17th International Symposium of Angiology and Vascular Surgery

New challenges, New solutions.

1-2 of April
PORTO 2016
PALÁCIO HOTEL

www.portovascularsymposium.com

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Dear Friends

Dear Colleagues,

This International Symposium, already celebrating its XVIIth edition, is set to offer you the most relevant clinical evidence in Vascular and Endovascular fields, aiming, for the third consecutive year, to broadcast a series of selected live cases, a National pioneering approach driving this event.

With our Faculty, we jointly created a teaching experience, proudly endorsed once again by the LINC and SITE initiatives and recognized by our Medical College and University. The full support and commitment of the Hospital Administration Council, Autonomous Surgical Management Unit and Vascular Surgical Department was essential to improve all the logistics and organization, allowing for our Hospital based initiative to be valued and shared by the vascular community.

The changing pattern in vascular Medicine, with endovascular procedures being part of the actual portfolio treatment options in an increasing number of situations, incorporating new materials and techniques, is assumed in this Symposium as a platform in which the sponsoring companies can have their fundamental partnership role highlighted and properly included.

Financial constraints and patient risk / benefit analysis oblige to proper assessment of the clinical decisions and therapeutic devices choice, taking into consideration the state of the art knowledge and the capabilities of our group.

I have to mention that this event has been, for us, a crucial opportunity to interact with the most skilled surgeons, upgrade the Department expertise, treat our patients with better results and justify future reference Centre ambitions. It also has to be emphasized the post graduate learning intention of the Symposium in which the involvement of our residents must be truly underlined.

From the most complex aortic cases treatment to PAD, carotid and venous disease management, all topics have been carefully selected for this interactive meeting.

I am most grateful for your presence and participation, your kindness and availability to be part of it, and please consider this event as a joint solid project, to sound your voice and reflect your experiences.

Enjoy the meeting and our beautiful city of Porto. You will certainly become part of our History.

José Fernando Teixeira

Symposium President
President
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Secretary General
Prof. Doutor Sérgio Sampaio

Honorary Presidents
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Dra. Fernanda Viana
Prof. Doutor Roncon de Albuquerque

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Dr. Luís Machado
Dr. José Pedro Pinto

Live cases and Handbook
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Dr. Luís Machado
Dra. Marina Neto
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Short cases committee
Dr. Joel Sousa
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Web Supervisor
Dr. João Neves

Logistics coordination
Dr. José Almeida Lopes
Dr. Pedro Henrique Almeida
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<td>Image evaluation in treatment planning and surveillance</td>
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<td>TEVAR indications: when and why, after the trials</td>
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<td>Open surgery indications: when and why, from our experience</td>
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<td>Fate of patent false lumen after Type B dissection</td>
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**APRIL 1ST AFTERNOON**

**Sessions**

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| 14H30 | Juxta and suprarenal abdominal aortic aneurysms                      | Chairpersons: António Braga, Daniel Menezes  
Moderators: Manuel Alonso, António Assunção, Gonçalo Cabral, José Carlos Vidoedo |
| 16H30 | What are the choices to be made, if the choice is endo?              | P.M. Kasprzak  
Complex Aortic Aneurysms – A Patient tailored approach. How to decide? The experience of the Lisbon Aortic Centre  
José Fernandes e Fernandes  
Endovascular vs open surgery in thoraco-abdominal aneurysms, a comparison in a matched population  
Ciro Ferrer  
Parallel grafts: indications and results  
Armando Lobato |
| 17H00 | Sites Session                                                        | Hostile neck aneurysms  
Chairpersons: Vincent Riambau, Mota-Capitão  
Moderators: P.M. Kasprzak, Rui Machado, Miguel Maia, Rocha e Silva |
| 17H00 | Defining a hostile neck in 2016                                      | Nilo Mosquera  
How to tackle a hostile neck in 2016  
Gaspar Mestres  
Critical IMA and ectopic renal arteries: the use of parallel grafts to preserve them during EVAR  
Fernandez Noya  
Rationale of EndoAnchors in abdominal aortic aneurysms with short or angulated necks  
Vincent Riambau |

**Live Cases**

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APRIL 2ND MORNING

**Sessions**

**09H00**
- Symptomatic stenosis. ICSS late results – what to conclude
  - Frank Vermassen
- Asymptomatic lesions and contralateral occlusion
  - Luís Silvestre
- How dangerous is a carotid plaque?
  - P.M. Kasprzak
- CEA within 48 hours in symptomatic patients – decision making
  - Laura Cappocia
- Filter and reversed flow embolic protection during carotid stenting comparison
  - Carlos Vaquero

**11H00**
- COFFEE BREAK

**11H30**
- Peripheral redo endo surgery after open surgery
  - Andrej Schmidt
- Vascular mimetic technology: concept, artery preparation and deployment technique
  - Michael Piorkowski

**13H00**
- Treatment of SFA lesions: clinical evidence
  - Giancarlo Biamino

**13H00**
- LUNCH

**Live Cases**

**Operating Room – room 9**
- Thoracic AA
- Scallop Bovine Trunk TEVAR
- Vincent Riambau
  - Comment: Matas do Campo
- SFA Restenosis
- ELUVIA Stent
- Rui Machado
  - Comment: Luís Loureiro

**Operating Room – room 10**
- Chronic iliac and infra-renal vena cava occlusion
- Venous stenting + IVUS
- Marzia Lugli
  - Comment: João Almeida Pinto

**Angiosuite – 1st floor**
- TAAA (3rd step)
- TEVAR + Chimneys Extension
- Mário Lachat
  - Comment: Rosa Moreno
### Short Cases

**Chairpersons:** Alexandra Canedo, António Simões  
**Moderators:** Alfredo Cerqueira, Eurico Norton, Sérgio Eufrásio

- Circumstances predisposing the development of infectious complications in angiosurgical patients.  
  **Artemova Anastasia** – Saint Petersburg
- Hemangiendoenteloma epitelioide (HEE) da Veia Jugular Interna (VJI)  
  **Isabel Armas** – Porto
- Malformação arterio venosa pélvica e gravidez. A propósito de um caso clínico.  
  **Pereira Albino** – Lisboa
- Pelvic arteriovenous malformation and pregnancy: A particular clinical report  
  **Pereira Albino** – Lisboa
- Splenic Artery Aneurysm – Two Cases of Endovascular Stent Graft Treatment  
  **Andreia Coelho** – Vila Nova de Gaia
- TEVAR with scallop - a tailored approach for hostile anatomies  
  **Joel Sousa** – Porto
- Use of Excluder Iliac Branch device to preserve hypogastric artery  
  **Alba Méndez Fernández** – Ourense

### Venous Disease Session

**Chairpersons:** Albuquerque Matos, Pereira Albino  
**Moderators:** Paulo Correia, Maria José Ferreira, Amílcar Mesquita, Manuel Fonseca

- Real world data in DVT anticoagulation: rivaroxaban and the Xalia Study  
  **Paulo Dias**
- Rationale and applicability of IVUS in deep venous disease  
  **Marzia Lugli**
- Peripheral venous aneurysms: indications and treatment options  
  **Carlos Vaquero**
- Deep venous system reconstruction surgery: learning curve considerations  
  **Marzia Lugli**
- Venous Surgery in Portugal: National Trends  
  **Ricardo Castro Ferreira**

### Closing Session
APRIL 1ST
SPEAKEARS
LECTURES
According to IRAD data, emergent surgical intervention for early complications was necessary within the acute setting of 14 days in 24% of patients with Type B dissection. So, most of the cases with type B AD do not complicate and can be treated medically by effective blood pressure and heart rate control, complemented by regular image evaluation aiming to identify patients at risk for late aortic events.

Prophylactic intervention by TEVAR in non complicated type B dissection cases remains a controversial issue. Most of published studies refer to uncontrolled prospective or retrospective cohorts or case series, including complicated and non-complicated forms of type B AD. To date, only 1 randomized trial of TEVAR versus medical management for non-acute type B aortic dissection has been completed. In the INSTEAD trial, a total of 140 patients with sub-acute (<14 days) uncomplicated Type B AD were randomized for TEVAR or medical treatment:

- At 2-years, endovascular repair did not demonstrate a significant difference in cumulative survival compared to best medical treatment for all-cause deaths (88.9±3.7% with TEVAR versus 95.6±2.5% with optimal medical therapy (P=0.15)) or aorta related deaths (p=0.44). TEVAR showed to be effective in aortic lumen remodeling (with true-lumen recovery and thoracic false lumen thrombosis occurring in 91.3% of patients with TEVAR versus 19.4% of those who received medical treatment (p<0.001) but at the expense of major procedural events.

- At 5-years, the results are more favorable to TEVAR for aorta-specific mortality (6.9 versus 19.3%; P=0.045) and disease progression (27.0% versus 46.1% (P=0.04)). However, no difference was found regarding total mortality (11.1% versus 19.3%; P=0.13).

The recommended practice in the chronic phase of non-complicated Type B AD, is watchful medical treatment for heart rate and blood pressure control, complemented by periodic image evaluation (TEE, CT scan and/or MRI) for early detection of patients at risk. Symptom recurrence or progressive aortic dilatation (total aortic diameter ≥50 mm or total early aortic diameter increase > 4 mm), are clear indications for TEVAR or Surgery when an endovascular procedure is not feasible. Patients with proximal location of the entry tear, entry tear size > 10 mm or Marfan syndrome, are at higher risk for aortic dilatation and justify a close follow-up.

Because of its lower incidence, the best practice in descending aorta intramural hematoma and penetrating aortic ulcer is less well established. According to expert consensus, intervention by TEVAR or surgery is recommended in the acute phase in patients with a complicated course: haemodynamic instability, persistent pain, signs of impending rupture and progressive periaortic haemorrhage in two successive imaging studies. In the chronic phase, medical treatment is necessary, with image control follow-up at 7 days, 3 and 6 months and annually thereafter. An aortic diameter >55 mm or a yearly increase ≥5 mm should be considered indications for open surgery or thoracic endovascular treatment, with the latter being preferred in the presence of suitable anatomy.
Mariangela DE MASI (MD) studied medicine at Catholic University Sacred Heart of Rome (Italy) and obtained her diploma in Vascular Surgery in 2002. After her specialization she moved in Marseille in 2005 where she makes a research with a flow model for studied the neck angulation (NA) in aortic abdominal aneurysm before endovascular treatment. In 2006 she spends one year at University of California (UCSF) in the department of vascular surgery as a post-doctoral fellowship. Since 2007 she works at the Aix Marseille University in the department of Vascular Surgery and integrated the reference center for aortic disease (Centre Aorte Timone). She is a member of the SICVE, SCV and ESVES.

TEVAR neurologic complications: prevention strategies

INTRODUCTION:
Aortic dissection is a rare but potentially life-threatening condition. Thoracic endovascular aortic repair (TEVAR) had significantly decreased surgical morbidity and mortality, duration of hospital stay, and provide excellent short- and mid-term outcomes (1, 2). However, stroke and spinal cord ischemia (SCI) are still a matter of concern. The goal of that paper is to review clinical and radiological markers to preoperatively identify patients who are at risk for stroke and SCI and to review prevention measures to minimize the risk of complications.

SPINAL CORD ISCHEMIA
Previous reports demonstrated that the incidence of SCI after TEVAR varied from 0.8% to 7.5% (3, 4). SCI after endovascular stenting is multifactorial and can be attributed to sacrifice of arteries that supply the spinal cord (Adamkiewicz's artery, intercostal and lumbar arteries) and/or perioperative hypotension or embolic event (5). Identified risk factors of SCI are:

- **Clinical** including: age, gender, renal failure and presence of an abdominal aneurysm

- **Anatomic**:
  - a) The length of aortic coverage is an independent predictive factor of SCI with 205 mm as a threshold for increased risk (3).
  - But in aortic dissection it is difficult to assess the length of false lumen thrombosis provided by the endovascular treatment.
  - b) Simultaneous or previous open infra renal aortic replacement (6)
  - c) Coverage the subclavian or hypogastric arteries (7)

- **Hemodynamic** with prolonged hypotension during endovascular intervention (8).

