Oncovascular resections with vena cava invasion: 53 cases

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Objectives: Retroperitoneal tumors with inferior vena cava (IVC) involvement are rare and associated with a high morbidity. Their management is based on expert recommendations (Delphi Consensus). The objective of this study was to describe the results of a consecutive series of oncovascular resections with caval reconstruction performed in a tertiary center and to assess adherence to the proposed good practices.
Material and methods: Retrospective single center study including 53 patients operated between February 2009 and April 2022. Data collected included clinical characteristics, imaging modalities, anatomy of the vena cava, reconstruction techniques and postoperative outcomes.
Results: Mean age of patients was 75.5 years; 36 (68%) were men. Comorbidities included hypertension (32%, n=17), renal impairment (17%, n=9) and active smoking (75%, n=40). All patients underwent preoperative CT or MRI. Caval involvement concerned infrarenal IVC in 46 cases (81%) and suprarenal IVC in 12 cases (23%). Ten patients (19%) had infrarenal and suprarenal involvement, 18 (34%) had suprarenal IVC and hepatic involvement, and 4 (8%) had a three levels involvement. Caval occlusion was found in 8 patients (15%) and associated arterial disease in 13 patients (25%). Solid organ invasion was present in 66% of cases (n=35) The median time from diagnosis to surgery was 168 days (range: 13-359). Indications for caval surgery were tumor invasion in 43 cases (81%), isolated thrombus in 4 cases (8%) and thrombus associated with invasion in 7 cases (13%); information was lacking for 2 patients. Reconstruction consisted of cavo-caval bypass in 41 cases, associated with cavo-renal bypass in 8 patients (predominantly with ringed ePTFE), cavo-bi-iliac bypass in one case, and 5 partial reconstructions. Six patients required complete resection of the IVC. Among the 31 patients (58%) with malignancy, 28% had leiomyosarcoma; other etiologies included renal tumors, testicular tumors, cholangiocarcinoma, melanoma, and other sarcomas. 30-day mortality involved two patients, and 3-year overall survival was 68%. Postoperative anticoagulation with vitamin K antagonist or direct oral anticoagulant was prescribed in all patients and primary patency was 66% (n=35).
Conclusion: Oncovascular resections of IVC with venous reconstruction are feasible in expert centers with results in agreement with current Delphi consensus recommendations; extended follow-up is needed to assess long-term patency and survival.

Long-term experience of arteriovenous fistula surgery in pediatric patients undergoing hemodialysis in a single center

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Objectives: Vascular access and the creation of arteriovenous fistula (AVF) are still challenges in pediatric hemodialysis. This single center, retrospective study reports 20 years of experience in the creation and monitoring of AVFs in children.
Material and methods: An analysis of the data and results of children in which an AVF was created between 2006 and 2025 was conducted. Each patient had preoperative ultrasound vascular mapping. Distal AVFs were preferred as 1st-line access when possible. Demographic data, surgical data, and early and late complications were collected. Patencies were calculated according to the Kaplan-Meier method. Continuous variables were described by their median [interquartile and range (IQR)].
Results: 47 first AVFs were created in 47 children (21 females; age: 12 years [10-14]; weight: 25 kg [15-46]). Baseline nephropathies were malformative uropathies (14 cases), glomerulopathies (10 cases), genetic ciliopathy (8 cases), primary hyperoxaluria and hyperoxaluria of unknown origin in 4 cases, respectively. 37 AVFs (78%) were distal. No grafts or transpositions were used. A basilic superficialization was carried out in 2 cases. The maturation time was 86 days [35-120]. 13 children were receiving dialysis prior to the use of their AVF. No children died during the follow-up (31 months

[22-47]; age at end of follow-up: 15 years [12-16]). The average flow rate was 1300 mL/min [1000-1500] (distal AVFs: 1300 mL/min [1000-1500]; proximal AVFs: 1300 mL/min [925-1500]). Complications occurred in 38 (80%) children and were venous stenoses (57%), thromboses (51%), high-flow AVFs (8%), aneurysms (4%) and vascular steal (2%). Interventions included venous PTA (n=14), thrombectomy (n=9) and surgical repair (n=3). One-year primary, assisted primary and secondary patencies were 65%, 65% and 94%, respectively. 38 children (80%) were transplanted (mean waiting time 14 months [9-25]). 12 AVFs were scheduled for closure (average time 15 months [11-22]); 11 AVFs spontaneously thrombosed after transplantation (average time 12 months [7-19]).
Conclusion: The creation of an AVF for hemodialysis in children is a safe and effective vascular access strategy, compared to the data on catheter vascular access. When possible, AVF remains the preferred option for children over the long term. Regular monitoring is required.

Evaluation of the rate of utilization of arteriovenous fistulas: An observational study
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Objectives: In patients with severe chronic renal insufficiency, arteriovenous fistula (AVF) creation prior to initiation of dialysis is indicated. This procedure, although often performed under locoregional anesthesia in outpatient surgery, can have complications and represents a healthcare expense. Because the worsening of kidney function is not linear, we looked at the proportion of created AVFs that was never used and studied the reasons for non-use.
Material and methods: This was a retrospective single center observational study. All patients who had AVF creation between 2018 and 2024 were enrolled and categorized into two categories: used AVFs and never-used AVFs. AVFs were considered as used when they were effectively used at least once for a dialysis session. By definition, an AVF was considered distal when it was located below the elbow fold. We analyzed the reasons why an AVF was never used during the follow-up of patients using the Kaplan Meier method.
Results: 439 patients were enrolled with the creation of 336 distal (76.5%) and 103 proximal (23.5%) AVFs. 42% of patients were already on dialysis before their fistula was created. With a median follow-up of 24 months [16-36], 324 AVFs (73.8%) were used while 110 patients (25.1%) were never on dialysis on their AVF. This lack of use of the AVF was explained in 12 patients (11%) who were a posteriori considered too fragile or who died before maturation of their AVF, and 7 patients (6.3%) who were transplanted before maturation of the AVF. 45 patients (40.9%) never required dialysis while 46 patients (41.8%) had a fistula whose development never allowed the performance of a dialysis session whereas the patients needed it.
Conclusion: Over a 2-year follow-up, more than 25% of patients were never dialyzed on their AVF. The two main reasons were the absence of dialysis criteria and AVF dysfunction. However, 11% of patients were considered too frail or died before dialysis. These findings emphasize the need to refine the criteria for selecting patients for the creation of an AVF, notably by improving preoperative multidisciplinary consultation for frail patients and improving tools for predicting the decline of kidney function.

Influence of a new anatomical characterization of the nutcracker syndrome on the technical modalities of surgical treatment
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Objectives: Left renal vein (LRV) transposition is a common intervention to treat nutcracker syndrome (NCS). Two pathological anatomies are distinguished: pure compression by the superior mesenteric artery (SMA) and a LRV vein stretching effect by the lumbar spine, a potential cause of failure of a simple transposition without elongation by a saphenous collar. With the experience acquired, the demonstration of this stretch led to a lengthening plasty, which was initially not planned. Our objective was to assess the incidence of NC stretch and the impact of this plasty on transposition patency.
Material and methods: Retrospective review of all patients operated in our center by robotic-assisted transposition of the LRV for NCS between February 2022 and September 2025. Stretch NCS was defined by a straight, flattened and tensioned LRV demonstrated on the CT scan and intraoperatively without actual compression by the SMA. In case of confirmed stretch, an elongation plasty of the LRV using a saphenous collar was associated with the transposition. For each patient, the preoperative

angio-CT and the peroperative videos were re-analyzed to distinguish between stretch and compression forms.
Results: Twenty-four surgeries were performed, and four were excluded for absence of preoperative scan and video. A total of 18 CT-scans and 14 videos were analyzed retrospectively and showed 4 cases of stretch NCS, either isolated or with moderate pinching, and 14 compressions without stretch which were treated by transposition of the VRG without saphenous collar with a satisfactory ultrasound patency with an average follow-up of 26 months. Only one simple angioplasty was needed at postoperative day 5. Of the 4 stretch NCS, two cases suspected pre- and intraoperatively had a tubular saphenous collar elongation, which was patent at follow-up. The other two cases were defined as stretch a posteriori and did not benefit from an elongation collar. LVV thrombosis occurred at one month, with failure of endovascular attempts to recanalize, requiring renal autotransplantation in one case and left ovarian vein transposition in the other.
Conclusion: Stretch NCS is a mechanism distinct from pure compressive forms. Preoperative diagnosis is required to associate an elongation technique with the robot-assisted LRV transposition.

Treatment of the nutcracker syndrome by transposition of the left gonadal vein: Results from a single center cohort of 79 patients
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Objectives: Nutcracker syndrome (NCS) results from compression of the left renal vein (LRV), leading to venous hypertension and the development of collateral vessels including the left gonadal vein (LGV). LGV transposition uses this dilated collateral pathway to decompress the LRV without prosthetic material. The aim of this study was to evaluate the efficacy and safety of this technique.
Material and methods: All consecutive patients who underwent LGV transposition for symptomatic NCS between January 2018 and December 2024 were analyzed retrospectively. Inclusion criteria were symptomatic NCS with LGV ≥6 mm in diameter, documented reflux on imaging studies, and pressure measurement. The primary endpoints were clinical improvement at 6 months and perioperative complications. Secondary endpoint was 12-month primary patency.
Results: Seventy-nine patients (97% women, median age 42 years [37-51]) underwent LGV transposition. Symptoms included pelvic congestion syndrome (n=54, 68%), left flank pain (n=19, 24%), and gross hematuria (n=6, 8%). NCS was anterior in 90% of cases. Anastomosis was done on the common iliac vein in 85% of cases, the external iliac vein in 14%, and the inferior vena cava in 1%. The median duration of hospitalization was 3 days [2-5]. The overall complication rate was 12%: hematoma requiring drainage (5%), LGV thrombosis (5%) and deep vein thrombosis (2%). Complete resolution of symptoms was achieved in 78% of patients for flank pain, 74% for pelvic congestion, 83% for hematuria, and 82% for varicose veins. Multiparous women had better results compared to nulliparous women (85% vs 64% for complete resolution, p=0.03). After an average follow-up of 18 ± 12 months, the primary patency was 94%.
Conclusion: LGV transposition is a safe and effective technique for treating carefully selected NCS patients with an acceptable morbidity and an excellent long-term patency. Success critically depends on appropriate patient selection, with optimal results in multiparous women with a LGV diameter ≥6 mm.

Predictive machine learning models for estimating 30-day outcomes after a superficial venous insufficiency procedure
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Objectives: The treatment of superficial venous insufficiency may be associated with postoperative complications and pain, which may affect patient satisfaction. Early identification of patients at higher risk of complications could allow for tailoring of postoperative management. The aim of this study was to develop machine learning models that can predict 30-day outcomes in patients undergoing superficial venous insufficiency surgery.
Material and methods: A prospective vascular registry database (Qualivein) was analyzed from January 2014 to February 2024 to identify patients who were treated for superficial vein insufficiency in France. Data collected included clinical and procedural characteristics, as well as outcomes (pain, physical capacity, postoperative complications) during the 30-day follow-up. After transformation of the variables, an XG-Boost model was used to predict postoperative outcomes. The dataset was randomly

divided into a training (50%) and a test (50%) set, and four balancing methods were evaluated.
Results: A total of 4219 patients were enrolled (mean age: 54 ± 13 years; 34.0% male). The average pain score at 30 days was 0.52 ± 1.45, the physical capacity score was 8.96 ± 2.50, and postoperative complications occurred in 181 patients (4.3%). The best performing model predicted the occurrence of a painful rebound in the short and medium term, with an accuracy of 0.824 ± 0.011 and 0.954 ± 0.005, respectively. The model achieved an accuracy of 0.844 ± 0.009 to predict the time to recovery of full physical capacity, with a sensitivity of 0.847 ± 0.009 and a positive predictive value of 0.852 ± 0.0008. Postoperative complications at 30 days were predicted with an accuracy of 0.933 ± 0.007.
Conclusion: The machine learning model demonstrated good performance in predicting postoperative 30-day outcomes after venous surgery, including the occurrence of complications, pain and the time required to regain optimal physical capacity.

Rotarex in real practice: Performance and limitations in acute lower limb ischemia
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Objectives: With the advances of endovascular techniques, percutaneous mechanical thrombectomy systems were developed to manage acute ischemia. The objective of this study was to evaluate the efficacy and safety of the Rotarex mechanical rotational thrombectomy system in the treatment of acute lower limb ischemia.
Material and methods: A retrospective single center analysis of clinical data from patients with acute ischemia treated with Rotarex between June 2022 and October 2025 was performed. The primary endpoint was limb salvage. Analysis of secondary endpoints included technical success, mortality, primary patency, and lack of revascularization.
Results: 34 patients were enrolled, of which 26 (76%) were Rutherford 1 and 8 (24%) were Rutherford 2A. Seven patients presented the occlusion of a native artery (20.5%) and 27 (79.5%) an intra-stent occlusion (Tosaka III). The median age was 66.5 years. Femoropopliteal location was the most common (30, 88%). The procedure was performed under local anesthesia in 82% of cases with contralateral retrograde femoral access in 65% of patients. Technical success was 91% (two thrombectomy failures and one distal embolism). One-year mortality and limb salvage rates were 6%. We report a one-year re-intervention rate of 38% (28.5% for native artery ischemia and 48% for intra-stent occlusion).
Conclusion: The Rotarex system is effective and safe for treating acute lower limb ischemia, with a high rate of technical success and an excellent one-year limb salvage rate. However, the re-intervention rate remains notable, highlighting the need for close monitoring and further studies.

Stent or Not to Stent? 24-month results after intravascular lithotripsy of the femoral bifurcation
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Objectives: Endovascular therapy developed as an alternative to conventional surgery to revascularize the femoral tripod. However, there are few comparative data on different strategies for endovascular revascularization of the femoral bifurcation. In this study, we compared the results of a stent-free strategy (Group A) with a stent-preferred strategy (Group B), after optimal lesion preparation using intravascular lithotripsy.
Material and methods: This was a retrospective, multicenter, European study that enrolled all patients with symptomatic lesions of the femoral bifurcation treated with intravascular lithotripsy and drug coated balloon or stent. The primary endpoint was primary clinical improvement. Primary patency, lack of target lesion revascularization (LTR), and mortality were also analyzed.
Results: 126 patients were enrolled (group A=82, group B=44). Demographics were comparable between the 2 groups. The lesion characteristics were comparable except for the rates of severe calcification (37% vs 91%, $p<0.001$) and occlusion (6% vs 45%, $p<0.001$). The average duration of follow-up was 19 months in group A and 13 months in group B. At last follow-up, the primary clinical improvement was 73% in group A and 91% in group B ($p=0.02$). At 24 months, the stent group had better primary patency (A:72% vs. B:92%, $p=0.12$) and a lower re-intervention rate (A:17% vs. B:3%, $p=0.16$) but this difference was not significant.
Conclusion: Despite more complex lesions in the stenting group, this group showed better clinical and arteriographic results at 24 months. These differences suggest a potential advantage of stents in

complex and severe femoral bifurcation lesions.

