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Thoracic pathology
My experience in ascending aorta TEVAR

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INTRODUCTION
Endovascular techniques have revolutionized the treatment of pathology affecting the descending thoracic aorta (TEVAR), with demonstrable reduction in both mortality and morbidity in conditions with diverse pathologies. It may be argued that endovascular repair of the thoracic aorta is now the first-line therapy for complicated acute Type B dissections, descending thoracic aneurysms and thoracic aortic aneurysms. With the success of TEVAR, new applications have been sought for this technology. One area of potential interest is the ascending aorta. Several pathologies may be candidates for endovascular treatment including isolated ascending aortic aneurysms, cannulation site false aneurysms and some Type A dissections. Around two thirds of all dissections affect the ascending aorta.

CHALLENGES OF THE ASCENDING AORTA
The anatomical and physiological challenges to endovascular therapy of the ascending aorta remain formidable and include: Proximal fixation close to the aortic valve and coronary ostiaDistal fixation which may impinge on the innominate arteryCurvature of the distal ascending aortaSizing discrepancies in pathological conditionsHaemodynamic forces in this arterial segmentPotential for fatal retrograde dissection Despite these difficulties, endovascular development may offer a therapeutic modality for cases of surgically untreatable Type A dissection. Selective studies have demonstrated that up to 30% of patients with Type A dissection are unable to undergo surgical treatment. The mortality in these cases is high at around 1% per hour or 80% in all. Endovascular therapy may be a possible alternative. Furthermore, the mortality from open surgery for Type A dissections is high in most centres, with most published series demonstrating a perioperative mortality of over 20%. Approximately 50% of Type A dissections occur 2cm or more distal to the coronary ostia and these patients might derive some benefit from coverage of the primary entry tear. A number of case reports have demonstrated the feasibility of type A dissection endovascular techniques in the ascending aorta. The extension of endovascular techniques into the ascending aorta is now a reality but demands design modifications to existing devices. Stent manufacturers have designed devices which can be used for compassionate use in the ascending aorta. Such stent graft need features specifically designed for use in this challenging anatomy: A delivery system capable of delivering the stent to the ascending aorta from a femoral route.A soft flexible tip capable of atraumatic entry to the left ventricleStable delivery with accurate placementLength and diameter compatible with the ascending aorta. The design and applicability of these device will be discussed. It should be reiterated that these devices are not currently approved for commercial use.

SUMMARY
Currently intervention rates for acute type A Stanford dissection are too low, and conservative management confers extremely high mortality rates. Open surgery, while feasible in over two thirds of cases, has a perioperative mortality of over 20%. We now have proof of concept with regard to endovascular repair and are developing and testing stent grafts specifically designed for purpose. It could be argued that an endovascular approach can only improve current results for type A repair but careful audit and follow up will be required as the technique is developed.

References
Thoracic pathology
The false channel occlusion technique

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Chronic aortic dissection includes different previous histories such as residual dissection after surgical repair of a DeBakey type I aortic dissection, dissection after ascending aortic repair for other pathologies, and chronic type B aortic dissection. Despite the different background, the risk for future complications in chronic aortic dissection is mainly related to false-lumen aneurysmal dilatation and rupture. The aim of therapy in chronic aortic dissection is to prevent false-lumen dilatation and aortic related death. Endovascular stent-graft therapy aims to reduce or abolish flow in the false lumen. Since the introduction of thoracic endovascular aortic repair (TEVAR) for the treatment of aortic dissection type B in 1998, it has become the mainstay of operative treatment for acute complicated type B aortic dissection, offering a clear benefit with lower mortality and morbidity rates compared to open surgical repair. TEVAR in aortic dissection is based on the implantation of thoracic tubular stent-grafts to cover the proximal entry tear and thereby redirect flow into the true lumen. This strategy intends to depressurize and thrombose the false lumen, and promote aortic remodeling in a majority of patients with acute aortic dissection. Response to this treatment strategy is limited in patients with chronic dissections with a reduced capacity for aortic remodeling due to the thickened and fibrotic degenerated intimal flap. A significant proportion of patients have persistent and significant false lumen flow despite placement of a thoracic stent-graft even where long lengths of the thoracic aorta are covered. Large re-entry tears at the level of the visceral aorta or further distally are particularly responsible for persistent false lumen flow. This limited response to endovascular treatment in chronic aortic dissection is caused by the continued pressurization from persistent retrograde false-lumen flow to intercostal and bronchial arteries from downstream entry-tears. Retrograde filling and pressurization leads to late aortic expansion in 35% of patients treated by TEVAR for chronic type B aortic dissection. The lack of aortic remodeling and false lumen aneurysmal dilatation caused by continued perfusion of the false lumen causes late aortic death as has been recently shown by Mani et al. in 2013. In patients with ruptured chronic false lumen aneurysm after type A and B aortic dissection the persisting retrograde filling may lead to continued bleeding despite TEVAR down to the celiac artery to cover the descending aortic entry-tears. Novel techniques have been introduced recently to prevent retrograde flow into the thoracic false lumen. Fenestrated stent-grafts allow longer segment coverage and thereby to abolish further distal entry tears. Other techniques to exclude the thoracic false lumen from aneurysmal dilatation are the “candy-plug technique” and the “knickerbocker technique”, which both aim at false-lumen occlusion at the distal descending thoracic aorta. Residual dissection after previous ascending aortic repair is a specifically challenging condition as treatment usually involves the supra-aortic branches, which might be dissected. Open treatment strategies are often limited due to comorbidities, the previous surgery and the complex anatomy requiring seal of true and false lumen. Hybrid techniques have been introduced using debranching techniques or frozen-elephant trunk repair and early results of these techniques are promising for aortic arch repair, but there is no published data for residual dissections as a subgroup. The introduction of new fenestrated and branched aortic arch endografts have shown promising results in single centers and allow to treat these difficult pathologies without the use for cardiopulmonary bypass. This presentation will focus on newer endovascular strategies for false lumen exclusion and endovascular arch repair for residual dissection.

Thoracic pathology
TEVAR for chronic dissection

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The goal of endovascular repair is to reduce perfusion of the false lumen, by covering the primary entry tear, promoting aortic remodeling by causing false lumen thrombosis and true lumen expansion. For chronic aortic dissections, this requires coverage from a suitable proximal landing zone (typically in the distal arch or proximal descending thoracic aorta) to the level of the celiac axis and possibly beyond. Although the results of TEVAR for chronic aortic dissections have shown promise with respect to morbidity and mortality rates, morphological changes in the aorta and re-intervention rates have been less favorable when compared to the results in the acute phase. Although TEVAR for chronic aortic dissections has been shown to effectively decrease maximal aortic diameter in the stent-grafted aorta, distal aortic segments tend to continue to increase in patients with extensive dissections. Endovascular strategies to deal with continued sac enlargement after TEVAR for chronic dissections include one of the following:

- False lumen exclusion
  False lumen exclusion can be accomplished with placement of coils or plugs in the false lumen, or more recently the deployment of a “candy plug” that conforms to the false lumen, thereby providing a more reliable exclusion.

- Occlusion of reentry sites
  If an isolated reentry site can be accurately located and excluded by placement of a covered stent or plug, this may be feasible though should be performed with consideration of the need for further endovascular intervention in the future.

- Completion endovascular repair
  Aortic remodeling with endovascular repair can only be consistently predicted by placement of the stent graft in normal aorta with complete coverage of intimal tears. Because most patients have multiple reentry tears across the visceral segment, treatment of aortic enlargement after TEVAR for aortic dissection remains a challenge. Hybrid procedures have been used with mixed results and mortality rates of around 15%. There are limited reports in the literature on use of fenestrated and branched endografts for chronic dissections though they offer promise in selected patients.

CONCLUSION
Chronic aortic dissection remains one of the greatest challenges to endovascular repair. Re-intervention rates are high and patients require very careful surveillance and clear strategies for achieving successful outcomes.
Femoropopliteal disease: Strategy
Popliteal artery aneurysm - What is the best mode of treatment?
Review of the literature and call for a register study

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Evidence-based statements on the question of whether the popliteal artery aneurysm (PAA) should be better addressed by an endovascular approach or by open surgery are missing, the issue is considered unresolved. After all, there are no major safety concerns regarding the endovascular procedure so that databases have been established in some European countries to document the results of treatment of PAA. The present paper explains why such a registry should be available Europe wide. Also discussed is the alternative of a prospective randomized trial, as initiated for asymptomatic patients in the U.S. This alternative is rejected due to the expected long recruitment period because of the rarity of the disease. Besides, the numerous exclusion criteria and necessary stratification of a randomized study speak against such a project. Instead, it must be the task to make known the nationwide results in all forms of PAA (symptomatic / asymptomatic / thrombosis as an emergency) and to detect the amputation rates. The concept of a Europe-wide registry is presented.
Carotid Occlusive Disease
Are we ready for the next breakthrough?
CAS revival is now

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From more than 15 years, Carotid Angioplasty and Stenting (CAS) was expected to compete with surgery. To reach this goal, various devices were developed. Nevertheless, according to Randomized Controlled Trials (RCT), Carotid Endarterectomy (CEA) remains the gold standard even if equivalency in Stroke-Death rate (SD) was approved by the CREST trial. It is admitted that CAS presents a higher risk of TIA while CEA presents a higher risk of Myocardial Infarction (MI).

Looking back to all trials, it is clear that they were initiated in the nineties and, at that time CAS technology was evolving to the more mature aspect of today. Different works have proved the inefficacy of filters, the negative impact of crossing the aortic arch and the potential benefit of semi covered stents.