Pre-operative planning is a major step to avoid neurologic complications. Willis polygons anatomy and possibilities to avoid LSA or hypogastric artery coverage are included in the treatment strategies. Assessment of Adamkiewicz artery is not performed systematically. In case of a high-risk procedure for neurologic complications, prevention of SCI is required and promotes the increase of perfusion pressure of the spinal cord by two means:

1) CSF drainage has been used to lower the intrathecal pressure and subsequently increase spinal cord perfusion. In our conventional practice, the goal of CSF drainage is to maintain intrathecal pressure <10 mmHg by draining spinal fluid within 48 hours. After that period of time, the drain could be clamped and neurologic symptoms have to be carefully recorded. If the patient remains asymptomatic for 24 hours with a clamped drain, the catheter could be removed.

2) Blood pressure increase is one of the first therapeutic maneuvers employed using volume resuscitation and vasopressor therapy with an mean arterial pressure objective> 90 mmHg.
**STROKE**

Endovascular treatment of type B-AD is linked with a relatively lower incidence of stroke when compared with open repairs. IRAD investigators \(^9\) reported stroke in 9.0% of patients treated with traditional surgery, whereas Waterford et al. reported a much lower rate of 3.2% after TEVAR in a systematic review \(^10\).

Stroke after TEVAR is multifactorial and could be due to: An embolic event from the aortic wall or carotid and vertebral-basilar arteries or air embolism \(^11\), and or an Ischemic mechanism due to the coverage of the LSA.

Coverage of the LSA without revascularization was associated with a much higher risk of arms and vertebrobasilar ischemia compared with patients who did not undergo LSA coverage \(^4,12\). These data were confirmed by a meta-analysis published recently: LSA coverage without revascularization may increase stroke rates compared to coverage with revascularization, and LSA revascularization may lower the rate of posterior stroke \(^10\).

Precautions against strokes should be taken perioperatively:
- Planning to reduce procedural time \(^4\).
- Guide wire or stent graft delivery systems within the aortic arch must be manipulated carefully throughout the whole procedure.
- In the case of insufficient proximal landing zone, routine preoperative revascularization of LSA is suggested in patients who need elective TEVAR.

**CONCLUSION**

Stroke and SCI continue to be one of the most devastating complications after TEVAR. The key to minimizing their impact is identifying high-risk patients and adopting strategies to decrease their occurrence. The synergic effect of improvement in many different areas offer the best hope to further reducing the incidence of neurological complications.

**REFERENCES**

Management of TEVAR neurologic complications: a starting approach

**Introduction:** Spinal cord ischemia (SCI) after TEVAR remains a feared complication. In a recent meta-analysis (1) that included 5349 patients and 50 studies, the overall risk of paraplegia/paraparesis after TEVAR was estimated to be 3.9%. Implementation of protocols for prevention of SCI in open repair of thoracoabdominal aneurysms has been shown to reduce the incidence of SCI and paralysis. Concerning the endovascular approach, a recent study by Dias NV et al (2) showed that introduction of a protocol of SCI prevention resulted in a residual rate of SCI of 13.2% as opposed to 33.3%. The use of cerebrospinal fluid (CSF) drainage during TEVAR lacks consensus: some centers use drainage selectively in anatomically high-risk situations, while others perform drainage only in patients who become symptomatic during the postoperative period (1).

**Objective:** To present a protocol of SCI prevention for TEVAR.

**Methods:** MEDLINE search of articles that included data on institutional protocols of SCI prevention and the results of its application. Development of an algorithm based on the available scientific evidence.

**Results:** The protocol of SCI prevention for TEVAR includes the following: definition of high-risk criteria for development of SCI in TEVAR that justify intraoperative prophylactic drainage of CSF, measures to be taken in patients considered at high risk but without intra or post-operative neurologic complications (asymptomatic), measures to be taken in case of intra or postoperative neurologic complications in patients with and without prophylactic drainage, cessation of drainage in the presence and absence of neurologic complications and neurologic monitoring.

**Discussion and Conclusion:** The increasing number of TEVARs, along with more complex cases, implies a greater concern with potential complications, particularly the dreaded SCI. SCI protocols aim at reducing the incidence of neurologic complications and its application should be encouraged. Prospective institutional monitoring to evaluate benefits versus incidence of possible complications associated with CSF drainage should be cautiously engaged.

**References:**
Image evaluation in treatment planning and surveillance, for type B aortic dissection

An ideal imaging modality will precisely, safely, and rapidly confirm suspected aortic pathology with quantitative information on aneurysm formation and progression, as well as on tear location, extent, and type of dissection including evaluation for imminent complications. A clear and efficient imaging strategy is required, according to the technology available at the institution and the ease of performing each test, especially after hours.

**Imaging Strategy**

Today, invasive angiography has been replaced by noninvasive imaging strategies with CT angiography (CTA), transeosophageal echocardiography (TEE) and MRI. Under emergency conditions, acute aortic syndromes can be imaged and confirmed at the bedside by TEE, particularly to identify type A aortic dissection; however, CTA become the diagnostic method of choice in most institutions. The obvious advantages of CTA include rapid image acquisition, the ability to view vessels from the lung apices to the groin, in multiple projections, in < 20 seconds. A significant drawback is a radiation dose, especially of concern in young patients often subject to serial cardiovascular imaging.

**Special Diagnostic Considerations:**

The report shall specify the precise level of the lesion, different diameters, the extension to the main thoracic, abdominal and iliofemoral axes, the presence of complications, as well as the indication for an invasive treatment and technical possibilities.

1. **Localization and size of Intimal Tears:**
   Usually, patients have both entry and reentry tears and, in addition, may have multiple intermediary tears.

2. **Differentiation of the True and False Lumens:**
   Compared to systolic forward flow in the true lumen, delayed or even reversed flow in the false lumen may be seen on CTA. However, the degree of contrast visualization of the false lumen is dependent on the extent of communication with the true lumen. The delayed or reversed flow is also dependent of the main entry tear level.

3. **Blood Extravasation:**
   Extravasation of blood in the pericardium, pleural space or mediastinum often signals an emergency knowing that dissection usually ruptures into these spaces.

4. **Side Branch Involvement:**
   Branch ischemia related to aortic dissection contributes significantly to the perioperative mortality of aortic dissections. Knowledge of the involvement of the aortic arch vessels, visceral arteries and iliofemoral arteries is also important for therapeutic planning.

   A classification of malperfusion, separating the so-called “static” mechanisms when the dissection flap propagate into the vessel and the “dynamic” lesion when the aortic flap does not enter the branch vessel but prolapses across the branch vessel origin, covering it like a curtain, must be used. The two mechanisms can coexist in a mixed type. Subsequently, complete avulsion with
residual intimal flap projecting into the branch, which may cause a stenosis. An image-based understanding of the different mechanisms responsible of malperfusion helps selecting the right endovascular techniques to treat the complications of aortic dissection.

5. Stent Graft insertion possibility:

The analysis of the supraaortic and visceral extension, the level, size and number of the entry tears, the femoral access, as well as the aortic diameters and length of the lesion to be covered is crucial to select the best therapeutic options.

Although conservative management remains indicated in uncomplicated Acute type B dissection, several predictors might be used to identify the patients at high risk for aortic growth. These patients might benefit from closer follow-up or early endovascular intervention. Specific predictors of early or late adverse events identified in multiple studies include:

1. Progressive dilatation of the aorta:
2. A maximal aortic diameter ≥ 40 mm during the acute phase
3. Large false lumen diameter (≥ 22 mm in the upper descending thoracic aorta).
4. Large primary entry tear (> 1 cm) at the level of the Isthmus.
5. An elliptical configuration of the true lumen with a circular formation of the false lumen.
6. Partially thrombosed false lumen appears to be higher than that in patients with a completely thrombosed or patent false lumen.

Follow-Up Strategy after medical or surgically

After discharge, follow-up by CTA or MRI is indicated depending on technique availability and patient characteristics such as age, renal function, and test tolerance, at 3, 6, 12 months and annually thereafter. MRI appears to be an excellent technique, avoiding exposure to ionizing radiation and the nephrotoxic contrast agent used for CTA and is less invasive than TEE. Morphologic and dynamic information may be useful for predicting aortic dissection evolution and identifying the subgroup of patients with a greater tendency to severe aortic enlargement.

The risk of late aneurysmal degeneration of the aorta seems to be correlated to specific anatomic features of the aorta and branch vessels:

a) an infrarenal extension
b) a short stent graft coverage,
c) patients with a large baseline thoracic FL diameter or a large abdominal aortic diameter (>37 mm),
d) patients who are receiving long-term anticoagulant therapy for cardiac reasons
e) residual thoracic FL perfusion
f) the number of reentry tears below the stent graft,
g) The number of visceral branches and intercostal artery arising from the FL leaving the FL pressurized.

Patients with these anatomic features should have particularly close follow-up to assess the need for reintervention after TEVAR placement. Actually, consideration should be given to more aggressive endovascular intervention, when residual thoracic FL perfusion is present. But adherence to universal terms, definitions, and classifications is crucial. FL perfusion after TEVAR is generally related to 2 mechanisms: Endoleak and/or Reentry from the aorta or collaterals. Both of them may continue to perfuse and pressurize the FL, thereby conferring an ongoing risk of aortic enlargement and rupture, but the therapeutic strategies are different.

CONCLUSIONS:

In clinical practice and particularly in an emergency situation, the diagnostic method of aortic dissection depends primarily on the availability of high-performance equipment and the local organization of radio-medico-surgical resources. CTA is the imaging technique usually carried out in cases of suspected acute aortic dissection. This is chiefly due to the considerable around-the-clock availability of CT scanners. The ability to detect extension to visceral arteries and malperfusion syndrome, to select the best endovascular technique, gives a major advantage to CTA.

MRI seems preferable for long-term monitoring of aortic dissection, particularly in order to limit repeated radiation exposure.
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TEVAR indications for type B aortic dissection: when and why, after the trials

Introduction:
The treatment of type B aortic dissection has evolved during the past several decades. Since Dake et al and Nienaber et al described in 1999 the implantation of thoracic stent grafts for acute type B dissection, in our days, a large variety of indications for endovascular aortic repair of complicated and even uncomplicated type B aortic dissections has evolved.

Development of the topic:
Up to 20% of uncomplicated type B aortic dissections with best medical treatment develop chronic aortic expansion with the risk of false lumen rupture over time. Therefore, the application of TEVAR to seal the primary entry tear, thus preventing rupture, and to redirect and re-establish adequate true lumen flow, thereby treating dynamic aortic branch obstruction, has emerged as the preferred treatment modality in large false lumen and big size entry, although the real benefit of this early endovascular approach is still examined in clinical trials. The late results of the INSTEAD trial and data from the ADSORB trial have shown a benefit for TEVAR regarding false lumen thrombosis in uncomplicated type B aortic dissections. In complicated type B aortic dissections presenting with persistent thoracic pain, rapid aortic expansion, malperfusion of the renovisceral organs, spinal cord or peripheral ischemia an immediate endovascular sealing of the proximal entry using TEVAR can restore true lumen flow and visceral perfusion in most patients, sometimes requiring more specific secondary interventions according to the remaining malperfusion sites. Indications for elective endovascular interventions for type B chronic aortic dissection is given in patients with progression of the aortic aneurysm of more than 10 mm in one year or an aortic aneurysm size of more than 55 mm. Emergency cases are those with symptoms despite best medical treatment including persistent pain, mesenteric, renal, spinal cord or peripheral ischemia, ruptured aneurysm or aortic fistula.

Over time patients with chronic aortic type B dissections will frequently develop post-dissection thoracoabdominal aortic aneurysm (TAAA) following chronic aortic expansion. Recently, we have published our experience with 31 patients, treated with fenestrated and branched-TEVAR for aneurysmal expansion of the false lumen with a technical success of 93.5% and a 30-day mortality of 9.6%. Nevertheless, treating post-dissection TAAA is associated with additional technical challenges, due to the narrow true lumen, perfusion of visceral arteries from the true and/or false lumen, a floating dissection membrane and a vulnerable aortic wall. Custom-made fenestrated stent grafts are preferably used in patients with small true diameter and target vessels arising from the aortic wall close to the implanted stent graft. Additional treatment modalities include distal occlusion and flow reduction of the false lumen using coils, plugs and stent graft modifications.

