial and venous disease. Hypertension and atherosclerosis of the peripheral vessels lead to arterial disease associated with ischemic ulcers. Chronic venous insufficiency and the resulting venous hypertension cause venous ulcers. Vasculitis such as Buerger disease (thromboangiitis obliterans) or Takayasu disease can also be associated with ulceration. The great majority of vascular ulcers are chronic or recurrent. They cause a considerable amount of morbidity among patients with peripheral vascular disease, including work incapacity. Additionally, these nonhealing ulcers place the patient at much higher risk for lower extremity amputation. Surgical therapy of vascular ulcers may be accomplished by a number of methods; tailor the choice to fit both the patient's and surgeon's expectations. Revascularization may be most appropriate in one patient and amputation with rehabilitation most suitable in another. Surgery to correct venous reflux does not appear to improve ulcer healing, though it may reduce the recurrence of problem wounds.

Surgical therapy is an integral part of the treatment of nonhealing wounds. Wounds with necrosis or infection usually require debridement or incision of the affected tissue. The goal is to achieve a clean, granulating bed.

*CHRONIC WOUNDS*

# APPLICATION OF COMPRESSION THERAPY IN THE TREATMENT OF LYMPHEDEMA

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**Keywords:** lymphedema, primary, secondary, compression therapy

Lymphedema is a condition of extremities swelling due to lymphatic hypoplasia (primary) or obstruction or injury to the lymphatic vessels (secondary). There is abnormal accumulation of interstitial fluid rich in protein, which increases the intercellular plasma oncotic pressure and leads to further accumulation of fluid. It also contains wather, blood cells and hyaluronic acid. Symptoms and signs are firm, hard and fibrous edema of one or more extremities.

With persistent treatment and application of preventive measures the symptoms can be weakened and slowed down and the advancing of the illness can be completely stopped. In the last few years, a new classification has been developed, dividing primary lymphedema according to phenotypes and in the same cases by genetics where the genes are know, to secondary lymphedema.

Compression therapy is part of the vein surgery treatment and lymphedema. The pressure under the bandages has to exceed the intravenous pressure wich is to higher in standing position. Different compression material different works on speed of reducing the oedema, on venous refluxes, on venous pump, on ambulatory venous hypertension, on microcirculation and on lymphatic drainage. Compression material with high stiffness is more effective to prevent and reducing oedema than compression with low stiffness.

Inelastic materials or short strech bandages system faster reducing the oedema, faster and beter reducing the venous refluxes in superficial and deep venous system, better promoting the venous pump, faster decreasing of ambulatory venous hypertension, improving the microcirculation and promoting and improvement the lymphatic drainage with increased lymphatic contractions. Stiff compression cause intermittent venous occlusion during walking and so impeding venous reflux. The inleastic multi layer bandages system - materials have higher efficacy than long strech materials. Intermittent compression enhances arterial flow too. Reducing the oedema is enhanced by movement of calf and foot, micro massage under the under-padding compression materials, with arterial pulsation and respiration too wich working on lymphangions. Long stretch bandages and compression stockings wich have extensibility more than 100% performing moderate working pressure but they are easier to apply by patient alone or his relatives. Applaing of short stretch bandages request trained staff. Bandages applied with excessive tension can cause tissue damage leading to necrosis at the patients with unrecognized artherial occlusive disease. So, before applaing the compression ancle brachial index have to be measurement.

*CHRONIC WOUNDS*

# CHRONIC SURGICAL WOUNDS AND BIOFILM

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**Keywords:** chronic surgical wound, infection, biofilm

The notion of surgical site infection (SSI) implies the infection of the incision or of the organ or organ space, as a consequence of surgical intervention. It develops up to 30 days aft er surgery or up to one year in the insertion of prostheses or implants.

An acute wound can develop into a chronic one in every phase of healing, most frequently as a consequence of infection. Measures which facilitate healing and prevention of infection are good hydration, oxygenation and absence of pain. Impediments to healing are numerous. They are the result of interrelationship of the comorbidity of the host, extrinsic factors such as the characteristics of bacteria or fungi, and their virulence factors, predominantly the biofilm. Extrinsic risk factors in a surgical patient appear in the pre-operative, intra-operative and post-operative period, along with other factors related to localisation and type of operation.

Wound infection is a continuous process which develops in several phases, and it is defined by the relationship of microbes and the host, along with belated or inefficient preventive measures.

The infection of acute and chronic surgicalers by clinical symptoms, course and consequences, as well as on the level of pathophysiological-molecular processes which are determined by the biofi lm and bacterial multiple resistance.

The presence of bacteria in the wound and in the tissue includes quantity, variety, virulence, mutual interaction, along with a synergy of action in relation to the host.

The reservoir and source of etiologic agents of infection is primarily the physiological flora of the skin. Activity of bacteria in the wound depends on the quantity of agents, and type and quantity of virulence factors. We differentiate several types of virulence factors which are signifi cant in the development of infection. These are factors connected to the bacterial cell wall such as hydrophobia, adhesins and biofi lm, followed by excretory ones such as enzymes and exotoxins and endotoxins.

Biofilm is a complex community of aggregated and adhering bacteria, connected with a self-producing extracellular polysaccharide matrix. The removal of biofilm is extraordinarily complicated. A relative success can be obtained by debridement along with the application of dressings with anti-biofilm activity. The goal of the physiological healing of the surgical incision is the re-establishment of the integrity of tissue and function, along with a cosmetically acceptable appearance of the scar. A basic supervision of the surgical incision includes the host, the environment and endogenous flora. The strategy of wound care and treatment relies on the establishment of cell balance and return of the wound into a healing phenotype along with an action on the etiological agents of infection.

Infection of the wound is multifactorial, and the procedures of prevention and treatment are multi-modal and must be combined and repeated. In this process, a certain role is played also by antiseptics which are bactericidal, as well as biofi lm-active substances, especially those incorporated in up-todate dressings.

*CHRONIC WOUNDS*

# THE EXPERIENCE OF SUCCESSFUL USE OF NEGATIVE-PRESSURE WOUND THERAPY IN PATIENTS WITH INFECTIOUS COMPLICATIONS AFTER SURGERY ON THE AORTO-ILIAC AND FEMORAL-POPLITEAL SEGMENTS

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**Keywords:** Negative-pressure wound therapy, NPWT, infectious complications

The aim is to study the effectiveness of Negative-pressure wound therapy (NPWT) in patients with infectious complications after surgery on the aorto-iliac and femoral-popliteal segments.

**Materials and Methods:** We have observed 22 patients who formed infectious complications with postoperative suppuration of wounds after performing reconstructive surgeries on the lower limb arteries. The study group included 18 (82%) men and 4 (18%) women. 11 (50%) patients had diabetes mellitus, 10 (45%) patients were obese. 17 (77%) patients were performed femoral-popliteal bypass, 5 (23%) patients underwent aortofemoral bypass surgeries.

In most cases (77%), infection has occurred in the upper-third hip. For all of study patients was executed surgical treatment of purulent focus in post-operative wounds, using NPWT after the development of infectious complications. Further to all the patients received antibiotic therapy according to the results of bacteriological sowing from the wound. Stage-by-stage sanctions were fulfilled every three days. Having inflammation symptoms relieved, bacterial contamination reduced, repeated surgical treatment with excision of affected tissues was performed.

**Results:** After NPWT, the majority of patients (91%) had complete wound cleansing. In 1 (4.54%) case after long-term therapy from the distal anastomosis area of the femoropopliteal bypass developed an arrosive bleeding, that was demanded to remove synthetic prosthesis.

**Conclusion:** NPWT is a safe and effective method of treatment infectious complications after surgeries on the aorto-iliac or femoral-popliteal segments.

*CHRONIC WOUNDS*

# INTERDISCIPLINARY APPROACH TO THE PATIENT WITH HARD TO HEAL VENOUS LEG ULCER – CASE REPORT

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**Keywords:** compression therapy, endovenous laser ablation, hard to heal wounds, venous leg ulcer

Aim: to present a combined treatment of hard to heal venous leg ulcer (VLU): topical with wound dressings, compression therapy and endovenous laser ablation (EVLA) after the wound healed to prevent recurrence.

Method: a 78-year-old patient comes in for visit due to a 4-year-old leg ulcer, 150 cm2 in size, on the left lower leg that shows no signs of improvement despite local therapy and long stretch bandage compression therapy. Dressing changes are done 3 times a week at the family doctor's practice or by patient itself with regular dermatologist check-ups. Comorbid diseases: arterial hypertension and osteoporosis.

The VLU was verified clinically and with duplex ultrasound, insufficiency of Great Saphenous Vein, followed with Ancle Brachial Pressure Index (ABPI) measurement, right leg 1.22, left leg 1.19. The formation of biofilm at the wound bed was clinically evaluated and debridement and dressing changing were done regularly with Enhanced Hydrofiber Dressing with Silver and Strengething Fibre, as well as with secondary polyurethane foam dressing with the application of multi-component compression system of short stretch bandages.

Results / Discussion: the wound healed completely within a period of 25 weeks in the continuation of the treatment, compression stockings 23-32 mmHg are being applied. A one year after VLU healed EVLA was conducted to prevent recurrence. The procedure went without complications.

Nine-month monitoring period shows no signs of relapse.

Conclusion: venous leg ulcer is successfully treated with the application of combined local and compression therapy and the recurrence is prevented by EVLA.

*VENOUS*

## SEALING IN VARICOSE VEINS

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**Keywords:** Varicose veins, treatment, glue application, recent advances

The cyanoacrylate glue application for different kind of vascular diseases such as vascular anastomoses, occlusion of aneurysms and vascular fistulae was recommended since the 1960s. Especially, first clinical vascular occlusion series with cyanoacrylate was reported after the 1970s. However, the clinical usage of cyanoacrylate for the treatment of lower extremity varicose disease gain popularity in the last decade.

The previous popular methods for endovenous closure of varicose veins were depended on endothermal methods such as laser and radiofrequency ablation that requires tumescent anesthesia. According to presented results from scientific reports glue seems to be effective in lower extremity varicose disease that can not be treated with medical therapy and being non-thermal as not requiring tumescence is an extremely popular technique. However, the industry trying to develop some new strategies for taking this technique more useful and solving some confusing problems about he residual material, diffuse distribution, and postoperative progress.

Recently studies focused on developing more elastic and soft glue options and also presenting good alternatives for diffuse and easier delivery techniques. It seems to be glue treatment of varicose veins will become more popular with further advances.

*VENOUS*

## INTERVENTIONAL TREATMENT OF DEEP VENOUS THROMBOSIS. WHICH PATIENT?



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**Keywords:** Deep venous thrombosis, post-thrombotic syndrome, pharmacomechanical thrombectomy

Despite the use of anticoagulant therapy, the post-thrombotic syndrome (PTS) develops within 2 years in approximately half of the patients with proximal deep-vein thrombosis. Recent studies claimed that quality-of-life scores of moderate symptoms patients with PTS were reported as lower than diabetes, arthritis, and chronic lung disease. Thus, more recent alternative interventional therapies to reducing thrombosis burden for avoiding the progression of PTS in patients with deep venous thrombosis (DVT) were developed. However, clinical data about these pharmacomechanical thrombectomy techniques still insufficient and there is no exact consensus about application time and selection of technique.

Goals of invasive techniques can be listed as diminishing the severity and duration of extremity symptoms, prevent pulmonary embolism and also PTS, and minimize the risk of recurrent venous thrombosis. In current presentation we aimed to discuss the possible cost effectivity of these interventional techniques and patient selection criteria for pharmacomechanical thrombectomy.

As the results of recent data further investigations may helpful for the clarifying the pathophysiological basis of PTS and define alternative applications to reduce progression or alleviate disabling symptoms. According to the findings from these investigations, an algorithm for management of pharmacomechanical thrombectomy applications should be determined.