Indeed if long term outcomes of stents can compete with surgery in terms of restenosis and stroke freedom, we know that early outcomes still need to be improved. The way to go is reducing TIA’s, the technical aspect is leading.

We must turn the page of the old concepts and forget what we did previously, CAS must be review. We only miss new RCTs from the groin and from the neck have proved their superiority and seems to be the best option today.

3. Access to carotid bifurcation is commonly from the femoral artery; problems to navigate in the arch are due to difficult arch ananoties and diseased arches with debris deposition prompt to move. Cervical access is an alternative, avoiding arch crossing, but needs either a small cutdown or the use of a reliable percutaneous preclosing device. So some patients may not tolerate the access to carotid artery acutely or causing late myointimal hyperplasia.

- Reverse flow systems (RFS) are the same philosophy than surgery, based on the flow substitution by the collateral circulation. So some patients may not tolerate the flow interruption but if surgery needs shunting, RFS can accommodate brief flow interruption to moderate flow reversion allowing quick stent implantation. Different systems from the groin and from the neck have proved their superiority and seems to be the best option today.

Carotid Occlusive Disease
Get organized for in hospital stroke (iatrogenic or not) acute rescue

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Rescue of acute stroke has been investigated by many Institutions world-wide. Two recent multicenter trials (EXTENDED-IA and ESCAPE) were stopped for excessive positive outcome in favor of endovascular. This results re-opened the indication to mechanical thrombectomy in acute rescue of stroke.

But important limitations may reduce its effectiveness: first of all the delay from onset of symptoms and admission to therapy. Second the logistic needs to provide enough medical and expertise for a 24h service. We propose to start a “ stroke rescue interventional team” to cope with acute strokes presenting in the hub Hospitals while the patient is asipaled or operated. Cardiovascular surgery, TAVI, CAS can be complicated by a limited but consistent number of strokes during hospital stay. The number may be limited to 20-30 cases for year but it will be important to validate the usefulness of endovascular stroke rescue that early outcomes still need to be improved. The way to go is to provide a formal training to the interventionalist or interventional cardiology. These are usually on duty in big Centers, awareness should be stressed to perform pre- and post-TCD in Pts undergoing surgery with multiple risk factors for CVA and provide a formal training to the interventional cardologist to access intracranical large vessels.
Carotid Occlusive Disease
Are we ready for the next breakthrough?
The future for carotid stenting is bright

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Carotid artery stenting or CAS has undergone its ups and downs since it was first introduced in the late 1980s. In its early years CAS was greeted with skepticism, particularly by vascular surgeons. Despite this, CAS was increasingly embraced by interventional cardiologists as an extension of their technical skills with coronary stenting procedures.

The demonstration that CAS usually produced showers of embolic particles lead to the introduction of a variety of cerebral protection devices to capture most of this debris. These and other technical advances lead to improved results which in turn were followed by widespread usage of CAS to treat asymptomatic as well as symptomatic carotid stenosis. Again interventional cardiologists were foremost in this enhanced usage.

Nevertheless, because carotid endarterectomy (CEA), the alternative procedure for treating these lesions could be performed with good results and low morbidity and mortality, CAS remained highly controversial. This lead to several prospective randomized trials comparing the two procedures. The earlier of these trials, conducted in Europe, demonstrated lower peri-procedural stroke rates for CEA in symptomatic patients, but were criticized for not employing state of the art CAS technology. A major multicenter US trial, CREST, had its 4 year results published in 2010. Symptomatic and asymptomatic patients were included. With up to 4 years follow-up, there was no difference in total adverse event rates between the two procedures. However, stroke rates were significantly higher in the CAS treated patients, while myocardial infarction rates were higher in the CEA treated patients. These data were interpreted in different ways by different specialists who were clearly influenced by their interventional or open surgical orientation and their bias. In addition, multiple Society guidelines, all based on data from the same trials, also differed in their main conclusions, again based on specialty orientation and bias.

Nevertheless, at present, CAS usage is declining and CEA, because of its lower stroke rate, appears to be generally considered the procedure of choice for most patients around the world with symptomatic carotid stenosis. Exceptions in which CAS is chosen include some centers of excellence and some patients with unusual anatomy or surgical contraindications. This decline in CAS usage is furthered by the increasingly widespread opinion that most asymptomatic carotid stenosis patients are best treated by modern statin based medical therapy and require neither CAS nor CEA. Increasing numbers of experts have even opined that with current medical therapy no patient with asymptomatic carotid stenosis should undergo invasive treatment because the annual stroke rate is so low (<1% per year). According to this opinion, most asymptomatic patients who have undergone CAS derive no benefit, and up to 90% of reported CAS patients have been asymptomatic.

Despite this dire status for CAS, I believe its future is bright for several reasons. At the level 1 evidence indicating that CAS carries a higher stroke rate than CEA were obtained from trials using CAS technology which is now obsolete. Improvements in CAS technology now on the horizon will likely decrease its peri-procedural stroke rates. These improvements include better embolic protection systems featuring cessation or reversal of flow during the stenting and balloonizing phases of CAS, parts of the procedure that are most productive of embolic debris. There is already some evidence that such protection is more effective than the commonly used distal filters, particularly with high risk and symptomatic lesions.

In addition, avoiding transit of CAS devices through the aortic arch by using cervical access to the common carotid arteries reduces embolization from manipulation in diseased or tortuous aortic arches or proximal great vessels. Such complex arches are particularly common in elderly symptomatic patients who make up the bulk of candidates likely to benefit most from CAS. The recent introduction of a proprietary system to facilitate both cervical access and reversal of flow protection seems to be particularly attractive way to improve CAS results, although such improvement with this MiSch System from Silk Road Medical remains to be conclusively demonstrated. The current iteration of this system requires open exposure of the common carotid artery, but percutaneous modifications are on the drawing board.

It is well known that many strokes with CAS become apparent several hours or days after the procedure is completed and the embolic protection device has been removed. It is thought that these strokes are the result of debris trapped in stent interstices, and such debris has been observed in bench top-models of stented carotid lesions. When flow is restored, the trapped debris is freed as cerebral emboli, resulting in “delayed strokes” after CAS. To obviate this problem, three companies are evaluating membrane or mesh covered carotid stents with much smaller interstices to prevent delayed embolization.

Finally, evidence is accumulating that we are on the threshold of having methods available to select those few asymptomatic carotid stenosis patients that are at a high risk of having a stroke from their lesion. These methods involve detection of cerebral microemboli by transcranial doppler, techniques to evaluate various characteristics of carotid plaque morphology with duplex, MRI or CT imaging and detection of stent cerebral infarcts by CT or MR. Although none of these techniques are ready for widespread use, the likelihood is that one or more of them soon will be. If asymptomatic patients with such high risk lesions could be identified, it would become justified to treat them either by CEA or CAS, thereby adding to the patient group needing CAS treatment.

CAS has been slow to gain widespread approval as a method to treat carotid bifurcation stenosis. Controversy and bias have been connected to the procedure and the interpretation of its results. Registry and trial findings have generated more heat than light. The new technology advances described herein give promise that CAS will emerge as an effective and justifiable mainstream treatment which has a bright future and will benefit many patients. Further studies to document that promise are in order.
Femoropopliteal disease
TASC C/D femoropopliteal lesions
Endovascular treatment of occluded popliteal artery aneurysm

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PURPOSE
To evaluate the feasibility and mid-term results of a new endovascular method in the repair of chronic occlusion of popliteal artery aneurysm (PAA), in symptomatic patients.

TECHNIQUE
Eleven patients with occluded popliteal artery aneurysm, underwent an endovascular repair of PAA using the following new technique: after crossing the popliteal occlusion through antegrade or retrograde approach, a bare nitinol stent was deployed at the level of aneurysm with the intent to avoid distal embolization and to assure an external scaffold for the stent graft. The Viabahn stent graft was then delivery covering the entire popliteal occluded segments and flow was restored. Below the knee arteries revascularization was needed in 4 patient (36%) to achieve a direct line to the foot.

RESULTS
Technical success was achieved in all cases. A peroneal artery embolization (9%) occurred during the procedure and was successfully treated using a stent coverage. 24 month primary patency rates and limb salvage were 91 and 100 %, respectively. Conclusion: the endovascular repair of chronic occlusion of PAA, using our technique, is feasible and safe. External scaffold to stent graft and BTK arteries revascularization seems providing promising mid-term primary patency rate and avoid major amputations.

Key Words: Popliteal Artery Aneurysm, Endovascular, Critical limb ischemia, Viabahn, Bare metal stent, Patency, Repair

References
Endovascular intervention permits the management of complex arterial problems in patients who would have otherwise been precluded from open surgery as a result of cardio-pulmonary co-morbidities. However, radiation and exposure to nephrotoxic contrast agents are a necessary, if less desirable component of endovascular intervention (Kirkwood et al., 2013). Evidence suggests that repeated contrast injections can result in lifelong renal insufficiency (Solomon and Dumouchel, 2006) and the consequences of radiation on the human body are well-recognised. Clinical staff involved with endovascular interventions on a daily basis are also at higher risk of developing radiation-associated complications (Stecker et al., 2009). In parallel with endovascular device development, imaging technology has evolved from standard 2D fluoroscopy with mobile C-arms to fixed-room flat panel detector systems with demonstrable superiority in standard endovascular aneurysm repair (EVAR) (Eagleton, 2010). Modern hybrid rooms have the capacity to combine pre-operative computed tomography with mobile C-arms to fixed-room flat panel detector systems with demonstrable superiority in standard endovascular aneurysm repair (EVAR) (Eagleton, 2010). Modern hybrid rooms have the capacity to combine pre-operative computed tomography, typically the data acquired during stent-graft planning, with cone-beam computed tomography to provide a 3D roadmap to assist with intraoperative navigation and graft deployment. In order to do this, pre-operative CT data are fused with CBCT images acquired intraoperatively, by registering bony landmarks acquired during CBCT with those in the preoperative CT. Key vascular structures of interest can then be displayed on the main fluoroscopy screen and the overlay is adjusted automatically as the C-arm is manipulated. A number of groups have demonstrated a reduction in contrast usage using this technique during complex endovascular intervention (Dijkstra et al., 2011; Tacher et al., 2013) as well as a trend towards a reduction in radiation exposure and procedure times.