Conclusion:
TEVAR is the preferred treatment for acute complicated and some asymptomatic type B aortic dissection with immediate sealing of the proximal entry tear, positive aortic remodeling, false lumen thrombosis and improved survival. Post-dissection TAAA can be treated by fenestrated or branched-TEVAR to redirect true lumen flow with renovisceral perfusion, depending on the patients aortic anatomy. The time-point for endovascular intervention in type B dissection is given by the patients symptoms, the progression of the disease or the estimated risk of complications. Future development of endovascular techniques will improve outcome and increase indications for endovascular treatment of type B aortic dissection with patient specific indications for an individualized aortic repair.
Open surgery indications: when and why, from our experience

Introduction:
- 20% of TAAA are the result of chronic dissection
- Tend to be more extensive than degenerative TAAA
- Complete different spinal cord vasculature
- Proximal entry tear = inadequate landing zone for endovascular solutions = debranching
- Side branches coming off true and false lumen
- False lumen most often patent and perfused
- Rigid septum
- Frequent in connective tissue patient: young

Proposed treatment algorithm:

<table>
<thead>
<tr>
<th>Treatment post Type B TAA(A)</th>
<th>Open Surgery</th>
<th>Endovascular Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connective Tissue Disorder</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>TAA(A)&gt;6 cm, endo anatomy, comorbidities</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>TAA(A)&gt;6 cm, good surgical candidate</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Previous Surgery, Frozen Chest</td>
<td>X</td>
<td></td>
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<tr>
<td>Failed Endovascular Surgery</td>
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</table>
Fate of patent false lumen after Type B dissection

Surgical intervention is generally recommended for Stanford type A aortic dissection, and medical management is recommended for non-complicated type B dissection. Surgical repair of type B dissections is reserved for cases that are complicated by impending rupture, organ ischemia due to involvement of major branches of the aorta, propagation of the dissection, or refractory pain and hypertension. However, a not negligible percentage of patients with type B dissection, die of aortic rupture during the chronic period despite medical or interventional management. In fact, the reported 1-, 5-, and 10-year survival rates of patients with medically treated type B dissection are 95, 90, and 55%, respectively, similar to those with surgically treated type B dissection. These data are inclusive for both patients with a thrombosed false lumen and patients with a patent false lumen. Juvonen et al. reported that the status of the false lumen is not associated with an increased risk of rupture, whereas other investigators report that patency of the false lumen is an important predictor of aortic rupture or an otherwise poor outcome. However, there are few reports focusing on patency of the false lumen, particularly in type B dissection, in relation to long-term outcome, and the clinical significance of the patent false lumen has not been clearly defined. Thus, several clinically important questions have arisen: whether patency of the false lumen affects the outcome of type B patients, when the type of treatment should be determined, and how the patients who would benefit from surgical or endovascular treatment can be identified. A possible answer to these questions can be given by the staged endovascular approach, in which the progressive coverage of thoracic intimal tears is followed by the use of branched or fenestrated endograft in order to cover the visceral and abdominal tears and definitively exclude the false lumen. Increasing evidence is reporting encouraging results following endovascular treatment of post-dissection aortic aneurysms treated using branched or fenestrated endografts. However, there is still a lot of work to be done before total endovascular repair can be effectively and widely implemented in post-dissection aneurysms. In fact patients with post-dissection aneurysms are often younger than those suffering from atherosclerotic disease, and long-term durability of fenestrated and branched repair remains unclear so far.

References
Arch intervention – The Nexus stentgraft applicability

Background:
To describe the applicability and short-term results of new aortic stentgraft. Nexus is a unique system designed specifically to face aortic arch challenges.

Methods:
Stentgraft system consisting in a) arch module including a branch for the brachiocephalic trunk and b) module for the ascending aorta was used as in 6 FIM (First In Human) and 9 compassionate patients. Arch module was introduced transfemorally and advanced over a brachio-femoral guide wire up to the level of the braciocephalic trunk bifurcation and deployed. Ascending module was advanced in correct position and deployed with help of rapid pacing. The procedure was completed by molding the landing zones and overlapping. All procedures were performed after extensive patient specific rehearsal.

Results:
All implantations could be completed as intended and there was no device-related event. Two patients died postoperative from pneumonia and myocardial infarction and one patient died 15 months postoperative of unknown reason. Stroke occurred postoperatively in 4 patients, but all recovered. One patient with extensive arch and descending aortic aneurysm developed postoperative spinal cord ischemia that was successfully reverted after cerebrospinal fluid drainage. During mean follow-up of 8 months ± 7 months one endoleak I/III was detected and there was no aneurysm enlargement.

Conclusions:
In this very first series of 15 selected study patients or compassionate cases with favorable anatomy, Nexus showed to be safe and promising concept with no device-related events during implantation and stable short term function.
What are the choices to be made, if the choice is endo?

Introduction:
Thoracoabdominal aortic aneurysm (TAAA) repair still remains a challenging clinical pathology for vascular surgeons. Over several decades open TAAA repair became established as a primary treatment option with excellent results in specialized centers. However, patients with relevant comorbidities and advanced age had to be excluded from aortic repair. During the last decade endovascular aortic repair (EVAR) using fenestrated (FEVAR) or branched (BEVAR) endografts has become a valuable treatment option for patients with TAAA, with promising long-term results and increasing implantation rates, initially considered for high risk patients unfit for open surgery.

Development:
Endovascular treatment of thoracoabdominal aortic aneurysms requires an extensive preoperative evaluation of the aneurysm morphology focusing on the aortic segments considered as proximal and distal landing zones with determination of the origin, orientation and diameter of the renomesenteric arteries. Based on these planning data custom-made fenestrated or branched endografts (F/B-EVAR) are constructed requiring a fabrication time of 8–10 weeks. Fenestrated stent grafts are suitable for patients with juxtarenal aortic aneurysms with a small aortic diameter and a non-aneurysmal aortic segment at the level of target vessels. Since 2012 an off-the-shelf branched endograft, t-branch, became available for early treatment of symptomatic or ruptured TAAA’s. These t-branch endografts can preferably be used in cases with an aortic diameter at the level of the renomesenterial axis of at least 26 mm. Other alternatives for treatment of TAAA include hybrid operations with open surgical visceral debranching and endovascular aneurysm exclusion or sandwich procedures using the chimney and periscope technique implanted between doubled stent graft layers.

Possible complications after endovascular TAAA repair include stent graft migration, side branch dislocation, side branch stenosis or thrombosis and endoleaks localized at the landing zones, the side branch connecting stent grafts or from retrograde perfusion of intercostal, lumbar or mesenteric arteries. Patency rates of connecting stent grafts between the fenestrated or branched stent graft and the renomesenteric arteries are high, usually above 95 % and long-term follow up data support these findings. Recent studies did not show a difference in occlusion or reintervention rate for branch vessels mated with balloon-expandable or self-expanding stent grafts.

However, perioperative spinal cord ischemia (SCI) with paraplegia or paraparesis is still one of the most severe complications after TAAA repair, with an incidence of 0–20%. Several adjuncts have been used to reduce the risk of SCI including cerebrospinal fluid drainage, prevention of anemia and hypotension and preservation of subclavian and hypogastric arterial perfusion. We have recently reported the implementation of the concept of temporary aneurysm sac perfusion (TASP) as an adjunct for prevention of SCI showing promising results, with a reduced SCI rate of 5%. A new type of stent graft represents the so-called “2-in-1” stent grafts, which can markedly reduce the diameter of the proximal landing zone and, thereby, reduce the length of the overstented proximal aorta. Especially in emergency cases, off-the-shelf branched stent grafts (t-branch) or the chimney technique are valuable alternatives. However, in the case of the chimney technique a proximal type la endoleak called “gutter” has to be taken into
account and probably will require secondary reinterventions for sealing. As for all endovascular procedures, long-term follow-up is mandatory after F/B-EVAR or parallel graft techniques with evaluation for progression of the aortic disease probably requiring secondary endovascular reinterventions.

**Conclusion:**
Endovascular aortic repair for TAAA using F/B-EVAR has become a minimal invasive and valuable treatment option. During extended thoracoabdominal aortic repair SCI is still a relevant complication and staged interventions with temporary aneurysm sac perfusion (TASP) might provide the time for restoration of spinal cord perfusion. Off-the-shelf branched stent grafts are now available for immediate BEVAR in symptomatic or ruptured TAAA’s. Further development of endovascular techniques with steerable catheters, navigation techniques, CTA overlay and robotic technology might improve the treatment of extended thoracoabdominal aortic aneurysms.
Complex Aortic Aneurysms – A Patient tailored approach.

Complex aortic aneurysms can be defined as aneurysms involving i) both thoracic and abdominal segments of the aorta, ii) thoraco-abdominal aorta and ostia of the visceral vessels and iii) when aneurysmal repair requires a major vascular procedure in other arterial segments, cerebrovascular or visceral. Its etiology is known: degenerative atherosclerosis, aortic dissection, Takayasu’s disease, degenerative mediopathies like Marfan’s, Loyes-Dietz and Ehler-Danlos syndromes. Often these patients have severe co-morbidities due to age, concomitant cardiac, pulmonary and renal dysfunction that increase their treatment risk. Open repair (OR) in major reference centers has been the gold standard for their management, but new endovascular procedures with the use of fenestrated and branched endografts and combined hybrid procedures have challenged established practices with reduced operative risk and expanding treatment to high-risk patients for open repair.

We have adopted the concept of 3C’s as rule for their management: Complex patient, Cooperation (institutional), multidisciplinary and multiprofessional Centralization of management combining cardiac and vascular surgery expertise, dedicated anesthesiology, ITU support and nursing perfusionist teams, blood management and hematology support plus per-operative adjuvants for optimal management such as TDC (transcranial Doppler), Neuromonitoring (somato-sensory evoked potentials) during open repair, spinal cord fluid drainage and post-operative dedicated intervention such as dialysis, prolonged ventilation, cardiopulmonary support. Those are the requirements that are essential to offer all treatment alternatives and tailored them to the patient’s condition, etiology and extent of the disease and those are the basis and rationale for the implementation of the Aortic Center.

Endovascular repair (ER) often requires the use of fenestrated/branched prosthesis with careful planning to optimize landing zones and preserve all functional visceral vessels.

The aim of this presentation is to review our experience from 2012 to December 2015 of a joint and dedicated approach to these very difficult patients and our experience has been developed with international cooperation for both endo and open repair. 696 aortic aneurysms were treated, 394 by vascular surgery, 286 by cardiac surgery and 16 types II/III TAA being a combined effort. 31 arch aneurysms were treated by hybrid procedures (arch debranching plus thoracic endoprosthesis) – group A - and 121 patients with complex thoraco-abdominal and JR/PR/SR aneurysms were treated –group B -and are the basis for the present analysis, including selection, techniques and results. In Group A, 23 patients were treated electively with 9% hospital mortality (1 had also a massive stroke) and 4 were treated because of contained ruptures with hospital mortality of 25%. None of the surviving patients experienced paraplegia or other central neurological deficit. Group B included 49 patients with TAA, 36 treated by open repair (OR) and 13 by endovascular techniques (ER). Hospital stay was 20 days median for the OR group, hospital mortality 11% with OR and 11 days and 0 hospital mortality in EV. Spinal cord ischemia occurred in 5.5% (2/36) 1 paraplegia and 1 paraparesis; in the EV group 2 patients (2/13) experienced neurological signs completely reversed by increased spinal drainage and rise of mean arterial pressure >90mmHg. No persistent neurological deficit occurred. Deterioration of renal function occurred in the early post-operative period in 44% but only 2 (5.5%) in the OR required permanent dialysis; in the ER group transient renal dysfunction occurred in 46% and 0 required permanent dialysis. 49 patients with JR/PR/SR elective aortic aneurysms were treated 27 by OR and 22 by ER. In OR hospital stay (median) was 12 vs 5 days for EV, in-hospital mortality was 11% (3/27) for OR and 0 for ER.
Transient renal dysfunction was similar but in OR 1 patient (3.7%) required permanent dialysis and 0 in the ER; 5 (3.7%) patients in OR group required increased ventilation >72hrs but 0 in the ER group.