*VENOUS*

# INPACT OF ENDOVASCULAR MANAGEMENT OF ARTERIOVENOUS FISTULA MALFUNCTION IN PRESERVING HEMODYALISIS ACCESS

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**Key words:** arteriovenous, fistula, endovascular, transplantation

**Background:** To present our initiative and 2-year follow-up resolving arteriovenous fistula (AVF) malfunction in 45 patients.

Materials and methods: From July 2015 till November 2019, 45 patients with dialysis access related complications, most commonly inadequate blood flow rate during dialysis, arm swelling, pain during dialysis, and shortening of dialysis sessions due to clotting were presented to our department and underwent endovascular management.

**Results:** Of 45 patients admited to our Department, 37 pts had indication for endovascular treatment due to stenosis or occlusion of AV fistula, with tehnical success in 33 patients (89%) of cases. We did 6, 12 ad 24 months follow-up, considering kidney trasnplantation or patent AVF as success of our treatment.

After 6-months, all patients with follow-up (7/7) treated with drug eluting baloon angioplasty (DEB) had patent AV-fistula and one patient recieved kidney transplant, compared to only 9/17 (53%) patent AV fistulas in patients treated with plain old baloon angioplasty (POBA). At 1-yeat follow up, one patient in DEB group recieved kidney transplant and remaining 3 out of 5 patients had patent AV fistulas, while POBA group patients had one restenosis and patent AVF in remaining 8 patients. Loss of patients after 2 years left 2 patients in DEB group to follow-up, with one trombosed AVF, while 3 out of 5 patients in POBA group showing patent AVFs.

**Conclusion:** Our close multidisciplinary collaboration was successful in reducing vascular access complications, lowering dialysis patients' morbidity, and increasing the percentage of patients with a well-functioning AV fistula for long-term hemodialysis treatment, and serving as bridging towards transplantation. In addition, possible better results with DEB should be confirmed in larger cohort.

*VENOUS*

## SURGICAL TREATMENT OF TUMORS IN BIG VEINS

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**Introduction:** Thrombus and tumours extending into the inferior vena cava (IVC) in 10% of cases at diagnosis and up to the right atrium in 1% of cases In this specific scenario, clinical presentation is often characterised by acute cardiovascular failure o major systemic symptoms due to the concomitant presence of locally advanced bulky tumour, caval involvement, and/or distant metastases. Although prognosis is usually poor, selected patients may benefit from surgical treatment in the context of a multimodal management . We aimed tos hare our experience in this challenging situation.

**Methods:** We retrospectively analyzed 19 patients with thrombus or tumours in big veins who underwent surgery. There were 6 renal cell ca (5 type I and type 3), 2 leiomyoma and 1 leiomyosarcoma in inferior vena cava, 1 lipoma in subclavian vein, 2 tumour infiltration into superior vena cava and 7 patients with tumour infiltration to vena cava inferior. Mortality and technique was discussed.

**Results:** In all patients tumours were extracted. (videos) 4 patients were treated with dacron patch plasty with dacron, 12 patients with primary repair, 3 patients with graft interposition (PTFE, spiral vein graft and dacron ). In 4 patients cardiopulmonary bypass and in one patient total circulatory arrest was required. Mean follow up period was 28 months. There wewre 3 mortality beacuse of malignity.

**Conclusion:** Although the most appropriate or efficacious surgical technique remains unclear, it should be selected judiciously for each case based on the level of tumour thrombus.. Future research must endeavour to carefully design prospective comparative studies with experimental designs and use of appropriate controls to ascertain which surgical technique offers the best outcomes.for this challenging group of patients.

*VENOUS*

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## ENDOVASCULAR TREATMENT OF THORACIC CENTRAL VEIN OCLUSION STENT (PREVIOUS INTERVENTION) WITH A PARALLEL STENT – CASE REPORT

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**Keywords:** central venous obstruction, endovascular treatment, stenting, recanalization, parallel stents

**Introduction:** Superior Vena Cava Syndrome is a frequent complication in patients in hemodyalisis who have had previous venous catheter accesses. Treatment options include balloon angioplasty, stenting, venous bypass or fistula ligation. Recanalization of occluded central vein is difficult and the endovascular treatment have frequent and rapid recurrence, requiring early reintervention. The objective of this study is to report a case of recanalization of thoracic central vein obstruction with an occluded previous stent with a parallel position stenting.

**Case report:** 65-year-old male, with chronic kidney disease in hemodyalisis, with brachiocephalic arteriovenous fistula (AVF), with edema and pain in the left upper limb, collateral circulation (Superior Vena Cava Syndrome). History of previous venogram with central vein critical stenosis and treated with stenting. Performed new intervention for recanalization and angioplasty with stent parallel to the previous stent with good flow and regression of the symptoms.

**Conclusion:** Endovascular techniques allow several reinterventions in the same territory. The case presented was an example of immediate success after local interventions. The development of new devices and the improvement of endovascular techniques provide less invasive approaches to complex cases.

*VENOUS*

# FLUOROSCOPY GUIDED BLOCKED SAPHENOUS VEINS SCLEROTHERPY (FGBSS), ANOTHER POINT OF VIEW

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**Keywords:** Saphenous, Varicose veins, Sclerotherapy

**Objective:** An ideal method treating GSV incontinence should be effective, safe ,inexpensive, painless and ambulatory, it could treat associated varicose veins and pelvic congestion syndrome at same session.

FGBSS looks comparable to this ideal, we think that it is worthwhile to present our team experience, it includes never seen before videos and images of Saphenous veins anatomy and its reaction to sclerothrapy.

**Methods:** Between march 2008 and march 2012: 62 patients (69 legs: 7 bilateral) underwent FGBSS for GSV varicose veins

Associated simultaneous procedures:

- 6 LSV and 7 perforators sclerosis, 13 branches sclerosis
- 8 pelvic congestion syndrome and 1 varicocele embolizsation

- Under ultrasounds guidance, just below the knee GSV entry under local anesthesia, advancement of 5-8F 60 cm guiding sheath over 35 hydrophilic wire 3cm below Saph-fem junction
- Now working under fluoroscopy guidance (C arm) , descending phlebography during valsalva maneuver realizing reflux cartography
- Introducing 5-7 Fogarti occlusive balloon catheter, inflating the balloon at the junction
- new occluded phlebography to adjust balloon-sheath position
- Smoothly injecting foam-contrast mixture to fill the totality of incontinent network

Procedure average time 23 minutes, 3 % sclerosing agent average dose is 3.5 ml (1,5 - 7)

**RESULTS:** Out of 47 duplex controlled cases for more than 1 year, 44 show complete occlusion of GSV, tributaries and junction till the CFV who keeps a normal aspect with no deformity or bulging thrombus, one AAV recurrence and tow asymptomatic segmental recanalization.

**CONCLUSION:** FGBSS is effective, inexpensive, rapid and well tolerated method, it treats GSV and all incontinent brunches till junction, it must be encouraged and be subject to further trails and evaluation.

*PAD*

## PULMONARY ENDARTERECTOMY FOR CTEPH (CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION)

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Although the exact prevalence and annual incidence of Chronic Thromboembolic Pulmonary Hypertension (CTEPH )are

unknown, studies suggest that this condition may occur in approximately 4 to 5% of patients after an acute pulmonary embolism, making CTEPH one of the most common causes of precapillary pulmonary hypertension. However, it is likely that CTEPH remains significantly underdiagnosed. -In chronic thromboembolic pulmonary hypertension, thromboemboli do not undergo resolution but instead become highly organized and fibrotic, resulting in obstruction of segments of the pulmonary vascular tree. Progressive pulmonary hypertension ensues, with substantial associated morbidity and mortality.

Despite advances in medical therapy for some types of pulmonary hypertension, surgical pulmonary endarterectomy, also referred to as pulmonary thromboendarterectomy, is the mainstay of therapy for patients with chronic thromboembolic pulmonary hypertension (CTEPH). This operation leads to major clinical improvement and is a potential cure for a large majority for patients suffering from CTEPH. PTE is performed under cardiopulmonary bypass (CPB) and requires deep hypothermic circulatory arrest (DHCA) to complete the endarterectomy of the segmental and subsegmental branches of the pulmonary arteries. Here we tried to aim to emphasize the importance of this disease present our technique.

*PAD*

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## ENDOVASCULAR MANAGEMENT OF SFA DISEASE

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**Keywords:** SFA, CTO, VCD, CIA, EIA

**Background:** SFA disease is responsible for > 50% of PAD Cases.Vascular Access for SFA disease management are Antegrade CFA puncture , Contralateral retrograde access over the aortic bifurcation , Retrograde pop A access, Brachial access & pedal access. Endovascular management of SFA disease done by angioplasty , Stenting , Directional atherectomy ,Rotational atherectomy ,Laser angioplasty ,Intra-arterial radiation or Cryotherapy.

**Materials & methods:**

**Case 1**

52 yrs M ,DM & CAD with h/o lt. femur fracture 3 yrs back having lt. LL claudication & great toe ischemic ulcer. Doppler: multiple stenotic lesions with CTO in distal lt SFA. Cath: Left SFA POBA done which increased pedal flow & healed ulcer.

**Case 2**

67 yr M: severe claudication(Fontiane stage ll B;Rutherfors category 3) of Rt leg .Pedal pulses absent. CTA: aorto-iliac & b/l lower limbs atherosclerotic disease(TASC A lesion). Small outpouching in Rt CIA(9x4mm). Rt EIA:75% stenosis with 23 mm in length. Rt distal SFA: long segment 30 cm focal CTO with distal reformation of pop A via collaterals. ATA & PTA: normal course & caliber. Rt SFA angioplasty with 0.035 & 0.014 hi-torque 300 cm wires & 5 mm x 150 mm x 135 cm balloons via 35 ll pta catheters percut via lt CFA access. During ballooning in distal SFA,there was dissection which was treated with stent (Absolute pro ll,Peripheral self expanding stent

system, 5 x 150 mm, 135 cm). EIA angioplasty with complete CIA & EIA stenting by Abbott vascular, Absolute pro II, 8 x 120 mm, 135 cm stent was done.

**Case 3**

A 72 yrs old gentleman presented with disabling Claudication left leg.

H/O CABG, Bilateral SFA Stenting, DM, HTN. LOCAL EXAMINATION Left Leg: Popliteal and Pedal pulses were absent. No wound/Ulcer

**Colour Doppler:** Stenosis at distal end of previously placed left SFA stent. Short segment 100 % occlusion at distal SFA (adductor canal) with reformation of popliteal artery. Monophasic flows in infrapopliteal vessels Access -Right femoral retrograde.6 F crossover sheath.

**Selective Femoral angiogram:** Previously placed left SFA stent was patent with >50 % edge stenosis at distal end of Stent. There was 100 % short segment (< 5cm) occlusion of distal SFA (adductor canal) with reformation of popliteal artery.

Using routine 0.035 glide wire & 4 F catheter combination the CTO was crossed. Pre-dilatation was done with compliant 5mm PTA balloon dilatation catheter. This was followed by inflation DEB (Medtronic, IN.PACT Amphirion drug-eluting balloon, 6 mm x 60 mm) at the region of CTO and previously stented segment respectively. Inflation time of DEB was 3 min. Access site homeostasis achieved using Proglide VCD. There was satisfactory opening up of the stent edge stenosis & satisfactory recanalization of the distal SFA occlusion with non-flow limiting small dissection flap and good distal run off.

**Results:** Case 1 got ulcer healed post angioplasty & all 3 cases improved of claudication well following angioplasty or stenting.

**Conclusion:** Angioplasty works best for short SFA stenoses or occlusions. However, angioplasty with stenting is likely superior initial Rx for intermediate and long length lesions.