Balloon angioplasty with stenting or atherectomy with balloon-coated angioplasty in the endovascular treatment of common femoral artery lesions

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Objectives: Endovascular treatment of the common femoral artery (CFA) and its bifurcation is an alternative to surgical endarterectomy, with two main strategies: balloon angioplasty followed by stenting versus atherectomy associated with drug-coated balloon angioplasty (DCB). The optimal endovascular approach remains to be defined. The objective of this study was to evaluate the outcomes of these two strategies.
Material and methods: This retrospective single center study included consecutive patients with symptomatic CFA atheromatous stenosis requiring endovascular therapy between January 2016 and January 2024. Patients were stratified by treatment approach. The primary endpoint was twelve-month primary patency, defined as a maximum systolic velocity ratio ≤2.4 by Doppler ultrasound in the absence of target lesion revascularization. Secondary endpoints included lack of target lesion revascularization (LTR), technical success, and clinical improvement.
Results: 134 limbs from 138 patients were included in the final analysis: 39 in the atherectomy + DCB group and 95 in the single balloon angioplasty (POBA) + stenting group. Baseline demographic and clinical characteristics were comparable between the groups, with a mean age of 74 ± 8 years for atherectomy + DCB and 72 ± 8 years for stenting (p=0.14). Technical success was 89.2% in the atherectomy + DCB group versus 92.3% in the stenting group (p=0.52). 12-month primary patency rates were similar: 79.5% for atherectomy + DCB versus 78.7% for stenting (p=0.71). The absence of TLR was 92.3% and 85.3%, respectively (p=0.56). A bail-out stenting was needed in 10% of atherectomy cases, while stent fractures were observed in 5.3% of patients in the stenting group.
Conclusion: Atherectomy associated with drug-coated balloon angioplasty and stenting after POBA show similar results at 12 months for CFA lesions. Both of these strategies are viable endovascular options. Multicenter randomized trials are needed to establish the optimal treatment strategy.

Impact of paclitaxel-coated devices on isolated femoropopliteal and infrapopliteal endovascular revascularizations for critical ischemia: insights from the SWEDEPAD 1 Trial

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Objectives: In the Swedish Drug-Elution Trial in Peripheral Arterial Disease 1 (SWEDEPAD 1) study, the use of Paclitaxel-coated devices (PCDs) during infrainguinal endovascular revascularization for critical ischemia did not improve limb salvage compared to bare stents. The target vessel re-intervention rate was lower in the first year with PCDs (HR 0.81; 95% CI 0.66 - 0.98), but this difference was not maintained over time. The objective of this subgroup analysis of SWEDEPAD 1 was to determine the clinical impact of PCDs vs bare stents in the treatment of isolated femoropopliteal and infrapopliteal lesions.
Material and Methods: This study was a pre-specified subgroup analysis of SWEDEPAD 1, a randomized, pragmatic, multicenter clinical trial comparing the use of PCDs to bare devices in infrainguinal endovascular revascularization for critical ischemia Rutherford 4-6. All patients who had isolated treatment of the femoropopliteal or infrapopliteal segment were included, those treated in both segments were excluded. This analysis targeted the rates of major amputation and target vessel reintervention at 1 year, 5 years and up to 10 years of follow-up. Variables were analyzed using the Kaplan-Meier method and fitted with a Cox model.
Results: 1778 patients were enrolled of which 1241 were treated in the femoropopliteal segment only and 537 in the infrapopliteal segment only. PCDs did not reduce the rate of major amputation over the entire follow-up in the femoropopliteal or infrapopliteal segments. PCDs induced a reduction in the target vessel reintervention rate in the femoropopliteal segment in the first year (HR 0.74, 95%CI 0.56-0.96), in contrast to the infrapopliteal segment (HR 1.04, 95%CI 0.67-1.62). Treatment heterogeneity testing revealed no significant interaction between treatment and vascular segment subgroups at 1 year (p=0.19), 5 years (p=0.41) or at the end of the available follow-up period (p=0.49).
Conclusion: This subgroup analysis of SWEDEPAD 1 showed a comparable limb salvage rate with PCDs and bare devices regardless of the treated segment. The target vessel re-intervention rate during

the first year was reduced by the use of PCDs only in the femoropopliteal segment.

Endovascular treatment of peripheral occlusive lesions by distal isolated puncture (TAMI)
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Objectives: Retrograde distal percutaneous puncture is traditionally reserved for complex femoropopliteal lesions as an adjunct to anterograde puncture. However, its isolated use ("TAMI" technique) could reduce the morbidity linked to the puncture site, in particular since the advent of thin wall introducers. The objective of this study was to evaluate the results of the TAMI procedures performed in our center.
Material and methods: Retrospective single center study including patients treated with TAMI between August 2019 and April 2025. Indications were based on proximal approach constraints (obesity, hostile scarpa, difficult crossover, disorders of hemostasis), and on the morphology of the occlusions according to the C-TOP classification, and the inability to maintain strict supine behavior. The puncture was performed under ultrasound guidance on arterial axes ≥ 1.5 mm, preferably at the posterior tibial level. At the end of the operation, a 10-min manual compression was carried out. Distal puncture failures were excluded from follow-up. Two periods were analyzed: August 2019-May 2023 (before the "thin wall" introducers) and June 2023-April 2025 (systematic use).
Results: Out of 80 planned procedures, one punction failed due to major calcifications. The lesions were femoropopliteal in 77 cases with 42 (57%) occlusions, associated with leg lesions (N=11) or iliofemoral lesions (N=9). 33 limbs (42%) presented with critical ischemia and 48 (61%) had a hostile proximal approach. The majority of procedures were ambulatory (N=73, 92%) and performed under potentiated local anesthesia (N=65, 82%). The puncture was posterior tibial in 70 cases. At one month, one occlusion and one dissection of the punctured site were observed. The lesion crossing rate was 95%, and increased to 100% with proximal puncture. Femoropopliteal stenting (predominantly with 4F introducers) predominated in the first period (N=32/40). Thereafter, the use of active balloons, through thin wall introducers, predominated (N=34/37) with less stenting (N=17/37). The 6- and 12-month primary patency rates were 88% [78-100] and 69% [54-87] in the first period, versus 88% [78-100] in the second period.
Conclusion: This study confirmed the efficacy and safety of the TAMI technique. The advent of smaller introducers and devices expands its indications and allows the use of most femoral approach tools.

Carotid surgery in Mauritania. A reassuring preliminary experience in a context of epidemiological and climate transitions
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Objectives: Sub-Saharan Africa is undergoing a major epidemiological transition to cardiovascular disease, including stroke. Substantial vascular surgical activity is required to support the needs of the population. We report the first experience of carotid surgery in Mauritania and its relevance in a context of limited resources.
Material and methods: Retrospective single center study including all patients operated between January 2020 and December 2024. Indications were severe symptomatic carotid stenosis, confirmed by Doppler ultrasonography and CT angiography. Clinical, lesional, operative, and 30-day complications data were collected, with clinical and ultrasound follow-up when available.
Results: Forty-two patients (71% males, mean age 64 years) underwent surgery. More than half lived more than 300 km from Nouakchott. All had symptomatic lesions (26 TIAs, 16 strokes) with >70% stenosis. The time between symptoms and surgery ranged from 3 to 365 days (median 60 days). Only 2 patients underwent surgery within 2 weeks. Locoregional anesthesia was used in 71% of the cases. The surgical technique included 2 eversions (4.8%) and 40 conventional CEAs (18 patches, 22 direct sutures). Median clamping time was 25 minutes. At 30 days, one stroke by ipsilateral carotid occlusion and one TIA were observed, resulting in a stroke/death rate of 4.8% without other major complications.
Conclusion: Despite major logistical, human and material constraints, this nascent carotid surgery experience reports encouraging results, consistent with the recommendations. Frequent use of locoregional anesthesia is highly relevant, with lower costs and carbon emission. These data, collected in connection with the PANAVASC program of "La Chaîne de l'Espoir", alert to the urgent need to

develop structured vascular surgery and training programs in West Africa.

Carotid shunting in presence of contralateral occlusion: a real utility or surgical reflex?
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Objectives: In patients with contralateral carotid occlusion, carotid endarterectomy is potentially associated with an increased risk of intraoperative cerebral hypoperfusion. The purpose of using a shunt is to ensure continuous cerebral blood flow during clamping. However, the benefit of this strategy is still under discussion.
Material and methods: We conducted a retrospective bicentric study including patients operated between September 2017 and July 2025 for carotid stenosis with contralateral carotid occlusion. Patients were divided into two groups based on intra-operative shunt use. The primary endpoint was the occurrence of a neurological event after revascularization. Secondary endpoints included primary patency, re-intervention rate, and mortality.
Results: A total of 54 patients were enrolled (31 operated on with shunt and 23 without shunt). The median age was 72 years and the mean follow-up time was 27 months. Stenoses were symptomatic in 31% of cases. Regarding 1-month neurological complications, we observed one stroke and 2 TIAs in the shunt group and one TIA in the non-shunt group (p=0.83). The operating time was significantly longer for the shunt vs. non-shunt group (95.2 ± 29 min vs 77.5 ± 28 min; P=0.02). At last follow-up, there were no differences between the 2 groups in terms of neurological events (one case in the shunt group, p=1), restenosis (4 cases in the shunt group vs 3 in the non-shunt group, p=1), reintervention (one in the shunt group), and mortality (4 in the shunt group, p=1).
Conclusion: In this set of patients with contralateral carotid occlusion, the use of an intraoperative shunt was not associated with a reduction in neurological complications, nor with a significant difference in restenosis and mortality. These results suggest that shunting should not be routinely used to treat carotid artery lesions with contralateral occlusion.

CASSIS (Carotid Artery Stenting Simulation Study): How to improve carotid angioplasty with a numeric twin?
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Objectives: Carotid stenting is a well-established alternative to conventional carotid endarterectomy. However, an important limitation of this technique is the lack of a reliable predictive tool for predicting the mechanical behavior of stents in carotid anatomy. Inappropriate stent selection may result in suboptimal perioperative outcomes or in-stent restenosis. As a result, an assisted planning of carotid stenting by digital twin, using Acculink or X-act Abbott stents (Abbott Cardiovascular, Plymouth, MN, USA), was developed and validated. The objective of the Carotid Artery Stenting Simulation Study (CASSIS) was to clinically validate the digital twin and assess its impact on the planning of carotid angioplasty procedures.
Material and Methods: Two retrospective groups of patients undergoing carotid angioplasty with Abbott stents were selected: Group 1 (validation; N=18) and Group 2 (impact; N=20). In Group 1, numerical twin validation was performed by comparing the mean cross-sectional diameters of the simulated stents with those measured on the postoperative scanner. Group 2 patients were treated in four high-volume centers. Each investigator evaluated 5 preoperative scans from another center. The distal landing zone in the internal carotid artery and the initial choice of the stent were determined according to the conventional method (sizing 1). For all patients, a virtual deployment of all stents at this landing zone was performed. The results of the simulations were then reviewed by each investigator, who adjusted the sizing if necessary (sizing 2). The degree of correspondence between sizing 1 and sizing 2 was evaluated according to the characteristics of the stents (model, length, proximal and distal diameters). The match was considered perfect if all the characteristics were identical, null if none matched, and partial if at least one characteristic differed.
Results: In group 1, the absolute mean deviation (AMD) in diameters between the digital twin and the postoperative scan was 7.3 ± 3.0%, without significant difference. In Group 2, all simulations were performed successfully. A perfect match between initial sizing and revised sizing was observed in only 10% of the cases, with the operators having virtually modified their choice of stent according to the digital twin in 90% of the cases.

Conclusion: This preliminary study validated the feasibility of using a digital twin for carotid stenting planning. Its impact is significant, since the choice of stent was modified in 90% of the cases by trained operators. Prospective studies are needed to evaluate the clinical performance of digital twin-assisted planning, including CMMR and restenosis

Benefit of routine control arteriography during carotid thromboendarterectomy
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Objectives: The usefulness of routine control arteriography is discussed. The objective of this work was to assess the incidence and nature of abnormalities on control arteriography.
Material and methods: This single center retrospective analysis included all the patients who had CEA between January 2021 and December 2024. Collected data included the satisfactory or unsatisfactory results of the arteriographic control and the location and type of lesions found. The rate of post-operative neurological events was compared between patients who had an additional procedure following quality control and those for whom control images were satisfactory.
Results: 324 carotid artery surgeries were performed in 310 patients (73% males; mean age 70 years) for internal carotid artery (ICA) stenosis (55% symptomatic; 45% asymptomatic; 198 patch closures (61%); 55 direct sutures (17%); 43 eversions (13.4%); and 28 bypass grafts (8.6%). The average duration of surgery was 136 minutes. Arteriography showed an abnormality in 52 procedures (16%). 78% of the abnormalities were observed with patch closure, 10% with direct suture, 8% with eversion, and 4% with bypass. The lesions involved the ICA in 54% of cases (10 residual stenoses, 7 plications, 5 intimal flaps, 4 spasms and 2 clamp lesions), the ECA in 40% of cases (10 intimal flaps, 10 thromboses and one plication) and the CCA in 6% of cases (2 clamp lesions and 1 dissection). Immediate surgical revision was performed in 42 cases. 30-day mortality was less than 1%. The 30-day CRMM rate was 3.1% (4% for symptomatic stenoses and 2% for asymptomatic stenoses). No complications related to the arteriography occurred. There were significantly no more postoperative neurological events in patients who had an additional procedure following arteriography (9.5% vs 4.6% in patients with satisfactory arteriography; p=0.25).
Conclusion: Control arteriography very slightly increases the duration of the intervention and allows to detect frequent lesions at risk of serious complications. Complications of arteriography are extremely rare, and it allows immediate surgery.

Outcomes and morbidity of various subclavian artery revascularization techniques: transposition, bypass grafting and stenting
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Objectives: Subclavian artery (SCA) revascularization is indicated either in symptomatic atherosclerotic occlusive disease (AOD) or as part of prophylactic debranching prior to TEVAR (AD). Traditional surgical techniques - carotid-subclavian transposition (CST) and carotid-subclavian bypass grafting (CSB) - offer excellent long-term patency, but at the cost of significant local and nerve morbidity. Endovascular strategies, including stenting, were developed as less invasive alternatives. Current recommendations call for left subclavian artery revascularization during TEVAR when SCA coverage is required, but do not specify which technique should be preferred, leaving the choice to the operator. In this context, comparative data on results according to the revascularization technique remain limited. In this work, we compare the results of the three main techniques of subclavian artery revascularization (carotid-subclavian transposition (CST), carotid-subclavian bypass grafting (CSB) and stenting) by evaluating patency, neurological morbidity and mortality according to the surgical indication divided into 2 groups: atheromatous occlusive disease (AOD) or prophylactic disconnection before TEVAR (AD).
Material and methods: Retrospective single center study including 137 patients operated between 2010 and 2024: 66 CSTs, 37 CSBs and 34 stentings. Clinical features, postoperative complications, 30-day mortality, and primary patency were analyzed. A univariate analysis looked for factors associated with the risk of stroke and/or death.
Results: Primary patency was 100% at 12 months and 96.9% at 24 months (CST 100%, CSB 93.8%, stenting 100%; p=0.214). Two occlusions were observed during follow-up, both in the CSB group. At 30 days, the combined rate of stroke/TIA and/or death was 6.1% (CST 4.8%, CSB 11.4%, stenting 3.1%; p=0.397). Horner syndrome was significantly more common after CST (25.4% vs 6.7%; p=0.045) but regressive. Recurrent paralysis was observed in 16.9% of patients, with no statistical difference between

techniques. In univariate analysis, AOD was associated with an increased risk of stroke and/or early death compared to AD (HR 0.12 favoring AD; p=0.047). The operative duration significantly increased the risk of neurological complications (HR 1.48 per hour; p < 0.001). The type of revascularization was not a predictor of event.
Conclusion: Revascularization of SCA provides excellent short- and mid-term patencies, regardless of the technique used. CST appears to be the most durable, at the cost of local complications that are essentially minor. Neurologic morbidity appears to be primarily related to the complexity of the associated aortic procedures rather than to the revascularization technique itself. The expansion of endovascular strategies could strengthen the role of these procedures, especially for prophylactic revascularizations before TEVAR.