References

The A-Z of A-I disease: Imaging Overlay and dose reduction during aortic procedures
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The A-Z of A-I disease: AAA Will EVAS replace EVAR?
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OBJECTIVE
Endovascular aneurysm sealing (EVAS) has been proposed as a novel alternative to endovascular aneurysm repair (EVAR) in patients with infrarenal abdominal aortic aneurysms (AAA). To replace EVAR, the technique must be able to demonstrate clinical results at least equivalent to EVAR both in the short and long term. The early clinical experience, technical refinements, and learning curve of EVAS in the treatment of AAA at a single institution will be presented along with results from the Global EVAS Registry.

METHODS
In a single unit series, One-hundred and five patients were treated with EVAS between March 2013 and November 2014. Prospective data were recorded on consecutive patients receiving EVAS. Data included demographics, pre-operative aneurysm morphology, and 30-day outcomes, including rates of endoleak, limb occlusion, reintervention, and death. Postoperative imaging consisted of duplex ultrasound and computed tomographic angiography.

RESULTS
The mean age of the cohort was 76±9.8 years and 12% were females. Adverse neck morphology was present in 72 (69%) patients, including aneurysm neck length <10 mm (23%), neck diameter >32 mm (18%), b-angulation >60°, (21%), and conical aneurysm neck (51%). There was one death within 30 days. The incidence of Type 1 endoleak within 30 days was 4% (n =4); all were treated successfully with trans catheter embolisation. All four proximal endoleaks were associated with technical issues that resulted in procedure refinement, and all were in patients with adverse proximal aortic necks. The persistent Type 1 endoleak rate at 30 days was 0% and there were no Type 2 or Type 3 endoleaks. Angioplasty and adjuncive stenting were performed for postoperative limb stenosis in three patients (3%).

CONCLUSIONS
EVAS appears to be associated with reasonable 30-day outcomes despite the necessity of procedural evolution in the early adoption of this technique. EVAS appears to be applicable to patients with challenging aortic morphology and endoleak rates should reduce with procedural experience. The utility of EVAS will be defined by the durability of the device in long-term follow-up, although the absence of Type 2 endoleaks is encouraging. The Global EVAS Registry along with large single centre series will provide long term outcomes data.
Many vascular surgeons are convinced that endovascular aneurysm repair (EVAR) is superior to open repair for the treatment of ruptured abdominal aortic aneurysms (RAAAs). However, there is significant debate about the clinical trials' conclusions and the interpretation of these results. Recent years have seen three randomized controlled trials (RCTs) published or presented their results: the AJAX or Amsterdam (Dutch) trial, the ECAR or French trial, and the IMPROVE or UK trial. All three trials concluded that 30-day mortality outcomes after EVAR for RAAAs are no better than after open repair. However, we are concerned that in all three trials, these conclusions are rendered unjustified or misleading because of serious flaws or misinterpretation of the trial data. This communication addresses the specifics.

The AJAX and ECAR trials randomized small numbers of patients (116 and 107, respectively). In addition, both trials excluded many patients from randomization, and both had the potentially serious flaw of excluding hypertensive or unstable RAAA patients who were treated by open repair or not treated at all. Such patients are likely to be the ones who would have better outcomes with EVAR than with open repair. Thus, exclusion of these high-risk patients may have precluded any advantage EVAR might have had over open repair in the overall population of patients with RAAAs. Moreover, in both of these trials, three adjuncts generally believed to improve EVAR outcomes in RAAAs were used in a suboptimal fashion: improved utilization of preoperative fluid restriction (hypotensive hemostasis), suprarenal balloon control, and adjunctive open abdomen treatment of abdominal compartment syndrome might have further improved the EVAR outcomes in both trials. The larger UK IMPROVE trial was conducted in 30 high-volume centers (including one from Canada). This trial was carefully planned and conducted, and much useful information was collected. However, its most important findings were detailed in the report of its 30-day outcomes. In the IMPROVE trial, although 662 possible RAAA patients were excluded for various reasons, the trialists did randomize 613 patients with a diagnosis of RAAA to either an “Endovascular Strategy” group (316 patients) or an “Open Repair” group (297 patients). Patients were randomized before CT scans were performed. The 30-day mortality in the Endovascular Strategy group was 35%, and in the Open Repair group it was 37% (p=0.07). Obviously, there was no significant difference between these two groups based upon these percentages, and therefore a primary conclusion of the main IMPROVE trial article was “A strategy of endovascular repair was not associated with significant reduction in 30-day mortality.” This was unfortunately paraphrased in various news report headlines as, “NO DIFFERENCE in 30-day mortality between open and endovascular repair.”

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The superiority of EVAR over open repair within each of the two separate randomized groups approached statistical significance, and was highly statistically significant when data from the two groups were combined (when one takes into account the procedures that the patients actually had). Clearly, the conclusion of the IMPROVE trial should have been: In patients with a RAAA, if they can be treated by EVAR, their 30-day survival will be superior to those patients who undergo open repair. If one adds that patients undergoing EVAR are less likely to receive expectant or no definitive treatment, the conclusion is inescapable: EVAR, if it can be performed, is superior to open repair for the treatment of patients with RAAs.

A secondary conclusion is equally inescapable. Those treating RAAA patients must learn how to perform EVARs that achieve AAA sealing, including acquiring expertise in all the adjuncts and strategies that can improve EVAR outcomes in such patients. Further RCTs in the setting will be difficult to do and in our opinion are unnecessary.

As patients were randomized to the Endovascular Strategy group before CT scans were performed, the most common reason for patients in this group to ultimately receive open repair was anatomic unsuitability for EVAR. The 30-day mortality for those patients ultimately treated by EVAR in this group was 27% (42 of 154) while for those treated by open repair in this group it was 38% (43 of 112) (p=0.06). Of the patients randomized to the Open Repair group, 36 actually had EVAR, 220 had open repair, and 19 had no treatment. The 30-day mortality in this Open Repair group was 22% (8 of 36) for those undergoing EVAR and 37% (81 of 220) for those undergoing open repair (p=0.09). Overall, in the two randomized groups, taken together, the 30-day mortality for RAAA patients actually treated by EVAR was 25% (46 of 186), and for those actually treated by open repair, it was 38% (128 of 336) (p<0.002). (Four patients in the Endovascular Strategy group had an attempt at EVAR, but required conversion to open repair. All four died within 30 days. These four patients were included in the EVAR deaths but not in the open repair deaths in the Endovascular Strategy group calculations. However, in the calculations of the overall 30-day mortality rates for the two randomized groups taken together, these four patients were excluded from the EVAR deaths and included in the open repair deaths. If these four patients were included in the EVAR deaths and excluded from the open repair deaths, the calculations for the combined groups, the 30-day mortalities would have been 26.3% (60/190) for EVAR and 37.3% (124/332) for open repair (p=0.01).)

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Conflict of interest
None declared.

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References
Loss of kidney function after endovascular treatment of peripheral arterial disease

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Administration of radiocontrast during endovascular procedures for peripheral arterial disease may cause acute kidney injury, which generally recovers with supportive treatment. Long-term effects of endovascular procedures on renal function remain to be investigated.

This retrospective observational cohort study includes all patients who newly presented to the vascular surgery outpatient clinic with Rutherford class II or III peripheral arterial disease and who were treated with either supervised exercise therapy or endovascular interventions.

Changes in estimated glomerular filtration rates (eGFR) after one year were compared between the two treatment groups. Multivariate linear regression analysis and propensity score-matched paired analysis was done to correct for potential confounders. One year after treatment, eGFR was reduced by 8.5 mL/min (95%CI: 7.3 – 9.7, P<0.001) after endovascular intervention (N=301) and by 1.8 mL/min (95%CI: 0.95 – 2.4, P<0.001) after supervised exercise therapy (N=315). After correction for potential confounders, endovascular intervention was associated 7.4 mL/min reduction (95%CI: 5.4-9.3, P<0.001) reduction in renal function. Similar results were found in the propensity score-matched paired analysis.

Endovascular procedures for peripheral arterial disease are associated with clinically relevant permanent loss of kidney function.
Novel innovative endovascular technique to salvage acute limb ischemia in hostile groin

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**CLINICAL FINDINGS & PROCEDURE**
54 Y morbidly obese female presented in emergency with acute right leg ischemia (Rutherford stage 4). Ultrasound showed embolic occlusion of cfa, profunda & sfa. Right groin was hostile for surgical incision because of obesity & overlying skin necrosis. In view of hostile groin, transpopliteal approach surgical embolectomy was performed in a hybrid OR. Once cfa and sfa embolus was pulled out using standard Fogarty balloon, left cfa percut access was taken and a crossover 6F sheath placed. Right profunda was selectively cannulated followed by pulling of embolus into cfa using an otw Fogarty balloon and was subsequently removed via transpopliteal surgical approach endarterectomy site.