*PAD*

## PTA PROCEDURES AFTER PREVIOUS VASCULAR SURGERY

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**Keywords:** critic limb ischemia, vascular surgery, PTA procedure, vascular team

Backgroud: More than last 30 years we are witnessing the epidemia of cardiovascular diseases including peripheral vascular disease. The treatment of peripheral vascular disease could be conservative, endovascular and surgical. These days we are facing with lot of patients that are previously operated and now having new ischemia. This happens beacause the atherosclerosis is chronical progressive disease that attacks many vessels. With time passing by, many new problems are created (lack of vascular approach, lot of comorbidities, no possibility of surgical re-do, advanced age etc).

**Methods and patiets:** There are no specific guidelines how to treat those patients, so they are candidates for multidisciplinar approach,, so called vascular team. It includes: vascular surgeon, interventional cardiologist/radiologist, anaesthesiologist and some times cardiac surgeon. Vascular team is here to collaborate and decide how to treat patients in their best interest.

**Results:** This presentation shows some clinical cases with critical limb ischemia with previous vascular surgery succesfully treated with PTA procedure.

**Conclusion:** endovascular approach may be an excellent solution for treatment vascular patients with previous vascular surgery

*PAD*

# SUPERFICIAL FEMORAL AND POPLITEAL ARTERIES LONG OCCLUSIONS: ANOTHER WAY OF REVASCULARIZATION

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**Keywords:** popliteal artery, bypass surgery, endarterectomy, occlusion

**Objective:** No consensus in treatment of superficial femoral and popliteal arteries long occlusion causing limb ischemia is present nowadays. Femoropopliteal bypass below-knee position has significant disadvantages: small diameter of popliteal artery doesn't always corresponds with blood flow from femoral artery due to high peripheral vascular resistance, while collateral arteries surrounding knee joint are excluded from circulation. We hypothesized that consecutive endarterectomy using direct posterior approach in prone position and above knee femoropopliteal bypass (E+FemPop bypass) in supine position (Patent RF 2601698) would present a better outcome than distal femoro-popliteal bypass. Long-term results of retrospective study will be presented.

**Methods:** 66 patients were included: 34 underwent E+FemPop bypass (I group), and 32 – distal femoropopliteal bypass (II group). Indications for surgery were claudication in 20, rest pain in 24 and tissue loss in 22. All patients had TASC D lesions affecting superficial femoral artery and P1, P2 or all segments of popliteal artery. At least 1 crural artery was patent from origin to at least 8 cm distally.

**Results:** Primary patency after 74 months of follow-up was 42,05% for E+FemPop bypass and 15,92% for distal bypass (p = 0,021, log-rank test), and secondary patency was 57,8% and 22,59% (p = 0,017), respectively. Limb salvage after 74 months was 66,91% after E+FemPop bypass and 59,07% after femoropopliteal bypass below knee surgery (p = 0,33): 10 amputations in I group (40% major), 9 amputations in II group (100% major). Cumulative primary, secondary patency and limb salvage after 133 months in I group were 37,85%, 52,95% and 30,81% respectively.

Conclusions: E+FemPop bypass is a good option for surgical repair in superficial femoral and popliteal arteries occlusions, with better primary and secondary patency rates then distal bypass surgery. If the saphenous vein is not applicable, E+FemPop should be considered.

*PAD*

# CRITICAL LEG ISCHEMIA, THE ULTIMATE DEBATE, OPEN VERSUS ENDOVASCULAR

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**Introduction:** Patients with critical leg ischemia (CLI) demand a disproportionately large commitment both in medical effort and economically and represent the major workload for vascular surgical units. endovascular revascularization has become an alternative to surgery as a method for the salvage of critically ischemic legs. We tried to shared our comparison between two methods for CLI.

**Methods:** We retrospectively analyzed uour patients with critical leg ischemia (CLI). Between 2008 and 2017, 287 patients were treated wtih CLI, 216 underwent revascularization. 33 underwent primary amputation and 38 with medciical treatment and woundcare. 114 had Diabetes Mellitus, 54 had Chronic renal failure and 21 had both. We compared surgical and endovascular interventions in terms of mortality, and amputation . Demographic data is summarized in table 1.

**Results:** There was no difference in hospitalization (24 - 71 days). Follow up period 34.3 ± 5 months. Hospital mortality in 3 patients in open surgery group and 2 patients in endovascular group. Late mortality was 7 patients in open surgery group and 9 patients in endovascular group. Amputation free survival in open surgery group in 1, 2 and 3.rd years 82 %, 78 % and 75 %. Amputation free survival in open surgery group in 1, 2 and 3rd years 85 %, 79 % ve 68 % Secondary intervention is higher in endovascular group (12 % vs 5.9 %).

**Conclusion:** Each treatment modality provides solutions for CLI. Custom made solutions is essential for each cases. Using new classifications are helpful in decision making.

| | OPERATION | ENDOVASCULAR |
|---|---|---|
| CRF | 23 Patients (22.7 %) | 31 Patients (26.9 %) |
| DM | 63 Patients (62.3 %) | 51 Patients (44.3 %) |
| KBY +DM | 8 Patients (7.9 %) | 13 Patients (11.3 %) |
| AGE | 67.4 ± 11.2 | 65.1 ± 9.8 |
| greft ve flap | 18 Patients (17.8 %) | 22 Patients (19.1 %) |
| HBO 1 | 14 Patients (13.8 %) | 17 Patients (14.7 %) |
| EGF | 9 Patients (8.9 %) | 13 Patients (11.3 %) |
| coronary arter disease | 17 Patients (16.8 %) | 24 Patients (20.8 %) |

*Table-1 demographic data of the patients*

*PAD*

# PEDAL ARCH IN DIABETIC PATIENTS

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**Aim:** To retrospectively evaluate the impact of pedal arch quality on tissue loss and time to healing in diabetic patients with foot wounds undergoing infrainguinal endovascular revascularization.

**Materials and methods:** Between January 2014 and June 2015, 137 consecutive diabetic patients with foot wounds underwent infrainguinal endovascular revascularization (femoro-popliteal or below-the-knee, arteries). Postprocedural angiography of the foot was used to divide the patients into the following three groups according to the pedal arch status: complete pedal arch (CPA), incomplete pedal arch (IPA), and absent pedal arch (APA). Time to healing and estimated 1-year outcomes in terms of freedom from minor amputation, limb salvage, and survival were evaluated and compared among the three groups.

**Results:** Postprocedural angiography showed the presence of a CPA in 42 patients (30.7%), IPA in 60 patients (43.8%), and APA in 35 patients (25.5%). Healing within 3 months from the procedure was achieved in 21 patients with CPA (50%), 17 patients with IPA (28.3%), and in 7 patients with APA (20%) (P=.01). There was a significant difference in terms of 1-year freedom from minor amputation among the three groups (CPA 84.1% vs. IPA 82.4% vs. APA 48.9%, P=.001). Estimated 1-year limb salvage was significantly better in patients with CPA (CPA 100% vs. IPA 93.8% vs. APA 70.1%, P <.001). Estimated 1-year survival was significantly better in patients with CPA (CPA 90% vs. IPA 80.8% vs. APA 62.7%, P= .004).

**Conclusions:** Pedal arch status has a positive impact on time to healing, limb salvage, and survival in diabetic patients with foot wounds undergoing infrainguinal endovascular revascularization.

*NOACS – PHILIP MORRIS SPONSORED LECTURE*

# CARDIOVASCULAR EFFECTS OF THE TOBACCO HEATING SYSTEM (THS) COMPARED WITH CONTINUED SMOKING

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Cigarette smoking is causally linked to the development of cardiovascular diseases. For many decades, reducing tobacco harm has been focused on preventing smoking initiation and promoting smoking cessation. In recent years, the tobacco harm reduction approach has emerged, which focuses on providing smokers who do not quit with a new generation of smoke-free products that have the potential to be substantially less harmful than cigarettes. The Tobacco Heating System (THS) 2.2 is a novel tobacco product that heats tobacco instead of burning it, never allowing the temperature to exceed 350ºC, thereby preventing combustion and producing substantially lower number and levels of toxicants than CS.

Our assessment program includes in vitro/in vivo toxicology testing and randomized, controlled clinical studies.

The results of the THS translational assessment program demonstrated that cardiovascular toxicants are reduced by more than 92% in THS aerosol versus smoke and that THS aerosol contains no solid carbon-based nanoparticles. The effects of THS aerosol on adhesion of monocytic cells to human coronary endothelial cells in vitro are significantly reduced. Switching to THS halted the progression of smoke-induced atherosclerotic changes in ApoE-/- mice in in vivo studies.

Clinical risk endpoints (CRE) linked to the development of smoking-related diseases were analyzed following a 6-month randomized, controlled clinical study with THS, which demonstrated consistent improvement in CREs in different pathophysiologic pathways leading to atherosclerosis.

The evidence available to date indicates that switching to THS has the potential to reduce the risk of smoking-related diseases, such as cardiovascular diseases.

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## INFLAMMATION AND VENOUS THROMBOSIS: WHAT IS THE CONNECTION?

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During the last decade, the role of inflammation in the etiopathogenesis of arterial thrombosis has been elucidated. However, little is known about the relationship between inflammation and venous thrombosis. Recently, inflammation has been accepted as a possible mechanism through which different risk factors trigger thrombus formation in veins. The data indicate that inflammation of the vessel wall initiates thrombus formation in an intact vein and that inflammation and coagulation systems are coupled by a common activation pathway. The first event in thrombus formation is most probably activation of endothelial cells, platelets and leucocytes, with initiation of inflammation and formation of microparticles that trigger the coagulation system through the induction of a tissue factor. Therefore, the key event in the initiation of venous thrombus formation is most probably vein wall inflammation. However, expected relationship between inflammatory markers as indicators of inflammatory process and clinical venous thromboembolism (VTE) has not yet been elucidated. C-reactive protein does not appear to be useful in predicting future venous thrombosis or to be useful in the diagnosis of VTE. Recently, it was demonstrated that probable association between VTE and several other markers of inflammation such as: interleukin (IL)-6, IL-8 and tumor necrosis factor-a exists. While these markers of inflammation were studied during or after acute venous thrombosis, further prospective studies are needed to determine the predictive value of inflammatory markers for VTE. The identification and elucidation of inflammatory markers relevant to venous thrombosis could provide targets for future therapy. That inflammation is the basic etiopathogenetic process of VTE is also supported by the relation of some risk factors to both arterial and venous thrombosis: age, increased body mass index, hypercholesterolemia, hypertension, lupus anticoagulant and hyperhomocysteinemia. A relation was also found between preclinical and clinical atherosclerotic disease and VTE. Also in line with these arguments are the preventive effects of aspirin and statins in both arterial and venous disease.



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## NOACs IN VENOUS THROMBOEMBOLISM AND PERIPHERAL ARTERIAL DISEASE

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**Keywords:** NOACS, VTE, PAD

Several new or direct oral anticoaulants (NOACs), e.g. direct thrombin inhibitor (dabigatran) and direct factor Xa inhibitors (rivaroksaban, apiksaban) became over the last decade alternatives to old anticoagulant(VKA). NOACs offer rapid onset and offset of action, predictable anticoagulant effects and fewer drug and food interactions without the need for frequent monitoring. In addition, all the NOACs undergo kidney clearance to varying degrees.

Venous thromboembolism (VTE) is categorised as deep venous thrombosis (DVT) and pulmonary embolism (PE). Anticoagulant therapy is recommended in patients with DVT or haemodynamically stable non-high-risk PE. Combination therapy – heparin or other parenteral anticoagulation followed by an oral VKA –

is a traditional approach. However, since recently the NOACs have provided an alternative to VKAs and also offer the option of a single oral drug from the start of therapy.