Our experience reflects an organized approach to these complex aortic aneurysms, is based upon multiple institutional cooperation, embodied in the Aortic Center, provided a tailored approach using both open and endovascular repairs. The results show reduced mortality rates in the endovascular treated group in the TAA and J/S/P renal aneurysms, no definitive spinal cord ischemia and reduced incidence of persistent renal failure requiring dialysis in the endo group. For arch aneurysms the hybrid approach provided expansion of treatment to higher risk patients for OR, both in elective and patients with contained ruptures.
Endovascular vs open surgery in thoraco–abdominal aneurysms, a comparison in a matched population

The possibility to manage aortic aneurysms by endovascular means has been one of the major innovations of the past 20 years in vascular surgery. Currently endovascular repair has become the predominant treatment option for thoracic (TAA) and abdominal aortic aneurysms (AAA) that comply with morphological feasibility criteria.1-4 Open Surgery (OS) still remains the gold standard in case of complex aortic aneurysms involving visceral vessels, nevertheless there are relatively few vascular surgeons undertaking open surgery for thoraco–abdominal aortic aneurysm (TAAA) offering patients low mortality and morbidity risk exposure.5-7 Similarly, there are only few centers involved in endovascular repair (ER) who report encouraging results with branched and fenestrated stentgrafts in TAAA.8 Reliable unbiased data comparing open and endovascular technique for complex aortic aneurysms involving thoraco–abdominal aorta are lacking.

We recently reviewed the outcomes of all TAAA patients undergoing repair at three Italian vascular centers between January 2007 and December 2014, stratifying them according to treatment by ER or OS and comparing the outcomes using propensity score matching (1:1). Covariates included age, sex, aneurysm extent, hypertension, coronary disease, chronic pulmonary disease, diabetes, and renal function. The primary endpoint were mortality and paraplegia. Secondary endpoints included any spinal cord ischemia (SCI), renal and respiratory insufficiency and a composite of these complications or death at 30 days. All-cause survival and reintervention–freedom were also compared in the two groups.

Out of 341 patients, 84 (25%) underwent ER and 257 underwent OS (75%). After propensity score matching (65 patients per group), no significant differences were observed in rates of 30–day mortality (7.7% in ER and 6.2% in OS, p=1), and paraplegia (9.2% and 10.8%; p=1). Any SCI, renal and respiratory insufficiency were 12.3% and 20% (p=0.34), 9.2% and 12.3% (p=0.78), and 0% and 12.3% (p=0.006), in ER and OS respectively. The incidence of composite endpoint was significantly lower in ER patients (18.5% in ER vs. 36.0% in OS, p=0.03). According to Kaplan Meier estimates, all-cause survival at 24 months was 82.8% in ER and 84.9% in OS with rates unchanged at 42 months (p=0.9). Reintervention–freedom rates were 91.0% vs. 89.7% at 24 months and 80.0% vs. 79.9% at 42 months, in ER vs. OS, respectively (p=0.3).

In conclusion, a propensity score analysis in patients with TAAA undergoing repair suggests an early benefit from ER compared to OS with regards to composite endpoint due to reduced respiratory 30–day complications, while no significant differences were found in SCI and renal insufficiency at 30 days, and survival and reintervention rates at mid-term.
References.


Parallel grafts: indications and results
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**Defining a hostile neck in 2016**
**How to tackle a hostile neck in 2016**

**Introduction**

Since Parodi in 1991 and Volodos in 1986 demonstrated the feasibility of aortic aneurysm exclusion with endografts (EVAR), this technique has been used exponentially and widespread. Different devices, configurations, delivery systems and implantation techniques have also been developed in order to increase indications and improve long-term results.

Endovascular surgery, compared to open surgery, has been able to improve short-term results (30 day morbidity and mortality, in-hospital transfusions, quality of life). But these results have not been maintained in the long-term follow-up due to increased complications and reinterventions in the endovascular group. The most frequent complication after EVAR are the endoleaks: 13 cases per 100 patients/year for the early endografts. Indeed, this has been one of the most investigated focuses in this field: how to increase proximal fixation and reduce type Ia endoleaks.

The instructions for use (IFU) of every endograft detail the conditions to implant the device, and a minimum aortic neck length, appropriate anatomy without severe angulation, thrombus or calcification, assuring proximal fixation sealing zone, is one of the more limiting factors in EVAR use. Actually, hostile anatomy is usually defined as the presence of one or all of the following characteristics: neck length <15 mm, diameter >28 mm, and neck angulation >60°, proximal neck circumferential thrombus or calcification (>50%), or tapered/conical neck.

Unquestionably, the most important factor in ensuring a durable repair with a conventional stent graft is the anatomy of the proximal aortic neck, and anatomy studies found that nearly 35% of men and 60% of women remain ineligible for EVAR solely based on anatomical requirements. Indeed, some groups treat patients with non-favorable anatomies (outside the IFU), but reaching worst results and increased taxes of endoleaks and reinterventions. Actually, a review of the collected data of EVAR revealed that 58% of EVAR in United States were done outside of the IFU, and numerous studies have demonstrated that patients with short proximal necks are at significantly higher risk for device-related complications. In the EUROSTAR registry, patients with aortic necks <10 mm had a fourfold greater risk of proximal endoleak through 30 days of follow-up compared to those with necks >15 mm.

**Development of the topic**

The specific techniques to tackle hostile necks depend on the specific neck anatomy. However, the first lesson to be learned is to follow the IFU to avoid future complications, and search the best device or technique for each problem. The current endovascular therapeutic armamentarium offers us a huge variety of therapeutic options, which should be known by the endovascular therapist, but working outside the IFU should be considered in very selected and real unfit cases.
1. **Short proximal neck**

The first step to assure the proximal aortic neck length is an accurate CT analysis with accurate center-lumen line study and previewed endograft behavior. Most endografts recommend a minimum of 10 to 15mm length, but it should be carefully documented.

In short necks (between 10 to 15mm), some groups trend to increase oversizing to 20-25% and use suprarenal fixation endografts, but this is a not-evidence based behavior. It is also common to use suprarenal fixation endografts to treat these cases. However, in a study comparing the midterm performance of suprarenal and infrarenal fixations endografts, it was seen that there were no differences in the rates of migration, AAA sac stability, and other associated complications\(^1\)\(^2\). The use of proximal adjunctive bare stents (i.e. Palmaz stent) has also been used to improve proximal sealing. However, probably the best recommendation is to use endografts with accurate proximal deployment, like the use of tip-capture (i.e., Endurant, Zenith, Incraft devices), or the use of repositionable devices (i.e., Gore Excluder C3, Anaconda).

To treat patients with shorter proximal necks (<10mm) to the visceral vessels (or even thoracoabdominal aneurysms), fenestrated and branched endografts offer excellent results\(^1\)\(^3\), and should be the first considered option for these cases. However, these devices are not available in a short-time period, are expensive, time-consuming and technical demanding interventions. To avoid these disadvantages, different techniques have raised: custom made fenestrations (not recommendable when no experience), use of off-the-shelf stent grafts with standardized fenestrations, use of endostaples (described in next chapter) or the use of parallel stent technique (usually known as chimney or snorkel technique)\(^9\), based on the use of conventional infrarenal endografts and visceral stentgrafts, with intentional coverage of visceral ostium with the endograft.

The chimney technique is a clear “outside the IFU” condition, but it led us to treat patients in faster, easier and cheaper way, it is available even in emergent cases or in intraoperative complications (inadvertent coverage of visceral vessels), and the most important point, it has shown very good results in terms of aneurysm exclusion, proximal endoleaks and visceral patency\(^14\). It is usually performed in infrarenal aneurysms with short necks, preferably using one chimney (when there is a high distance between both renal arteries ostium), but it has been used with up to 4 chimneys (both renals, SMA and CT) without an increase of complications.

In short and conical necks, the use of endovascular sealing devices (EVAS, the Nellix-Endologix device) can also be helpful, decreasing type II endoleaks, simplifying the procedure in specific cases, and it can also be used with proximal chimneys. However, longer
experience should be published with these devices. Other devices with specific proximal fixation (Ovation) use a proximal sealing ring that creates no chronic outward force and insulates the neck from blood pressure, resulting in a supposed no neck dilatation over time, and which is supposed to get better adaptation to calcified and irregular necks. Nevertheless, longer experiences are needed to assure these assumptions.

2- Angulated proximal neck
Aortic neck angle should be examined in the suprarenal and infrarenal zone, where endografts and proximal bare stents will land. Determining this angle with CT center-lumen line analysis can improve planning and x-ray arm positioning, improving endograft deployment. In addition, the use of stiff or extra-stiff guidewires can straighten these angulations and improve endograft deployment.

Long angulated necks, mainly when associated to suprarenal angulation, can be treated with flexible infrarenal fixation endografts (i.e., Aorfix, Excluder, Anaconda). Actually, the Aorfix device has been approved to treat necks with up to 90º angulation, due to its high flexibility. The use of suprarenal fixation endografts can also aid the apposition between the stentgraft and the aortic wall, when lower suprarenal angles. In these cases, the adjunctive use of prophylactic bare metal stents (i.e., Palmaz) can improve the proximal fixation and angle straightening. Of course, the use of endostaples can be helpful to avoid migrations and to improve endograft-aortic wall apposition (described in next chapter).

3- Thrombus and calcification
Most IFUS recommend against EVAR when significant thrombus or calcification in the neck (>50%), as it can be related to higher migration rate due to poor endograft attachment. However, there is no evidence on this topic, because active and suprarenal-fixation can avoid these migrations; thrombus in the neck may have a protective effect against long-term complications, and actually more aneurysms sac regression has been related to not sever aortic neck calcification. Nevertheless, when significant thrombus and calcification are present, the same techniques used for short necks should be considered.

4- Neck diameter
Aortic neck diameter is one of the unachievable issues during EVAR. The maximum aortic neck diameter that can be treated with EVAR is 32mm (with a 36mm device), and bigger diameters should be treated with non-conventional devices (fenestrated, branched or chimney-EVAR). Some publications describe the use of thoracic endografts (more than 36mm) to seal big aortic necks, but this is not a recommendable therapeutic option.

Conclusions
The presence of a hostile proximal neck (short, angulated, calcified, with thrombus) is one of the most common difficulty during EVAR. Some specific techniques and devices to tackle these cases can be used. However, the first lesson to be learned is to follow the IFU to avoid future complications, perform very accurate preoperative planning to avoid complications and to better diagnose the difficulties, and search the best device or technique for each problem. The current endovascular therapeutic armamentarium offers us a huge variety of therapeutic options, which should be known by the endovascular therapist, but working outside the IFU should be considered in selected and real unfit cases.
References


Critical IMA and ectopic renal arteries: the use of parallel grafts to preserve them during EVAR

Introduction
Historically, the importance of renal parenchymal preservation during open aneurysm surgery has been emphasized because post-operative renal insufficiency is markedly associated with worse outcomes, including mortality.

The Society of Vascular Surgery Consensus statement for the treatment of abdominal aortic aneurysm (AAA) recommends for preservation and reimplantation of a sizable (3 mm) ARA or those that supply one-third or more of the renal parenchyma, while recognizing that only low-quality evidence exists to support any one strategy in the management of ARAs in both open and endovascular aortic aneurysm repair.

In the EVAR era we have been concerned about the IMA due to the type II endoleaks but in some cases the revascularization of the IMA can be recommended.

In the cases that we decide to preserve the ectopic renal arteries or critical IMAs we have different options from hybrid procedures to fenestrated or branched EVAR and a more recent option the Use of Parallel grafts.

Aim
To show the experience with this technique, parallel grafts for preserving critical IMA or ectopic renal arteries, because although is limited, in the small number of cases published the outcomes seem to be really good.

Conclusion
In some AAA selected cases with bilateral hipogastric occlusion the IMA chimney endovascular technique can be considered a option to decrease the risk for bowel ischemia.

Parallel graft techniques can be also considered for preserving relevant coexistent ARAs (>4mm) if we suspect that with occlusion the patient will develop important renal function impairment.
Rationale of EndoAnchors in abdominal aortic aneurysms with short or angulated necks

Hostile neck represents a challenge for EVAR durability. Type I endoleaks 4.5x more likely at 1-year after endograft implantation in hostile proximal aortic neck anatomy. Aneurysm-related mortality risk 9x greater in hostile neck anatomy. Features like length, angulation, diameter, thrombus formation, calcification, conical shape are included in hostile neck definitions and considered in the most part of the Instructions for Use (IFU) for any single endograft manufacturer. Nevertheless, the clinical experience demonstrates that even following the IFUs we would need to be aware that for good long term outcomes, we should be even more strict than the current well known IFUs. Recent studies, like ANCHOR, demonstrated that necks wider than 26 mm or length shorter than 17 mm are independent predictor factors for type Ia endoleaks.