**CLINICAL OUTCOME**
Innovative & timely endovascular approach avoided groin incision with complete embolus was removed. Thus we were able to avoid unhealthy groin and salvage limb except for established foot drop.

**LEARNING OBJECTIVES**
Endovascular knowledge and its correct application can sometimes be very helpful especially in cases where conventional surgery have limitations. Our technique may be helpful for removal of acute embolus from side branches such as profunda/deep femoral artery or internal iliac arteries in cases of surgically hostile overlying skin.

**Figures**
- Acute right lower limb with ischemic changes
- Hostile right groin skin
- Transpopliteal surgical approach for embolectomy
- Angiography showing complete embolus removal
- Saddle embolus mimicking cfa bifurcation with extension into sfa and profunda ostia
- Angiography after cfa & sfa surgical embolectomy with occluded profunda
- Fluoro showing otw fogarty in profunda

**References**
1. No online definite references could be found for the technique we described.
Management of long flush superficial femoral artery occlusions with ipsilateral antegrade common femoral artery access

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PURPOSE
To assess the efficacy and complications from ipsilateral antegrade common femoral artery access in the treatment of long flush SFA occlusive lesions.

METHODS
The study included 28 patients with flush SFA lesions with or without extension of the occlusion to the popliteal and/or tibial arteries. This morphology of occlusive lesions corresponded to TASC D. Majority of patients were at high risk for surgery. Patients with a patent stump in the SFA, short occlusion taking only part of the SFA, and fresh occlusion <3 months duration were excluded from the study.

RESULTS
12 limbs (42.9 %) were treated for rest pain and 16 limbs (57.1 %) for non healing ulcers or gangrene. Crossing the flush SFA lesion was successful in 24 (85.7 %) patients whereas 4 (14.3 %) attempts at crossing SFA failed. All patients underwent subintimal angioplasty without stenting except in 11 cases with stenting, 6 of them the stents was placed at the origin of the SFA. Procedure-related complications occurred in 4 cases, including 2 vessel perforation and 2 intraoperative thromboses.

CONCLUSIONS
Ipsilateral common femoral artery puncture in crossing long flush SFA occlusions offers some advantages as it gives very good pushability of the wire not only to cross the difficult flush occlusions but also to cross the long calcified lesions. Primary and secondary patencies were similar to those reported for treatments of long lesions.

Percutaneous imaging guided techniques of pv patency and integrity management - catheter directed local thrombolysis, stenting, endoluminal RFA & angioplasty or endoluminal RFA & stenting

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PURPOSE
Spectrum of PV patency and integrity percutaneous restoration techniques is presented.

MATERIAL AND METHODS
Total 20 patients with portal hypertension due to PV patency problem; among them 14 underwent percutaneous recanalization using a novel endovascular bipolar radiofrequency device. RFA was followed by balloon angioplasty (7 cases; 6 - HCC, 1-retropertioneal sarcoma) or vascular stent placement (8 cases; 7 - HCC, 1 - liver cirrhosis). In 2 cases catheter directed local thrombolysis was performed to clinically manifested fresh PV thrombosis, caused by thrombophylia and HCC. In 2 cases of pancreatitis induced PV stricture and porta-biliary fistula PV stenting was performed. The PV tributary was percutaneously accessed under US guidance and 5G guide catheter was manipulated through the block using guidewire technique under DSA guidance. In case of thrombolysis thrombolytic agent was injected directly below the thrombus, the stenting procedure was completed by self-expanding vascular stent placement; for RFA processing the endoluminal radiofrequency device was inserted into the thrombus; procedure was completed by immediate balloon angioplasty or stenting.

RESULTS
The technical success rate was 85.0%; in 3 cases (15.0%) wire conduction through the organized thrombus was impossible. Postprocedure portography documented significantly improved portal vein blood flow in all patients, to whom the procedure was completed. Porto-biliary fistula was successfully managed by percutaneous stenting. Patients tolerated the procedure easily; no intra-procedural complications were detected. In 1 case serious postprocedure bleeding was documented, which led to polyorganic failure and death.

CONCLUSIONS
The percutaneous management of PV patency and integrity problems by percutaneous stenting and endoluminal RFA is an effective technique; it should be suggested as a treatment option for otherwise incurable patients and might be used as a bridge for further treatment. Post-procedure intra-peritoneal bleeding is a possible life-threatening complication which should be prevented by procedure track ablation or embolization. A larger study is needed to assess the usefulness and long-term impact of PV percutaneous intervention on patient outcome.
Long-term performance of closed cell design self-expanding stainless steel stents in the treatment of cockett’s syndrome

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INTRODUCTION
The first venous stent got the European Community CE marking of approval in 2011, but since 1995 venous obstructions have been treated with stents. We present the long-term patency and integrity of the first 10 closed cell design self-expanding stainless steel stents deployed in the iliac veins for the treatment of Cockett’s syndrome at our center. This syndrome represents a particular intense stress for stents.

METHODS
We analyzed our prospective database of endovascular Cockett’s syndrome treatment. We reviewed the first 7 patients, treated with 10 stainless steel Wallstent Endoprosthesis, and analyzed the clinical and imaging records.

RESULTS
Indication for treatment was non-healing ulcer, venous claudication or incapacitant edema. All patients were on compression stocking and phlebotonics on daily basis before treatment. After stent implantation they were anti-coagulated for 3 months and maintained compression stockings life-long. We treated 7 patients (6women:1man), aged 25-72 (mean 40.5years). Five patients were treated with 1 stent, two patients with 2 stents. One patient required re-intervention for splitted stents with an additional stent. We used 16 to 18 mm diameter and 40 to 60 mm length stents. The average follow-up was 107months (88-148months). The patency was viceperforms flawlessly in this sector with a maximum of 148 months of follow-up.

DISCUSSION
The Wallstent Endoprosthesis was never approved in the European Community for the treatment of iliac veins obstruction. Nevertheless, our center experience shows that the device performs flawlessly in this sector with a maximum of 148 months of follow-up.
Mid-term outcome of hybrid revascularisation procedures for tasc c and d aorto-iliac and femoro-popliteal disease

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INTRODUCTION

Hybrid revascularisation combining open and endovascular techniques is increasingly used for multilevel arterial occlusive disease. However, there is still a lack of data on the long term outcome and durability of these interventions, particularly in TASC C and D lesions.

METHODS

The aim of this study was to look at the medium term outcomes of hybrid revascularisation procedures in advanced (TASC C&D) lesions. A retrospective analysis was carried out of consecutive patients who underwent hybrid revascularisation between 2011 and 2013. Study endpoints were amputation free survival, limb salvage, primary and assisted primary patency between 2011 and 2013. Study endpoints were amputation free survival rates. These procedures should be considered as an alternative to more extensive open surgical revisions.

RESULTS

We identified 83 hybrid revascularisation procedures performed in 79 patients with a mean age of 71 (±11) years. The indications for treatment included critical limb ischaemia (63%) and incapacitating intermittent claudication (37%). Procedural details are presented in Table 1. Median inpatient stay was 7 (1-106) days and mean clinical follow up was 19(±10) months. Technical success rate was 96.3%, with symptomatic improvement in 91.4%, and a limb salvage rate of 93% at 1 yr. There were 9 major limb amputations. Kaplan-Meier analysis showed primary and primary assisted patency rate of 86% and 89% respectively at 1 yr and 69% and 80% respectively at 2 years (Fig 1), with an amputation free survival of 84% and 75% at 1 and 2 years respectively (Fig 2). There were 14 endovascular re-interventions to maintain target vessel patency, 5 patients who needed bypass following occlusion of the primary target vessel and 3 further surgical revisions.

CONCLUSIONS

Hybrid revascularisation for TASC C and D multilevel disease has a high technical success with good limb salvage and amputation free survival rates. These procedures should be considered as an alternative to more extensive open surgical reconstruction.

What is the best solution for in-stent restenosis after SFA stenting: redo-PTA by use of poba, drug-coated balloons or stent-grafts

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BACKGROUND

Tackling in-stent restenosis (ISR) in the superficial femoral artery (SFA) has some challenges. To date literature review reveals only very limited data on ISR in peripheral arteries. The Viabahn endoprosthesis with a heparin bioactive surface coating provides an enhanced hemocompatibility. The use of drug-coated balloons (DEB) has shown promising results but lack evidence in the SFA.

METHODS

The RELINE trial is a prospective, randomized, multi-center, international, controlled trial in which enrollment was allowed to continue until 80 patients meet the eligibility criteria. Between June 2010 and February 2012, 100 patients were enrolled. The first primary endpoints is primary patency at 12 months, defined as no evidence of restenosis or occlusion within the originally treated lesion based on color-flow duplex ultrasound (CFDU) measuring a peak systolic velocity ratio ≤2.5 and without target lesion revascularisation (TLR) within 12 months. The second primary endpoint is the proportion of subjects who experience serious device-related adverse events within 30 days post-procedure. The subcohort of IN.Pact Global trial conducted at our site consist of 47 patients and were treated using the Invatec Admiral DEB.

RESULTS

The analysis is based on the intention-to-treat total of 100 patients. 47 (47.0%) patients were randomized to the VIABAHN ISR group and 53 (53.0%) patients were randomized to the POBA group. The demographic data was comparable in both treatment groups. In the VIABAHN ISR group there were 34 (72.3%) men and the mean age was 67.34 (±11) years. In the POBA group, 35 (66.0%) patients were male and the mean age was 69.26 (±10.4) years. The survival analysis shows a primary patency rate at 12 months of 94.4% for the VIABAHN ISR group and 60.7% for the POBA group (p<0.001). Freedom of TLR at 12 months is 94.3% in the VIABAHN ISR group and 60.3% in the POBA group (p<0.001). The subcohort DEB showed a freedom from TLR at 12 months of 92% and a primary patency at 12 months of 88%.