Persistent oral anticoagulant therapy in combination with antiplatelet therapy (for at least 1 month after percutaneous peripheral vascular revascularization) is indicated in patients with peripheral arterial disease (PAD) and atrial fibrillation with CHA2DS2-VASc ≥ 2 or in patients with mechanical valve.

The incidence of amputations in patients with PAD is associated with control of systolic blood pressure, which is very often lacking. Angiotensin-converting enzyme (ACE-I) inhibitors and angiotensin receptor antagonists (ARBs) can significantly reduce cardiovascular risk in patients with PAD.

The future of treatment for peripheral arterial disease is the administration of antiplatelet monotherapy with vascular dose of NOACs.

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## CAN WE REDUCE THE INCIDENCE OF THE POST-THROMBOTIC SYNDROME?

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The post thrombotic syndrome (PTS) is the major chronic sequel of deep vein thrombosis (DVT) of the leg and it is a major socio-economic challenge. In addition to systematic prophylaxis of DVT in hospitalized patients, effective management of DVT is important to reduce the incidence of PTS.

Correct diagnostic strategy and optimal anticoagulation are important to prevent the recurrent DVT which is the major risk factor for PTS.

Regarding the DOACs, extended anticoagulation may be promising for reducing the risk of PTS in comparison with standard anticoagulant therapy. Our data suggeted that they have a strong action on endogenous fibrinolysis, reducing early not only the recent thrombus but also the organized thrombus with, as result, a complete recanalization of affected veins and consequent reduction of incidence of PTS, saving the valves structure.

Aim of our clinical-instrumental observational research is to observe the anticoagulant effect of Rivaroxaban in patients with recent and previous VTE and in particular if the DOACs have a fibrinolytic effects on new and older thrombus.

We studied two groups of patients:

**The first group:** 27 subjects, age 50-70 years, with previous popliteal-femoral DVT.

- Complete femoral recanalization and partial popliteal recanalization (30%).
- Normal creatinine clearence and liver function.

**The second group:** 19 subjects, age 70-85 years, 11 males and 8 females.

- Parzial recanalization of popliteal vein (30%)
- Recent femoral re-thrombosis in previous popliteo-femoral DVT (about 3 years ago).
- Normal creatinine clearance and liver function.

The patients followed the AVKs therapy but modified the treatment for no compliance to dicumarols and starts with DOACs (rivaroxaban 15 mg BID for three weeks, then 20 mg die).

All patients were submitted to clinical and echo duplex evaluations every week for 30 days.

In the first group we observed the complete racanalization of popliteal thrombosis after 30 days.

In the second group we observed the complete recanalization of recent femoral thrombosis after 14 days and the complete recanalization of old popliteal thrombosis after 30 days.

No adverse events were observed.

These results show the fibrinolytic activity of DOACs also in patients with old thrombosis with partial recanalization. This action is useful to reduce the posthrombotic syndrome preserving the integrity of valves.

The introduction of non-vitamin K antagonist oral anticoagulants (DOACs) has fundamentally changed clinical practice in the use of oral and parenteral

anticoagulation therapy in the treatment of venous thromboembolism.

Some laboratory tools for determining the rate of thrombus formation and fibrinolysis in whole blood and plasma include techniques such as the thrombelastograph (TEG) and an assay performed in a 96-well microtitre plate (MPA). As reported by Y.C. Lau (J Thromb Thrombolysis (2016;42:535–544) the rate of clot dissolution is more rapid in rivaroxaban patients.

The TEG and MPA identify differences in thrombogenesis and fibrinolysis in different NOACs with major action in rivaroxaban patients. Rivaroxaban had the greatest influence of slowing thrombogenesis, giving a result (69 % inhibition) close to that of warfarin (65 % inhibition).

This result was confirmed in the EINSTEIN PE study (van Es J et al, J Thromb Haemost 2013;11:679–685) in which was observed the early clot regression following acute PE (88 % of clot complete of partial resolution after 21 days of treatment).

Better allocation of therapy based on an uniform diagnostic srtategy and risk stratification, supported by risk prediction models, might also improve the outcome of existing therapies.

More researchs should be undertaken to traslate pathophysiologic mechanisms of thrombus resolution and PTS development, into identification of PTS specific targets for pharmacotherapeutic intervention.

The correct treatment of DVT with DOACs represent the good and the diverse to counteract the dangerous network among hemodynamic, inflammatory and proteolytic processes occurring from the early stages of symptomatic varicose veins to severe steps of ulcers including the post-thrombotic patients, stigmatizing the fundamental role of the biomolecular mechanisms of endothelium in the management of vascular diseases

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## THROMBOLYTIC TREATMENT OF PULMONARY EMBOLISM

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**Keywords:** thrombolysis, pulmonary embolism, treatment, high risk

Pulmonary embolism (PE) is a disease with several different clinical presentations. The patients could be at low, medium or high risk for serious consequences. Patients with high risk PE are in schock or are haemodynamicly unstable and these patients should be treated with thrombolysis, which could quickly, by disolving the occlusions, diminishes the right ventricle overload, which is the main risk for dying and serious consequences. Such treatment markedly improves their outcome. In patients with increased risk of bleeding like patients with previous stroke or recent cerebral injury, recent gastrointestinal bleeding or increased bleeding risk there is absolute contraindication for thrombolysis. Bleeding especially intracranial, which could be expected in about 1 % of treated patents, is the main serious adverse event of thrombolysis. There are several therapeutic regimes of thrombolysis. The most suggested and approved is treatment with recombinant tissue plasminogen activator 100 mg i.v. in two hours. The bleeding during thrombolysis is also the main concern, when patients with intermediate high risk PE are concerned. In these pateints it has been shown that thrombolysis is effective in prevention of haemodynamic instability or dying due to PE, but it is also accompanied by serious bleedings and there is no effect on longterm outcome although thrombolysis quickly improves clinical status in the acute state. So, using thrombolysis in a conventional way in such patients is questionable. There are several other regimes of thrombolysis like catheter directed or catheter directed with some mechanical support, but their role is still debatable.

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# BLEEDING AS A MAJOR CAUSE OF EMERGENCY ATTENDANCE IN PATIENTS ON DIFFERENT ORAL ANTICOAGULANTS

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**Keywords:** Anticoagulant therapy, bleeding, emergency department, chronic kidney disease

Anticoagulant therapy is increasingly used in world, to prevent and treat thromboembolic incidents, which can lead to fatal outcome or lower quality of life.

The main causes are an aging population and many conditions that require this type of therapy suach as pulmonary embolism, deep vein thrombosis and atrial fibrillation.

Since bleeding occurs in patients using warfarin, as well in patients using DOACs, the aim of this study was to determine whether there is a difference in the frequency of bleeding, as a major cause of emergency attendance, between these two groups.

Study included 48 patients examined in Emergency Unit in Clinical Hospital Merkur in period of 3 months, who had been using anticoagulant therapy. In patients who had chronic kidney disease (stage 2-4) drug doses were adjusted according to GFR. 22 patients in Gropu A used warfarin, of which 8 were men, and 26 patient in group B used direct oral anticoagulants, 6 of them were men. The median age in group A was 80.77 years, while in group B was 81.77 years. There were no differences in comorbidities between those 2 groups.

In group A, main cause of emergency attendance in 14 (64%) patients, was bleeding, mostly from digestive tract, while in group B, bleeding was the main cause in 8 (31%) patients. Chi square test was used to test the difference in the frequency of bleeding as a cause of emergency attendance and a value was $\chi 2 = 8.777$ which gives $p < 0.01$.

Results suggest that in patients who used direct oral anticoagulants as anticoagulant therapy, adapted to the renal function, were significantly less bleeding, than in those who used warfarin. This study confirms the safety of DOACs over warfarin in the reduction of bleeding and the treatment and prevention of thromboembolic events.

*NEWS IN PHLEBOLOGY*

# ENDOVASCULAR TRETAMENT OF CHRONIC VENOUS DISEASE (FOAM, LASER, RF AND GLUE)

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**Keywords:** AVLA, VENEFIT, VENASEAL, CRYOSTRIPPING, MOCA

The purpose of the presentation is to evaluate the effectiveness of the various endovascular methods used in the treatment of chronic venous disease.

Material and methods: We have used the literature and the recommendations of the latest European guide on the large and small saphenous truncal ablation, along with personal experience with cryostripping. Several technical elements of the chronic venous disease cure are presented: endovenous laser (EVLA), radiofrequency (Venefit), mechanochemical method (MOCA), venaseal, ablation by cryostripping.

Results, discussions: The effectiveness of the various techniques presented is analyzed based on studies published in the literature.The occlusion rate in endovenous laser ablation was early 95 - 100 %, at 5 years from 65 % to 95 %. In the case of radiofrequency ablation the results were early 90 - 100 %, 92 - 94,2 % at 5 years. The glue technique was early successful in 93 - 99 % of cases and 94,4 % at 3 years. Mechanochemical ablation has an early occlusion rate in 87 - 99 % cases and 87 % at 3 years. The cryostripping method was in 98 - 100 % effective in early period and in 96 - 98 % at 5 years. The endovenous foam had the weakest results reported:early occlusion in 45 - 96 % cases and 23 - 68,5 % at 5 years.

Conclusions: Reflux in the internal and external saphenous vein territory has endovenous laser, radiofrequency and cryostripping the method of choice. Surgery and sclerotherapy are on the second plane. Mechanochemical ablation and glue are applicable but require further studies on results. Tributaires will be treated by phlebectomies at the same surgical session

*NEWS IN PHLEBOLOGY*

# PELVIC CONGESTION SYNDROME UNKNOWN ASPECTS

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**Keywords:** Pelvic congestion, Varicose veins, Pelvic veins anomalies

**Objectives:** Pelvic congestion syndrome PCS may be the most controversial vascular pathology, Syrian prevalence national study in 2005 screened about 5000 young women from different region showed proven PCS in about 16 % in urban cities and 24% in countryside and Sahara regions due multiple pregnancies.

Since 2001 our team is taking in charge hundreds of cases annually with the advantage that the same doctor is interviewing patient, doing ultrasounds, supervising the file and treatment decision and executing endovascular sclerosis-embolization so we have classified a lot of new clinical and anatomic patterns.

The aim of this presentation is to expose some overlooked and unknown aspects of PCS that we have encountered so we have changed our protocols as we are looking for them in every new patient.

**Methods:** PCS has extraordinary manifestation variability, some manifestation are well-known (lower dorsal and abdominal pain, dyspareunia-dysmenorrhea-dysuria, heavy legs and atypical or recurent varicose veins) others are less known (hemorrhoids, tenesmus, hematuria and left flank pain ).

We will try to elucidate ,expos , share and discus our experience concerning other unknown manifestations:

- recanalized or repermialized sciatic vein
- anatomic anomalies
- male PCS
- ovarian vein urinary compression syndrome
- ovarian vein thrombosis
- huge veins

**Results:** Between 2001-2019 we have taken in charge about 4800 proven PCS files and we have treated more than 860 case by endovascular approach so we begin to distinguish those special PCS patterns.

**Conclusion:** With its three floor (ovarian, pelvic and lower limbs) manifestations PCS doesn't stop surprising us, every case is special one, anatomic or clinical pattern deserves further studies and better definition and classification.

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## CHRONIC VENOUS OBSTRUCTION: WHAT IS IT AND HOW CAN WE MEASURE IT?