Spinal cord protection strategy without lumbar drainage in thoracic and thoracic-abdominal open aortic surgery based on spinal perfusion preservation
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Objectives: Open surgery of aneurysms of the descending thoracic aorta and thoracoabdominal aorta is complicated by a mortality rate of 9% and a permanent paraplegia rate of about 8%. Prophylactic lumbar drainage is recommended for these procedures (Class 2a Level B; ESVS 2017) with recent questions about this practice (Ann Thor Surg, 2025, 120:302). With this in mind, we propose to explain our operating strategy without lumbar drainage, based on an aggressive attitude of reimplantation of the intercostal arteries guided by the preoperative angiographic localization of the Adamkiewicz artery (ADK) and associated with the use of arterial perfusion techniques to limit ischemia.
Material and methods: Retrospective single center study of 69 cases operated between 2006 and 2025, with a mean age of 60 ± 12 years. Aneurysms: Thoracic 23 (33%), TAA I 17 (25%), TAA II 6 (9%), TAA III 23 (33%). The cause of aneurysm was atheroma 52%, dissection 46%, and other 2%. History of cardiac surgery was noted in 25% of cases. Approach: thoracotomy 22 (32%), combined with phrenotomy 47 (68%). Assistance: femoral distal perfusion (ECC) 54, inert shunt 9, unassisted 6. ADK was investigated in 61 cases (88%) and identified in 40/61 (66%). In 34/40, the ADK originated in the affected area and was reimplanted. In 6/40 ADK was out of the aneurysm segment. Without identified ADK 18/21 received reimplantation of intercostals that were patent during surgery. A total of 61 patients had at least one reimplantation: ADK alone (5), nonspecific intercostals (27) or ADK and nonspecific intercostals (29).
Results: Paraplegia was observed in 2.9% of cases (2/69), and stroke in 4.3% (3/69). Intra-hospital mortality was 7.2% (5/69). Respiratory complications (ARDS, atelectasis, reintubation, pneumonia, NIV/HFO) occurred in 68% of cases (47/69). AKI occurred in 18/69 patients (26%) (KDIGO 2, 10/69; 3, 14/69). Intra-hospital reinterventions were needed in 17% of cases (12/69).
Conclusion: An aggressive intercostal artery reimplantation strategy, targeted on ADK but not exclusively, without lumbar drainage, resulted in a low paraplegia rate.

Short- and mid-term results of TEVAR to treat descending thoracic aortic and thoracoabdominal lesions in real French population
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Objectives: TEVAR is the gold standard for aneurysms, dissections and traumatic ruptures. However, real-life outcomes in an unselected population remain limited. This study aimed to evaluate the short- and mid-term results of the TEVARs carried out in France in real life over a period of six years, for all aortic pathologies.
Material and methods: Based on a retrospective observational study from the national PMSI database, all patients who received TEVAR between January 2018 and December 2023 were identified via LPPR codes of procedures. Patients were enrolled if the procedure was associated with any of the following: DGLF003 “Endovascular Thoracic Covered Stent Graft Insertion” or DGLF012 “Implantation of a fenestrated or branched stentgraft for complex aneurysm”. The operative indication, demographics, early complications, five-year mortality, and aortic reinterventions were analyzed by Kaplan-Meier.
Results: A total of 5,527 patients were enrolled: 49% treated for aneurysm, 34% for dissection, 15% for traumatic rupture (2% unclassifiable). Of these, 91.9% received isolated thoracic TEVAR and 8.1% received a concomitant thoracoabdominal stent. For aneurysms, dissections, and traumatic ruptures,

the mean age was 71.2 ± 10, 64.7 ± 12, and 56.2 ± 20 years, respectively. The median duration of hospitalization was 7, 11 and 14.5 days. 30-day mortality rates were 7.4%, 7.2% and 15.5%, respectively. complications occurred in 12.8%, 12.7% and 19.2% of patients. At five years, mortality was 29.7%, 21.3%, and 30.9% for aneurysms, dissections, and traumatic ruptures, respectively. Aortic reinterventions were needed in 26.0%, 34.4%, and 16.2% of patients, respectively. Endovascular re-operations accounted for 16.1%, 20.2% and 8.6%, while surgical conversions were 11.3%, 18.4% and 8.7% respectively.
Conclusion: This national study confirms the safety of TEVAR in thoracic and thoracoabdominal aortic diseases in routine practice. Despite acceptable early mortality, neurological complications remain a concern, affecting up to one in five patients after rupture. The 5-year cumulative mortality and reintervention rates underscore the need for structured follow-up and long-term surveillance.

Evaluation of the STABILISE technique using a standard large-diameter nitinol stent
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Objectives: The STABILISE technique (Stent Assisted Balloon Induced Intimal Disruption and Relamination in Aortic Dissection Repair) for the endovascular treatment of acute B-type aortic dissections (TBAAD) was described with a dedicated bare aortic stent. Our objective was to report the mid-term results of this technique performed with a standard nitinol stent.
Material and methods: This was a retrospective single center study of 21 patients (19 males, mean age 62 ± 11 years) treated for complicated TBAAD (malperfusion (N=11) or rupture (N=1)), or with predictive criteria for aneurysmal evolution (N=9) between 2018 and 2025. All patients underwent closure of the entry point with a Gore® C-TAG active control stentgraft, associated with a thoracoabdominal aortic remodeling induced by a compliant balloon after placement of a bare OptiMed® Sinus XL nitinol stent.
Results: The mean treatment time was 37±25 days. Disbranching of the supra-aortic trunks was carried out in 15 cases (71%). Sixteen patients (76%) required concomitant renal (N=14) and/or gastrointestinal (N=3) artery stenting. CSF drainage was placed prophylactically in 12 cases (57%). There were no intraoperative complications or in-hospital mortality. The incidence of stroke, visceral ischemia and spinal cord ischemia at 30 days was 4% (N=1), 0% and 0%, respectively. At a median follow-up of 36 months (range 2-89 months), two patients (9%) required reintervention. One renal stent thrombosis was observed. One-year and three-year primary patency rates of visceral stents were 94% and 82%, respectively. Aortic mortality was 5% (N=1). Thrombosis rates of the false lumen at the level of the covered stent, of the bare stent, and of the distal abdominal aorta were 100%, 90% (N=19), and 33% (N=7), respectively. The external diameter of the distal abdominal aorta increased (> 5 mm) in two (9%) patients. The mean change in maximum external aortic diameter was -4 ± 8 mm.
Conclusion: These results suggest that the STABILISE technique using a standard nitinol stent is safe and reproducible. Visceral stents and visceral arteries are kept patent. Recanalization of the distal aorta below the treated area remains a weakness. Further studies are needed to confirm these data.

Long-term follow-up of patients with type A dissection surgery in an aortic center: Early treatment is associated with a better anatomical result
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Objectives: Persistence of residual aortic dissection (RD) is common after surgery for type A dissection (TAAAD). The aim of this study was to analyze the long-term evolution of patients operated for TAAAD in an expert center, and to evaluate the impact of the DR.
Material and methods: All patients who underwent TAAAD surgery in our center between January 2017 and December 2024 were included. The primary endpoint was long-term mortality. Secondary endpoints included perioperative mortality, aneurysm progression rate, reintervention rate, results of hybrid and endovascular reinterventions (morbidity-mortality, aortic remodeling, endoleaks, aneurysm progression).
Results: Among 504 patients with type A dissection surgery, in-hospital mortality was 13% (68/504) and 11% (56/504) were lost to follow-up. Of the 380 patients followed up, 261 had a RD (68%), 159 (41%) had aneurysms, and 74 (19%) were reoperated, mainly for diameter increases. RD (OR = 60.3 [95% CI: 18.6-195.8]; $p < 0.01$) and Marfan syndrome (OR = 4.13 [95% CI: 1.16-14.78]; $p < 0.05$) were

independent predictors of aneurysmal evolution. RD (OR=21.3 [95% CI: 5.1-2.7]; p<0.01), Marfan syndrome (OR=2.22 [95% CI: 1.14-4.32]; p<0.05) and bicuspid aortic valve (OR=2.22 [95% CI: 1.14-4.32]; p<0.05) were predictors of reinterventions. In patients with RD, all-cause mortality after a mean follow-up of 36.5 ± 24 months was 5.4% (14/261) with 1.1% of aortic cause (3/261). The reintervention rate was 27.6% (72/261): 26 TEVAR, 41 hybrid treatments and 10 branched aortic arch stentgrafts. In the hybrid group, mortality and morbidity were 4.8% (2/41) and 14.6% (6/41), respectively. In the branched stentgraft group, no intraoperative deaths or neurological complications were observed, and one late death related to IA endoleak was reported. Favorable remodeling was observed in 70% of patients treated with a branched stentgraft and 75% in the hybrid group. Early reinterventions were associated with better anatomical results (18.2 vs 30.3 months; p=0.02).
Conclusion: The long-term prognosis of patients treated for TAAAD is directly related to the existence of a residual dissection and their genetic status. Close follow-up and protocolization in an expert center can reduce long-term mortality at the cost of early reinterventions.

Treatment of chronic residual type A dissections of the aortic arch with fenestrated stent grafts
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Objectives: To present the results of double fenestrated aortic arch stentgrafts for the treatment of residual type A dissection and dissected supra-aortic trunks (SAT).
Material and methods: All patients treated between 2017 and 2025 with a double fenestrated physician-modified stentgraft (PMEG) for aneurysmal evolution of the aortic arch on a residual type A dissection were retrospectively analyzed. The primary objective was the analysis of aortic and SAT remodeling and ASD according to the dissection status. Secondary objectives were technical success, mortality, and stroke.
Results: Of the 52 patients analyzed, 37 had SAT dissections. 43 had a standard procedure (PMEG with a large window for the BCA and the left common carotid, a small window for the left subclavian artery which will be the only one to be stented), and 9 required complementary SAT stenting. Technical success was 100% (stent deployment and exclusion of aortic dissection). On day 30, 2 patients died after returning home: 1 hemorrhagic stroke, 1 pneumonitis. During the mean follow-up of 21 months (IQR=38.8), there were no Type Ia endoleaks. Six type Ic endoleaks were observed of which 3 were treated. Resolution of the SAT dissection was noted in 15 patients (40%) of whom 11 were treated with the standard procedure. Positive aortic remodeling was observed in 40 patients (76%) with a mean maximum diameter reduction of -1% (IQR: 5.5%). Five patients died during follow-up from non-aortic cause. In the subgroup analysis, positive aortic remodeling was observed in 73% vs. 83% (p = 0.7) in patients with SAT dissection and without dissection, in 83% vs. 92% (p = 1) in those with initially undissected SATs and those who recovered, in 61% vs. 88% (p = 0.07) in patients with residual SATs dissections and others. Patients on curative or dual anticoagulation had a lower rate of positive aortic remodeling.
Conclusion: Double fenestrated stentgrafts are effective to treat residual type A dissections with a high rate of positive aortic remodeling and healing of SATs. Routine stenting of dissected SATs does not appear to be necessary. Residual dissections of TSAs interfere with aortic remodeling and may warrant additional stenting.

Intravascular lithotripsy and need for stenting in isolated popliteal lesions
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Objectives: The aim of this study was to evaluate the feasibility, safety and mid-term outcomes of intravascular lithotripsy (IVL) in isolated massively calcified lesions of the popliteal artery, rare lesions (1% of occlusive lesions of the lower limbs) considered as ‘no-stent zone’.
Material and methods: This was a retrospective single center cohort of 18 consecutive patients in whom IVL was used to treat symptomatic isolated popliteal calcified lesions between 2021 and 2024. IVL was followed by vascular mimetic stent implantation in ≥30% residual stenoses. In other cases, IVL was used in combination with an active balloon. Technical success, patency, target lesion revascularization (TLR), and major adverse limb events (MALE) were collected. Results are presented as a median with inter-quartile range (IQR) and percentages.
Results: The indication for treatment was critical ischemia in 39% of cases. Lesion length was 60 mm

[IQR 55-100], with severe calcification in 72%, and 39% of occlusions. The maximum degree of stenosis was 90% [IQR 90-100]. Crossing of lesions was subintimal in 28% of cases. The luminal gain obtained after IVL was 60%. Intraoperative stenting was required in 39% of cases. The technical success rate was 100%, with no intraoperative complications. The duration of follow-up was 19 months [IQR 8.8-26.6]. According to Kaplan-Meier, both primary patency and TLR rates were 93% at 12 months and 73% at 18 months. During follow-up, MALEs were observed in 22% of cases, including three reoperations in patients treated with IVL plus active balloon during the initial procedure. All reoperations consisted of vascular mimetic stenting of the lesion previously treated with IVL. At the last follow-up, 56% of patients had received a stent in the target lesion.
Conclusion: IVL is an effective and safe preparation tool for isolated popliteal calcified lesions. Given that more than half of patients eventually need stenting, the benefit of IVL as part of a “nothing left behind” strategy remains questionable. Larger scale studies will further refine the role of IVL in this indication.

Prevalence of sarcopenia in a cohort of patients with exertional ischemia
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Objectives: The management of exercise-induced ischemia (EI) is based on optimal medical therapy combined with walking rehabilitation to improve muscle vascularity and functional capacity in order to increase the walking perimeter. Sarcopenia, in which muscular strength, mass, or both, decrease, impairs physical function. Its combination with EI may worsen functional outcome, compromise surgical outcome and improved rehabilitation after surgery (RAS) by increasing cardiovascular morbidity and mortality. Early diagnosis would help identify patients at risk and optimize their management. The objective of this study was to assess the prevalence of sarcopenia in EI.
Material and methods: This was a retrospective single center observational study conducted from January 2019 to November 2024 in a tertiary center. Patients came from the EVALMOB mobility cohort (NCT04375280) and presented a Rutherford stage 2 EI. They volunteered for exercise training. The search for sarcopenia was performed according to the EWGSOP2 consensus: probable in case of impaired muscle strength, confirmed if associated with decreased muscle mass and severe if accompanied by decreased physical capacity.
Results: We enrolled 96 patients (14 women: 14.5%) aged 66±10 years. The most common risk factors were age, gender, hypertension, dyslipidemia and sedentary behavior. The mean BMI was 28.2 ± 4.9 kg/m². Strength was impaired in 23 (23.9%), muscle mass in 46 (47.9%), and functional ability in 31 (32%). A total of 12 (12.5%) cases had probable sarcopenia, 5 (5.2%) cases had confirmed sarcopenia, and 6 (6.2%) cases had severe sarcopenia according to EWGSOP2 consensus.
Conclusion: In our cohort, screening for sarcopenia at the EI stage shows a prevalence of 23.9%. This result is similar to the review by Pizzimenti et al., which found a prevalence of 34.6% on data from populations at all stages of arterial disease. This frequency highlights the value of screening to identify a population at risk of complications and to consider early management with exercise training and nutrition measures. Further studies are needed to validate this physical readiness and integrate it into RAS protocols.