CONCLUSION

The data on all three treatments of ISR show a clear benefit in patency outcome and freedom of TLR for stent-grafts and DEB as compared to POBA for ISR.
Which stent graft system can be used for challenging anatomy in evar cases

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**ABSTRACT**

The use of Endograft for endovascular therapy of abdominal aortic aneurysms (EVAR) benefits especially in case of important comorbidities of our patient. We have used the Ovation Prime Stent Graft in two cases with very challenging anatomy of aneurysms. Endovascular treatment with any other device, available on market, was not according to the instructions for use (IFU). Our institution treated two patients for abdominal aortic aneurysm (AAA) with challenging anatomy that didn’t meet the instructions for use of other current available Endografts. Both AAA were successfully excluded using the Ovation Prime Stent Graft.

**CONCLUSION**

The Ovation Prime Stent Graft with 14F outer diameter has enabled and simplified treatment of patients with AAA with narrow and calcified vessels.

The re-entry catheter system for subintimal recanalization of chronic total occlusions in femoropopliteal arteries: primary safety and efficacy results of the re-ROUTE trial

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**PURPOSE**

The objective of the Re-ROUTE Clinical Study (NCT01500031) is to provide additional clinical data regarding the safety and technical success of the OffRoad Re-Entry Catheter System for subintimal recanalization of chronic total occlusion (CTO) in the femoropopliteal arteries.

**METHODS AND RESULTS**

A total of 92 patients (mean lesion length 175.1 ± 85.4 mm) were enrolled in this prospective, single-arm, multicenter, post-market study conducted at 12 centers in Europe. To be eligible for the study, patients were required to have claudication or critical limb ischemia and a de novo or re-occluded CTO lesion in a native femoropopliteal artery. Target lesion length ≥ 1 cm and ≤ 30 cm and a minimum reference vessel diameter of 4 mm by visual assessment were required. Eighty seven patients were evaluable for the primary 30-day safety endpoint. The composite rate of device-related major adverse events was 3.4% (3/87). All 3 events were clinically significant peripheral embolisms and the event rate was lower than the prespecified acceptable threshold. Effectiveness was based on device technical success, defined as placement of a guidewire in the true lumen distal to a CTO as confirmed by an angiography core lab. The core lab-confirmed success rate was 92.1% (70/76), however, the core lab was unable to evaluate all cases due to lack of proper post-operative images. Site-reported technical success was 84.8% (78/92). Technical success rates exceeded the prespecified performance goal.

**CONCLUSION**

Re-ROUTE trial results demonstrate acceptable performance of the OffRoad system in terms of safety and technical success.
Adjunctive procedures to lower risks of neurovascular complications in thoracic endovascular aortic repair: experience in the Oxford Regional Vascular Unit

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INTRODUCTION
Thoracic Endovascular Aortic Repair (TEVAR) has well-established clinical advantages over Open Repair, but it is associated with a significant incidence of neurovascular complications. Adjunctive procedures are thought to minimize the risks but remain controversial.

METHODS
Retrospective review of patients who underwent elective or urgent TEVAR for degenerative disease of the thoracic aorta (aneurysm and/or dissection) from January 2010 to December 2014 with identification of all patients with carotid-subclavian bypass and/or spinal drain placement peri-operatively. Pre-procedural complications were also identified. Pre-operative and intra-operative characteristics, outcomes, neurological complications and 30-days and late survival were also recorded.

RESULTS
Twenty-seven patients were identified and their characteristics are shown in Table 1. Eleven (40.7%) patients had adjunctive procedures including spinal pressure monitoring (n=7), aortic arch debranching with left carotid-subclavian artery bypass (LSA-BP) (n=7, 5 simultaneous with TEVAR) and Chimney stent grafts (n=3). The placement of spinal drain was uneventful in all cases. Delayed spinal cord ischemia (SCI) occurred in one patient (3.7%) and was successfully treated with CSF drain and hypertensive status. Cerebral ischemia with minor stroke was seen in one patient. All the LSA-BP were patent at discharge, except for one case who occluded intraoperatively without any complications. Two patients died within 30-days of TEVAR given a peri-operative mortality of 7.4%.

CONCLUSION
The use of peri-operative carotid-subclavian bypass and/or CSF drainage in TEVAR is associated with low complication and morbidity in a “real world” vascular unit. Adjunctive procedures should be considered for all eligible patients whenever possible given the relatively low complication rates of these procedures.

References

Thrombosis of femoral-popliteal graft treated with ultrasound assisted catheter - directed thrombolysis and stenting

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CLINICAL CASE
A. A., male, 59 years old. Peripheral artery disease: previous multiple angioplasty and stent implantation on right iliac and popliteal arteries. In August 2014 the patient was admitted to our hospital for acute ischemia of the right foot. The angiographic examination showed a thrombotic occlusion of the right femoral-popliteal graft.

TREATMENT
Left femoral artery approach with 6F – 45 cm in length sheath. Cross over into the right external iliac artery. Ultrasound assisted catheter – directed thrombolysis was performed and 20 ml of Reteplase were administered in twelve hours directly into the femoral-popliteal graft. The angiographic control performed twelve hours later showed the patency of the graft but occlusion of the distal anastomosis. The stenosis was crossed with a 0.014” guide-wire and then a 4.0 x 60 mm stent was implanted, the stent was post dilated with a 3.0 x 20 mm balloon. The final angiographic result was good on the femoral-popliteal graft but thrombolysis with slow flow was detected distally so we decided to administer other 20 ml of Reteplase. The angiographic control six hours showed a critical thrombosis of the stent treated with PTA (4.0 x 20 mm and 5.0 x 20 mm balloon). Good final angiographic result.

FOLLOW-UP
Computed tomography angiography performed in October 2014 showed the patency of the femoral popliteal graft and of the stent. After 6 months the patient is still symptoms-free and ecoDoppler controls have confirmed the patency of the graft.
Carotid Artery Stenting: is it possible to reduce complications?

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BACKGROUND
Carotid artery stenting (CAS) may be an alternative to surgical endarterectomy for the treatment of atherosclerotic carotid artery stenosis.

Purpose: Our goal is to improve patient selection for CAS identifying and excluding high-risk patients in order to reduce the complications (periprocedural stroke < 1%)

METHODS
We performed a retrospective analysis of 450 procedures (mean age: 72 years old) performed between January 2004 and December 2010. Symptomatic patients with carotid artery stenosis > 50% were the 45%; we treated asymptomatic patients affected by > 70% stenosis. 72% were considered at high surgical risk: 37% with severe contralateral stenosis; 24% with severe or unstable angina, poor left ventricular function, left main disease or trifascial coronary artery disease, severe cardiac valve disease; 36% presented restenosis after surgical treatment. 5% were treated with urgent coronary artery bypass grafting (CABG) immediately after CAS. Soft plaques were present in 18% of the patients. 9% of patients were submitted to CAS for bilateral carotid artery stenosis. 12% presented Type III aortic arch. 42% presented complex morphology (excessive angulation, heavy calcifications, angulation and kinking with complex type III aortic arch, soft plaques and thrombus), 12% presented Type III aortic arch. 42% presented complex morphology (excessive angulation, heavy calcifications, angulation and kinking with complex type III aortic arch, soft plaques and thrombus).

RESULTS
Between January 2011 and August 2014 we performed 252 procedure with a periprocedural stroke rate of 0.8% (1 Hemoragic shock and 1 minor stroke), no vascular complication and acute renal failure was significantly reduced. Material costs were reduced by 33%, the duration of the procedure and the hospitalization of the patients were reduced too (mean duration: 18 minutes, mean hospital stay: 3 days).

CONCLUSIONS
In our experience if performed by skilled operators CAS is a safe procedure with low complications and it is a viable alternative to endarterectomy also in high risk patients.

Abdominal aortic aneurysm repair increases cardiovascular risk

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INTRODUCTION
Abdominal aortic aneurysms (AAA) remain in the top 10 causes of mortality for older people in the Western world. First-line treatment is open or endovascular surgery, with endovascular aneurysm repair (EVAR) fast becoming the gold standard. Aortic stiffness, as measured by carotid-foemoral pulse-wave velocity (CfPWV), is a sensitive prognosticator for cardiovascular risk: a 1 m/s increase equates to a 15% increase in cardiovascular death1,1. As AAA-repair has been shown to have no benefit on all-cause mortality, and repair involves insertion of a semi-rigid conduit into the circulation, we aimed to determine whether AAA-repair increases cardiovascular risk (as measured by CfPWV).

METHODS
All patients attending assessment for AAA-repair in a single UK tertiary referral Vascular Unit were invited to take part in this observational cohort study. The Vicorder was employed to measure CfPWV at four peri-operative time-points: Pre-AAA-repair: 1-, 6- and 52-week post-operative CfPWV measurements were taken. Statistical testing was performed using the ANOVA test.

RESULTS
This study reports the change in CfPWV in 100 patients undergoing AAA-repair. 95/100 patients underwent EVAR. 90/100 patients were male. The mean pre-operative CfPWV was 10.2 m/s. At 1-6- and 52-weeks, the mean PWV was 10.0 (9.4-10.5), 11.4 (10.9-13.2), and 11.6 (10.9-13.0), respectively (p<0.001).

CONCLUSION
AAA-repair results in sustained functional stiffening of the aorta. Increasing aortic stiffness has deleterious effects on cardiovascular risk. AAA-repair, therefore increases the likelihood of stroke and myocardial infection in this already high-risk population, but this can be pharmaco-modulated2.