Endoanchor technology is a new adjuvant approach that may effectively prevent migrations and type I endoleaks in EVAR and TEVAR treatments on the long run and should improve their durability. In addition of that, endoanchors can be useful, in very selected cases, to fix secondary type I endoleaks.

Clinical experience has been systematically collected and assessed in the multinational ANCHOR registry that is still on going.

We will describe the most interesting features of the endoanchor system as well as some personal tricks and tips related with the technique. Finally we’ll present a very promising up to date interim analysis of ANCHOR study with over 600 cases.
APRIL 2\textsuperscript{nd} SPEAKEARS LECTURES
Symptomatic stenosis. ICSS late results – what to conclude
Asymptomatic lesions and contralateral occlusion

Carotid artery stenosis is associated with contralateral carotid occlusion (CCO) in approximately 10% of patients. These patients have a reduced collateral cerebral circulation and an overall more advanced state of vascular disease and have been historically considered at high risk for carotid endarterectomy (CEA), with higher rates of morbidity and mortality than the general population with carotid stenosis. However, results from randomized controlled trials on carotid surgery, concerning the subgroups with contralateral occlusion, have shown conflicting results.

A subgroup analysis of the North American Symptomatic Carotid Endarterectomy Trial (NASCET), in which 43 patients with a CCO were followed and compared with 616 patients with contralateral patent carotid artery, revealed that in both the medically and surgically treated groups, patients with CCO were more than twice as likely to have an ipsilateral stroke by 2 years than patients with patent contralateral arteries.

On the contrary, post hoc analysis of the Asymptomatic Carotid Atherosclerosis Study (ACAS), concluded that endarterectomy in asymptomatic patients with CCO provides no long-term benefit (and may be harmful) in preventing stroke and death. The ACAS study established that the long-term risk of ipsilateral stroke in neurologically asymptomatic patients with a >60% carotid stenosis was reduced by CEA. The estimated 5-year risk for ipsilateral stroke was 11% for the medical arm and 5.1% for the surgical group, with a 53% relative risk reduction with surgery. Among the 163 participants with CCO, 77 of whom were randomized to medical management and 86 to surgical therapy, the 5-year event rate was 3.5% for medical management and 5.5% for surgical management, with a 2% increase in absolute risk with surgery. The authors speculated that collateral circulation could explain such difference, arguing that since NASCET patients were symptomatic, they likely had poor collateral circulation, whereas asymptomatic ACAS patients had better collateral circulation, protecting them from stroke over time. An alternative but more likely explanation of such intriguing results is that ACAS patients with contralateral occlusion have had overestimation of the carotid stenosis in the ipsilateral artery because of the artificially elevated peak systolic velocity observed in the presence of CCO. They would actually have had moderate (<60%) carotid stenosis in the artery being treated, explaining the lack of any benefit with revascularization and the benign long-term outcomes with medical management.

Recently published data from the Society for Vascular Surgery Vascular Registry provided a large analysis of the "real world" results. This study included 11614 CEA procedures, comprising 666 patients with CCO and 10948 with a patent contralateral internal carotid artery. An increased risk of stroke was found in patients with CCO compared with patients with a patent contralateral carotid artery (3.1% vs 1.1%, respectively, P < .0001). This difference persisted even after comparing homogeneous groups of patients by symptomatic or asymptomatic symptom status. Those results are consistent with two distinct meta-analysis published recently.

Carotid artery stenting (CAS) has been suggested as an alternative treatment modality for carotid stenosis with CCO because of the high risk of these patients for CEA. Data from the Society for Vascular Surgery Vascular Registry, which included 6826 CAS procedures, comprising 1128 in patients with CCO, showed no difference in the risk of stroke between patients with occluded and patent contralateral carotid artery (2.1% vs 2.3%, respectively, P=0.83). Thus, contralateral carotid occlusion does not increase the risk of stroke in patients submitted to CAS and, among this subgroup, CAS and CEA seem to have equivalent results.
Introduction:
The best therapy of carotid artery disease is an ongoing discussion after several studies over the last years. Based on symptoms of carotid plaques and/or degree of carotid stenosis there are advocacies of medical, operative or interventional treatment from different medical specialties. Nevertheless after a 7-year process 20 medical societies agreed to a S3 guideline of extracranial carotid stenosis at the end of 2012. A general consensus to classify carotid stenosis was found two years before in 2010. Ultrasound criteria were transferred from local (ECST) to distal (NASCET) degree of stenosis to obtain valid data for comparison and evaluation of studies worldwide. On the other hand the estimated risk of carotid plaques remains controversial but plaque morphology has been arousing great interest.

Material and method:
PubMed (www.ncbi.nlm.nih.gov/pubmed) analysis showed nearly 2000 publications over the past ten years. Imaging modalities like high-resolution CT scan, MRI and ultrasound especially contrast enhanced ultrasound (CEUS) has been applied to characterize carotid plaques composition and differentiate between "benign or malignant plaque". Histopathology, immunohistochemistry after endarterectomy and biomarkers such as vascular endothelial growth factor (VEGF) and metalloproteins (MMP) in tissue and blood samples are used to estimate the risk of cerebrovascular events.

Results:
Echolucency with a standardized grayscale median (GSM) has been a well-known risk factor for embolization since Biasi published 2004 the ICAROS (Imaging in Carotid Angioplasty and Risk of Stroke) study. Hence continuously improving the detection of intraplaque hemorrhage and neovascularization is crucial. In contrast to potential nephrotoxic contrast agents in CT or MRI CEUS allows the imaging and measurement of neovessels in ultrasound in a very simple way. All recently published studies focused on CEUS preferably in correlation to histology. In a review Staub et al has clearly shown the importance of CEUS with the main advantage of a blood-pool agent (SonoVue®, Bracco) to identify carotid intraplaque neovascularization and vasa vasorum. Furthermore patient’s age, gender, diabetes mellitus and renal insufficiency are associated with plaque phenotype and ischemic attacks Atheromatous plaques in seniors and men contain less smooth muscle cells (SMC), more local inflammation (e.g. macrophages) and increased biomarkers such as MMP’s accelerating cardiovascular complications. A previous ocular ischemic event has fewer vulnerable plaque features than cerebral ones. Therefore local atherosclerotic plaque can be predictive for further cardiovascular outcome.

Conclusions
Intraplaque neovascularisation and composition is the key point to identify carotid vulnerable plaques. As mentioned before CEUS is advantageous in comparison to high resolution CT and MRI to estimate the risk of stroke.

Patient specific parameters like age, gender, renal insufficiency, diabetes mellitus and blood tests (VEGF, MMPs) as an interesting but unspecific adjunct can be helpful to assess overall cardiovascular outcome. Ultrasonic molecular imaging with highly specific targeted contrast agents might be a promising perspective for the future. In summary to confirm these and similar results to draw clinical decisions a randomized trial will be necessary not only to define an asymptomatic plaque at risk but to control the effect of drugs like statins as a stabilizing factor. Not only different therapeutic regimens may be influenced by the plaque morphology but as well the indication for carotid surgery or stent.
CEA within 48 hours in symptomatic patients – decision making

Introduction
Current guidelines on symptomatic carotid treatment still recommend carotid endarterectomy (CEA) to be performed within 14 days following the first neurological event. Nevertheless, some authors have demonstrated the feasibility and safety of CEA performed in the very early period following the first neurological event, with excellent results in terms of prevention of brain embolism recurrence, and neurological status improvement. Carotid endarterectomy in symptomatic patients carries a risk of intraoperative brain embolism that is considered increased when compared to asymptomatic patients but that can be minimized with some intraoperative techniques (i.e. early clamping of internal carotid artery). But above all, risk of reperfusion of brain zones with loss of autoregulation, hyperperfusion, hemorrhagic conversion of acute infarct, and increased perilesional oedema is feared to the utmost when performing CEA in a recently damaged brain, thus frequently preventing physicians from indicate early CEA as a safe and feasible treatment. Those risks in the first days must be counterbalanced by the risk of recurrent carotid embolism following the first event, that is reported in recent literature up to 11.5% at 14 days\(^1\), so that comparing risks and benefits of invasive manoeuvres can be really challenging and should be often based on a case-by-case evaluation. It is therefore of the utmost importance to define those patients that can be safely submitted to very early CEA in order to offer them the greater chances of neurological improvement and to minimize the risk of embolism recurrence.

Development of the topic
When evaluating risks and benefits of very early CEA in symptomatic patients, conflicting reports can be found in literature. Data on CEA within 48 hours following the first neurological event from the SwedVasc Registry published in 2012 reported a risk of embolism recurrence to be down to 2% at 2 days, while the risk of neurological events following 48-hour CEA was up to 11.5% in their series\(^2,3\). On the contrary, the Austrian experience recently published has demonstrated a very low risk of neurological event in patients submitted to CEA within 48 hours from symptoms onset, confirming a risk of embolism recurrence much higher in those same patients submitted to medical treatment alone, and in line with previous report on very early symptomatic patients\(^4\).

To explain those conflicting data a careful look into methods and results is mandatory. Inclusion criteria for evaluating recurrence risk vary significantly in different reports so that also definition of recurrence is affected. Moreover, inclusion of patients to CEA is crucial so that a strict protocol is mandatory to effectively include only those (and all those) who can really benefit from early intervention. When evaluating results, a careful look should be employed when classifying neurological events following CEA. As stated above, the real adjunctive risk in patients submitted to CEA after a very recent carotid-related neurologic event, is related to the possibility of the transformation of the ischemic brain area into an haemorrhage, or of the increase of the perilesional oedema. Analysing results from the Swedish series, percentages of those kinds of complications are extremely low (<1%) in all time-group patients, thus confirming that the real risk that must be feared – of increasing brain damage rather than curing it – is extremely low in experienced stroke centres. Some authors have reported the presence of a brain ischemic area to be the only predictor of adverse outcome in recently symptomatic carotid patients, and this is why current guidelines recommend early CEA to be performed in TIA patients or patients with a minor stroke. However, it is well known that brain response to ischemic insult is related to ischemia volume and localization, but also to ischemic penumbra volume and collaterals, so that characterization of the brain lesion can help to identify those patients that can be safely submitted to very early CEA, thus possibly including also patients...
presenting with a mild and moderate neurological deficit. Therefore, it is of the utmost importance to define a protocol in order to include to urgent invasive treatment all patients adequately studied by advanced brain imaging. In 2000 we started in Rome, Italy, a close collaboration with neurologists in order to improve results in stroke patients, by offering a round-the-clock service of urgent carotid ultrasound diagnostic service and carotid invasive treatment. All strokes classified as carotid-related were included in a work-up protocol (Systematic Advanced Features Evaluation – SAFE CEA protocol; Table I) in order to enrol patients for expedite CEA. Carotid and brain imaging were employed in an emergency setting, together with a grading scale for neurological deficit (National Institute of Health Stroke Scale – NIHSS) to be employed at different time-points during the diagnostic and therapeutic work-up. Up to today the main points of our protocol remain the brain infarction area/volume evaluation by appropriate diagnostic imaging, and the prompt diagnosis of stroke etiology. The previous is nowadays well recognized as mandatory in stroke treatment by recently published guidelines, based on recent results from trials on cerebral intrarterial thrombectomy. The latter can only be achieved by a multidisciplinary work that has always be the cornerstone of our stroke center. Neurologically stable and unstable patients with TIA, mild, and mild-to-moderate stroke have been treated over time, and we have been able to maximize neurological improvements in those patients, keeping brain complications below 3%. In our series NIHSS score decrease of more than 4 points was achieved in 45% of patients, with better results in patients presenting the worst neurological status on admission (NIHSS ≥ 8 on admission improvement of more than 4 points in 77% after CEA, NIHSS 4–7 on admission improvement of more than 4 points in 27% after CEA)5. Despite the refining of guidelines over time, still the need for prompt diagnosis of carotid disease as possibly causing stroke, reported in literature in 15–20% of cases, is still lacking in the very early phases of stroke treatment. The possibility of recognizing the role of carotid disease and of treating it invasively can represent the next frontier of stroke treatment.