Retrospective multicenter evaluation of cold-preserved saphenous vein allografts in infrainguinal revascularization of symptomatic PAD patients: The « REVAS » project
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Objectives: Despite the development of endovascular techniques, bypass surgery of the digestive arteries remains important. Presence of infectious peritonitis or aneurysms requires an autologous substitute. The greater saphenous vein may be unavailable. The superficial femoral vein (SFV) is an alternative. The primary aim of our study was to assess primary and secondary patency. Analysis of graft degradation by CT scan as well as complications at the sampling site were performed.
Material and methods: From January 2015 to March 2024 all the patients who underwent SFV bypass were enrolled. Demographic characteristics, indications and the involved arteries were identified. Graft patency was studied by CT scan at 3 and 12 months. Analysis of limb morbidity was performed by clinical examination and Doppler ultrasound of the lower extremities.
Results: We enrolled 35 patients with a mean age of 66 years (48-86) including 7 women. Indications for revascularization were infectious aneurysm in 22.9% of cases (n=8), acute mesenteric ischemia in

22.9% (n=8), atheromatous aneurysm in 17% (n=6) chronic mesenteric ischemia in 20% (n=7), neoplastic disease in 8.6% (n=3) and prosthetic infections in 8.6% (n=3). 30-day mortality was 28.6% (10 deaths between 8 and 30 days). Mean duration of follow-up was 21.2 (3-93) months. 3-month and 1-year primary patency rates were 100% and 94.3%, respectively. Secondary patency was 100% at 3 months and 1 year. Two patients required anastomotic stenosis angioplasty at 11 and 12 months. No bypass reinfection was noted. The CT-scan morphological study of the grafts showed an average difference in proximal and distal Δ diameters at 3 months and 1 year of 0.48 (σ 1.01) and 0.06 (σ 1.1), respectively 5 patients experienced deep vein thrombosis including 3 complicated with minor PE and 3 with persistent edema >3 months. Limb circumference measurement showed mean differences in thigh and calf of 1.375 cm (σ 1.64) and 1.21 cm (σ 3.2), respectively.
Conclusion: SFV is an excellent autologous substitute to revascularize the digestive arteries with good 1-year patency rates. It is resistant to infection and is always available. The morbidity of harvesting is acceptable provided that a suitable technique is used.

Treatment of external iliac artery lesions: Multicenter results obtained with covered stents and predictors of reintervention
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Objectives: Covered stents have been shown to improve outcomes in common iliac artery (CIA) occlusive lesions, but data on their use in external iliac arteries (EIA) remain limited. The objective was to evaluate the technical success, long-term patency and predictors of re-intervention after endovascular treatment of EIA occlusive lesions by self-expanding covered stents.
Material and methods: Patients treated for EIA occlusive lesions with Viabahn stents in six centers between 2010 and 2022 were analyzed retrospectively. The primary endpoint was target lesion revascularization-free survival (CD-TLR) at 6, 12 and 24 months. Secondary endpoints included primary patency, major amputation-free survival, and overall survival at the same time points, as well as serious adverse events at 30 days. Kaplan-Meier and Cox models were used to identify predictors of CD-TLR, taking into account intra-patient clustering in case of bilateral treatment or multiple stents implanted in the same EIA.
Results: 183 patients (207 EIAs) were treated with a median follow-up of 23 months [10-24]. At baseline, 45% had claudication and 62% had chronic limb-threatening ischemia (RB4 29%, RB5 21%, RB6 4%). Concomitant procedures were common: CIA stenting in 97 cases (47%), common femoral endarterectomy in 72 (35%), endovascular femoropopliteal revascularization in 44 (22%), and leg bypass in 9 (4%). CD-TLR-free survival was 90.2% at 6 months, 86.3% at 12 months and 81.8% at 24 months. Primary patency loss occurred in 27 EIAs (10.8% at 6 months; 24.2% at 24 months). 12-month major amputation and overall survival rates were 3.4% and 95.7%, respectively. CD-TLR-free survival was better with concomitant CIA stenting (24-month TLR 5.8% vs 30.0%, $p<0.01$). In multivariate analysis, CIA stenting remained protective (HR 0.21, 95% CI 0.08-0.58), while younger age was associated with an increased risk of reintervention. No independent predictors of serious adverse events at 30 days were identified.
Conclusion: Endovascular treatment of EIA with Viabahn stents provides acceptable intermediate outcomes in this high-risk population. Concomitant CIA stenting is a strong protective factor against reintervention, underscoring the importance of downstream bed optimization. Prospective studies are needed to confirm these results and refine patient selection.

Hybrid Operating Room vs. Mobile Arch: An advance in the management of critical ischemia?
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Objectives: Critical limb ischemia (CLI) is associated with a high risk of amputation and mortality. Hybrid operating rooms offer high-resolution imaging and advanced guidance software associated in the literature with optimization of endovascular procedures, but their clinical impact on CLI remains poorly studied. The primary objective of this study was to assess the impact of hybrid room revascularization compared to mobile arch use on survival without major amputation in patients presenting with CLI.
Material and methods: Retrospective single center study including all patients who underwent endovascular revascularization in a hybrid room or with mobile arch for critical ischemia between 2018 and 2022. The primary endpoint was survival without major amputation at 1 year. Secondary endpoints

included overall mortality, wound healing, reoperations, and intraoperative radiation.
Results: 462 patients were enrolled: 301 in the hybrid room group and 161 in the mobile arch fluoroscopy group. Demographic characteristics were comparable and 97.8% of patients were Rutherford Stage 5. Revascularized lesions were femoropopliteal (77.1%), below the knee (19.7%), and 2 levels (24.7%). One-year survival without major amputation was significantly higher in the hybrid vs. mobile C-arm group (91.2% vs 78.7%, p=0.0005). No significant differences were observed in mortality or wound healing. Contrast media volume was significantly reduced in the hybrid operating room (p = 0.0463), with no difference in irradiation data. After adjusting for confounding factors, the use of a hybrid operating room remained independently associated with a better survival without major amputation (adjusted HR 0.35; 95% CI 0.19-0.61; p=0.0003).
Conclusion: In this retrospective study, achieving infrainguinal revascularization in a hybrid room was independently associated with a better 1-year survival of CLI patients without major amputation. Prospective multicenter randomized studies are essential to confirm this result.

Pain control with peripheral blood mononuclear cells (PBMC) implantation in Rutherford V/VI patients with ineffective or impossible revascularization. Preliminary results of a multicenter study with PBMC implantation
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Objectives: The need for prompt treatment of Rutherford stage V and VI lesions arises from the frequency of amputations. There are about 120 to 500 amputations per million inhabitants, with an annual increase of 23% over the past decade. Regenerative therapies are used as adjuncts to revascularization or when revascularization fails or as an alternative in patients who are ineligible for surgery or who have severe comorbidities that may contraindicate surgery. The results of limb preservation and amputation reduction are well documented, but few studies have analyzed the analgesic aspect of regenerative therapies. The objective of this study was to evaluate the efficacy of peripheral blood mononuclear cells (PBMC) therapies in the management of pain. Peripheral blood mononuclear cells (PBMCs) play an important role in pain management by modulating immune responses and influencing inflammatory processes. They consist mainly of lymphocytes (such as T and B cells) and monocytes, which can produce various cytokines that modulate pain perception and inflammatory responses. The use of regenerative medicine techniques is relevant, including in the treatment of arterial diseases.
Material and methods: This retrospective multicenter study was conducted in six regenerative medicine centers with vascular surgery expertise. 155 patients with Rutherford stage V or VI peripheral arterial occlusive disease (PAD) were prospectively followed from 2014 to 2024. Mean age was 76.8 ± 5.8 years, and 60.2% (110/155) were male. Treatment included at least two sessions, with an average of three (±1). The Monocells, Hematrate and Easycell with filter systems were used to polarize the cell concentrates for injection. Pain intensity was assessed using the Numeric Rating Scale (NRS) before and after treatment.
Results: A retrospective post-harvesting analysis was performed for all patients. The mean follow-up was 36.5 months and showed a reduction in postoperative pain. This reduction was 91% (141/155), with a p-value < 0.0001, and stable pain symptoms were observed in 9% (14/155) of patients. Twenty-one minor amputations were performed in 13% (21/155) of patients and two major amputations in 9% (14/155). Overall limb salvage rate was 77.4% (120/155), with a p-value of 0.002 (< 0.05).
Conclusion: The use of regenerative medicine techniques is relevant, including in the treatment of arterial diseases. Good results in pain control require further evaluation in larger population samples and in randomized trials.

Superficial femoral artery transposition for popliteal aneurysm: long-term results
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Objectives: Popliteal aneurysm (PA) is a major cause of acute peripheral ischemia, warranting preventive or emergency repair. Among the open options, venous bypass, prosthetic bypass, and endovascular exclusion, transposition of the superficial femoral artery (SFA) is described as an attractive anatomical alternative, but its positioning relative to other techniques remains poorly documented in the long term. The objective of this study was to compare the long-term outcomes of SFA transposition with

those of other PA repair strategies in a large cohort operated over twenty years in our tertiary center.
Material and methods: Retrospective study including 183 patients managed for popliteal aneurysm and over 200 operated limbs. Primary objectives were the 1-year, 5-year, and 10-year primary, primary-assisted, and secondary patencies. Secondary endpoints included the rate of aneurysmal recurrence on the operated limb at the same timepoints and the long-term amputation rate.
Results: The population was almost exclusively male (99%), with 50% of symptomatic patients, including 26% with acute ischemia, 12.9% with claudication and 7% with critical ischemia. Open surgery predominated (88%), with 35% of venous bypasses, 32% of SFA transpositions, and 21% of prosthetic bypasses. No amputations were observed after transposition. In comparative analysis, transposition had the best secondary 1-year and 5-year patency rates (92 and 82%), ahead of venous bypass (87 and 78%), prosthetic bypass (73 and 62%) and endovascular treatment (86 and 43%). Aneurysmal recurrence on the operated limb remained rare, confirming the anatomical and hemodynamic robustness of the reconstruction.
Conclusion: Over 20 years, SFA transposition appears to be a sustainable technique in PA repair, with the best late patency and absence of amputation rates. Venous reconstructions continue to perform well, whereas prostheses and endovascular treatment perform poorly. However, transposition is feasible only in patients with favorable anatomy. For eligible patients, it is a preferred option, combining excellent patency, very low morbidity, and a maximal rate of limb salvage.

Common femoral artery intra-stent puncture: feasibility and safety in a contemporary cohort
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Objectives: With the constant progress of endovascular techniques, femoral tripod stenting became a more widely accepted treatment option. However, the need to re-access through these stents may arise during follow-up. To date, few studies looked at puncturing through the mesh of a stent. We report our experience with intra-stent puncture of the common femoral artery.
Material and methods: All patients with a history of common femoral artery stenting angioplasty and subsequent re-stenting procedures were enrolled over a four-year period (January 2021 - September 2025). The primary endpoint was the rate of access-related complications, assessed at 30 days.
Results: Twenty-four patients were enrolled in this study. Mean age was 68 years and 71% of patients were male. Eighteen patients (75%) had claudication and 6 (25%) had critical ischemia. All the punctures were retrograde. 6F introducers were used in 17 patients (71%), and 7F in 7 (29%). Puncture was closed by percutaneous closure in 21 cases (87.5%) and manual compression was applied in 3 cases (12.5%). FemoSeal® (St. Jude Medical) was used in 18 cases, AngioSeal® (Terumo) in 2 cases, and ProStyle® (Abbott Vascular) in 1 case. The median duration of hospitalization was 2 days, and 8 patients were managed as outpatients. Only one patient had a post-operative day 10 stent thrombosis manifested by recurrent intermittent claudication. This patient was reoperated and underwent crossover intra-stent angioplasty, with puncture of the stent in the contralateral common femoral artery. No early adverse events occurred in the other patients, and no problems were reported at the 1-month ultrasound follow-up.
Conclusion: Our results suggest that intra-stent puncture is feasible and safe, and that closure systems can be used effectively without major complications.

Results of arterial allografts stored between +2 and +8° in a septic environment
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Objectives: Arterial allografts stored between +2 and +8 °C recently obtained marketing authorization in France for revascularizations in a septic environment. This method of storage allows for the immediate availability of biological grafts throughout the country, including in emergency situations. The objective of this study was to evaluate the safety and early clinical outcomes of these refrigerated allografts.
Material and methods: A prospective bi-centric study was initiated in March 2024 for a 3-year enrolment period. The primary endpoint was reintervention or death attributable to the allograft. Secondary endpoints included primary, primary-assisted and secondary patency, as well as post-operative complications and overall mortality.
Results: To date, 62 allografts have been implanted in 40 patients with a mean age of 67.3 years. Revascularizations were predominantly infrainguinal (83%), followed by aortic revascularizations in

10%, and were associated with explantation of material in 75%. 39-day mortality was 7.5% (n=3), not directly related to the allograft. The mean follow-up was 5.9 ± 4.4 months. Six patients (15%) required 8 reinterventions in relation with the allograft: 4 during hospitalization (thrombectomy n=2, hemorrhage n=1, false aneurysm n=1) and 4 during follow-up (thrombectomy n=2, false aneurysm n=1, uretero-allograft fistula n=1). Two patients (5%) developed a collection around the allograft without evidence of reinfection or the need for revision, while three patients (7.5%) had delayed healing at the surgical approach requiring prolonged local care. Two patients (5.4%) died during follow-up, but their death could not be directly related to the allograft (metastatic cancer n=1 and unknown cause n=1). Kaplan Meier estimates of 6-month primary, primary-assisted and secondary patencies were 82.9%, 91.7% and 97.1%, respectively. The overall 6-month survival was 86.2%.
Conclusion: These results suggest the possibility of using refrigerated allografts in septic arterial revascularizations. Larger-scale, longer-term results are now needed, prompting a national multicenter study.

Femoropopliteal percutaneous bypass: technical developments and results of a seven years' experience with the first 100 cases
Pierre SARRADON, Toulon, France

Objectives: In cases of long occlusion of the femoropopliteal axis, the percutaneous bypass technique allows bypass surgery without surgical opening and without vascular suture, with the aim of reducing the impact of the procedure. We report the results of this technique on the first 100 cases over a 7-year period, and the technical developments based on the experience gained.
Material and methods: The technique consists of three puncture points, using ultrasound guidance, on either side of the occluded vascular segment, allowing for vessel exit upstream of the occlusion, extravascular passage through the tissues, and then re-entry downstream of the occlusion. Passage of a guidewire and then of a long introducer allows the deployment of self-expanding covered stents as bypass grafts.
Results: The evaluation covered the period from January 2018 to October 2025, with 100 percutaneous bypass grafts. Technical success was achieved in 98% of cases (2 required a short popliteal incision). The 30-day follow-up confirmed a marked decrease in pain, resumption of walking by Day 1, shortened hospitalization (in the absence of disabling trophic disorders, and potentially possible by Days 1 or 2), and absence of infection, discharge, or wall complication. One cross-over peroperative aortic wound that required emergency repair led us to prioritize the ipsilateral approach whenever possible. Average follow-up was 40 months (1-94 months), we observed one lost to follow-up, 3 unrelated deaths, one junctional false aneurysm due to overlap failure and treated with a covered stent graft. Primary patency was 74%, secondary patency was 88%, and limb salvage was 97%.
Conclusion: This experience, although observational and monocentric, suggests that the percutaneous bypass technique provides a significant benefit at the 30-day follow-up, in terms of impact and complications, with non-inferior mid-term results, compared to "conventional" bypass surgery. Prospective randomized studies are required to validate these results. If confirmed, the percutaneous technique could become a first choice for performing prosthetic femoropopliteal bypass grafts.