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Chronic venous obstruction (CVO) is poorly understood. It is caused usually by the aftermath of a deep vein thrombosis (DVT). Here, the pathology of the lesion is post-thrombotic fibrosis (PTF). This results in luminal obstruction, valve scarring and vein wall stiffness. Clinically, this is manifest as the post thrombotic syndrome (PTS). In some cases, the lesion is non-thrombotic occurring typically in the iliac veins. The classification of these lesions "adhesions" were described by the anatomist Playfair McMurrich in 1906 with a frequency of 32.7% in the normal population. Over half a century later, May and Thurner (1957) described a compression syndrome where the left common iliac vein is squashed as it passes between the right common iliac artery and the spine. This is a common CT finding where a >50% reduction in diameter of the vein occurs in 25% of the asymptomatic population. Since many scans are performed supine it remains debatable whether the narrowed vein demonstrated represents a true stenosis, venous collapse or merely a C-shaped indentation of no haemodynamic significance. If CVO is defined correctly as an impediment to venous drainage rather than a lesion, then the aetiology broadens. Obesity, tall stature, raised intra-abdominal pressure and right heart failure enter the picture. Furthermore, reflux disease, luminal shape, tortuosity and reduced venous tone are included. The inter-relationships between the lesion, a compression and impeded drainage make the assessment of CVO complex and problematic. Furthermore, the failings of an adequate clinical assessment questionnaire, like the Villalta scale, and the injudicious use of diameter measurements, hamper decision making when they are used to interpret randomized controlled trials.

The venous drainage index (VDI) of air-plethysmography measures the rate of decongestion of the calf (mL/s) in response to leg elevation. The new user friendly interface now positions the test for screening everyone in the outpatient setting prior to specialist review. Patients with a significant venous impediment to drainage have a (i) reduced VDI, (ii) an increase in the time taken to drain and an (iii) undrained volume, termed the drainage reserve volume (DRV). Furthermore, (iv) the drainage tracing is a curve (hydrostatic drainage) instead of a normal straight line (waterfall drainage). All 4 parameters should improve if the intervention to relieve the CVO was the correct decision.



*NEWS IN PHLEBOLOGY*

## ENDOVENOUS HEAT INDUCED THROMBOSIS

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**Keywords:** EHIT, DVT, SFJ, SPJ

**Background:** EHIT is propagation of a thrombus from a SV into a DV post EVTA.Generally considered clinically insignificant if the thrombus does not propagate to the DV system. EVTA of the saphenous vein has become one of the preferred Rx for treating saphenous vein reflux resulting in symptomatic lower extremity CVI or VV. Initial reports had a low incidence of postop thrombosis of the DV adjacent to the treated GSV or SSV. Later clinical experience suggested that the actual incidence of this event is higher & it was subsequently termed EHIT. EHIT is classified into EHIT 1- EHIT 4.

**Materials & methods:** >400 patients treated with EVTA at my center from Jan 2015 - Dec 2017.

**Results:** Have encountered 55 EHIT 1,no any Rx fr them.5 patients with EHIT 2 were Rx with LMWH for 1-2 weeks depending upon when the patient was reclassified by USG to Class 1. 1 patient in class 3 treated by LMWH fr a week & warfarin for 1 month. After a month kept her on aspirin fr another one month. There were no patients in class 4.

**Conclusion:** EHIT behave differently than a spontaneous DVT, displaying USG chronicity at a much earlier time. Close duplex USG observation of EHIT 1 without pharmacologic Rx. Treatment of EHIT 2 with LMWH until the EHIT can be reclassified to EHIT 1 by duplex USG. EHIT 3 or 4 should be treated according to the suggested guidelines for DVT.Better understanding of the clinical significance of EHIT in proximity & beyond the SFJ/SPJ with EVTA continuous popularity should be continued with further studies. This will ultimately allow us to make more definitive recommendations regarding treatment options.

*NEWS IN PHLEBOLOGY*

## CANCER RELATED DVT – WHAT IS NEW IN THE TREATMENT?

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Risk of venous thromboembolism (VTE) vary from cancer diagnosis to its treatment. The annual incidence rate of the cancer related DVT or cancer-associated thrombosis (CAT) is from 0,5 to 20 % and it depends on type and location of cancer, metastasis status, cancer treatment (surgery or chemotherapy), usage of central venous catheter, hospitalization and patient's risk factors.

The treatment and prevention choice of cancer related DVT is very important to prevent not only thrombosis and its recurrence, but also not cause bleeding, especially in patients with active cancer.

Thrombosis that can recur has noticed in ACCP 2016. Their cause may be cancer - unprovoked thrombosis (30% recurrence at 5 years) and CAT (15 % annualized risk of recurrence). In the treatment of CAT, LMWH is preferred over VKA or NOAC therapy. When recurrence of VTE happens after index event, it is need the confirmation of VTE recurrence and an assessment of the anticoagulation adequate, as well as the consideration of oncological status. If recurrence of VTE occurs on VKA or NOAC it is recommended to switch to LMWH for at least 1 month. If VTE recurrence occurs on LMWH it is recommended to increase the LMWH dose by one-fourth or one-third. The recommended duration of the anticoagulant therapy is more than 3 months (extended) with mandatory categorization of the risk of bleeding.

Since their appearance in the early 2000s, NOAC (later on DOAC – dabigatran is direct thrombin inhibitor and apixaban, edoxaban, rivaroxaban are inhibitors of activated Xa factor) quickly replaced all traditional anticoagulants in treatment of VTE regarding its easy administration and minimal requirements for their monitoring. Still, DOAC usage in cases of CAT was limited due to lack of evidence.

Until recently all data was received from subgroup analysis of randomized clinical trials in patients with CAT (RE-COVER I, RE-COVER II, EINSTEIN-DVT, EINSTEIN-PE, AMPLIFY, Hokusai VTE). In these trials, a small number of patients with active cancer was included. VKA, not LMWH, was as a compared medicine, and appeared to be inferior to LMWH in terms of CAT treatment, risk of recurrence and bleeding rate. NOACs have shown a non-significant decrease of VTE recurrence and less major or clinically relevant bleeding rate compared to VKA. However, cancer patients in these trials were healthier (and had a lower mortality than patients in CLOT study.

In Hokusai VTE-Cancer, Select-D, ADAM VTE trials patients with active cancer were enrolled aligning to a new definition of «active cancer».

In the Hokusai VTE-Cancer study, the recurrence rate of VTE was non-significant lower in patients that received a combination of edoxaban with LMWH than on dalteparin only. The incidence of major bleeding was significantly higher in edoxaban with LMWH group. The mortality rate was not substantially different between groups and most of deaths was caused by cancer. The number of deaths associated with VTE or bleeding was too small to make comparison between groups.

In Select-D study rivaroxaban was associated with a lower rate of venous thromboembolism recurrence compared to dalteparin at 6 months. The rate of major bleeding was numerically higher in the rivaroxaban arm but with a similar rate of fatal bleeding. Overall survival was also similar between treatment arms.

In these trials was also noticed that patients with gastrointestinal or genitourinary cancer were at high risk of major bleeding associated with DOAC treatment.

Results on the ADAM VTE trial showed with very low bleeding and venous thrombosis recurrence rates compared to dalteparin, but the data have not been included in guidelines yet.

ESC2017, ESMO2017, NCCN2018, ISTH 2018, Canadian Expert Consensus 2018 ASCO2019, ESC2019 recommend LMWH as choice of treatment for patients with CAT within 6 months and more. Only edoxaban and rivaroxaban are recommended by for cancer patients with acute VTE, low risk of bleeding and no drug-drug interactions with current systematic therapy (results on the ADAM VTE trial showed with very low bleeding and venous thrombosis recurrence rates compared to dalteparin, but the data has not been included in guidelines yet).

The treatment choice should be based on the type and location of the cancer, an assessment of the risk of bleeding, concomitant anticancer treatment, drug-drug interactions, patient's preferences and life expectancy.

*NEWS IN PHLEBOLOGY*

## (RE)CONSTRUCTION OF ARTERIOVENOUS FISTULA WITH CORMATRIX

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**Keywords:** arteriovenous fistula, extracellular matrix, haemodialysis

**Introduction:** CorMatrix is an acellular extracellular matrix that acts as a biological scaffold and remodels into site-specific tissue. We used it for the (re) construction of arteriovenous fistulas (AVFs).

**Methods:** In this prospective pilot case study, we used CorMatrix in 6 patients. We included patients who required vascular access reconstruction due to thrombosis of unsalvageable AVFs, patients with high-flow AVFs and patients with microvasculature in which autologous AVFs did not mature, requiring reconstruction with a graft. We sutured the CorMatrix plate into a tubular shape and then constructed end-to-side or end-to-end arterial and end-to-end venous anastomoses.

**Results:** There were no periprocedural complications, CorMatrix-related infections, bleeding or limb swelling after the procedures. CorMatrix was first punctured after 8-10 weeks. In 5 patients, a percutaneous angioplasty due to CorMatrix stenosis was performed; in 1 patient, a stent was placed due to refractory stenosis. We observed 8 thromboses during the observation period (4 in one patient). Perianastomotic stenosis of CorMatrix and interdialytic hypotension were the causes of the thrombosis in 5 patients, cephalic arch stenosis was the cause in 2 patients, and thromboembolism to the brachial artery and AVF were the causes in 1 patient. Thrombendarteriectomy was successful in 87.5% of patients, and 1 patient required AVF reconstruction. After a median observation period of 12.5 (range 4–23) months, all AVFs were patent, with a median brachial artery flow of 1450 (range 700–1700) ml/min.

**Conclusions:** AVF (re)construction with CorMatrix seems to be feasible and safe, with a relatively high incidence of neointimal hyperplasia, predominantly at venous anastomoses, but additional clinical and histological studies are needed.

*CHRONIC VENOUS INSUFFICIENCY TREATMENT: SYNERGY OF VENOACTIVE DRUGS AND SURGERY*

# BENEFITS OF VENOACTIVE DRUG THERAPY IN SURGICAL OR ENDOVENOUS TREATMENT FOR VARICOSE VEINS

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**Introduction:** Chronic venous disease affects significant proportion of general population Clinical status is commonly divided in 7 grades, raging from 0 which means absent disease and 6 which means varicose veins with active leg ulcers. Therapy varies form conservative treatment, sclerotherapy to endothermal and surgical interventions. Veonactive drugs may be added to any treatment and at clinical level of the chronic vein disease.

**Materials and methods:** We present several studies including latest review and our own experience and case studies. There are different type of flavonoids that are being use solely or in combination.

**Results:** There were no side affects when micronised purified flavonoid fraction (MPFF) was used. The symptoms of the varicose vein disease have improved. There was excellent compliance during the treatment.

**Conclusion:** Appropriate treatment with micronised purified flavonoid fraction (MPFF) may help reduce postprocedural pain, haemorrhage and symptoms specific to chronic vein disease.

*PLENARY SESSION – SPECIAL LECTURE*

# THE USE OF A NINE STEP THERAPEUTIC LADDER IN PAD AND CLI

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Endoluminal treatment of severe vascular occlusive disease over the last years showed the existence of nine major steps: STEP 1, was introduced in 1977 by Andreas Gruentzig (recanalization of an occluded peripheral artery using balloon angioplasty). By the end of the eighties, metal stents (STEP 2) were also introduced in order to minimize the problem of re-stenosis. However, metal stents generate intimal proliferation as well, responsible for a late re-stenosis. So, the use of either balloon angioplasty alone or in combination with metal stents may cause in occluded arteries a late re-stenosis at a rate shifted between 20% (balloon+stents) and 50% (balloon only). The answer to the problem was the use of drug eluting stents (STEP 3). These were first applied in the coronary arteries and later in the peripheral arteries as an answer to the problem of re-stenosis. Drug eluting balloons (STEP4) represent a novel option in treating occluded distal coronaries and distal leg arteries. Several randomized trials (i.e. THUNDER, PACIFIER and LEVANT 2) shed light to the field of drug-eluting balloons and stents. STEP 5 of the ladder, has also emerged. This step deals with bio-absorbable stents made of polytactide or sirolimus, which resolve in about two years' time. Such stents managed to remodel the occluded artery releasing an anti-re-stenotic drug at the same time. Endoluminal irradiation (STEP 6) is also in use as a new promising method for the occluded coronary arteries. However, radiation protection is an important parameter to consider as atypical malignancies have already appeared in high volume interventionists. Intravascular lithotripsy (STEP 7) is an exciting method for calcified lesions protruding in the arterial lumen. Lithotripsy can also decrease the calcium density before using a drug eluting balloons to remodel the occluded artery. Gene therapy (STEP 8) is a new way to modify the endoluminal response and prevent re-stenosis by various techniques one of which is the infusion of mutant genes at the site of an angioplasty. Finally, stem-cell therapy alone or in combination with gene therapy (STEP 9 of the ladder), can also be applied in cases of end stage peripheral critical ischaemia. This kind of therapy is based on angiogenesis. Patients with end stage Buerger's disease, by receiving multiple injections of volume reduced bone marrow mononuclear cells into the gastrocnemius muscle and the foot dorsum, showed six months after the injection that several collateral networks were developed (angiogenesis).