Conclusions

Despite conflicting data in literature embolism recurrence risk in carotid plaques is highly unpredictable. In some experiences the only predictor of adverse outcome is the presence of a brain ischemic lesion and there is emerging evidence from most recent stroke trials that advanced imaging can help to tailor the best treatment strategy in different stroke patients. Nevertheless, prompt diagnosis of the stroke etiology/cause (i.e. carotid embolism) might be the turning point of tailored treatment, so that carotid specialists should be involved in stroke patients treatment in the acute phase. The “as soon as possible” strategy is still winning in stroke treatment, that nowadays is more and more a multidisciplinary work.

### Table I. Systematic Advanced Features Evaluation – SAFE CEA protocol

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
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<tr>
<td>Clear time of onset of symptoms</td>
<td>Not clear time of onset of symptoms</td>
</tr>
<tr>
<td>NIHSS score &lt; 22</td>
<td>Severe neurological deficit (NIHSS score ≥ 22)</td>
</tr>
<tr>
<td>Recent ischemic hemispheric brain infarct ≤ 1/3 of the middle cerebral artery area regardless of BBB disruption at CT or MRI scans</td>
<td>Cerebral ischemic onset with seizures</td>
</tr>
<tr>
<td>ICA stenosis ≥ 50% at US evaluation</td>
<td>Previous ischemic or hemorrhagic stroke with residual severe deficit (Modified Rankin Scale ≥ 2)</td>
</tr>
<tr>
<td>Patent middle cerebral artery in the detectable portion M1 and M2</td>
<td>History of cerebral haematomas</td>
</tr>
<tr>
<td></td>
<td>Any other cerebral disease with residual permanent deficit</td>
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</tbody>
</table>

According to clinical presentation on admission:

- Recent ischemic hemispheric brain infarct ≤ 1/3 of the middle cerebral artery area
- Presence of cerebral haemorrhage
- Brain tumor
- Cerebral artero-venous malformation
- Cerebral aneurysm

NIHSS: National Institute of Health Stroke Scale; ICA: internal carotid artery
REFERENCES


Filter and reversed flow embolic protection during carotid stenting – comparison

Introduction
A carotid stenosis is responsible for about 30% of strokes occurring. Whenever a clinical onset carotid stenosis, as well as non-disabling stroke (INI), transient ischemic attack (TIA) and even as a disabling stroke (stroke), we considered which would rapidly the optimum time for surgical repair and what treatment should be used. The CEA is now widely accepted and its usefulness demonstrated in both symptomatic patients (NASCET and ECST) and asymptomatic (ACAS and ACST). According to the NASCET and ACAS results provides a risk reduction of 5.4% and 5.9% respectively and the rate of stroke and symptomatic patients exitus 0 to 11.1% and 0–5.5% in asymptomatic. Actually there is a great controversy on the indication in the time in order to carry out the surgery on a symptomatic carotid (CVA, TIA, INI). The aim of this revision is to determine that good moment of agreement the most recent scientific literature.

Carotid angioplasty and stenting (CAS) for the treatment of severe carotid obstructive disease is becoming more widely performed, and is now widely accepted as a less invasive technique that provides an attractive alternative for many patients, particularly those with significant co-morbidities.

The risk of divers complications and special neurological complications and brain embolism remains the major drawback to this procedure of Carotid Angioplasty and Stenting (CAS).

This study was a nonblinded, retrospective analysis of data obtained from September 2002 to present in the CAS femoral access group and the CAS neck access group.

Material and methods
A comparative study between 432 patients, 231 to which has implanted carotid stent by means of transcervical access of the carotid, with carotid reversal flow and 201 with implantation of stent by femoral route with cerebral protection is made. 22 cases have been making without protection. The criteria of inclusion of patients in both groups have been similar. Aspects like local and systemic complications have been valued, insolvent attempts of positioning of stent, results. The period of pursuit has been of 1 month to six year.

Results
The results in almost all cases have been improvement in patients with reduction of clinical symptoms. It has often been palliative especially in progressive and advanced neoplastic problems. In all cases, and if it has had time to mint, they have established pathways collateral circulation.
Table I – The accidents you will tilt cerebral in postoperating the immediate one was superior in the transfemoral group that in the transcervical (6.04% against 4.15%)

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>GROUPS</th>
<th>STATISTICAL SIGNIFICANT</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>FEMORAL ACCESS (rate)</td>
<td>NECK ACCESS (rate)</td>
</tr>
<tr>
<td>DEATH</td>
<td>0.18%</td>
<td>0.18%</td>
</tr>
<tr>
<td>MAJOR STROKE</td>
<td>1.45%</td>
<td>0.34%</td>
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<tr>
<td>MINOR STROKE/TIA</td>
<td>2.53%</td>
<td>1.25%</td>
</tr>
<tr>
<td>RESTENOSES. YEAR</td>
<td>3.57%</td>
<td>3.85%</td>
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<tr>
<td>30 DAYS TRANSIENT ISCHEMIC</td>
<td>2.16%</td>
<td>2.56%</td>
</tr>
</tbody>
</table>

Discussion

It is necessary good indications, good patients, lesion selection, correct techniques, brain protection devices, good choice of the stent, good team, pharmacological adjuncts and correct indications.

The results indicate that the transcervical route offers better results in relation to insolvent attempts of positioning, local and general complications that the transfemoral but long term route stent of both groups presents/displays resemblances behaviors. Complication rates range from 0.9% to 9.3% following the experience of different centres. It is of fundamental importance that physicians be able to recognise and manage the various possible complications of carotid angioplasty and stenting.
References


Andrej Schmidt

Professional Career

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/2013</td>
<td>Priv.-Doz. University of Leipzig</td>
</tr>
<tr>
<td>09/2010</td>
<td>MPG-GCP-Training</td>
</tr>
<tr>
<td>Since 09/2014</td>
<td>Universitätsklinikum Leipzig AoR, Department of Interventional Angiology</td>
</tr>
<tr>
<td></td>
<td>Chief senior physician</td>
</tr>
<tr>
<td>2006 to 2014</td>
<td>Park Hospital Leipzig, Department of Angiology</td>
</tr>
<tr>
<td></td>
<td>Chief senior physician</td>
</tr>
<tr>
<td>2001 to 2006</td>
<td>Heart Center, University of Leipzig, Department of Cardiology/Angiology</td>
</tr>
<tr>
<td></td>
<td>Senior physician</td>
</tr>
<tr>
<td>1998 to 2001</td>
<td>Heart Center, University of Erlangen, Department of Cardiology/ Angiology</td>
</tr>
<tr>
<td>1995 to 1998</td>
<td>University of Dresden Carl Gustav Carus, Department of Angiology</td>
</tr>
</tbody>
</table>

Peripheral redo endo surgery after open surgery

Aguardo envío de texto
Endovascular therapy have gained wide acceptance as a treatment option in patients with peripheral artery occlusive disease. The development of nitinol stents, dedicated crossing devices, dedicated balloons, atherectomy and thrombectomy devices have markedly improved outcome of patients with critical limb ischemia and stable claudication. Furthermore individual tailored strategies for each patient and lesion are the key for a successful treatment. Especially long and calcified lesions still remain a challenge for the interventionalist. A recommendation for systematic stenting of such complex lesions has been shown to be superior to balloon angioplasty and provisional stenting. But still normal nitinol stents have their limitations regarding the requirements of biomechanical forces in the femoropopliteal arteries. Beyond radial force and kink resistance, the occurrences of stent fractures remain an important concern. The introduction of the interwoven Supera Peripheral Stent System helped to overcome these limitations. In large registry trials for the superficial femoral and the popliteal artery 12 month patency rates between 80% and 90% could be demonstrated according to the length and localization of the lesion.

Despite this encouraging patency rates especially in complex long and calcified lesions, outcome of the patients is also determined by the experience of the interventionalist. There are many pitfalls during the procedure especially in terms of choosing length and diameter of the stent, vessel preparation and stent invagination as well as stent elongation. Furthermore the occurrence of stent thrombosis and in-stent restenosis require different treatment strategies compared to normal nitinol stents. Especially in undersized diameters the stent behaves not like a normal nitinol or balloons expandable stents. The interventional treatment of such unsolvable situations is limited to highly experienced centers with a variety of tools for endovascular procedures. In this talk we will demonstrate the concept, the vessel preparation as well as some tips and tricks to avoid pitfalls of the implantation of the Supera Peripheral Stent System.
**Giancarlo Biamino**

**Professor of Internal Medicine, Cardiology, Angiology**

- 1959-1965: Study of medicine at the Free Universität of Berlin
- 03-13-1965: Medical state examination
- 12-07-1965: Doctorate
- 06-01-1965 to 05-31-1967: Residency
- 06-01-1965 to 05-03-1969: Scientific assistant Institute of Physiology of the FU Berlin
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- 11-17-1970: PhD, Habilitation in “Physiology and clinical Physiology”
- 11-19-1973: Approval as internist by the Ärztekammer Berlin
- 08-13-1975: PhD, Habilitation of internal medicine
- 10-01-1976 to 03-31-1977: Head physician at the Heart Center in Munich/ Bavaria
- 01-17-1978: Nomination to the extraordinary professor at the FU Berlin
- 11-01-1979: Nomination as full professor for “Internal Medicine and Cardio-Pulmology”
- 04-29-1980: Permanent Head-deputy of the Dept. of “Internal Medicine and Cardio-Pulmology”, FU Berlin
- March 1984 and Sept./Oct. 1984: Guest professor at the Mid American Heart Institution in Kansas City, USA
- Spring 1986-Nov. 1989: Medical Director of the CVLA-project at the Laser-Medizin-Zentrum Berlin (LMZ)
- 12-01-1989 to 03-05-1996: Head of the Dept. Laser Angioplasty, Universitätsklinikum Rudolf Virchow/ Wedding Zentralinstitut für Röntgendiagnostik
- 03-05-1996 to 03-31-1998: Director of the Dept. for “Clinical and Interventional Angiology” Virchow Klinikum, Medizinische Fakultät der Humbold-Universität zu Berlin
- 04-01-1998 to 12-31-2001: Head of Cardiovascular Unit, Villa Cherubini, Florence, Italy
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- From February 2006 To March 2011: Chairman Gruppo Villa Maria Endovascular, Cortignola, Italy
- From 2004 to 2013: Clinical and Scientific Consulting “Clinica Montevergine, Dept of Cardiovascular Med.”, Mercogliano (AV); Italy

**Treatment of SFA lesions: clinical evidence**

Having the vision of a potential endovascular treatment (EVT) of PAOD A.Grünzig proposed in 1971 a balloon based dilatation of the obstructed artery.

Already in 77 he was publishing in a booklet his results related to the desobliteration of chronic total occlusions of the SFA. In the preface of that booklet Prof.W. Siegenthaler was writing: “I am convinced that percutaneous transluminal angioplasty represents a real expansion of our therapeutic possibilities.....The advantage of this easy, safe, and cost reducing technique is evident....we have to evidentiate its value on the basis of credible scientific data, analyzing indication, acute and long term results .”

The Realization of this vision in the daily practice and the Extrapolation to recommendations was a long very hard way and is still not concluded.

Anyway, the clinical penetration of EVT is in the meantime an unstoppable process and we could change the paradigm in the treatment of PAOD, however we have still to clearly DEFINE the limits avoiding a potential discrimination of useful technologies, just because of their misuse.
Moving towards extreme revascularization is nowadays routine to try to recanalize long complex and calcified SFA lesions. Using new dedicated guide-wires, reentry-systems and particularly retrograde approaches it is possible to pass more of 95% of total occlusions.

The problem remains the high rate of restenosis using OPB, ranging between 30 and 80% after one year.

The expected **BREAKTHROUGH** implanting NITINOL STENTS was only partially fulfilled. In fact in-stent-restenoses occur with an incidence of 18 – 40% after one year. The recurrence rate after POB treatment is very high: 49.9% in class I (focal), 53.3% in class II (diffuse), 84.8% in class III (occlusive).

This problem has a high clinical relevance (> 65,000 In-Stent-Restenoses / y. estimated in USA for SFA) and at the moment we do not have a clear answer, may be drug coated balloons?

How can we further improve the results of femoral stenting? It is mandatory to improve the mechanical stent characteristics. The results of different groups are indicating that using the Supera stent excellent results with a primary patency rate of 76% after 24m can be achieved also in complex SFA lesions.

Now the question is: Do we need ulterior long term concepts for the treatment of infrainguinal lesions?


The results of numerous CRS are clearly indicating the superiority of DCB in comparison to PTA.