References
Endovascular repair of mycotic thoracic aneurysm
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BACKGROUND
Mycotic aneurysms of the thoracic aorta constitute one of the most challenging diseases that present to the surgical team. Conventional open repair with thoracotomy, debridement and either anatomical or extra-anatomical revascularisation has high mortality and morbidity (up to 40%), particularly in the context of rupture. (4,5) Thoracic endovascular aortic repair is increasingly utilised in the management of thoracic aneurysms, the acute aortic syndrome and trauma. We report the case of endovascular management of a contained rupture of a mycotic thoracic aneurysm.

PATIENT
A 72 year old lady presented to our hospital with pyrexia, cough, tachycardia and abdominal pain. Past medical history included breast cancer and thyroidectomy. With acute abdominal pathology excluded with a CT abdomen and pelvis, she was initially treated for a community acquired pneumonia. Blood cultures grew group A beta haemolytic streptococcus. Suspicious findings on echocardiography of a subsequent CT aortic angiogram 12 days after admission diagnosed contained rupture of a descending thoracic aortic mycotic aneurysm (figure 1). With an ejection of 30% and can-curent chest sepsis she was not suitable for open repair. She underwent TEVAR of her descending thoracic aorta without left subclavian coverage on the 13th day of admission. She underwent fenestration (figure 2). The aortic aneurysm was an infected, contained rupture of a descending thoracic aortic aneurysm and not a mycotic disease.

METHOD
Computed tomography and USG on 12th day of admission CT identified the ruptured mycotic aneurysm. Complete aortic remodelling with no residual radiological signs of sepsis was complete at 3 years after repair CT demonstrates complete aortic remodelling with no residual radiological signs of sepsis. (5,6)

CONCLUSIONS
Endovascular techniques can act as a bridge to, or constitute definitive repair in those with infected aortic pathology. (4,5) Endovascular strategies are particularly useful in the physiologically unwell patient with multiple co-morbidities. (4,5)

References
Three cases confirming the appropriateness of “centralization of flow concept” in aortic dissection

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We present three cases (two men, one woman, 54, 74 and 63 years old) of endovascular treatment of complicated aortic dissection type A (Stanford) with critical and life-threatening compression of the true lumen and expansion of the false lumen after previous surgical treatment of the ascending aorta intimal tear. In two of the cases the compression was symptomatic with life-threatening visceral and peripheral ischemia in the early postoperative period, while in the third patient late expansion of the false lumen with symptom of chest pain and high risk of rupture was diagnosed on the MSCT. In all of the three patients was conducted endovascular treatment with implantation of 3 different types of non-covered stents into the compressed true lumen of the aorta, with excellent immediate and late result. One patient received aortic arch stenting with restoration of 3 different types of non-covered stents into the compressed true lumen of the aorta, with excellent immediate and late result. One patient received aortic arch stenting with restoration of the “centralization of flow concept” in patients with aortic dissection. The other two patients received stents in the compressed true lumen at the level of the thoracoabdominal aorta resulting in restoration of the compromised visceral perfusion. The three patients were followed between 3 and 14 years with excellent long term clinical results confirmed with non-invasive imaging methods (Duplex and MSCT). These three different complex cases treated with endovascular implantation of different types of open stents confirmed the efficiency and appropriateness of the “centralization of flow concept” in patients with aortic dissection and prove the role of the hybrid surgical-endovascular treatment in critically ill patients with aortic dissection.
Vertebral stenting

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Stenting of single vertebral artery—the only one supplying the brain

HISTORY AND PHYSICAL
A 63-year-old man was admitted to our hospital because of left side hemiparesis. He has history of 4 ischemic strokes. Due to chest pain the patient was diagnosed with CAD - two vessel disease, status post stenting of LAD and RCA. In 2009 a symptomatic PAD was verified - Ao-bifemoral bypass real- ized. The patient is with arterial hypertension. Major risk fac- tor: smoker.

INSTRUMENTAL EXAMINATION
Duplex sonography showed: LCCA- ostial occlusion, RI- CA-occlusion; Left subclavian artery- ostial occlusion, right vertebral artery - 90% ostial stenosis. From performed carotid angiography: occlusion of RICA, LCCA, left subclavian artery; RECA- patent, giving collaterals toward LECA; right vertebral artery with severe stenosis.

TREATMENT STRATEGY AND PROCEDURES
A high risk procedure was undertaken to improve antegrade filling of the whole circulation. Right vertebral artery was en- gaged with 5F JR catheter. The lesion was intentionally pre- dilated with 2,0x15mm coronary PTCA balloon. A drug -elut- ing coronary stent 4/15mm was implanted. Postdilated with 5,0x15mm balloon.

TREATMENT RESULTS
No residual stenosis of the right vertebral artery with good an- tegrade filling of postero-basilar, left intracranial circulation and retrograde filling of left vertebral artery.

IN CONCLUSION
Extracranial vertebral artery stenosis is common among pa- tients with total carotid occlusions and they can develop is- chemic stroke as a result to hemodynamic impairment. Flow augmentation can be provided through a variety of surgical and endovascular techniques. We describe a patient treat- ed with vertebral artery stent placement to improve indirect flow to the territory of an occluded carotid arteries and con- tralateral left vertebral artery. In this case we used a coro- nary DES which has lower rates of restenosis and recurrence of symptoms compare to bare metal stents. As a result, the patient has uneventful follow-up.

Key words
Extracranial vertebral artery stenosis, total carotid occlusions, stent

Percutaneous recanalization of occluded renal arteries in patient with resistant hypertension and high rennin activity

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OBJECTIVES
To analyze the feasibility and the effect on blood pressure control and rennin levels of the percutaneous recanalization of totally occluded renal arteries in patients with resistant arterial hypertension, preserved blood flow in the subseg- mental renal arteries and high level of plasma rennin ac- tivity. BACKGROUND: Hypertension affects more than 25% of the worldwide adult population. Although the vast majority have essential hypertension, it is important to identify patients with secondary treatable causes of hypertension, especially atherosclerotic RAS, the most common cause of renovascu- lar hypertension. The DRASTIC, CORAL study showed that renal stenting resulted in improvement of blood pressure and reduce the number of antihypertensive medications. The ASTRAL study showed that there is no significant difference between the group with renal stenting and group medical therapy. The total occlusion of renal artery is contraindications for endovascular treatment. We want to prove that in patients with totally occluded renal arteries, and high rennin activity recanalization of the renal occlusion leads to signif- icant reduction of blood pressure and reduced need for antihypertensive medications.

MATERIAL AND METHODS
Between 2013 - 2015 we had 6 patients with total occlusion of the renal arteries. Percutaneous recanalization was at- tempted in all of them, success was achieved in all of the cases. All patients were hypertensive, before the procedure in all patients mean values of BP 161/90 mmHg under sys- tematic antihypertensive treatment with at least 3 antihy- pertensive agents. In all patients plasma rennin activity (PRA) was more than 2.76 ng/m1/h before the procedure. The pa- tients had duplex signs of occluded renal artery and partially preserved subsegmental flow. Two of the patients were with normal serum creatinine level; one was with CKD and was receiving chronicodialysis. The other three patients had slightly increased creatinine levels and in two of them those levels normalized and in one there was no significant change after the procedure. For recanalization of the occlusions of the re- nal arteries we used coronary CTO techniques. RESULTS: Per- cutaneous recanalization was attempted in six patients and was successful in all of the cases. Follow-up was on week 4 and on 3rd and 6th month. Blood pressure was significantly reduce in all of the patients. We had two in stent restenosis with increased BP levels which normalized after second PTA. All patients received Clopidogrel for one year. In three pa- tients there was normal PRA after six mounts.

CONCLUSION
In case of renal occlusion and resistant AH, predictor of clinical success after recanalization is probably the preserved rennin production. There is evidence of direct relationship be- tween preserved parenchymal flow and the expected post- interventional result regarding the BP control, confirmed in our cases.

References
Early outcomes of patients transferred with ruptured suprarenal aneurysm or dissection: implications for the organisation of vascular services

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BACKGROUND
This study investigates outcomes in patients with ruptured suprarenal aneurysm or dissection (rSRAD) transferred to a specialist centre and estimates the incidence of rSRAD in England and Wales.

METHODS

RESULTS
Fifty-two patients (median age 73 years, 32 male) with rSRAD were transferred, and a further 4 died during transit. Pathology included arch aneurysm (N=1, 2%), descending thoracic aneurysm (N=12, 23%; including 1 mycotic aneurysm and 3 vascular aneurysms); Crawford extent I (N=1, 2%), II (N=13, 25%), III (N=3, 6%), IV (N=6, 12%; including 1 mycotic aneurysm); juxtarenal aneurysm (N=6, 12%), type B dissection (N=5, 12%) penetrating aortic ulcer (N=2, 4%; including 1 mycotic ulcer); intramural haematoma (N=2, 4%); traumatic thoracic aortic transection (N=1, 2%). The mean distance of patient transfer was 35 miles (range 4-211). One patient did not undergo intervention due to frailty and two died before reaching the operating theatre. Twenty-three patients underwent endovascular repair, 9 hybrid repair, 17 open surgery. Median follow-up was 12 months (range 1-43). Thirty-day and inhospital mortality were 16% and 27%. For patients who discharged alive from hospital, 1-year survival was 67%. Hospital admissions for ruptured thoracic and thoracoabdominal aortic aneurysm in England and Wales 2004-2013 was 67%. Hospital admissions for ruptured thoracic and thoracoabdominal aortic aneurysms rose from 0.53 to 0.60 (Figure 1), emergency admissions for aortic dissection rose from 1.10 to 1.68. Emergency procedures for open repair to SRAD rose from 0.41 to 0.68. The majority to ascending aorta: to suprarenal abdominal aorta changed little (0.07); to thoracic aortic decreased (0.08 to 0.05) (Figure 2). Since 2006, emergency endovascular procedures for SRAD have quadrupled, from 0.06 to 0.21 (Figure 3). All figures per 100,000 population.