A vital question is: when to attempt open surgery in CLI? According to consensus documents an open surgical procedure in patients with CLI should be undertaken when endovascular surgery is unsuccessful and there is still a 25% chance of saving the limb for a period of one year. However the to-day practice, taking into account the evolution of technology and the expanding endovascular skill level, suggests an

endovascular attempt in all lesions (TASC A to D), prior to any surgery or amputation.

In no option CLI a major amputation is decided when there is (a) no run off below the femoral artery, (b) when tissue loss involves the heel and (c) when severe rest pain exists. Below-Knee amputation, is the operation of choice in patients with end-stage CLI. The outcome of an amputation is generally poor. Only 4 out of 10 patients are expected to regain adequate mobility. Also three out of 10 patients will die in two years' time as a result of atherosclerotic occlusions in other areas of the circulatory system.

*PAD AND RADIATION PROTECTION*

# SECONDARY PREVENTION OF CARDIOVASCULAR EVENTS IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE

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Atherosclerosis is considered a generalized disease. Similar or identical etiopathogenetic mechanisms and risk factors are involved in various atherosclerotic diseases, and the positive effects of preventive measures on atherogenesis in different parts of the arterial system were shown. However, until know, great emphasis has been placed on the aggressive pharmacological management of coronary artery disease (CHD), while less attention has been devoted to the management of peripheral arterial disease (PAD), despite its significant morbidity and mortality. Data on the efficacy of preventive measures in PAD patients have mostly been gained from subgroup analyses from studies devoted primarily to the management of coronary patients. These data have shown that treatment of risk factors for atherosclerosis with drugs can reduce cardiovascular events also in patients with PAD. The effects of some preventive procedures in PAD patients differ from coronary patients. Aspirin as a basic antiplatelet drug has been shown to be less effective in PAD patients than in coronary patients. The latest Antithrombotic Trialists' Collaboration (ATC) meta-analysis demonstrates no benefit of aspirin in reducing cardiovascular events in PAD. Statins reduce cardiovascular events in all three of the most frequently presented cardiovascular diseases, including PAD to a comparable extent. Recent studies indicate that in PAD patients, in addition to a reduction in cardiovascular events, statins may have some hemodynamic effects. They prolong walking distance and improve quality of life. Similarly, angiotensin enzyme inhibitors are also effective in the prevention of cardiovascular events in coronary, cerebrovascular, as well as PAD patients and show positive effects on the walking capacity of patients with intermittent claudication. In PAD patients, the treatment of hypertension and diabetes also effectively prevents cardiovascular morbidity and mortality. As PAD patients are at a highest risk of cardiovascular complications, the risk factors of atherosclerosis should be treated intensively in this group of patients. Most of the preventive measures, including the drugs used for prevention of CHD, are also effective in PAD patients.

*PAD AND RADIATION PROTECTION*

# PAOD IN HOSPITAL ADMISSIONS IN PORTUGAL - IMPACT OF ENDOVASCULAR TREATMENT. WHEN IS OPEN SURGERY THE FIRST OPTION? LESSONS FROM THE PRESENT AND THE FUTURE.

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Peripheral arterial disease has an important impact on modern society because of its morbidity and mortality, associated complications requiring hospital care and often multiple reinterventions as documented in several epidemiological studies. In a previous study published recently in Portugal, a multidisciplinary group involving health scientists from the National School of Public Health and our group in the Academic Vascular Unit from the University Hospital Santa Maria in Lisbon aimed to quantify the impact of this disease in Portugal during the last eight years, expressed by the volume of admissions, treatment strategies and associated morbidity and mortality.

Data was collected from the Diagnosis Related Group national database on primary diagnosis, procedures codes, demographic variables, a number of risk factors, and mortality of all cases admitted from 2009 to 2016 with a primary diagnosis of peripheral arterial disease coded according to the 9th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-9).

In this study, peripheral arterial disease led to 27 684 hospitalizations, which corresponded to 26.7% of all admissions for vascular disease in this period. Approximately 49.9% of patients were admitted to the emergency department. The volume of procedures in patients with claudication decreased over the eight years, unlike patients with critical ischemia, in which the number of procedures increased and a remarkable choice for endovascular techniques was noted. Age and the presence of cardiovascular risk factors have been associated with the severity of disease, as observed in our series. Overall hospital mortality varied, being significantly higher in patients with more advanced severity of the disease. There was a reduction on overall mortality in hospital admissions, but peripheral arterial disease continues to represent an important burden in the overall volume of admissions in Portuguese public hospitals with a large number of patients being admitted in the context of emergency.

Subsequently we discuss in this presentation the impact of diabetes in Portugal concerning the number of minor and major amputations, review the available techniques to deal with CLTI with illustrative cases from our experience and analyze the new possibilities of endovascular treatment in comparison with open surgery and present our criteria for selection to the type of revascularization according to surgical risk, life expectancy, severity of disease and availability of suitable vein conduit.

We conclude for the need of a better stratification in the global assessment of the patient status, severity and extension of arterial disease in order to better stratify the clinical situation and obtain relevant prospective data on the preference for type of revascularization, open or endovascular and to analyze its cost-effectiveness as well long-term benefit for the patients.

*PAD AND RADIATION PROTECTION*

## ANGIOGENESIS INDUCTION IN BUERGER'S DISEASE: A DISEASE MANAGEMENT DOUBLE-EDGED SWORD?

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**Keywords:** Thromboangiitis Obliterans, Buerger's disease, Angiogenesis, Endothelial cell, Treatment

Due to unknown aetiology of Thromboangiitis obliterans (TAO), its effectively treating is challenging. However, angiogenesis induction is one of the acceptable treatments for TAO patients. Recently, we have noticed that TAO patients who were under long-term treatment with angiogenesis-inducing medication showed considerable improvement in terms of healing chronic ulcers over the course of one to 2 years of treatment. However, some of them developed dermal gangrene despite the warming of their feet, with or without palpable pulses in the extremities, and with hair growth on the affected skin. Unfortunately, following the progression of dermal gangrene, some of these patients had to undergo amputation and limb loss. During histopathological evaluation, we detected some changes in the amputee TAO patients under long-term angiogenic medical treatment that were not present in amputee TAO patients who had not received any treatment for many years. The greatest pathological changes were observed in the microvascular of the skin, appearing as a proliferation of endothelial cells, NETosis and thrombus formation inside the vessels with proliferation of endothelial cells. The immunohistochemistry for CD31 and Ki67 as markers of vascular endothelium differentiation and cell mitosis confirmed the proliferation of endothelial cells. However, in the patients who had not received any treatment for years the typical pathology view of BD, including preserved vascular architecture with infiltration of inflammatory cells and inflammatory cells inside the thrombus, organised thrombus with recanalisation and intimal thickening was observed. Further longitudinal cohort studies regarding long-term treatment with angiogenic medications for TAO in different geographic areas are highly recommended.



*PAD AND RADIATION PROTECTION*

## RADIAL ACCESSS FOR PERIPHERAL VASCULAR INTERVENTIONS AND DIAGNOSTICS

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**Keywords:** transradial approach, peripheral arterial disease, percutaneous intervention

Transradial approach is frequent procedure in treatment of percutaneous coronary interventions while the same approach is still used rarely in treatment of peripheral artery disease.The main advantages of the transradial approach concerning the potential complications (less minor and major bleedings assossiated with vascular in comparison to femoral) are very well known as well as the advantages in the means of comfort for the patient. In University Clinical Centre "Sestre milosrdnice" from 2012 to 2017 transradial approach was used in total of 158 cases of invasive diagnostics or interventional treatment. In 48 situations it was used as one of the additional approaches within the main intervention on iliac arteries, whilst in 60 cases the transradial approach was the main route for the intervention on iliac arteries. TASC A lesions was treated in 64% of patients and 35% patients had TASC B lesions. In 50 cases radial approach was used for invasive

diagnostics. Except 5 minor hematomas there were now reported access site-related complications. All procedures were performed in cath lab with high radial volume in coronary interventions. Transradial approach in patients with peripheral artery disease is mainly reserved for the interventions on iliac arteries with rising numbers in interventions on femoral arteries. Transradial approach is safe and reliable method for interventions on peripheral arteries. More data and dedicated interventional devices are needed to establish radial access a standard procedure.

*PAD AND RADIATION PROTECTION*

## RADIATION PROTECTION IN VASCULAR SURGERY

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**Keywords:** radiation protection, endovascular procedures, dose , dose area product, radiation risk

There is growing concern regarding the radiation dose delivered during vascular interventional procedures, particularly in view of the increasing frequency and complexity of these techniques. Therefore, nowdays the importace of radiation protection in vascular interventions is growing.

These procedures have a potential for high exposures to both the patient and the medical stuff. The collective effective dose to the population due to interventional procedures is approximately 10% even though they account for only 1% of the number of procedures, making interventional procedures a significant contributor to the stochastic risk of patients.

Studies have, on the other hand showed, increased prevalence of left-sided brain tumors, cataract and thyroid disease for interventionalists.

Understanding how to avoid or minimize radiation effects is an important responsibility of everyone involved in the medical process. The key basic principles in understanding radiation protection are: justification, optimization and dose limits. Othe knowledge of otimisation of the medical procedure is crucial in terms of dose to the patient and personnel. The three main dose reduction techniques are: time, distance and shielding. In order to ensure this, adequate training of the medical staff is of great importance.

Understanding all parts of radiation protection will not only benefit the patient, but all the medical staff as well.

*PAD AND RADIATION PROTECTION*

# RADIATION EXPOSURE RISKS DURING ENDOVASCULAR PROCEDURES

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Endovascular procedures represent an important part of a vascular surgeon's practice. However, exposure of interventionists to ionizing radiation and safety issues have not been well studied in the past. As a matter of principle, the effective body, eye, thyroid and hand radiation doses of all participating surgeons and staff should be measured by mini-thermo-luminescent dosimeters (TLD) attached at the chest level under a lead apron, at the forehead about the eye level, inside and outside the thyroid protector and at the hand area. Also, the type of procedures, fluoroscopy machine and fluoroscopy time, as well as personal and operating theatre radiation protection devices have to be checked regularly.

It has been demonstrated that during straight forward procedures the cumulative ionizing radiation dose is not exceeding usually the maximum safety levels. On the contrary, in complex cases i.e. (a) endovascular treatment of infrarenal aortic aneurysms, or (b) introduction of branched and fenestrated grafts for treating thoraco-abdominal aneurysms and aortic dissections, the radiation dose for vascular surgeons and interventionists is enormously increased.