DCB changed the paradigm of the SFA treatment radically, at least for non calcified lesions, showing a patency rate of 79% after two years and a TLR of 2.5% at one year.

**In conclusion:**
- Compelling Evidence supports the use of DCB as front-line therapy for femoro-popliteal revascularization
- Highest Primary Patency and lowest TLR
- Sustained QoL, functional benefit and walking improvement up to 2-year
- Interventional treatment of complex and long SFA lesions remains to be a challenge
- Optimized stent designs with high flexibility, durability and radial strength are mandatory
- Likely the future for long lesions will be a combination of antiproliferative local drug delivery and dedicated stent platforms – either as DES or DEB/Stent combinations
Real world data in DVT anticoagulation: rivaroxaban and the Xalia Study

Hierarchies of evidence should be replaced by accepting – indeed embracing – a diversity of approaches.

Sir Michael Rawlins
Chairman of the National Institute of Health and Care Excellence (NICE), 2008

Anticoagulation is still the mainstay of venous thromboembolism treatment and it is strongly recommended in all guidelines addressing this subject.

Until recently, the standard of care was parenteral anticoagulation agents, such as low-molecular-weight heparin, followed by vitamin K antagonists, with a target international normalised ratio of 2.0–3.0.

For several decades, vitamin K antagonists, such as warfarin or acenocoumarol, were the only oral anticoagulants available for long-term VTE treatment. Its drawbacks, limitations and potential hazard side effects were well known and felt. Therefore, new oral anticoagulants were long time desired, for both clinicians and patients. And the new agents were expected to have a predictable pharmacology (with few food or drugs interactions and targeting a single coagulation factor), a wide therapeutic window (with no requirement for routine coagulation monitoring, that can be used at fixed doses) and improved benefit-risk profiles.

Resuming those characteristics, rivaroxaban, apixaban, dabigatran and edoxaban were finally developed and have been shown to be effective in phase 3 randomised trials for acute and long-term treatment of venous thromboembolism.

In 2011 rivaroxaban was the first direct oral anticoagulant to be approved by the European Medicines Agency (EMA) for the treatment of acute symptomatic deep-vein thrombosis and secondary prevention of recurrent venous thromboembolism. This approval followed the RCT phase 3 EINSTEIN DVT study that showed rivaroxaban as effective as LMWH and vitamin K antagonists, with similar frequency of bleeding.

The importance of clinical trials and level 1 evidence in the approval of a new drug or technology is undeniable. The major advantage of a trial over an observational study is the ability to demonstrate causality. In particular, randomly assigning the intervention can eliminate the influence of confounding variables and that is the hallmark of a new drug market introduction.

However, clinical trials and phase 3 studies address narrow clinical questions, have selective inclusion criteria and the reproducibility of their findings needs to be assessed in broader patient populations that are seen in routine clinical practice.

Therefore real-world evidence can offer a complementary resource. It allows treatments to be better tailored, tracked and understood. In fact, such kind of data provides significant insight into how a drug performs or is used in real-world medical settings.
The XA inhibition with rivaroxaban for Long-term and Initial Anticoagulation in venous thromboembolism (XALIA) study was done to assess the safety and effectiveness of rivaroxaban for DVT treatment in patients typically seen and managed in routine practice, and to meet a regulatory request during the assessment procedure for marketing authorization from the EMA.

It was a multicentre, international, prospective, non-interventional study of patients with deep-vein thrombosis, done in hospitals and community care centres in 21 countries, including Portugal. The study compared rivaroxaban with standard anticoagulation therapy. Eligible patients were adults (aged ≥18 years) with an objectively confirmed diagnosis of deep-vein thrombosis, and an indication to receive anticoagulation treatment for at least 3 months. Following approval of rivaroxaban for the pulmonary embolism indication, patients with deep-vein thrombosis and concomitant pulmonary embolism were also eligible, however, those with isolated pulmonary embolism were not included. Type, dose, and duration of therapy for each patient were at the physician's discretion. The primary effectiveness and safety outcomes were major bleeding, recurrent venous thromboembolism and all-cause mortality. Propensity score-adjusted analyses were done to account for potential imbalances between groups.

The Xalia study was published online in 7th December 2015, in The Lancet Haematology. The article reference is listed below and will be reviewed. We aim to appraise the real-world data provided by this study.


Rationale and applicability of IVUS in deep venous disease
Peripheral venous aneurysms: indications and treatment options

Introduction
Venous aneurysm can be defined as a persistent isolated dilatation of twice the normal vein diameter or three times in its normal size. Venous aneurysms have been described in quite of all the major veins. Isolated venous aneurysms are very rare. In clinical practice it is predominantly seen in the course of a random diagnosis to find the cause of pulmonary embolism or venous thrombosis.

Venous aneurysms have been reported in the intra and extracranial veins, in the extremities, in the superior vena cava, and in the visceral–portal veins and common iliac system. Venous aneurysms are usually uncommon but due to an increased use of duplex scans there is also an increase in the number of diagnoses of venous aneurysms even if patients are still asymptomatic.

Material and methods
We evaluated patients with venous aneurysms of extremities. Aneurysms were located in the lower extremities and the upper extremities and were centrally localized.

We analyzed the clinical features including sex, age, duration between the onset and the time of the diagnosis, the anatomical location, and the accompanying subjective symptoms. All the patients presented with signs and symptoms of venous thrombosis were examined by computed tomography angiographic scan for venous images, color duplex scan of extremities. The precise prevalence is yet unknown.

Results
The natural history of the venous aneurysm remains poorly defined. Upper extremities vascular aneurysms are usually asymptomatic and are most frequently treated for aesthetic reasons, while deep venous lower extremities aneurysms may be associated with thromboembolism and then surgery should be the recommended approach. The choice of therapeutic procedure in our experience is dependent on each individual clinic as well as the size and morphology (fusiform or saccular) of the aneurysm.

Fig. 1. AngioTC image of subclavia venous aneurysm
Fig. 2. Dilatation of pelvic veins. May–thurner Syndrome

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- Head of Service of Angiology and Vascular Surgery of the University Hospital of Valladolid
- Director of Department of Surgery. University of Valladolid.
- Director of Laboratory of Surgical Research and Experimental Techniques.
- University of Valladolid President of Chapter of Endovascular Surgery
The results in almost all cases have been improvement in patients with reduction of clinical symptoms. It has often been palliative especially in progressive and advanced neoplastic problems. In all cases, and if it has had time to mint, they have established pathways collateral circulation.

**Discussion**

Conservative therapy is initially used for venous aneurysms. Sclerotherapy therapy, or surgical resection is considered with endovascular treatment, in combination with the use of compressive garments. Surgical resection is indicated for completely resectable lesions and is appropriate for large lesions in terms of cosmetic benefit. However, partial resection may result in excessive bleeding or postoperative recurrence.

The therapy for venous aneurysms should be decided based on the degree of disability in daily living, adjacent tissue damage, and cosmetic concerns after appropriate differential diagnostic investigations and biopsy.

**References**

Marzia Lugli

- Deputy Chief of Vascular Surgery in the Department of Cardiac-Thoracic-Vascular Surgery at Hesperia Hospital Modena, Italy.
- She performed more than 6000 vascular surgery operation concerning arterial surgery (open or endovascular) and venous surgery (superficial and deep venous surgery – open or endovascular).
- Her equipe has been nominate among the ten Centres of world excellence in deep venous surgery.
- In particular Dr. Lugli has acquired extensive experience in venous diseases, with high level of competence in performing endovascular procedures for diagnosis, treatment of acute and chronic diseases, stenting implant.
- She directed the first Hands-On Courses in surgical and endovascular surgery on deep venous system.
- President, Moderator, Scientific Secretary or Invited Speaker in more than 150 International and National Congresses and Courses.
- Author of 60 published papers, co-author in 13 edited textbooks, author of 70 medical films.
- Chair of the Research, Education, Publications Committee of European Venous Forum Society.
- Peer-reviewer for 3 Journal dealing on vascular surgery.
- Member of 5 Scientific Societies.

Deep venous system reconstruction surgery: learning curve considerations
INTRODUCTION
Varicose vein (VV) surgery is the most common vascular procedure in Europe. It is a technique frequently performed by surgeons without vascular specialization. We aim to describe the frequencies and compare the results of VV surgery in Portugal, performed by vascular or general surgeons.

METHODS
Every patient submitted to VV surgery between 2004 and 2014, whose information was contained within the national administrative database of healthcare was included in the study. In a random sample of 275 patients (145 from 6 departments of vascular surgery and 130 from 7 departments of general surgery) a phone enquiry was performed.

RESULTS
Close to 124000 patients were identified, 48% were operated by general surgery, 39% by vascular surgeons and in 13% it was not possible to identify the specialty. Nineteen deaths were registered (no differences between groups). In the general surgery group, 15% of patients were hospitalized for 3 or more nights compared to 3% in the vascular group (p<0.001). The evaluation of the 275 phone enquires revealed that patients operated by vascular surgeons have less residual varices (p<0.001), are more satisfied with the surgical scars (p<0.001), are less time absent from work (27 vs 41 days, p<0.001) and return faster to routine exercise (41 vs 60 days, p<0.001). In the vascular group, 90% of the patients would again be operated in the future vs 79% in the general group (p<0.001). The ratio of short vs long stripping of the great saphenous vein was 57/43 in the vascular group and 15/85 in the general group (p<0.001). Short stripping was associated with less post-operative pain (p<0.001) and a faster return to routine exercise (41 vs 54 days, p=0.019). A significant and similar improvement in the quality of live assessed by the CIVIQ-14 score was observed in both groups after surgery. The majority (97%) of the inquired patients had a venous ultrasonography performed prior to surgery, but only a subset of patients in the vascular group (15%) had their VV marked with an ultrasound executed in the moment of the surgery. When that occurred, less residual varices (p<0.001) and higher general satisfaction with the surgery were reported (p=0.031).

CONCLUSION
In the past 10 years, the majority of VV surgery in Portugal has been performed by general surgeons. This study highlights important advantages when it is performed by vascular surgeons. Should this be enough to promote a praxis change?
# Live Cases – Overview

**FRIDAY APRIL 1ST**

**MORNING**

<table>
<thead>
<tr>
<th>Time</th>
<th>OR room 9</th>
<th>OR room 10</th>
<th>Angio Suite</th>
</tr>
</thead>
</table>
| 09h00 | **1** AAA + bilateral common iliac aneurysm  
EVAR + Bilateral IBD  
Cook + Bard  
Nilo Mosquera  
FR + LM + TS  
Comment: Duarte Medeiros | 4 Juxtarenal AAA  
Fenestrated Anaconda  
Cardiva + Bard  
J. Fernandez Noya  
PPD + MV + JN  
Comment: Javier Villaverde | 5 (will start later in the morning) TAAA + iliac aneurysm  
TEVAR + EVAR + CHIMPS  
Medtronic + Gore  
Armando Lobato  
PD + RF  
Comment: Gaspar Mestres |

**AFTERNOON**

<table>
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<tr>
<th>Time</th>
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| 14h00 | **2** AAA  
EVAR Incraft  
Cordis  
Nilo Mosquera  
LM + JS + ASF  
Comment: Ricardo Vale Pereira | 4 Juxtarenal AAA  
Fenestrated Anaconda  
Cardiva + Bard  
J. Fernandez Noya  
PPD + MV + JN  
Comment: Javier Villaverde |
| 16h00 | **3** Carotid stenosis  
Carotid Stent  
Abbott  
F. Vermassen  
JS + JRN  
Comment: Javier Villaverde | 4 Juxtarenal AAA  
Fenestrated Anaconda  
Cardiva + Bard  
J. Fernandez Noya  
PPD + MV + JN  
Comment: Javier Villaverde |
|       | **6** SFA CTO  
Supera  
Abbott  
Michael Piorkowsky  
RF  
Comment: Ciro Ferrer | 4 Juxtarenal AAA  
Fenestrated Anaconda  
Cardiva + Bard  
J. Fernandez Noya  
PPD + MV + JN  
Comment: Javier Villaverde |
|       | **7** Popliteal CTO  
DEB – Lutonix  
Bard  
Michael Piorkowsky  
JS  
Comment: Ciro Ferrer | 4 Juxtarenal AAA  
Fenestrated Anaconda  
Cardiva + Bard  
J. Fernandez Noya  
PPD + MV + JN  
Comment: Javier Villaverde |
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<th>OR room 9 (25 Kw Ziehm + Stille)</th>
<th>OR room 10 (25 Kw Ziehm + Stille)</th>
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<td>Thoracic AA</td>
<td>Chronic iliac and infra-renal vena cava occlusion</td>
<td>TAAA (3rd step)</td>
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<td>Scallop Bovine Trunk TEVAR</td>
<td>Venous stenting + IVUS Optimed + Volcano</td>
<td>TEVAR + Chimneys Extension</td>
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<td>Bolton</td>
<td>Marzia Lugli</td>
<td>Gore</td>
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<td></td>
<td>Vincent Riambau</td>
<td>JCV + LM + JPP</td>
<td>Mário Lachat</td>
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<td>DR + AS</td>
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<td>Comment: João Almeida Pinto</td>
<td>Comment: Rosa Moreno</td>
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<td>SFA Restenosis</td>
<td>Chronic iliac and infra-renal vena cava occlusion</td>
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<td>ELUVIA Stent</td>
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<td>Rui Machado</td>
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<td>Gore</td>
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<td>F. Fernandez Noya</td>
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<td>Covered stent Begaft</td>
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<td>Pelvic Congestion Syndrome</td>
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<td>Embolization</td>
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<td>Medtronic + Terumo</td>
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<td>Ignacio Lojo</td>
<td>JCV + LM + JPP</td>
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**SATURDAY APRIL 2<sup>nd</sup> AFTERNOON**
CASE 1