Evaluation of a standardized gait rehabilitation protocol for chronic exertional ischemia: A single-center experience in Lyon
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Objectives: Gait rehabilitation is a first-line treatment for patients with peripheral arterial disease presenting with exertional ischemia. In line with the recommendations of scientific societies, the implementation of supervised programs improves functional ability and quality of life. We implemented a walking rehabilitation protocol in partnership with a team of physical therapists to standardize practices, improve patient compliance, and optimize treatment efficiency. The objective of the study was to assess the clinical outcomes achieved since the implementation of this program.
Material and methods: Patients were referred to the physical therapy team by the vascular surgeon after the consultation. The protocol begins with an initial and ends with a final standardized treadmill evaluation. The rehabilitation protocol includes 3 weekly treadmill sessions with self-directed exercises during 3 months, i.e. 36 supervised sessions. Finally, the patient is seen again by the vascular surgeon

with the results to reevaluate a surgical or medical attitude. Patients were prospectively and consecutively enrolled in the study from 2021 to 2025. The data collected included clinical characteristics, baseline and final pain-free (PFWD) and maximum (MWD) walking distances, quality of life score (SF-36 and EACH-Q), and adherence.
Results: A total of 121 patients were enrolled. 178 protocols were initiated, and 140 protocols were completed, which represents a compliance of almost 80% after the first appointment with the physical therapist. Our population was predominantly male (70%). At baseline, 35% of patients had a walking perimeter ≤ 200m, 62% had a walking perimeter > 200m. PFWD were 560m and 1726m at the beginning and at the end of the protocol, respectively. The MWD doubled from 1385m to nearly 2800m. An improvement in the SF-36 (+15%) and EACH-Q (+13 points) quality of life scores was observed. No protocol-related major adverse events were reported.
Conclusion: A structured gait training regimen is feasible, well tolerated and associated with a significant improvement in functional performance in PAD patients. Harmonization of practices according to the recommendations of scientific societies appears essential to optimize management. It is a simple protocol that can be widely disseminated.

Experimental study of the influence of mechanical and hemodynamic parameters on the aneurysmal growth of the abdominal aorta
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Objectives: Growth and rupture of abdominal aortic aneurysms (AAAs) are difficult to predict. Indications for surgery are based primarily on diameter and growth rate, using a statistical rather than an individualized approach. This pathology results from complex interactions between hemodynamics, wall mechanics, and biochemical phenomena. Yet, understanding of arterial biology paradoxically exceeds understanding of the mechanical behavior of the wall and the flow. This work aimed to improve the understanding of AAA from a strictly mechanical point of view in order to contribute to a personalized risk assessment.
Material and methods: We developed a bio-realistic experimental circulatory loop incorporating aortic phantoms. It includes a pulsatile centrifugal pump with left ventricular pressure, a prosthetic aortic valve, an immersion chamber with interchangeable phantoms, and Windkessel models of arterial compliance and resistance. 3D printed phantoms are used. The materials are selected to mimic the ranges of arterial elasticity. The geometries may be idealized or patient-specific, and include the aortic bifurcation, which is crucial in pressure wave reflection. The fluid is currently Newtonian (water or water-glycerol); in the long term, a non-Newtonian rheology will be simulated by adding xanthan gum. Instrumentation includes pressure gauges, flow meters, and a digital image correlation system to measure wall deformations.
Results: The development and validation of the loop provided aortic pressure and flow waves of physiological aspects and values. The mechanical characteristics of the two compliant resins used to produce the phantoms were evaluated by uniaxial traction and inflation testing, and show Young's moduli of 0.8 and 1.9 MPa. The plastic deformations of the phantoms streamed into the loop are currently evaluated by digital image correlation as a function of an index of fluid-structure instability likely to have a predominant influence on aneurysmal growth.
Conclusion: This device, coupled with the numerical simulation, will identify mechanical growth and rupture factors of AAAs, in order to refine the risk prediction and pave the way for personalized management.

Evaluation of hydrogels as a controlled release system for the treatment of arterial calcifications
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Objectives: Arterial calcification (AC) is a cardiovascular disease characterized by accumulation of mineral deposits in the arterial wall, resulting in vascular rigidification. Several studies have shown a link between osteoporosis and atherosclerosis. AC involves conversion of vascular smooth muscle cells to osteochondrogenic cells, which initiate mineral nucleation and growth of hydroxyapatite crystals. This process is multifactorial and presents many similarities with bone metabolism. Facing the limitations of current therapies, bisphosphonates (BPs) and bone antiresorptive agents are being explored for their potential to inhibit the formation of hydroxyapatite crystals in soft tissues. However, their systemic

administration is often associated with side effects and low local bioavailability, hence the need to develop controlled release systems.
Material and methods: Five hydrogels based on arabic gum (AG) and acrylamide (AM/AA) were synthesized by radical polymerization, varying the proportions of the monomers, of the crosslinking agent (MBA, N,N′-Methylenebisacrylamide) and of the initiators (APS, ammonium persulfate) in order to optimize the structure of the network. Characterization included FTIR spectroscopy (IRAffinity-1 FT-IR, 4500-600 cm^{-1}, 45 scans) to confirm copolymerization. The particle size distribution was analyzed by laser diffraction (Malvern Mastersizer 2000), and the swelling properties were evaluated in PBS, pH 7.4, at 21° C and 37° C. Quantification of alendronate and etidronate for release studies was developed by UV-Visible Spectrophotometry (UV-Vis BioServ, UVLine) at 523 nm, using the iron-salicylate complex method. The in vitro release kinetics are ongoing in PBS at pH 7.4 and 37° C.
Results: FTIR confirmed the formation of the AG-AM/AA copolymer network: the significant disappearance of the C=C band of AM/AA (about 1610 cm^{-1}) and the presence of C-O-C/C-OH bands (1000-1150 cm^{-1}) of the AG attest to integration and crosslinking of the polymers. The particle size distribution showed a significant increase in the median particular size (d(0.5)) from 210.9 µm for native AG to 549.9-729.8 µm for hydrogels, confirming their structure. Swelling studies revealed distinct behaviors: AG-AM/AA hydrogels exhibit swelling capacities inversely proportional to cross-linking density, which is crucial to modulate PA release kinetics. PNIPAM showed a high swelling at 21°C compared to other hydrogels and a rapid deflation at 37°C, confirming its thermosensitivity related to its lower critical solution temperature (LCST of ~32°C). This intelligent property is an asset for saline temperature-dependent leaching. The first data on in vitro release of PAs are being acquired and various profiles are observed.
Conclusion: These hydrogels represent a promising approach for the controlled release of bisphosphonates (BPs) to treat AC using a balloon-type angioplasty device.

Assessment of open surgery skills using marker-free hand tracking: an overall learning and kinematic metrics approach
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Objectives: Training in open vascular surgery becomes a critical component. Objective assessment of competencies is often hampered by reliance on subjective human assessment and logistical constraints related to the deployment of monitoring systems. Video analysis of minimally invasive surgery is now standardized. The aim of our study was to translate unique challenges in computer vision to open surgery.
Material and methods: We developed an automated assessment system to evaluate suture skills, using only a zenithal camera. Our approach uses the MediaPipe framework to extract 3D hand skeletons from 2D videos to which we have added a treatment specifically for the multi-hand environment of open surgery, based on wrist-palm orientation vectors and reinforced by time coherence checks. The surgical workflow was then segmented into two phases (active suture vs inactivity) via learning dynamic dependencies based on position, bone vectors and motion derivatives. Finally, we extracted a complete set of explainable kinematic metrics, including separation of the hands (Hand-Separation STD), logarithmic fluidity (LDLJ), the total path length, and the frequency of submovements (Submovement Hz). We performed experimental validation on a data set of 100 videos of approximately 7 minutes, consisting of the realization of terminal anastomoses in a simulation model.
Results: Our approach made it possible to get rid of any intrusive material while maintaining high kinematic precision. Our action recognition model achieved a segmentation accuracy of 96%, effectively distinguishing active suture from periods of inactivity. The separation of the data set into four level groups revealed, via statistical analysis, that a high OSATS score is associated with a reduction in hand separation and trajectory length, as well as an increase in the fluidity and frequency of submovements.
Conclusion: These results suggest that kinematic analysis of hands provides accessible and objective feedback for surgical training, bridging the gap between expensive sensor-based systems and subjective human observation.

Daily feasibility and safety of robotic-assisted minimally invasive surgery in a tertiary vascular surgery center
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BENABDELATIF, Georges IBRAHIM, Tristan LETERRIER, Olivier ROUYER, Romain DURIF, Fabien THAVEAU, Clermont-Ferrand, France

Objectives: Robot-assisted vascular surgery is a minimally invasive alternative to open surgery, as is endovascular surgery, with a stratification of indications to treat arterial and venous pathologies. The objective of this study was to evaluate the daily feasibility and safety of robotic assisted mini-invasive procedures (MIRA) for vascular surgical indications selected in an Accelerated Post-Surgical Rehabilitation Protocol (APRP) in a tertiary center.
Material and methods: This was a retrospective single center study including MIRA cases between January 2023 and November 2025. Indications were abdominal and iliac aortic aneurysm, aorto-iliac occlusive disease, nutcracker syndrome (NCS), median arcuate ligament syndrome (MALS), splenic artery aneurysm, in situ renal artery aneurysm, and thoracobrachial outlet syndrome (TOS) with first rib excision and scalenectomies. The primary endpoint was technical success (lack of open surgical conversion), and secondary endpoints were primary and secondary patency, complications, mortality, and mean length of stay (MLS) in hospital.
Results: A total of 155 patients were enrolled (mean age: 55.7 ± 16.2 years; 58.4% of male). Fifty-five patients underwent aortobifemoral or aortobiiliac bypass grafting for aneurysms, 53 for occlusive disease, 24 had a renal vein transposition for NCS, 8 were treated for MALS, 8 for a splenic artery aneurysm, 3 for renal artery aneurysms, and 4 for TOS. The technical success rate was 96.1%, with a conversion rate of 3.9% in cases of aortoiliac surgery, including 4 emergency conversions and 2 intention-to-treat conversions for polar and inferior mesenteric artery reimplantation. The 30-day mortality was 2.25% (non-procedural cause). MLS was 6.7 ± 4.1 days, including 1.6 ± 2.2 days in ICU for aortic aneurysm and occlusive lesions, 4.2 ± 2.1 days for NCS, 5 ± 2.1 days for MALS, 4 days for splenic aneurysm, 8 days for renal aneurysm, and 5 days for TOS. The 1-, 6-, and 12-month primary patency rates were 94.4%, 91.7%, and 90.9%, respectively. The 1-, 6-, and 12-month secondary patency rates were 98.8%, 97.9%, and 94.1%, respectively.
Conclusion: Robot-assisted vascular surgery is a safe and effective technique, associated with low morbidity and mortality, as well as a shorter MLS than open surgery, with clinical and medico-economic value fully in line with an APRP program. These results confirm the value of robotic minimally invasive approaches for the management of vascular diseases, as an alternative to conventional open surgery.

Minimally invasive sutureless and clampless aortic bypass (***MISCAB)***: ***Technical developments, results and prospects***
Pierre SARRADON, Toulon, France

Objectives: MISCAB is an innovative low-impact aortofemoral bypass technique, with minimally invasive access and absence of aortic clamping and vascular suture. It aims to avoid the deleterious effects and potentially life-threatening complications of this surgery.
Material and Methods: An anterior retroperitoneal aortic approach (ARAA) provides access to the infrarenal abdominal aorta and iliac axes without muscular or vasculo-nervous pedicle section. The impact on pain, respiratory function and risk of ileus is thus limited. Preferred to retroperitoneoscopy, this approach provides increased safety, shorter procedure duration, and is minimally invasive. The ipsilateral common femoral artery is then punctured under ultrasound control, and an 8 F introducer is placed in contact with the occlusion. A transseptal needle is then inserted, puncturing the distal external iliac artery from the inside out. The 8 F introducer is thus pushed into the retroperitoneal space. The aorta is then punctured with a needle, allowing the introduction of a 0.35 guide, followed by the 8F introducer with its mandrel. After contrast injection for localization, a 25 cm self-expanding stent covered with PTFE can then be deployed, its proximal end placed in chimney in the infrarenal aortic shaft, and its distal end in the iliac ending or the common femoral artery, which creates an aorto-femoral bypass. If needed, contralateral puncture and deployment of a second stent graft may then be used for a bifemoral bypass.
Results: Between May 2020 and October 2025, twelve MISCAB bypass grafts were successfully performed, allowing revascularization of patients at risk of amputation presenting an aortic and/or iliac occlusion, for whom endoluminal revascularization had failed, in which a crossover bypass was contraindicated (previous occlusion or contralateral axis occluded), and conventional open aortic surgery was contraindicated. There were 8 men and 4 women, with a mean age of 75 years (59-89). Six right, 5 left aorto-femoral, and one aorto-bifemoral bypasses were performed. The mean operative

time was 130 minutes (110-170), and the mean blood loss was 125 mL (100-300). There were no operative failures. Two patients were discharged home on Day 2, and 3 on Day 3. The 30-day follow-up showed one local complication, a pseudoaneurysm at the superficial femoral puncture site, treated with a covered stent graft. No amputations or deaths followed, despite significant comorbidities. One bypass surgery required thrombectomy and distal angioplasties after 56 days. Two patients underwent further downstream angioplasties. All bypass grafts are patent to date, with four having a five-year follow-up. One death occurred from an unrelated cause.
Conclusion: The MISCAB technique, derived from the percutaneous bypass concept, can be a less invasive approach for aorto-(bi)femoral bypass surgery. Our initial experience showed its feasibility, efficacy and mid-term durability. If subsequent evaluations confirm the initial good results, this innovative technique could be incorporated into the therapeutic arsenal of aorto-iliac occlusions.

Can artificial intelligence do as well as semi-automated software to size windowed stentgrafts?
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Objectives: Endovascular treatment of juxtarenal (JAA), suprarenal (SAA) or thoracoabdominal (TAA) aortic aneurysms requires precise measurements using sizing software. In contrast to semi-automatic measurement software, the artificial intelligence (AI) software PRAEVAorta2 (Nurea, Bordeaux, France), provides fully automated sizing for EVARs. It provides automated analysis of the visceral aorta and its branches. The objective of this study was to assess the reliability of these measures for FEVAR.
Material and methods: All the patients treated in two centers with Anaconda (Terumo Aortic) fenestrated stentgrafts for JRA, SRA or TAAA between November 2021 and June 2024 were included retrospectively. Automatic measurements of PRAEVAorta2 were compared to semi-automatic (Endosize) measurements for the celiac artery (CT), the superior mesenteric artery (SMA) and the renal arteries. The mean diameter, the clockwise position of the arteries and the lengths separating them were collected. Outlier thresholds were defined: difference in diameter >5 mm, length >15 mm, and angulation >45°. The primary endpoint was the agreement between the automatic and semi-automatic measurements, analyzed by the Lin agreement coefficient. It was perfect at 1 and good when > 0.9.
Results: A total of 63 cases were reported, including 41 windowed Anaconda cases. Outliers accounted for 7.4% of the 459 measurements. Before excluding outliers, the concordance coefficients were low for diameters (CT 0.627; SMA 0.221; RRA 0.376 LRA 0.163), time positions (CT 0.650; SMA 0.275; RRA 0.576; LRA 0.665), and lengths, ranging from 0.012 to 0.388. After excluding outliers, they were better, on average 0.566 for diameters, 0.724 for hourly positions, and 0.560 for lengths. In practice, the median differences were 0.60-1.13 mm for diameters, 5.9-7.9° for angulations, and 3.2-8.3 mm for lengths.
Conclusion: Exclusion of outliers improves correlation coefficients, which however show differences between AI and semi-automatic measurements. In clinical practice, the absolute differences are very small, especially for diameters and angulations, and should not compromise the design of windowed stents, including emergency homemade stents, using AI and its “real-time” measurements.