CONCLUSIONS
Although the number of patients with rSRAD is low and those who are transferred alive are a self-selecting group, this study suggests that transfer of such patients to a specialist vascular centre is associated with acceptable mortality rates following emergency complex aortic repair. The early and 1-year mortality rate in this series of ruptured SRAD compares well with that for ruptured infrarenal aortic aneurysm repair confirming that it is a viable treatment option in selected cases. However, the treatment of such patients is resource heavy, requiring concentration of facilities and expertise to enable the optimal choice of open, endovascular or hybrid aortic repair to be selected depending on the needs of an individual patient. Further centralisation of vascular services for such procedures will streamline referral pathways and increase volumes at supraregional centres, with the expectation of improved access to intervention and better outcomes.

Figures
Figure 1. Hospital admissions for ruptured thoracic and thoracoabdominal aortic aneurysm in England and Wales 2004-2013

Figure 2. Emergency open surgery for suprarenal aortic repair in England and Wales 2004-2013

Figure 3. Emergency endovascular procedures for suprarenal aortic repair in England and Wales 2004-2013

References


Does reintervention influence the late results of EVAR?

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INTRODUCTION
To ensure long-term successful aneurysm exclusion, abdominal aortic endografting has shown to be prone to repeated interventions and eventually conversion to open repair. Often, correct identification of the cause of failure and indication for secondary endovascular procedures are not standardized, and can lead to variable treatment options, different protocols and dissimilar outcomes.

METHODS
This study focuses on the most frequently encountered causes of failure after aneurysm endovascular repair and the possible therapeutic options proposed in the literature to maintain the endograft in place and avoid the risk of subsequent aneurysm growth and rupture. The experience of our group has been reviewed with the aim of evaluating the incidence of need for secondary procedures, and the late results after re-intervention.

RESULTS
The present study reveals that the rate of re-intervention at a maximum follow-up time of 174 months (mean 54 months) is 13.2%, with a Kaplan-Meier freedom from reintervention of 74.4% at 120 months. Of those patients with a re-intervention, the alternative endografts for failure may reduce the risk of late ruptures. Midterm aggressive posture toward correction of potential risk factors is mandatory to obtain the endograft in place and avoid the risk of subsequent aneurysm growth and rupture. The experience of our group has been reviewed with the aim of evaluating the incidence of need for secondary procedures, and the late results after re-intervention.

REFERENCES

Is there a place for a prosthesis in the treatment of aortic graft infection?

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BACKGROUND
Infection after aortic reconstruction is rare but constitutes one of the most life-threatening complications in the field of vascular surgery. In situ revascularization (ISR) has been preferred since many years to extra-anatomic reconstruction (EAR), providing better global results in terms of survival, re-infection and patency. However, the ideal conduit material for ISR remains a matter of debate. Femoral veins and arterial allografts offer the lesser risk of reinfection with low rate of complications. However, prosthetic grafts offer two major advantages over femoral veins and allografts, i.e., immediate availability and shorter procedure time but the main drawback is an enhanced risk of reinfection. In this context, the vascular bioprosthesis Omniflow II, which is a truly integrated bio-synthetic component of polyester mesh and ovine connective tissue components, could represent a suitable alternative. It has been shown to be more resistant to infections due to complete tissue incorporation with good patency and minimal aneurysm problems. The aim of this study is to present the preliminary results of this technique.

MATERIAL AND METHODS
Between January 2010 and January 2015, 14 patients have been operated using this technique. The data prospectively registered have been reviewed and analysed. The primary outcome was the post-operative mortality rate and secondary outcomes were the rates of complications of re-infection and of overall mortality.

RESULTS
They were 13 men and 1 woman with a median age of 68 years (median 44-81). The primary reconstructions were 11 aorto-uni or bifemoral bypasses, 2 aorto-iliac bypasses and 1 aorto-aortic graft, using in all cases Dacron graft. The indication was an occlusive disease in 8 patients and an aneurysm in the remaining 6. The clinical presentation of the aortic graft infection was a sepsis in 6 cases, hemorrhagic shock in 5 and in 3 patients only minor signs were present. Surgical technique included complete resection of the infected material and in situ reconstruction using Omniflow II prostheses of 8 mm in diameter. In 9 cases, visceral surgery was associated. The median operated time was 207 minutes (19-368). There was no post-operative death. Nine complications occurred requiring 8 re-interventions. During median follow-up of 26 months, 1 patient died (7%) and the rate of reinfection was 14% (2/14). Primary patency was 86%.

CONCLUSION
The vascular bioprosthesis Omniflow II seems to be safe and effective in the treatment of aortic graft infection with acceptable rate of mortality and of reinfection. Therefore, it could have a place in the therapeutic armamentarium according to these preliminary results. However, longer follow-up and more patients are required before recommendations can be made.
Carotid artery stenting with cerebral embolic protection: a single-center initial experience

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AIMS
Stroke is the third cause of death and the leading cause of disability worldwide. Atherosclerotic disease of the extracranial internal carotid artery (ICA) is responsible for 20% to 25% of all ischemic strokes, and both medical therapy and carotid endarterectomy have been previously used to prevent them. Although the role of carotid artery stenting (CAS) is currently under revision, it represents a therapeutic option for patients with indication for carotid revascularization. The purpose of this study is to determine safety, short and midterm outcomes of CAS in a single center.

METHODS AND RESULTS
From February 2007 to December 2014, we performed 95 consecutive CAS procedures in 83 patients (right, 55; left, 40). Fifty patients were men (60%) and their age mean was 70.8 ± 10.5. Of these patients, 34% were symptomatic and 66% were asymptomatic. Twelve patients underwent bilateral procedures. Ninety five stents (90 WallStent, 3 Cristalo and 2 Acculink) with cerebral protection system (62 Spider FX, 31 FilterWire EZ and 2 MoMa) were used. In one patient, severe arterial tortuosity prevented catheterization and stenting. The rate of major complications at 30 days was 3.1%: 0 deaths, 1 major stroke (1%) and 2 transient ischemic attacks (2.1%). Two vascular complications at the access site (2.1%) also occurred. No cranial nerve deficits were noted. In the 30-day postprocedural period, 2 ICA stents occluded (patients asymptomatic). Over a mean 32.4±6 months follow-up, no new neurological symptoms developed.

CONCLUSIONS
The carotid stenting angioplasty is a safe, effective and low-complication-rate alternative for the treatment of atherosclerotic disease. Cerebral protection may improve the results of carotid angioplasty and expand the indications for this procedure.
Microcoil embolization for an acute bleed from ruptured middle rectal artery aneurysm

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Bleeding per rectum is a relatively common cause for surgical admission and rectal source itself accounts for 9-10% of all cases. The middle rectal or haemorrhoidal artery is usually a branch of the anterior division of internal iliac artery and forms part of the anastomotic blood supply to the rectum. There are case reports in world literature of bleeding from the middle rectal artery treated by embolization from causes such as trauma, tumour and radiation. However, to date the authors have been unable to find any cases in the literature of bleeding secondary to a ruptured aneurysm of this artery. We present a case of acute bleeding per rectum from a middle rectal artery aneurysm successfully treated with superselective microcoil embolization.

An 84 year old lady presented to the emergency department with 2 episodes of bleeding per rectum over 2 days, the latter of which was large. She denied any prior episodes or abdominal pain. She had a background of hypertension, atrial fibrillation, osteoporosis, bilateral hip replacements, an open fracture of the tibia sustained the year prior and treated conservatively. She denied any prior episodes or abdominal pain. She had a background of hypertension, atrial fibrillation, osteoporosis, bilateral hip replacements, an open fracture of the tibia sustained the year prior and treated conservatively. She did not take warfarin, clopidogrel or aspirin. Her hemoglobin on admission was 124g/dl, urea was 14.8 mmol/l and coagulation screen and other standard laboratory tests were within normal limits. Rigid sigmoidoscopy was booked but could not be done as she was known haemodynamically unstable.

CT examination, showed the source of the active arterial bleed in the upper rectum where a dense pool of contrast was seen on the left side of the mid line at the level of sacral notch originating from branches of left internal iliac artery (Figure 1). On the delayed scan contrast at the site of presumed bleed was still dense and spread out over a relatively large area conforming to the pattern of an arterial bleed (Figure 2).

On subsequent angiogram, the cause for arterial bleed was clearly evident from the left common iliac artery injection as a modest sized aneurysm arising from one of the branches of anterior division of left internal iliac artery with considerable extravasation of contrast opacifying the lumen of the rectum (Figure 3). Super selective angiography with a microcathether confirmed that the aneurysm was arising from a rather hypertrophied middle rectal artery and sparing the inferior pudendal artery. The microcathether was advanced into the aneurysmal sac and the aneurysm was completely packed with multiple Nester microcoils (Figure 4).

The authors suggest that angiography and embolization could be an appropriate, effective and safe initial treatment of this condition with endoscopy and surgery reserved for cases where embolization may fail or for any related complications.

References
Atherosclerotic plaque analysis in the lower limb may help predict outcome following endovascular intervention

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INTRODUCTION
Computed tomography atherosclerotic plaque analysis in the coronary and carotid arteries has been found to be accurate and reproducible. The aim of our study was to assess the utility of this technique in predicting outcome in peripheral arterial disease.