Infrarenal AAA and bilateral common iliac aneurysms
(N. Mosquera)

- Male, 69 years old
- Comorbidities: chronic kidney disease, former smoker, arterial hypertension, dyslipidemia
- Diagnosis: infrarenal AAA + bilateral common iliac aneurysm
- Procedure: EVAR + bilateral IBD Cook®/Bard®

Procedure Steps:
- Bilateral percutaneous femoral access and Proglide placement
- Bilateral IBD COOK device deployment and internal iliac catheterization
- Life Stream stent BARD as bridging to an internal iliac branch
- Infra-renal AAA correction with ZENITH COOK
- Percutaneous femoral closure
CASE 2
AAA
(N. Mosquera)

• Male, 71 years old
• Comorbidities: arterial hypertension, smoker, coronary heart disease
• Diagnosis: Infrarenal AAA
• Procedure: AAA exclusion with Incraft Cordis®

Procedure Steps:
• Bilateral percutaneous femoral access and Proglide placement
• INCRAFT CORDIS endoprosthesis deployment
• Femoral access closure
CASE 3

Carotid stenosis
(F.E. Vermassen)

- Male, 57 years old
- Comorbidities: smoker, DAP submitted to femoro-femoral bypass, oropharynx carcinoma submitted to chemo and radiotherapy (without recurrence after 5 years).
- Current medication: aspirin, atorvastatin, ogastro, lisinopril, fludex
- Carotid Doppler: left internal carotid artery stenosis of 70%; retrograde flux in the left vertebral artery
- Diagnose: asymptomatic stenosis of the left internal carotid artery
- Procedure: Stenting (Abbott®)

Procedure Steps:
- Retrograde femoral access
- Diagnostic angiogram
- Catheterization of left internal carotid artery with embolic protection device
- Stenting
- Control angiogram
CASE 4

Justarenal AAA
(J. Noya)

- Male, 70 years old
- Comorbidities: smoker, hypertension, dyslipidemia, cerebrovascular disease, coronary heart disease (previous MI, normal systolic function), renal failure, cerebral aneurysm repair in 2002
- Current medication: simvastatine, bisoprolol, losartan/HCT, fenobibrate
- Diagnose: justarenal AAA (7cm, tortuosity index >1.6)
- Procedure: fEVAR with Anaconda Cardiva® with three fenestrations Bard®

Procedure Steps:
- Bilateral groin incisions
- Right 20F sheath
- Angiogram
- Endoprosthesis positioning and deployment through right common femoral artery
- Contralateral catheterization using magnet wire Terumo®
- Catheterization of the visceral branches through left sheath (upward sequence)
- Balloon expandable covered stent deployment and flare (downward sequence)
- Left limb deployment
- Right limb deployment
CASE 5

TAA and Common Iliac aneurysms

(A. Lobato)

• Male, 72 years old
• Comorbidities: smoker, diabetes, hypertension, dyslipidemia, depression
• Current medication: Captopril, Aspirin, Serenal, Prvastine, Sertraline, Zomarist
• Diagnose: Descending thoracic aorta aneurysm (58mm), justa-renal abdominal aortic aneurysms (57mm) and right common iliac artery aneurysm (26mm)
• Procedure: TEVAR + EVAR + CHIMPS

Procedure Steps:
• TEVAR
• Two chimneys – right and left renal artery Viabahn® – Gore
• EVAR – deployment of endoprosthesis Medtronic® below the superior mesenteric artery
• Sandwich technique for endorevascularization of the right internal iliac artery
• Male, 86 years old
• Comorbidities: past smoker, diabetes, hypertension, obesity, left femoropopliteal DVT (2005), intestinal adenocarcinoma (2005), surgery due to prostat hypertrophy.
• Current medication: aspirin, gliclazide, amlodipine, latanoprost, losartan/HCT, tiotropium
• Physical exam: not palpable left popliteal and bilateral distal pulses; recurrent left leg ulcer
• ABI: R0.69/L0.46
• Diagnosis: PAD (Rutherford grade 5)
• Procedure: Supera Abbott®

Procedure Steps:
• Left retrograde contralateral percutaneous femoral access
• Cross over
• Sheath introduction
• Intimal/subintimal recanalization
• Predilatation
• SUPERA® implantation
• Male, 61 years old
• Comorbidities: past smoker, COPD
• Current medication: aspirin, statin and salmeterol
• Diagnosis: PAD (Rutherford grade 5)
• ABI: R0.58/L1.15; distal right ankle pressure of 60mmHg
• Procedure: PTA with DEB Lutonix Bard®

Procedure Steps:
• Right anterograde percutaneous femoral access
• Intimal/subintimal recanalization
• PTA with DEB
CASE 8
Thoracic aortic aneurysm
(V. Riambau)

- Male, 45 years old
- Comorbidities: no prior medical conditions
- Diagnose: Thoracic aortic aneurysm (50mm); left subclavian debranching on March 2016
- Procedure: TEVAR with Scallop bovine trunk Bolton®

Procedure Steps:
- Positioning of a custom made Relay of dimensions 34/24x130mm with proximal scallop 15mm wide and 18mm long to maintain the patency of the LCCA
- This strategy considers proximal landing zone just downstream LCCA (therefore covering LSA).
- Proximal landing zone according to Ishimaru classification: 2
CASE 9

SFA restenosis
(R. Machado)

• Male, 73 years old
• Comorbidities: hypertension, dyslipidemia, DAP with prior angioplasty of the SFA
• Current medication: enalapril/HCT, trimetazidine, atorvastatin, aspirin
• ABI: D1.00/E0.29
• Diagnose: PAD (Rutherford grade 5), restenosis
• Procedure: DES with ELUVIA Stent Boston®

Procedure Steps:
• Left anterograde percutaneous femoral access
• Intimal/subintimal recanalization
• Distal PTA
• Treatment of the SFA with DES
• Male, 55 years old
• Comorbidities: smoker, dyslipidaemia, psoriasis
• Physical exam: not palpable popliteal and distal pulses
• ABI: R0.50/L0.50, right ankle pressure of 48mmHg and 78mmHg in, respectively, anterior tibial and posterior tibial arteries
• Diagnosis: DAP (Ruderford grade 5)
• Procedure: Viabahn®

Procedure Steps:
• Left retrograde contralateral percutaneous femoral access
• Cross over
• Sheath introduction
• Intimal/subintimal recanalization
• Viabahn® deployment
CASE 11

Right iliac artery lesions
(TBA)

- Female, 58 years old
- Comorbidities: smoker, hypertension, cervix carcinoma submitted to radio and chemotherapy
- Current medication: aspirin, atorvastatin, olmesartan, zolnor
- Physical exam: not palpable pulses in right lower limb
- ABI: R0.51/L0.86, ankle pressure of 70mmHg in the right limb
- AngioCT: right external iliac artery stenosis and infragenicular lesions
- Diagnose: DAP (Rutherford grade 3)
- Procedure: right external iliac stent Bentley Begraft®

Procedure Steps:
- Left retrograde contralateral percutaneous femoral access
- Cross over
- Sheath introduction
- Intimal external iliac artery catheterization
- Stenting with Bentley Begraft®
CASE 12

Obstructive post thrombotic syndrome
(M. Lugli)

- Female, 42 years old
- History of DVT in 2009, with occlusion of the vena cava and the two iliac veins. No history of thrombophilia. **Present state:** Bilateral venous claudication. Lumbar pain, bilateral swelling despite compression therapy, varicose veins.
- CT and MRI: No identification of the inferior vena cava on its infrarenal path, nor the iliac veins. Extensive venous collateral circulation, including through the lumbar veins (with drainage for hemiazygos and azygos), collaterals of the anterior abdominal wall and pelvic varicose veins.
- Diagnose: Obstructive post thrombotic syndrome
- Procedure: **Deep venous stenting Optimed® + IVUS (Volcano®)**

Procedure Steps:
- Bilateral common femoral vein and right jugular vein access
- Wire crosseage
- Phlebography, IVUS (VOLCANO)
- Predilatation (Atlas Balloon BARD)
- Implantation of dedicated iliac vein stents: IVC - Sinus XL (OPTIMED), Kissing iliac vein stents - Sinus XL Flex (OPTIMED)
- High-pressure post dilatation (Atlas Balloon BARD)
CASE 13

Pelvic congestion syndrome
(I. Lojo)

- Female, 58 years old
- Comorbidities: chronic pelvic pain, dyspareunia
- Diagnosis: Pelvic congestion syndrome, with ovarian and pelvic varicosities described in MRI
- Procedure: Embolization with Medtronic® and Terumo® coils

Procedure Steps:
- Local anesthesia
- Basilica vein access in upper right limb
- 4F introducer
- Selective catheterization of Gonadal Vein
- Phlebography
- Distal Coils deployment by scaffolding technique
- Foam sclerotherapy with 2% Etoxisclerol
- Proximal Coils deployment
- Final phlebography with anterograde contrast
CASE 14

Descendent thoracic aortic aneurysm (3rd step)
(M. Lachat)

- Male, 60 years old
- Comorbidities: smoker, hypertension, obesity, coronary heart disease, COPD, ascending aortic aneurysm (48mm).
- History of ruptured abdominal aortic aneurysm (78mm) submitted to EVAR with two chimneys to renal arteries in December 2015 (1st step); visceral debranching of the hepatic and superficial mesenteric arteries from left iliac artery with hybrid vascular prosthesis (Vortec®) in March 2016 (2nd step)
- Diagnose: Descendent thoracic aortic aneurysm (74mm)
- Procedure: TEVAR Gore® + CHIMPS

Procedure Steps:
- Upper limb access and catheterization of previous chimneys to renal arteries
- Proximal extensions of previous chimneys with Viabahn®
- TEVAR Gore covering TAA and visceral trunks (previously vascularized in the 2nd step)
MATERIALS
**Stent Technology**
**Designed Specifically for the Iliofemoral Venous Anatomy**

**Technical Data and Specifications**

<table>
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<tr>
<th>Parameter</th>
<th>Specification</th>
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<td>16 mm, 18 mm, &amp; 20 mm: 10F</td>
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<td>Delivery System Catheter Design</td>
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<td>Deployment Action</td>
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<tr>
<td>Indication</td>
<td>Treatment of stenoses and occlusions in the iliac and femoral veins</td>
</tr>
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</table>
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---

**Magnet Accelerated Cannulation**

- to facilitate fast and easy cannulation \(^4\)

- Product availability subject to local regulatory approval

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**References:**

1. Data on file at Vascutek - IFU 301-130/A.

\(^*\) The Magnet Accelerated Cannulation is achieved using the Intraluminal Magnet Guidewire and the Contralateral Magnet Guidewire.
CUSTOM MADE FENESTRATED DEVICES

Unsupported body section maximises the available area for fenestrations$^{1,2}$

Repositionable facility enables accurate deployment$^{3,4}$

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2005
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approved in US

2008
FIRST thoracic stent-graft approved in Japan

2012
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2013
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