Artificial intelligence-assisted sizing for endovascular treatment of infrarenal abdominal aortic aneurysms: precision and reproducibility of PRAEVAorta2 compared to human operators
Aude GATINOT, Catherine BOUDREAU, Bruno GARGIULO, Xavier BERARD, Éric DUCASSE, Caroline CARADU, Besançon and Bordeaux, France, and Sienne, Italy

Objectives: Accurate sizing is essential for planning endovascular treatment of aortic aneurysms. This study evaluated the accuracy and reproducibility of a fully automated segmentation tool using artificial intelligence (FAVS) by comparing it to physician controlled manual segmentation (PCMS), including inter- and intra-observer variability.
Material and methods: Ninety-two infrarenal abdominal aortic aneurysm CT-scans were analyzed with FAVS and PCMS (two readers + review). The agreement was evaluated by Bland-Altman, Pearson correlations and mean differences. The accuracy of the automated sizing was also examined by comparing the stentgraft that would have been selected according to the FAVS measurements and the instructions for use of the devices actually implanted.
Results: FAVS had good agreement with PCMS for maximum aortic diameter (Dmax) (mean difference 1.0 mm; range -8.1 to 10.1 mm; r = 0.9) and aortic neck diameter (1.6 mm; -8.8 to 11.9 mm; r = 0.4). Inter- and intra-observer reproducibility was high for Dmax and for bifurcation diameter (-0.3 mm; -5.1

to 4.4; r = 1.0). Agreement was also important for aorto-iliac length (-0.9 mm; -26.9 to 25.0 mm; r = 0.9) and correct for neck length (7.2 mm; -18.7 to 33.1; r = 0.6). The iliac and access diameters showed a wider variability, especially for the external iliac arteries (MD 1.1 mm; r = 0.3), while the aortic angulation remained well correlated (0.9°; -15.3 to 17.1; r = 0.8). FAVS slightly underestimated iliac tortuosity (-0.1; -0.3 to 0.2). The sizing suggested by FAVS showed a good agreement for main body diameter (1.1 mm; -5.1 to 7.3; r = 0.6) and contralateral length (-0.8 mm; -20.4 to 18.7; r = 0.7), despite increased variability for leg lengths, particularly the ipsilateral leg (16.7 mm; -36.6 to 70.0).
Conclusion: FAVS provides reproducible and overall consistent measurements with manual segmentation for most parameters critical for sizing infrarenal stents. The integration of automated tools could help standardize preoperative planning while reducing operator variability, especially for aortic diameters and aorto-iliac length.

3D analysis of stent graft displacement after endovascular repair of infrarenal abdominal aortic aneurysms
Aude GATINOT, Florent LALYS, Paul CARETTI, Stéphane AVRIL, Simon RINCKENBACH, Besançon, Rennes, and Saint Etienne, France

Objectives: Aortic stent graft (ASG) monitoring is based on the occurrence of complications, not the warning signs that may lead to them. Early analysis of ASG displacement could help to anticipate late complications. The objective was to evaluate the accuracy and reproducibility of a new tool for tracking 3D ASG displacements, as well as to identify the anatomical factors associated with these displacements.
Material and methods: Retrospective single center study including 30 patients who received an aorto-bi-iliac ASG without complementary module. For each patient, the preoperative CT-scan and 3 postoperative CT-scans were analyzed. Each follow-up scanner was automatically re-aligned with the first postoperative scanner with an artificial intelligence-based segmentation (Endosize, Therenva, France), making it possible to obtain the 3D coordinates of the ASGs in a single spatial mark of reference. The accuracy of the readjustment was evaluated by 3 points of interest on 4 lumbar vertebrae (12 points of interest by CT). To quantify 3D displacements and assess intra- and inter-observer reproducibility (2 observers), 10 radiopaque markers of the ASG were annotated on each follow-up CT. Mean displacements were correlated by univariate analysis with anatomical endpoints from the preoperative scan (Pearson).
Results: The mean CT-scan analysis time was 2 min52 (+/- 21 seconds). The average recalibration time between 2 CTs was 1 min (+/-24 seconds). The median recalibration accuracy was 1.2 mm (IQR 0.78-1.9). Intra- and inter-observer intra-class correlation coefficients were 0.98 and 0.97, respectively. Medians of 3D displacements were 3.16mm between the first two CTs and 2.78mm between the 2nd and 3rd CTs. The maximum AAA diameter (Rho = 0.36; p=0.056) and the volume of AAA (Rho = 0.35; p=0.067) showed a non-significant correlation with the displacement of the ASG. Proximal neck length showed a negative correlation with the ASG displacement (Rho = -0.36; p=0.053) i.e. the shorter the proximal neck, the more the ASG moved.
Conclusion: This precise and reproducible tool would allow patients with ASG displacement to be identified early, and to be considered as patients at risk of complications by offering them appropriate follow-up or management.

Study of the lymphatic system in the wall of abdominal aortic aneurysms: Regulation and pathological involvement
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Objectives: Abdominal aortic aneurysm (AAA) is a chronic inflammatory condition characterized by progressive degradation of the aortic wall. Lymphangiogenesis, eosinophils (EOS) and pro-resolving lipid mediators derived from 15-lipoxygenase (15LO) emerge as important players in immune regulation. However, the coordinated role of these elements in AAAs remains unclear. Recent literature presented intra-aortic eosinophils as a protective agent for aneurysmal development. This study aimed to determine how lymphatic 15LO and inflammation mediators (SPMs) influence lymphangiogenesis and eosinophil trafficking within the aortic wall.
Material and methods: Human samples of healthy and aneurysmal aorta were analyzed by histology,

immunolabeling and RT-qPCR. The SPM composition was determined by lipidomics. Two mouse models of AAA were developed and used to study lymphangiogenesis, including a mouse model genetically devoid of 15LO specifically in the lymphatic endothelium (Alox15^LEC-KO). Blood and tissue populations of eosinophils were quantified. In vitro, the impact of 15LO knock-down in human lymphatic endothelial cells was evaluated via adhesion and transmigration assays. Finally, a lentivirus overexpressing 15LO was administered to test the effect of restoration of this pathway.
Results: In human AAA, the aneurysmal wall exhibits marked adventitial lymphangiogenesis, associated with an increase in VEGFR3, Podoplanin, IL6 and CCL21 that regulate these neo-vessels. Lipidomics shows an overall decrease in SPMs, particularly those derived from 15LO. Mouse models confirm the occurrence of lymphangiogenesis after AAA induction. In Alox15^LEC-KO mice, the lymphatic density increases further and the circulating eosinophils increase, while the aortic infiltration of EOS is reduced. In vitro, the loss of 15LO decreases the adhesion of eosinophils to the lymphatics and increases their transmigration to the systemic circulation. Lentivirus 15LO restoration reduces blood eosinophils, increases their resident presence in the aneurysm wall, and decreases lesion size.
Conclusion: Lymphatic 15LO and SPMs regulate lymphangiogenesis and control eosinophil drainage. Their deficiency promotes the leakage of eosinophils into the circulation, reduces their local protective role, and worsens AAA. Restoration of 15LO restores resolution of inflammation and limits aneurysmal progression. Targeting of the pro-resolving pathways and lymphatic system appears to be a potential therapeutic strategy in AAA.

Contribution of a hybrid deep learning model to identify carotid plaques at risk
Jean-Michel DAVAINE, Juan Manuel VARGAS, Louise KOSKAS, Louise WANG, Guillaume GOUDOT, Alix PIEDELIEVRE, Jean-Marc ALSAC, Salma EL BATTI, Pierre JULIA, Camil CASSIEN BAMDE, Farid BAKIR, Meriem TAOUS-LALEG, Paris, and Dijon, France

Objectives: Recent literature data suggest that open surgery or stenting remain beneficial compared to optimal medical therapy alone in the management of asymptomatic, tight stenoses of the carotid bifurcation. The challenge is to be able to identify the patients who will benefit from a particular intervention through better recognition of the vulnerability factors. Artificial intelligence offers powerful insights into perioperative data that are essential to explore.
Material and methods: Scans of patients with symptomatic (N=40) and asymptomatic (N=40) plaques were analyzed using a hybrid deep learning method. Manual selection of the regions of interest was performed targeting the stenosis. For each section, windowing and reformatting were carried out in order to allow an analysis by 3 different models of neural networks (VGG 16, Resnet, Densenet). This analysis identified a large number of characteristics whose number and discriminating character were selected by random linear projection. The best features were again evaluated with 3 machine learning models (Support Vector Machine, Random Forest, Gaussian Naive Bayes). The final prediction was binary: symptomatic or asymptomatic lesion. The model was trained by cross-validation. A validation cohort was submitted to the model with new scans (20 asymptomatic and 20 symptomatic patients) never seen by the model.
Results: The model showed an excellent ability to discriminate between symptomatic and asymptomatic lesions at the end of the training phase. The best prediction was obtained by combining ResNet and Random Forest. There were 20 very discriminating characteristics. At the validation phase the model had an accuracy of 0.90, an AUCROC of 0.99, and an F1 score of 0.90.
Conclusion: This work allowed the development of a hybrid model of deep learning allowing the distinction of symptomatic and asymptomatic carotid plaques from preoperative scanners. Although preliminary, this model presents an extremely interesting potential. Its improvement by integrating biological, clinical, and ultrasound data makes it possible to envisage a predictive personalized medicine to improve the surgical indication.

Surgical management of complex abdominal aortic aneurysms in octogenarians: short- and mid-term results from 2 expert centers
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Objectives: Sophisticated endovascular solutions have expanded treatment options for complex abdominal aortic aneurysms (cAAAs), particularly in high-risk elderly patients. However, these

techniques are limited by anatomic constraints and costs, while their superiority over open surgery remains questionable. This study compared the short- and mid-term outcomes of open surgery for cAAAs in patients aged 80 years or older versus those aged less than 80 years.
Material and methods: A retrospective analysis was performed on patients undergoing open surgery for a cAAA between 2017 and 2022 in two vascular centers. A total of 226 patients (median age 71 years [66-80]; 89% male) were enrolled, including 74 patients ≥80 years. The primary endpoints were 30-day mortality, cardiovascular adverse events (CVAEs), and early reinterventions. Secondary endpoints included length of stay (LOS), postoperative acute renal failure, mid-term survival (≤5 years), and reinterventions related to the primary surgery. Propensity score matching was performed.
Results: Of the 1087 patients enrolled, 226 met the inclusion criteria: 74 octogenarians and 152 patients <80 years. 30-day mortality was significantly higher in octogenarians (9.5% vs 0.7%; $p < 0.001$), as was the incidence of CVAEs (8.2% vs 1.9%; $p=0.026$). Rates of renal failure, LOS, and other complications were comparable. Survival and re-intervention rates were similar between the 2 groups after 42.7 months of median follow-up. After propensity score matching, analysis confirmed early mortality and higher CVAEs in octogenarians, but no significant mid-term difference.
Conclusion: Although octogenarians undergoing open abdominal aortic repair have increased early mortality and cardiovascular complications, their mid-term survival and lack of reintervention are comparable to those of younger patients. These results suggest that age alone should not be a contraindication to open repair in suitably selected individuals.

Early and long-term outcomes of cryopreserved arterial allograft aortic reconstruction in concomitant aortic and vertebral infections
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Objectives: To report early and long-term results of aortic reconstruction with cryopreserved arterial allografts in patients with concomitant aortic and vertebral infection.
Material and methods: All patients operated for thoracic or abdominal aortic infection associated with spondylodiscitis between October 2004 and July 2024 in two French hospitals were included. Endpoints included mortality rates, perioperative complications, aortic reinterventions, and reinfections.
Results: 26 consecutive patients were identified. Thirteen (50%) had primary aortoiliac infection, and 13 (50%) had infection secondary to orthopedic or vascular implants. One patient (4%) had an aortodigestive fistula. The most common pathogens were *Escherichia coli* (n=6, 23%) and *Staphylococcus aureus* (n=5, 19%). All patients were treated with open surgery using cryopreserved arterial allografts. The orthopedic approach was conservative in 9 patients (35%), consisting of bone debridement in 14 patients (54%), and arthrodesis in 6 patients (23%). Bone grafting was performed in 10 patients (38%). Hospital mortality was 15% (n=4). The median duration of follow-up was 35.5 (4.5-85.4) months. Overall all-cause mortality was 46% (n=12), the reinfection rate was 12% (n=3) after 4 (2.5-4) months, and the aortic reintervention rate was 19% (n=5) after 4.2 (1.8-14.6) months.
Conclusion: The management of concomitant infections of the aorta and spine is based on a combined strategy: prolonged antibiotic therapy, vascular reconstruction and vertebral surgery. In situ reconstruction using cryopreserved arterial allografts, combined with orthopedic management, appears to be a viable and effective treatment option. Our results, from the largest cohort reported to date, show perioperative results comparable to those of isolated infections. Further studies are needed to refine the understanding and therapeutic strategies for this rare and complex condition.

Impact of age on the outcomes of endovascular management of severe aortoiliac occlusive lesions: mid-term results from a single center study
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Objectives: Aorto-iliac bypass has long been the standard of care for severe aorto-iliac occlusive lesions, with less favorable long-term outcomes in younger patients. The development of endovascular techniques now allows to treat an increasing number of complex lesions. The objective of this study was to assess whether the adverse impact of youth observed in open surgery was also seen after endovascular therapy.
Material and methods: Between January 1st, 2014 and December 31, 2021, all patients who received endovascular or hybrid therapy for severe aortoiliac lesions (TASC II C or D) were retrospectively

enrolled. Three age groups were defined: <50 years, 50-60 years and >60 years. The endpoints analyzed were primary and secondary patencies and survival.
Results: Of the 170 treated patients, 152 were included: 11 <50 years, 41 between 50-60 years and 100 >60 years. The population was frail with a median ASA score of 3. The majority of patients had TASC D lesions (<50 years: 84.6%; 50-60 years: 86%; >60 years: 66%), most commonly occlusive. Patients were mainly treated for exertional ischemia. Younger subjects were more frequently women, active smokers, obese and diagnosed with critical ischemia. 3-year survival appeared better in <50 years (90.9%) than in 50-60 years (84%) and >60 years (65.6%) patients. In contrast, the 3-year primary patency was less favorable in the younger age group (77.4%) compared to the other groups (86.1% and 84.5%). Secondary patency remained high and comparable between groups (94.4%, 96.9% and 96.9%).
Conclusion: As in open surgery, mid-term endovascular outcomes appear less satisfactory in young patients. Strict optimization of medical therapy and, when possible, delaying the intervention appear appropriate in this at-risk population. In the case of endovascular management, the good secondary permeability observed emphasizes the importance of close monitoring and early interventional management of restenosis.