To-day, there is an obvious interest in the professional radiation risk. Although the trunk and the thyroid gland are well protected by lead garments, the eye lens and hands are at risk of high exposure. It has been shown that during simulation of an endovascular aortic procedure, with a 10 seconds period of fluoroscopy in DSA modus, the eye lens is receiving a median radiation dose of 0.02 μSv/s while the fingers of 0.41 μSv/s. According to the International Council for Radiation Protection, a threshold of 20 mSv/y was judged critical for operators' lens exposure.

Formal radiation safety training for vascular trainees is based on ALARA strategies {"As Low as Reasonably Achievable"}. An anonymous survey was distributed to our vascular trainees. It was found that 50% of the responders had no formal radiation safety training. From the remaining 50%, a significant percentage (64%), were unaware of ALARA radiation safety policy for pregnant females. Also another 40% did not know their radiation safety officer and a 33% were unaware of the yearly acceptable levels of radiation exposure. On the contrary, untrained residents knew more basic radiation safety regulations but relied mainly on other trained residents. Main ALARA strategies are:

(a) Keep the patient away from the radiation source.
(b) Keep the detector close to the patient.
(c) Keep angulation to a minimum.
(d) Step back during acquisition.
(e) Use personal protective equipment.
(f) Use lead shielding on the fluoroscopy unit.
(g) Limit fluoroscopy on time.
(h) Lower the exposure rate wear lead gown and protective eye wear.
(i) Use lowest-needed magnification.
(j) Limit fluoroscopy on time.

In conclusion radiation protection is a serious issue for vascular surgeons because most complex endovascular procedures are delivering high radiation to various parts of the body and especially to the eyes. All operating endovascular surgeons and interventionists should undertake a mandatory basic and special course in radiation physics and radiation protection. Finally, the whole staff is encouraged to use all available protection measures such as lead screens, under table lead aprons and optimum source-to-object distance.

*UEMS / YOUTH session IUA / ESVST*

## VASCULAR AND ENDOVASCULAR SURGERY IN SLOVENIA

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**Keywords:** vascular surgery, endovascular surgery, specialty, education

In past decades there was no specialty in vascular surgery in Slovenia. This does not mean that there was no vascular surgery. However, young surgeons had to pass board exam in general surgery and after that they were prepared to gather experience in the field of vascular surgery. Meanwhile emerging interests of other competing specialties in Slovenia, especialy invasive radiology, had pushed into the field of vascular care. In Europe new specialization called vascular and endovascular surgery emerged. Continuous technological innovation drives the need for sub-specialisation to provide disease-centred expertise; however, treatment success equally depends on balanced patient-centred care. Vascular surgeons in Slovenia are amidst this controversy and are currently challenged by their own demand to offer all aspects of vascular care – as "the vascular specialist". This presentation discusses the natural driving forces towards sub-specialisation and appraises advantages and limitations with respect to the future of integrated vascular care in Slovenia.

*UEMS / YOUTH session IUA / ESVST*

## HOW TO BECOME A VASCULAR AND ENDOVASCULAR SURGEON AS WELL AS ENDOVASCULAR SPECIALIST IN GERMANY



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**Keywords:** education, vascular endovascular surgery, Germany

Aim of the presentation is to present the structure of educational and training program of vascular and endovascular surgery in Federal Republic of Germany.

Residency program for vascular surgery is determined by medical chamber from each constitute State of Germany and lasts at least 72 months. It contains basic surgical program during the first two years (24 months), as well as special educational program for vascular surgery in a period of 48 months. Basic surgical program includes at least 6 months at Emergency Department, 6 months at Intensive Care Unit, as well as 12 months of clinical practice in the theater, on the station and at the ambulance. Special educational program for a vascular surgeon has a focus on diagnostics as well as conservative and operative/endovascular treatment of the vascular diseases. During the program a resident needs to perform at least 250 diverse operations as well as certified radiation protection courses.

The educations and courses such as Doppler-ultrasound course of different degrees and good research practice courses should be completed during the residency program. Although research work is not official part of the program, it is highly appreciated to get involved into clinical and basic science projects. This is especially the fact in university clinics as well as in university teaching hospitals.

Training program for endovascular surgeon and endovascular specialist has been organized by German vascular association. Training program for endovascular surgeons includes four different programs: basic program, abdominal aorta, pelvic arteries and legs arteries. Endovascular specialist program contains 7 different specials courses (carotid, thoracic aorta, pelvic and visceral arteries, legs arteries, treatment of deep veins, treatment of

special entities (v. cava superior and inferior, Trauma, pulmonary Embolism, A-V Malformation).

Educational and training programs for a vascular and endovascular surgeon, as well for an endovascular specialist are strictly defined and organized programs that are regularly adapted to new developments at vascular surgery.

*UEMS / YOUTH session IUA / ESVST*

## VASCULAR SURGERY IN CROATIA

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During the past two decades vascular surgery has been thoroughly changing What was expected from a vascular surgeon 20 years ago, is no longer sufficinet for someone to be addressed as a modern vascular surgeon. Development of endovascular techniques and benefit they added to treatment of the vascular patients forced vascular surgeons to adopt these techniques at least to some extent By adopting endovascular techniques, vascular surgeons provided that vascular surgery didn't become obsolete and marginalized speciality.

Accordingly, the education of vascular surgery trainees needed to be changed to adapt to these new cicrumstances. Many european countries changed their vascular surgery training program to provide that new generations of vascular surgeons/specialits are able to treat vascular patents in best possible way, by either open or endovascular techniques.

This changes were adopted in Croatia about 7 years ago, and the first generation of vascular trainees trained according to the new program finished their training last year. Up to 10 new medical doctors start their vascular training in Croatia each year. This new program lasts for 63 months of which the first 24 months is general surgery training. Throughout the training, each trainee is beeing supervised by his mentor who should take care that his trainee accomplish all goals of the training program. After they finish the training programm, trainees must pass the final exam which consists of oral and practical part. When they pass the exam they become vascular surgeons. They are also encouraged to take the UEMS exam, however the number of those who become FEBVS so far is only one.

The two main problems the new trainees face are the availability of the equipment for endovascular procedures needed for training and the insufficient number of vascular surgeons (mentors) provicient in endovascular tecniques who could educated them. As a result, they spend the most part of their endovascular education at radiology departmets and once they become vascular surgeons they don't have adequate equipment within their vascular surgery departments (at the moment there is only one dedicated hybrid vascular operating room in Croatia).

Vascular surgery training is closely related to the development of vascular surgery, and main goals should be providing adequate education and equipment (more hybrid operating rooms) but based on thorough analyzis of needs of croatian population for vascular surgery service. One of cornerstones of that development is centralization of vascular service for most complex procedures. Only in those centers vascular surgeons can achieve sufficinet number of procedures they perform that can result in acceptable tretment results.

*UEMS / YOUTH session IUA / ESVST*

## IMPROVING TRAINING OPPORTUNITIES IN EUROPE: EUROPEAN VASCULAR SURGEONS IN TRAINING (EVST)

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On September 5th 1994 the European Association of Vascular Surgeons in Training (EAVST) was established from an idea of Prof. Paaske. EAVST changed its name in European Vascular Surgeons in Training (EVST) and during the last 25 years represented European trainees in vascular surgery with the aim to promote knowledge and skills, improve networking, connect different Europeans countries enabling trainees to share experiences in different educational strategies and helping develop educational activities in collaboration with the European Society for Vascular Surgery (ESVS) and its Academy.

All the ESVS registered trainees under the age of 35 are automatically considered EVST members. In the last 4 years we observed an exponential increase of EVST registrations. In 2019 EVST members represent more than Ľ of all ESVS registrations (743/2719=27,3%).

EVST is lead by the EVST Council, the decision-making body, that in 2019 is composed by 21 European countries. Every European country with at least 10 EVST members can elect a representative in the Council that represents the link between that country and the ESVS. Some of the benefits ESVS gives to EVST members are represented by the chance to organize and chair scientific session, participate training session and symposia, be part of European Journal of Vascular and Endovascular Surgery (EJVES) review and guidelines writing committee. It finally provides Travel Grants and Congress Grants to visit foreign centers and congresses for free. EVST represent an outstanding chance for trainees to get the best training opportunities in Europe.



*UEMS / YOUTH session IUA / ESVST*

## EUROPEAN VASCULAR SURGEONS IN TRAINING (EVST). CALL FOR CROATIA.

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**Keywords:** ESVS, EVST, grant, council, membership

The European Vascular Surgeons in Training (EVST) is part of the European Society for Vascular Surgery (ESVS). The aim of the EVST is to provide an equal level of knowledge and skills for European trainees in vascular surgery and to improve interaction and networking within the trainees of European countries. What do members benefit from? Subscription to the European Journal of Vascular and Endovascular Surgery – the leading journal in vascular surgery (impact factor 3.642), free registration and grants for congresses such as Charing Cross, EVC, CACVS, MEET, LIVE; international fellowship opportunities, and much more. The EVST is led by the Council that is currently composed by more than twenty representatives from United Kingdom, Austria, Belgium, Denmark, France, Greece, Germany, Italy, Slovakia, Switzerland, Romania, Portugal, Spain, Netherlands, Sweden, Norway, Finland, Ireland, Bulgaria, Norway, Russia, Serbia, and Island. The Council meets three times a year to discuss current issues and to organize workshops and socializing events. These meetings are held at the European Vascular Course – EVC (March, Maastricht, the Netherlands), the Charing Cross Meeting (April, London, UK) and at the Annual Meeting of the ESVS (September, yearly changing locations). We enjoy working together, trying to do things better for the 743 trainees currently registered with ESVS. Every European country with at least 10 members of the EVST may nominate a national representative to the Council. What are you waiting for? Join us!

*UEMS / YOUTH session IUA / ESVST*

# SYMPTOMATIC AAA AND CHRONIC STANFORD A DISSECTION

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Aneurysm of the abdominal aorta (AAA) occurs 7 times more often than TAA. In 96% of cases enlargement of the abdominal aorta is infrarenal and up to 70% of the AAA extends to one or both iliac arteries. Patients are mostly asymptomatic therefore the diagnosis is incidental. Risk factors that accelerate the onset of aneurysms include arterial hypertension, arteriosclerosis, smoking and genetics. Absolute indications for surgery are AAA diameters greater than 55 mm and growth dynamics greater than 5 mm in the last 6 months or more than 10 mm per year, as well as symptomatic aneurysms.

A 78-year-old man, due to a long-term finding of Stanford A dissection and a new-found symptomatic infrarenal abdominal aortic aneurysm, and associated left iliac artery aneurysm, was referred for detailed assessment and surgery done under general anesthesia during which a resection of the infrarenal abdominal aortic aneurysm and the left iliac aneurysm as well as reconstruction using a bifurcation transplant on the aortofemoral left and aortoiliac right side was performed.

Despite the extremely high perioperative risk, the complexity of the procedure, the patient's age and comorbidity, and the possibility of a fatal outcome, surgery was still performed. We decided not to treat chronic, asymptomatic Stanford A aortic dissection Successful treatment of symptomatic AAA prevented possible rupture and death.

**The XXIX Congress of the Mediterranean League off the Angiology and Vascular Surgery (MLAVS)**

November 7 – 9, 2019, Zagreb, Croatia

# ABSTRACTS



## Poster presentations

*MINOR AND MAJOR AMPUTATIONS*

# LIMB SALVAGE PROCEDURE VERSUS AMPUTATION – THE CREDIBILITY OF MANGLED EXTREMITY SEVERITY SCORE (MESS) IN SEVERELY INJURED LIMBS

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**Keywords:** mangled extremity, mangled extremity severity score, salvage versus amputation, lower extremity trauma

**Background:** Massive extremity trauma, in particular, complicated fractures associated with vascular injuries, present immediate and complex decision-making challenge between a limb salvage attempt and a primary amputation. While the evolution of sophisticated surgical reconstruction techniques has brought possibilities of successful limb salvage in even the most extreme cases, these technical possibilities can bring both favourable and unfavourable outcome.