MATERIAL AND METHODS
We retrospectively analysed pre-procedural CT angiograms in 50 patients who had undergone superficial femoral artery (SFA) angioplasty (+/-stenting). CT atherosclerotic plaque analysis was performed on TeraRecon software by observers blinded to the long term outcome. The section of artery undergoing angioplasty was subdivided into volumes of soft(-100-100HU) fibro-calcific(101-300HU) or calcified(300-1000HU) plaque. The end points were primary, primary assisted and secondary vessel patency, binary restenosis rate and amputation free survival at 12 months using Kaplan Meier analysis.

RESULTS
The technical success rate was 98%, with 48% of patients receiving SFA stents. The amputation free survival was 90%, primary patency 84%, primary assisted patency 88% and binary restenosis 44% all at 1 year. A significantly greater total volume of calcified plaque (1.1(0.01-3.2) cm³ vs 0.11(0.186) cm³, P=0.001) and a greater percentage of calcified plaque (9.6(0.2-34)% vs 2(0-13)% , P=0.001) was found in patients developing restenosis (>50%) compared to those who did not. Total calcified plaque volume was significantly lower in patients remaining free from SFA occlusions or reinterventions (0.21(0.01-2.6) cm³ vs 1.3(0-3.2)cm³, P=0.007) and in patients surviving 2 years without major amputations (0.34(0.01-3) cm³ vs 1.4(0-3.2) cm³, P=0.038).

CONCLUSIONS
CT plaque analysis has been successfully applied to lower limb arterial disease. The burden of calcified plaque, but not soft or fibro-calcific plaque, has an impact on restenosis, re-intervention and amputation free survival indicating that it may form an important non invasive tool for risk stratification in patients.

Use of drug-coated balloon angioplasty as first line treatment for all femoropopliteal lesions: twelve month results

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BACKGROUND
The use of drug-coated balloons (DEB) in the SFA is currently still under investigation in Trials. Although there are clear indications of the benefits in case of restenosis or in-stent restenosis, scientific evidence to support the title of abstract is still lacking today. We have used DEB treatment for 116 consecutive limbs to challenge the title.

METHODS
Patient cohort is a subgroup of the prospective controlled trial IN.PACT Global conducted at our institution. Between Oct 2012 and Sep 2014, 92 patients (116 limbs treated) were enrolled and treated with Invatec Admiral DEB. The efficacy endpoint of the trial is freedom from clinically driven TLR and primary patency within 12 months. Safety endpoint includes freedom from MAE through 30 days, freedom from target limb amputation and freedom from TLR within 12 months.

RESULTS
Of the 92 patients enrolled, 88% had intermittent claudication and 12% presented with critical limb ischemia. For lesion treatment, only 30% received a bail-out stenting for residual stenosis or flow-limiting dissections. The overall mean lesion length was 149.6 mm. Twelve month results show a freedom from TLR at 12 months of 92% and a primary patency at 12 months of 88%.

CONCLUSION
Treatment of all real-world SFA disease with DEB seems safe and feasible, shows promising primary patency rates and appears to have lower bail-out stenting rates as compared to POBA in other SFA trials. As these 12-month data show promising results. Full 12 month and preliminary 24 month data will be presented at the congress.
Percutaneous exclusion of subclavian artery aneurysm with endoprosthesis

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**BACKGROUND**
M. A., a 84 years old man was referred to our institution because of aneurism of the right Subclavian Artery. Computed Tomography showed an important aneurism of the right Subclavian Artery. Investigation and diagnosis: Angiography confirmed the aneurism of the right Subclavian Artery. Management: right axillary artery approach with 12 F sheath. The aneurysm was crossed with a 0.035” guidewire. An endoprosthesis with proximal diameter 16 mm and distal diameter 7 mm, 10 mm in length was released and then it was post dilated.

**RESULT**
Final result was good, showing the complete exclusion of the aneurysm.
Post procedure: the patient was hospitalized for four days, he remained symptoms free.
Follow-up: after two weeks the computed tomography control showed the patency of the endoprosthesis and no endoleaks was detected. Four months follow up: the patient is still symptoms free and the ecoDoppler controls confirmed the patency of the endoprosthesis.

Revascularization of the plantar arch: its impact on foot salvage in critical limb ischemia

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Foot ulcers are a common and feared complication of diabetes. 15% of diabetic patients will develop a foot ulcer during their lifetime, of them 14% to 43% will require amputation. The basic factor preventing healing of a diabetic foot ulcer is often inadequate perfusion. Endovascular recanalization of tibial and feet arteries has proven to be feasible and safe in wound healing and limb preservation. The study was conducted on 145 consecutive patients with critical limb ischemia divided into two groups, group A (85 patients), for whom angioplasty of tibial vessels together with the plantar arch was done and group B (60 patients) for whom tibial angioplasty only was done. Patients response to therapy was assessed by measuring ankle-brachial index(ABI), transcutaneous partial oxygen tension (tcpO2), and duplex before intervention and 3,6 as well as 12 month following intervention. Arch revascularization had a significantly higher rate of ulcer healing at 12 months (89% in group A vs 47% for group B). The 1-year foot salvage rates were 92% for the group A and 77% for the group B. The 1-year survival rates were the same in both groups. Reinterventions to the initially revascularized artery was performed in 10% of group A and 15% of group B. Conclusions: re-canalisation temporarily increases blood flow to the foot which helps in eradicating infection and healing ulcers. As healing reduces oxygen demand, less blood flow is generally required to maintain tissue normality. The arch acts as a pivotal distribution conduit that provides direct flow to the forefoot and indirect for the heel or the reverse according to the occluded crural artery. It seems essential to revascularize the foot through one of the pedal arteries together with the arch rather than multiple arteries without the arch.
Pinterventional treatment of an intracranial left vertebral artery stenosis in the state of contralateral vertebral artery occlusion

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HISTORY AND PHYSICAL
A 68 YO male was admitted with complaints of unstable posture, vertigo and several drop attacks. He was diagnosed with a subacute ischemic stroke in the vertebro-basillary system. The patient was referred for urgent endovascular treatment of stenotic right vertebral artery seen on echo-doppler study. His medical history and included: Two ischemic strokes in 2014 without any information about location, SVS – treated with PCI, currently with angina class II CCS. Paroxysmal AF – on pharmacological conversions – currently in sinus rhythm. Dyslipidemia - on statin therapy. Physical exam was unremarkable (HR – 71/min; BP – 159/81), neurologic status - unstable posture.

IMAGING
An immediate angiography was performed with evidence of old distal occlusion of the right vertebral artery and high grade (85%) intracranial stenosis (ICAS) of the left vertebral artery. (Fig 1)

INDICATIONS FOR INTERVENTION
A decision for endovascular treatment solely with balloon angioplasty of the left vertebral artery was taken based on three arguments: 1. A solitary patent vessel for the cerebellum. 2. Ambiguous results of stenting even with dedicated stent systems based on SAMMPRIS trial. 3. The patient was pretreated with DAPT and balloon angioplasty would allow short DAPT period having in mind that the patient is also indicated for oral anticoagulant.

INTERVENTION
Angioplasty with PTCA balloons 2,0x10 and 2,5x15mm with insignificant residual stenosis was done. (Fig. 2) The patient had uneventful hospital stay and 6-month follow-up period.

LEARNING POINTS OF THE PROCEDURE
Balloon angioplasty alone could be a safe treatment of ICAS in patients with single patent vertebral artery even more in a state of DAPT and further need for OAC.

Percutaneous exclusion of renal artery aneurysm with endoprosthesis

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BACKGROUND
M.V. 73 years old man. Comorbidities included: hypertension, dyslipidemia. The computed tomography showed a right renal artery aneurysm 34 mm in diameter. Investigation and diagnosis: Angiography (march 2015) confirmed the presence of important right renal artery aneurysm. Management: right femoral artery approach with a 7 F sheath positioned selectively in the right renal artery. The aneurysm was crossed with a 0.014” hydrophilic guidewire, a balloon expandable endoprosthesis (6 mm in diameter, 58 mm in length) was positioned. Postlalation with a 7 mm, 20 mm in length balloon was performed. The angiography showed a fracture with solution of continuity in the endoprosthesis. A second self-expandable endoprosthesis (6 mm in diameter, 50 mm in length) was released.

RESULT
Final result was good, showing the complete exclusion of the aneurysm. Post procedure: the patient was hospitalized for two days, he remained symptoms free. Blood tests showed only a slight increase in creatinine values (1,3 mg/dl vs 1,1 mg/dl).
Overcoming Difficult CTO increasing the applicability of Endovascular Intervention to patients with challenging Re-entry

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PURPOSE
Assess the feasibility of crossing CTO in long complex lesion and safety and applicability of double balloon technique in the unavailability of new crossing re-entry devices.

BACKGROUND
CTO sometimes is a challenge for endovascular intervention especially in developing countries where new devices used to cross CTO unavailable; it is too expensive and insurance does not cover all citizens. Using basic available tools become the only solution in such cases especially if open surgical intervention is of high risk procedure for the patient.

PATIENTS AND METHODS
Conventional methods for crossing CTO in the femoro-popliteal territory was used in about 350 lesion but it was failed only 28 where double balloon technique was used to crush the atherosclerotic plaque.

RESULTS
The success rate of the technique was 100%. Conclusion: Double balloon technique is safe cheap and may replace and keep the use of new re-entry devices in only bail-out cases after failure of this technique.

Key words
CTO double balloon technique femoro-popliteal occlusion

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