Modified ROMS technique: simpler, and less irradiating
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Objectives: First described in 2004, retrograde and open mesenteric stenting (ROMS) is a widely used technique to manage acute mesenteric ischemia. This hybrid approach combines laparotomy to explore the gastrointestinal tract with recanalization and stenting of the superior mesenteric artery (SMA) with C-arm profile views. This approach can be difficult to achieve due to the size of the operating field and leads to a high exposure to ionizing radiation. We have modified the ROMS technique to stent the SMA while keeping the C-arm facing forward and report our experience.
Material and methods: All patients treated using the modified ROMS technique from January 2015 to December 2024 in our center were collected. After recanalization of the SMA, the technique consists of mounting over the guidewire a 9 mm x 20 mm balloon through the SMA into the aorta, inflating it, withdrawing it towards the SMA, identifying the SMA ostium by the zone where the balloon blocks, and then positioning the proximal end of the stent (chosen by sizing from angio-CT reconstructions) 5 mm upstream of this marker. Technical success, perioperative morbidity-mortality, primary and secondary patencies were analyzed.
Results: Technical success was 90.5% (19/21). In 2 cases, the SMA stenosis was not crossed with the anteroposterior and lateral arch, and an ilio-mesenteric bypass was performed. The median age of patients was 70 years with 73.7% men. The median operating time was 123 minutes (IQ 115-157), the median fluoroscopy time was 180 seconds (IQ 122-300), the median radiation dose was 520 cGy/cm^3 (IQ 446-555) for a median volume of contrast agent of 25 mL (IQ 24-32). During a median follow-up of 16 months (IQ 5-22), there were 4 stent thromboses with three surgical reoperations and one death, and one asymptomatic patient who did not undergo reoperation. No intrastent angioplasty was required to maintain patency. One-year primary and secondary patencies were 82.1% and 93.3%, respectively.
Conclusion: The modified ROMS technique provides safety and efficacy, reduces ionizing radiation exposure in dose and duration and the amount of contrast injected. Our study needs to be reinforced by external validation.

Technical and clinical success of retrograde mesenteric stenting (ROMS technique) by open surgery in mesenteric ischemia: Importance of a dedicated multidisciplinary management protocol
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Objectives: Mesenteric ischemia (MI) is a critical condition associated with high morbidity and mortality rates. The objective of this study was to evaluate the outcomes of Retrograde Open Mesenteric Stenting (ROMS) in the management of MI, before and after the initiation of a multidisciplinary surgical management protocol.
Material and methods: All surgical procedures performed for MI between November 2016 and December 2023 were retrospectively reviewed to identify ROMS procedures. Two groups were defined

following the implementation of a multidisciplinary protocol in 2021: pre-protocol (PreP) and post-protocol (PostP). The results were compared between the two groups. The primary endpoint was overall survival. Secondary endpoints included technical success, MI-related mortality, postoperative morbidity, lack of reintervention, in-stent restenosis, and primary patency.
Results: Among the 156 patients operated for MI (112 PreP and 44 PostP), 21 ROMS were performed (13 PreP and 8 PostP). The frequency of ROMS was similar in the two groups. The technical success of ROMS was 86%. Median survival was 6.3 months (IQR 0.3-22.2). The 1-year survival rate was 45.6% (95% CI: 28.1-73.9). The 1-year MI-related mortality was 45.3% (95% CI: 17.4-63.8). Eighteen patients (86%) experienced complications at one year. The one-year rates of no re-intervention, intrastent restenosis, and primary patency were 72.6% (95% CI: 52.4-100.0), 52.7% (95% CI: 11.6-74.7), and 52.8% (95% CI: 29.3-94.9), respectively. One-year survival was significantly better in the PostP group than in the PreP group (87.5% [95% CI: 67.3-100.0] versus 23.1% [95% CI: 8.6-62.3]; p=0.013). MI-related mortality and postoperative morbidity were also lower in the PostP group (p=0.041 and p=0.017, respectively). There was no difference between groups in terms of technical success, reintervention, intrastent restenosis and patency.
Conclusion: ROMS is an effective treatment for MI, with acceptable mortality rates. Interdisciplinary collaboration and dedicated protocols are essential for optimal management.

Ischemic preconditioning prevents renal vascular dysfunction in a murine model of supra-celiac aortic clamping
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Objectives: Surgery of suprarenal aortic aneurysms is burdened with a rate of acute renal failure (ARF) of 30%, particularly due to supraceliac aortic clamping. It is hypothesized that endothelial vascular disease caused by ischemia-reperfusion (I/R) of the kidney causes inflammatory phenomena leading to renal dysfunction. Ischemic preconditioning (IPC) has been shown to be very protective against the deleterious effects of I/R phenomena, particularly in the coronary arteries. Our objective was to develop an experimental model of renal ischemic insult and test the effect of aortic IPC to prevent renal dysfunction.
Material and methods: Three groups of 10 rats were formed with a sacrifice at 3 h: (A) control without clamping, (B) 40 min clamping, (C) IPC (6x 1 min/ 1 min) + 40 min clamping. Renal dysfunction was assessed by renal tissue cytokine assay (RT-qPCR), plasma renal biochemistry (BUN, creatinine, urea). Renal vascular endothelial dysfunction was investigated by the glycocalyx pathway (Western blot: Heparan Sulfate (HS), heparanase activity (HA) and Syndecan1 (Sdc1)), and ex vivo in 2nd division arteries using Mulvany myograph. The results were analyzed according to an ANOVA or Kruskal-Wallis test according to their distribution parameters (threshold p<0.5).
Results: After 3 hours of reperfusion, supraceliac clamping (groups B and C) resulted in ARF (p < .002), increased intra-renal cytokines (MCP1, IL1b, IL6 p < .001; TNFa NS), metabolic acidosis, hyperchloremia, hypocalcemia and hyperlactatemia (p = .015). Clamping (B and C) resulted in an increase in endothelium-specific glycocalyx products (Sdc1 p<.02; HS p<.04; AH NS). With Mulvany, ex vivo, clamping (B) caused strong arterial endothelial dysfunction compared to controls (p<.0001) (A). IPC (C) provided protection against renal endothelial dysfunction (p<.001), but did not protect against ARF measured after 3 hours of reperfusion.
Conclusion: This experimental approach makes it possible to study renal aggression on its vascular and parenchymal functional sides. The effect of IPC on ARF requires a later time point (24 and 48 h) study.

New method of catheterization of the contralateral leg of aortic stentgrafts: impact on radiation?
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Objectives: Today, EVAR is standardized. The contribution of image fusion as well as the setting of radiation modalities made it possible to reduce dosimetry during these procedures. The only technical point that can be improved is catheterization of the contralateral leg, which can be complex in certain anatomical configurations, drastically lengthening the procedure time. We have developed a technique to overcome anatomical constraints.
Results: In the 51 procedures analyzed, the median time to catheterization of the contralateral leg was

21 seconds [IQR 14-28] (range 3-72). The median dose (Kerma) was 110 mGy [IQR: 88-170] (range: 38-347). The median DAP was 11.3 Gy·cm² [IQR: 9.0-16.7] (range: 2.7-35.7). Compared to the 2022 national Health C2i baseline data for EVAR in hybrid rooms (national median PDS: 77 Gy·cm², 75th percentile: 129 Gy·cm²), the PDS in our series was significantly lower (85% reduction, $p < 0.001$). Compared to the 2022 national Health C2i baseline data for EVAR in hybrid rooms (national median DAS: 77 Gy·cm², 75th percentile: 129 Gy·cm²), the DAS in our series was significantly lower (85% reduction, $p < 0.001$).
Conclusion: This new technique of catheterization of the contralateral leg allows a rapid and reproducible catheterization, independent of anatomical constraints (iliac tortuosity, neck angulation). It could help reduce the overall irradiation of EVAR procedures. Prospective comparative studies are required to confirm these preliminary results.

Zenith Alpha® bi-iliac stents: predictors of leg thrombosis, a retrospective single center study
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Objectives: Occlusion of a limb after EVAR is a rare but potentially serious complication, which may manifest as claudication, rest pain or acute ischemia. Several studies have suggested the influence of the type of limb on iliac permeability. The objective of this study was to identify factors associated with the occurrence of thrombosis or stenosis of ≥50% of the legs of Zenith Alpha® stents.
Material and methods: This is a retrospective single center study that included all patients treated between 2017 and 2024 with Zenith Alpha® (Cook Medical) aorto-bi-iliac stentgrafts. Clinical, morphological (Endosize® analysis), intraoperative, and postoperative computed tomography data were collected. The primary endpoint was the occurrence of thrombotic limb events. A univariate analysis was performed.
Results: Among 163 patients (326 legs), 24 thrombotic events were identified (7.4%), affecting 18 patients. The median follow-up was 28 months (IQR 16.5-51.5) and the mean time to onset was 21.5 ± 23.9 months. There were no comorbidities, demographics, major anatomical features or intraoperative variables associated with the event. In the postoperative period, leg compression was more frequently observed in the event group (12% vs 0.8%, $p<0.01$). Of the symptomatic patients, 77% received endovascular treatment with Rotarex® mechanical thrombectomy and new limb placement; 23% received conventional surgery.
Conclusion: In this cohort treated exclusively with Cook Medical® devices, all thrombotic events occurred with ZSIL limbs, suggesting a determining role of device type in iliac patency after EVAR. These results, although limited by the small number of patients, reinforce the importance of rigorous computed tomography monitoring and have led to prefer using of ZSIL limbs in our practice. Prospective multicenter studies are required to confirm these findings.

Long-term outcomes after endovascular repair or open surgery of abdominal aortic inflammatory aneurysms (AIAA): National study from the SNDS
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Objectives: Abdominal aortic inflammatory aneurysms (AAIAs) are rare and characterized by retroperitoneal fibrosis. Data to guide management remain limited. A recent review suggests fewer early complications after endovascular repair (EVAR) compared with open surgery but more late events related to retroperitoneal fibrosis. Robust population data are lacking. The objective of this study was to compare late fibrosis complications after EVAR versus open surgery for IAA.
Material and methods: We conducted a national cohort study in the National Health Data System (NHDS) using a trial emulation framework. Adults with a first diagnosis of non-infectious AAIA treated with EVAR or open surgery between 2010 and 2020 were enrolled and followed until December 2023. The primary endpoint was the occurrence of late complications of retroperitoneal fibrosis (ureteral compression, acute limb ischemia or reintervention ≥1 year after repair). Secondary endpoints included early complications (intraoperative complication or perioperative mortality) and all-cause mortality. Propensity score weighting (PSP) was used. Late events were analyzed by Fine-Gray model, early complications by logistic regression, and mortality by Cox model.
Results: Of 714 patients (median age 72 years; 15% women), 396 underwent EVAR and 318 underwent open surgery. Late complications occurred in 104 patients in the EVAR group and 58 in the open surgical

group. EVAR was associated with a higher risk of late complications (HR 1.50; 95% CI 1.09-2.07). Early complications did not differ significantly (OR 1.31; 95% CI 0.85-2.03), nor did all-cause mortality (HR 1.15; 95% CI 0.85-1.56).
Conclusion: In this national cohort, management of AIAA with EVAR was associated with more late complications of retroperitoneal fibrosis than open surgery, with no significant difference in early outcomes and overall mortality. These results provide robust real-life data and can guide treatment choice for AIAAs.

Mid-term multicenter results of aneurysmorraphy performed for type 2 endoleak
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Objectives: Type 2 endoleaks (EL2) after EVAR are the most common complication of postoperative follow-up. Although usually low-flow, some EL2 cause growth of the aneurysmal sac and may require surgical treatment after endovascular options fail. Aneurysmorraphy, done without aortic clamping, is an attractive alternative, and results should be reported.
Material and methods: This was a retrospective multicenter study, including all patients managed with aneurysmorrhaphy for aneurysmal sac growth due to EL2 from January 2011 to July 2025. The procedure consisted of aneurysmorrhaphy with ligation of the refluent arteries, without aortic clamping. Treatment efficacy was defined as absence of endoleak and sac retraction on the postoperative scan. Postoperative morbidity and mortality data were collected. Follow-up was performed by angio-CT with an evaluation of survival and reinterventions according to Kaplan Meier method.
Results: 49 patients were enrolled, with a median age of 75 years [69-82]. The median time to conversion was 35 months [20-48.75], with 67% by laparotomy and 33% by lumbotomy. 25% of patients had at least one prior attempt to embolize the type 2 endoleaks. One stroke-related death (2%) occurred at 30 days. Postoperative complications included early surgical revision in 4 cases (8.2%): two hematomas of the surgical approach (4.1%), one evisceration (2%), and one case with no known cause (2%). Morbidity was reduced to 6% of non-serious pneumonitis, without cardiological, neurological or induced dialysis complications. Treatment was effective in 96% of cases and persistent over time. During a median follow-up of 14 months [2-29], 2 patients experienced a new growth of the aneurysmal sac, corresponding to a very low recurrence rate (4%).
Conclusion: These results confirm the efficacy and safety of aneurysmorrhaphy in the management of EL2, with very low morbidity and mortality and excellent control of aneurysmal sac growth. This is an interesting technique because it allows to treat EL2 with growth of the sac before a possible evolution of the anchorage zones, which complicates the management.

Experimental study of posterior reducing ties for homemade fenestrated stents
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Objectives: Posterior caliber reducing ties (PCRTs) are used when making homemade windowed stents to contain the stent and facilitate rotation and navigation between the stent and the aorta. In 2010, they were described by Oderich et al. with the retraction of six stent bars. Their impact on stent diameter and window orientation is unclear. The objective of this study was to determine the impact of PCRTs on window diameter and rotation.
Material and methods: PCRTs were created using the technique described by Oderich et al. on a range of Cook TX2 stentgrafts (Cook Medical, Bloomington, IN, USA) (24-40mm diameter). Landmarks were created to symbolize windows at 90°, 180° and 270°. Time dials were created for handling. They were printed on a rigid support with a hole in the center of which the diameter was equivalent with the diameter of each prosthesis, allowing accuracy to within 2.5 degrees. PCRTs, constraining 2, 4 and then 6 stent bars, on each side of the guide, were created at each stent stage. The diameter measurements were taken before and after the PCRTs were created using a digital caliper. An average between anteroposterior and lateral diameter was calculated. The posterior time deviations were measured using the time dials.
Results: Nine stent samples were used. The tests were repeated three times on each sample. A diameter reduction of 0 to 5% was observed after stressing 2 stent bars, of 15-20% for 4 stent bars and

30-40% for 6 stent bars. With respect to the time deviation of the window, a posterior deviation of 0 to 5 degrees with stress of 2 stent bars, of 15 to 20 degrees with 4 stent bars and of 40 to 50 degrees with 6 stent bars was observed. The diameter reductions and hourly deviations were consistent regardless of the stent's initial diameter. The differences were statistically significant between each group.
Conclusion: Consistent effects were observed, depending on the number of stent bars constrained, regardless of stent diameter, on both size reduction and window orientation. This experimental study allowed a better evaluation of the effect of the PCRTs in order to assist in the planning of homemade stents.