**Case presentation:**

**Patient 1**
A 74-year old lady was admitted in our emergency room due to her left leg injury after a truck ran over it. She was hypotensive (100/70mmHg), pale with a faint dorsalis pedis and posterior tibial artery pulse on the left leg. Two thirds of the left upper leg in its anterior aspect was struck by a skin defect and a muscle crash injury. Femoral medial condyle fracture, collateral genicular ligaments and joint capsule tear was found as well. According to the Gustillo classification, this injury was estimated as 3B and to MESS 8.

After haemodynamic stabilisation, a wound exploration revealed a posttraumatic spasm of the middle third of superficial femoral artery which recovered after 2% xylocaine application to its wall and 1mL to its lumen (Kimmonth's technique). Instable knee was treated by the external fixator type Zagreb 1. After the negative pressure wound therapy (NPWT) led to clean granulation tissue appearance in the wound, a split-thickness skin graft (Tiersch 0,3) combined with NPWT 80mmHg was applied. Rehabilitation therapy led to complete recovering in the 6 weeks of the treatment.

**Patient 2**
A 59-year old motorcyclist participated in a traffic accident. He was brought pale, hypotensive (90/70mmHg). Skin defect took two thirds of his right forearm. Volar and dorsal muscles were crushed. An X ray revealed multiple fractures of ulnar and radial diaphyses combined with radial head dislocation. The injury was estimated as Gustillo 3B and MESS 9.

Both radial and ulnar arteries were found in a spasm recovered after xylocaine application. Fracture was treated by the Hoffman external fixator. The skin defect was treated afterwards by a Tiersch graft 0,3mm. 6 months later, the external fixation was replaced by AO spongioplasty due to non-union signs. On the third postoperative day a dynamic splint rehabilitation was indicated.

**Conclusion:** Complex limb salvage procedures must advocate safe and fast recovery with satisfactory function in cooperation of a multidisciplinary team.

Even though the MESS score greater than 7 indicates the amputation, limb salvage is possible even in higher MESS score.

*INFECTIONS IN VASCULAR SURGERY*

# IN SITU ABDOMINAL AORTIC RECONSTRUCTION WITH CRYOPRESERVED ALLOGRAFT IN SETTING OF GRAFT INFECTION

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**Keywords:** Aorta Graft Infection Cryopreserved Homograft

**Aim of the study:** Vascular reconstruction in patients with prosthetic graft infections is one of the greatest challenges in vascular surgery and is associated with significant morbidity and mortality. Secondary Aortoenteric Fistula is rare ( incidence rate 1.6-4%) but fatal complication ( mortality rate 24-45%) after reconstructive surgery. In this case we demonstrate a successful aortic reconstruction with cryopreserved allograft in the setting of graft infection and Aortoenteric Fistula.

**Materials and methods:** This case report presents on a 66-year old male with infected aortobifemoral dacron bypass and Aortoenteric Fistula, vascular reconstruction of infected aortic graft was done with in situ cryopreserved allograft.

Three individual cryopreserved homograft elements (iliac artery and two femoral veins) were sewn together to create a new aortobifemoral bypass. The allografts were chosen to best match the recipient patient's anatomic measurements and create a tension-free anastomosis.

**Results:** Postoperative CT-scan one month after discharge showed excellent result of the aortic homograft implantation with no signs of reinfection, thrombosis or aneurismal dilatation. In 90-day follow up the patient was not diagnosed with recurrence of initial infection and did not require reoperation. These results demonstrate an encouraging outcome after cryopreserved allograft implantation in set of abdominal aorta graft infections.

**Conclusion:** Cryopreserved human allograft is a viable alternative to vascular reconstructions of infected aorta. We believe that cryopreserved allograft should be considered a first line treatment of aortic infections in future and serve as acceptable alternatives when autologous or extra-anatomic prosthetic reconstructions are not possible.

*OPEN AND ENDOVASCULAR TREATMENT OF ABDOMINAL AORTA*

# OPEN SURGERY REPAIR OF RUPTURED GIANT INTERNAL ILIAC ARTERY ANEURISM: A CASE REPORT

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**Keywords:** open surgery, giant ruptured internal iliac artery aneurysm, abdominal structure compression

Internal iliac artery aneurysms are very rare vascular malformations. Ruptured aneurysms of the internal iliac artery (IIA) are rare and challenging to treat surgically. Due to their anatomic location they are difficult to operate on and perioperative morbidity is high.

An 62-year-old male patient of high surgical risk was presented with pain symptoms and a palpable pulsatile right lower abdominal mass. He was operated 8 years ago for a large infrarenal aortic aneurysm. Computed tomography angiography (CTA) revealed a ruptured giant right internal iliac aneurysm ( 101 mm), left internal iliac aneurysm (40 mm), bilateral common iliac aneurysm ( right 34 mm, left 32.8 mm), (he had right urethral obstruction with dilation of the canal system of the right kidney, increased values of urea, creatinine and inflammatory parameters). He was successfully treated by aneurysmectomy and aortoiliac bypass.

Patient recovered completely and was discharged 13 days after the procedure in a relatively good condition.

*NOACS*

# LOWER LEG COMPARTMENT SYNDROME IN A PATIENT USING DABIGATRAN

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**Keywords:** compartment syndrome; dabigatran; fasciotomy; extremity trauma; idaricuzimab

**Background:** Acute compartment syndrome is a limb-threatening condition mostly associated with trauma. An annual estimate of incidence is 0.7-7.3 per 100000.1,2 Roughly, 2.8% of patients who sustain extremity trauma will require a fasciotomy.3

**Case presentation:** A 74-year-old patient was presented to our emergency room with the injuries sustained during a tractor roll-over accident. The patient was taking dabigatran. He had a medical history of atrial fibrillation and two ischaemic strokes. Last dose of dabigatran was taken 9 hours before the accident. Clinical examination revealed a painful, pale, oedemic lower leg with blisters and a haematoma medially and faint peripheral pulsations. There were no signs of fracture on X ray. Fasciotomy was indicated. A specific antidote (idaricuzimab) wasn't available in the hospital. Thus, preoperatively, 1g of tranexamic acid (TA) and 2U of fresh frozen plasma (FFP) were administered. A fasciotomy was performed 3 hours after the injury by a dual incision. A large haematoma was removed from posterior compartment. Muscles were found vital. Postoperatively, 2U of FFP and 2U of red blood cells more were administered.4 Wound dressing was performed every 3 days with a silver impregnated non-adherent wound dressing. On the 9th postoperative day, a necrectomy of a necrosis on the dorsal edge of the medial incision was performed. We started to close the lateral incision by graduate secondary suturing. The patient is scheduled for a split thickness skin graft placement on the medial incision site.

**Conclusion:** Clinical examination and an early fasciotomy remain the cornerstone in diagnosis and a successful treatment of the extremity compartment syndrome.

Anticoagulant therapy appears to increase the risk of occurrence and severity of compartment syndrome.

In the absence of specific antidote (idaricuzimab) and prothrombine complex concentrate, antifibrinolytic and FFP are a safe procedure correcting a coagulant status in a patient in need of fasciotomy.

*NOACS*

# DOSE DEPENDENT DRUG-DRUG INTERACTIONS WITH DABIGATRAN

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**Keywords:** dabigatran, polypharmacy, drug interactions, erythrocyturia

Dose-dependent toxicity (type A reactions) can be predicted by known pharmacology of the used drugs. We assume that polypharmacy (concomitant use of 3 or more drugs per day) can dose-dependently change the pharmacokinetics of dabigatran (Pradaxa R).

In our study we enrolled 17 patients aged from 70 to 85 years taking dabigatran divided into two groups dependently of the drug dose (A=dabigatran 110mg, B=dabigatran 150mg, taken two times per day) and the number of the drugs they used (1: less than three drugs, 2: three or more drugs). We checked hemoglobin levels, prothrombin time (pt), INR, APTT and the number of erythrocytes in blood samples and erythrocyturia in the urine.

In the group A2 all parameters were statistically lower compared to the group A1 (hemoglobin levels 79.71 vs 125.00 g/L, p=0.008; pt 0.41 vs 0.57, p=0.02; erythrocyte number 3.07 vs. 4.96, p=0.006; APTT 22.5 vs 43.75 s, p=0.08), except INR which was significantly higher (1.9 vs 1.3, p=0.05). There were also differences when group B2 was compared to B1 (hemoglobin levels 125.50 vs. 158.33 g/L, p=0.01; pt 0.38 vs. 0.60, p=0.01; erythrocyte number 4.1 vs. 5.17, p=0.02; APTT 30 vs. 38.5 s, p=0.18; INR 2.05 vs 1.36, p=0.04). Erythrocyturia was noticed in all group B patients while in the group A the incidence was only 33%.

Drug-drug interactions are dose-dependent and very common in patients with polypharmacy where dabigatran in higher doses showed the bigger incidence of erythrocyturia and pt/INR changes. All other changes need to be carefully examined in further studies.

*CAROTID ARTERY DISEASE*

# MODIFIED METHOD OF EVERSION CAROTID ENDARTERECTOMY IN PATIENTS WITH EXTENSIVE ATHEROSCLEROTIC DISEASE OF CAROTID BIFURCATION: SHORT-TERM RESULTS

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**Keywords:** carotid artery disease, carotid endarterectomy

**Introduction:** Performing eversion endarterectomy some difficulties arise. Firstly, it requires a great deal of coherence between the work of the surgeon and the first assistant, as well as a great experience of the latter. Secondly, in some cases, there are difficulties in visualizing the distal margin of the intima: in the absence of a rigid skeleton, the soft unchanged artery walls after removal of the plaque subside, making it difficult to visualize possible fragments of the intima. Thirdly, the cost of the error is high: with a random de-version, repeated eversion turns out to be impossible. It should be noted that the use of an eversion technique becomes difficult to implement, and sometimes impossible, with extended stenosis, since a very high allocation of the ICA is required, which increases the invasiveness of the operation and the difficulty of access. With prolonged stenosis, the carotid endarterectomy remains the option of choice. The modification used eversion carotid endarterectomy combines the advantages of both methods, and also eliminates the limitations of the carotid endarterectomy and eversion carotid endarterectomy.

**Methods:** The study included 64 patients: 33 underwent eversion carotid endarterectomy (I group), and 31 – modified eversion carotid endarterectomy (II group). In 100% of cases, the intervention was performed under endotracheal anesthesia. Brain perfusion and the need for an intraluminal shunt were assessed using cerebral oximetra and retrograde pressure in the internal carotid artery. Exclusion criteria from the study: patients with a mouth injury of the ICA (plaque < 2 cm), patients with a contralateral occlusion of the ICA, patients with stroke in ischemic type in the acute period.

**Results:** In our study, there were no cases of using a glove shunt. There were no hospital lethality, strokes, cases of transient ischemic attack and injuries of the cranial nerves in both groups. In group I, the clamping time of the internal carotid artery was 19.21 ± 1.47 minutes, versus 14.94 ± 1.39 minutes, $p < 0.05$ in group II, respectively. The patient´s stay in the ICU in both groups did not exceed 1 day. In all patients, the wound healed by first intention. The average hospital stay did not exceed 6 days in both groups.

**Conclusion:** The use of a modified eversion carotid endarterectomy technique can reduce the clamping time of the internal carotid artery and, as a consequence, reduce the time of cerebral ischemia in patients with common lesions of the common carotid artery bifurcation.

**Disclosure:** Nothing to disclose

# Authors' Index

Organizing and Scientific Committee would like to express their gratitude
to all firms and institutions who helped make the

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