Factors associated with MAE after F/BEVAR
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Objectives: Routine postoperative admission to the intensive care unit (ICU) is often advocated following fenestrated and/or branched endovascular repair (F/B-EVAR) of complex abdominal (CAAAs) and thoraco-abdominal aneurysms (TAAAs). Given limited ICU resources, identifying predictors of major adverse events (MAE) is crucial for optimal resource allocation.
Material and methods: Medical history, intraoperative and postoperative data of consecutive patients who underwent elective F/B-EVAR to treat CAAAs and TAAAs (December 2012–May 2020) were retrospectively analyzed. Patients were divided into three groups based on aneurysm extent: CAAA, type 4 TAAA (TAAA4) and type 1-3 TAAA (TAAA1-3). MAEs were defined according to current SVS reporting standards. The primary endpoint was 30-day MAE with risks factor assessed using a least absolute shrinkage and selection operator (LASSO) regression model.
Results: In total, 439 patients (129 CAAAs, 193 TAAA4, and 117 TAAA1-3) with 1718 target arteries were included, with 379 patients (86%) having at least four vessels incorporated. The primary technical success rate was 96%, mean surgical time was 185 (±68) minutes. Overall, MAE incidence was 9.8% (n=43) including a 30-day mortality rate of 3.6% (n=16). 75% of MAEs occurred within 48 hours after surgery. Grade 3 spinal cord ischemia occurred in 1.6%, significantly higher in patients with TAAA1-3 (4.3%, p=.023). Renal failure was the most common MAE (4.8%). The 30-day reintervention rate was 8.2% (stent graft-related: 2.7%; access-related: 3.4%). LASSO regression model revealed female sex, total fluoroscopy time, unplanned additional procedures (UAPs), Norephedrine use, ASA score, packed red-blood cells transfusion as independent factors associated with MAEs. AUC of our model was 0,78 (IC95 % 0,69–0,85)
Conclusion: In the immediate postoperative period, 10% of patients undergoing F/B-EVAR experiences MAEs. Female gender, total fluoroscopy time, UAPs, Norephedrine use, ASA score and packed red-blood cells transfusion predicted MAEs regardless of aneurysm extent. Selected low-risk patients undergoing straightforward procedures could undergo postoperative monitoring in standard wards if they are relatively fit and surgery is uncomplicated.

Branched iliac stentgrafts: analysis of sealing zones and impact on mid-term outcomes
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Objectives: The endovascular management of aortoiliac aneurysms and primary iliac artery aneurysms has evolved since the introduction of branched iliac stentgrafts to preserve flow towards the internal iliac artery and reduce pelvic ischemic complications. However, mid-term durability remains dependent on the quality of the proximal and distal sealing zones, the influence of which is still insufficiently studied. The objectives of this study were to evaluate the mid-term technical and clinical outcomes of iliac branched stentgrafts by specifically analyzing the determinants of complications in the proximal and distal sealing zones.
Material and methods: Retrospective single center study including all patients implanted with an iliac-branched device (ZBIS Cook or IBE Gore) between January 2014 and June 2025. Demographic, anatomical, perioperative and follow-up data were collected. Primary endpoints included technical success (absence of access complication, failure to deploy, or persistent type I/III endoleak at 30 days), occurrence of internal iliac branch instability (type Ic/III endoleak, stenosis, kinking, or occlusion), and the need for secondary reintervention. Survival estimates were determined with the Kaplan-Meier method.
Results: 75 devices were implanted in 69 patients (median age 73 years; 100% men). An isolated

primary iliac aneurysm represented 32% of indications, and an aorto-iliac aneurysm 54%. Initial technical success was 96% and no 30-day mortality was observed. The rate of major complications was 13%, with no sequelae. The median follow-up was 15.1 months. Overall survival was estimated to be 97% at 6 months, 90% at 12 months and 84% at 24 months. Type Ic endoleak-free survival was 95% at 24 months, and type III endoleak-free survival was 94% at 24 months. Only one occlusion and three asymptomatic stenoses of the hypogastric branch were observed, resulting in a 24-month occlusion or stenosis-free survival of 93%. Twelve-month and 24-month survival rates without branch instability were 86% and 82%, respectively. Survival without branch-related reintervention was 92% at 24 months. In the distal inner iliac seal zone, an inner iliac extension diameter ≤ 10 mm was associated with a lower stenosis/occlusion-free survival. Implantation of more than two distal extensions significantly increased the frequency of branch instability. The type of stent (balloon versus self-expanding) was not associated with a higher rate of instability or reintervention. Anchoring in a division branch favored more occlusive events, although most often asymptomatic (27% vs 10%), without reintervention. In patients treated for isolated iliac aneurysms, findings observed with iliac branched device implantation without aortic module suggested the feasibility and safety of this strategy at the primary iliac proximal sealing zone.
Conclusion: Branched iliac stentgrafts have excellent perioperative safety and satisfactory mid-term durability, with a low reintervention rate and an effective preservation of hypogastric flow. The stability of the branch appears to be primarily affected by the quality of the distal sealing zone, including the diameter of the internal iliac artery and the possibility of anchoring in the main trunk.

Predictors of target vessel instability following fenestrated aortic stentgraft implantation
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Objectives: To evaluate target vessel instability (TVI) after FEVAR and analyze the factors associated with its occurrence.
Material and methods: Retrospective single center study including all patients treated with custom made branched and/or fenestrated stentgrafts (B/FSGs) for complex aortic or thoraco-abdominal aneurysm at Lille University Hospital between 2010 and 2024. Patients treated with B/FSGs consisting of branches only were excluded. TVI was defined as any target vessel re-intervention for occlusion, stenosis, stent fracture or endoleak and was analyzed using Kaplan-Meier curves. The association between TVI and target artery morphology parameters including ostium diameter, angulation, clockwise orientation, as well as the distance gap between the window and the vessel ostium assessed on the postoperative scan and the type of connection stent was studied by multivariate Cox models. A specific analysis of subcategories of events (stenosis, thrombosis, fracture) was also performed.
Results: A total of 796 patients and 2548 target vessels (439 celiac trunks (TC), 665 superior mesenteric arteries (SMA), 719 right renal arteries (RRA), 725 left renal arteries (LRA)) were analyzed. The overall TVI rate was 8.5% after a median follow-up of 36 ± 35 months. One-year, 5-year, and 10-year survival rates without instability were 98%, 90%, and 75%, respectively. SMA was the target vessel with the highest TVI rate (10%) at follow-up, and with the lowest 5-year and 10-year survival rates without instability of 70% and 60%, respectively. Gap distance (HR=1.07; 95% CI [1.05-1.09]; p<0.001) and angulation (HR=1.01; 95% CI [1.00-1.02]; p=0.049) were associated with the occurrence of TVI. Five-year and 10-year stenosis/occlusion/fracture-free survival rates were 90% and 85%, respectively. The increase of the target artery diameter (HR=0.70 per mm increment; 95% CI [0.53-0.93]; p=0.014), TC (HR=0.45; 95% CI [0.22-0.92]; p=0.030) and LRA (HR=0.32; 95% CI [0.15-0.71]; p=0.005) were associated with a reduced risk of stenosis/occlusion/fracture.
Conclusion: Target vessel instability after FEVAR is an important cause of reintervention. Gap distance and angulation are the factors most commonly associated with its occurrence. Connection stent stenosis, thrombosis, or fracture is favored by the target artery size and type.

Comparative study of type II endoleaks after aorto-bi-iliac or a fenestrated stentgraft
Romain LEPILLIET, Alexandre ROSSILLON, Nicolas MASSAD, Floriane LEFEBVRE, Robin SAGNET, Marine GAUDRY, Pierre-Edouard MAGNAN, Michel BARTOLI, Marseille

Objectives: Type II endoleaks (EF2) are the most common complication after endovascular repair of abdominal aortic aneurysms. Their evolution is unpredictable. Some regress spontaneously, others persist and are associated with sac expansion, exposing to rupture and reoperation. The objective of this study was to compare the natural history and prognosis of type II endoleaks according to the type

of endovascular repair (EVAR vs FEVAR for complex aneurysms) and to identify risk factors for aneurysm sac augmentation.
Material and methods: Retrospective single center study conducted between 1999 and 2024, including 115 patients with EF2 diagnosed during follow-up (34 FEVAR, 81 EVAR). Preoperative anatomical characteristics as well as intraoperative and follow-up data were systematically analyzed. Primary endpoint was the expansion of the aneurysmal sac (diameter increase ≥ 5 mm). Secondary endpoints included sac dynamics, the need for secondary procedures (SP), and overall survival. Survival without sac augmentation, EF2-free survival, and overall survival were estimated by the Kaplan-Meier method. Risk factors for aneurysmal sac expansion were investigated in univariate and multivariate analyzes.
Results: The prevalence of EF2 was 18% in FEVAR-treated patients compared to 22% in EVAR-treated patients. 12-month persistence of EF2 was observed in 68% and 77% of patients, respectively (p=0.36). A trend towards more frequent sac expansion was observed after FEVAR (52.9% vs 33.3%; p=0.08), with a significantly shorter increase-free survival (37 vs 61 months; p=0.003). EF2-related SP also tended to be reduced after FEVAR (49 vs 74 months; p=0.061). In multivariate analysis, the persistence of EF2 at 12 months was a factor independently associated with aneurysmal sac expansion (OR 4.8; 95% CI [1.17-19.8]; p=0.03), while the presence of an aneurysmal thrombus showed a protective trend (OR 0.3; 95% CI [0.07-1]; p=0.06). Finally, the estimated overall survival at 3 and 5 years did not differ significantly between patients treated with EVAR vs FEVAR (82% and 74% vs 89% and 71%; p=0.41).
Conclusion: Type II endoleaks remain common after EVAR and FEVAR, but their impact appears more marked after FEVAR, with a faster growth of the aneurysmal sac and a tendency to more reinterventions. Persistence beyond 12 months is a pejorative marker, while the presence of aneurysmal thrombus may play a protective role. These findings support prolonged and rigorous monitoring and suggest that a more proactive strategy could be considered when monitoring complex repairs.

24-month results of fenestrated/branched stentgrafts in patients ≤ 65 years
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Objectives: F/BEVARs for complex abdominal aortic aneurysms (CAAA) and thoracoabdominal aneurysms (TAAA) are gaining momentum due to their minimally invasive nature compared to open surgery. However, data in young patients are limited. The objective of this study was to report the 24-month results in patients ≤ 65 years treated by F/BEVAR.
Material and methods: This two-center retrospective cohort included all patients treated for CAAA or TAAA with F/BEVAR between 2017 and 2023 at the Nantes and Rennes University Hospitals. Pre-, intra- and post-operative data were prospectively collected. All data were compared between patients < 65 years and those > 65 years. Follow-up data analyzes were performed at 24 months.
Results: 24.8% of the 254 enrolled patients were ≤ 65 years of age (n=63). Preoperative data of patients ≤ 65 years showed a higher incidence of TAAA (44.4% vs 19.9%, p < 0.001), history of aortic dissection (19% vs 4.2%, p < 0.001) and aortic surgery (43% vs 28%, p = 0.046). Primary technical success rates were comparable between the groups (96.8% vs 92.9%). 30-day all-cause mortality was 3.2% in patients < 65 years, similar to that observed in patients > 65 years (4.2%, p=0.9). The rates of medical postoperative complications (< 30 days) were also comparable, including acute renal failure (12.7% vs 8.9%) and paraplegia (1.6% vs 0%). Surgical complications were mainly related to the approaches (6.3% vs 4.7%), with no significant difference between groups (p=0.57). Two-year rates of endoleak, stent occlusion and all-cause reinterventions were similar. A significant difference was found in the reoperations for branch stenting on endoleak (14.3% in patients ≤ 65 years vs 3.7% in patients > 65 years, p=0.005). 24-month mortality in patients ≤ 65 years was 11.1%, without significant difference with patients > 65 years. A trend towards a greater decrease in aneurysmal diameter was observed in younger patients (-10.1% vs -4.4%, p=0.1).
Conclusion: Overall results of F/BEVAR were similar in patients ≤ 65 years and older patients, despite an initially more extensive aneurysmal disease. The need for close monitoring of target arteries in these patients is supported by the higher frequency of initial and progressive dissecting disease.

36-month results of the TAILOR register on the treatment of aortoiliac aneurysms with E-liac branched stentgrafts
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Objectives: The European guidelines encourage preserving internal iliac patency in isolated aorto-iliac or iliac aneurysms. The objective of this non-interventional study was to evaluate the prevention of ruptures and deaths with the E-liac branched stentgraft (Artivion).
Material and methods: This was a prospective, non-randomized, multicenter observational study. A total of 16 centers participated and 71 patients with unilateral or bilateral aorto-iliac or iliac aneurysms were enrolled. Patients were enrolled if compatible with the anatomical criteria of the Instructions for Use. For aortoiliac aneurysms, the E-liac stent graft was implanted with one of the following aortic stents: E-tegra (Artivion), Endurant (Medtronic), Zenith (COOK), Excluder (GORE). The planned follow-up time was 36 months for each patient. Postoperative scans were routinely read by a Corelab. The primary endpoint was the 30-day clinical success rate. Secondary endpoints included 30-day, 12-month, 24-month, and 36-month all-cause mortality, survival, E-liac reintervention, and change in iliac aneurysmal diameter.
Results: Clinical success was achieved in 89.3% of patients. Reasons for failure were: Type I or III stentgraft leakage in 5.4% of patients, E-liac thrombosis in 5.4% of patients, and E-liac stentgraft integrity failure in 1.8% of patients. 12-month, 24-month, and 36-month clinical success rates were 83.3%, 80.4%, and 77.1%, respectively. All-cause perioperative and 30-day mortality was null. 12-month, 24-month, and 36-month mortality rates were 2.8%, 4.2%, and 8.5%, respectively. Only one procedural or device-related death was recorded in the 24 months of follow-up, following hemorrhagic shock due to right iliac thrombosis. Survival analysis showed survival rates of 100% at 30 days, 97% at 12 months, 96% at 24 months and 90% at 36 months. The absence of E-liac-related reinterventions was 94.4% at 30 days, 90.1% at 12 months, 81.7% at 24 months, and 77.5% at 36 months. 36-month Iliac diameter decreased in 37.8% of cases, was stable in 54.1%, and increased in 8.1%.
Conclusion: E-liac Stent Graft differs from other stentgrafts as a stand-alone device for isolated aneurysms of the common iliac artery. In this registry, data collected up to three years of follow-up demonstrate the safety and efficacy of this device to treat iliac/aorto-iliac aneurysms when used according to the indication.

Branched iliac stentgrafts and unfavorable anatomies: Is gluteal anchoring keeping its promise? Results of a bi-centric study
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Objectives: Branched iliac stents (BISs) preserve pelvic perfusion during endovascular treatment of complex aorto-iliac aneurysms. When the internal iliac artery is too short or aneurysmal, distal anchoring in a gluteal branch may be considered. This study compared the efficacy and safety of conventional hypogastric and gluteal anchoring.
Material and methods: Between 2018 and 2024, 81 patients treated with BIS (66 hypogastric anchors, 15 gluteal) were enrolled in two French tertiary centers. The primary endpoints were 1-month and 1-year primary/secondary technical success and BIS-related reintervention-free survival. Secondary endpoints included complications, endoleaks, patency, and mortality. Intent-to-treat analysis was performed.
Results: Primary technical success was 97% in the hypogastric group and 100% in the gluteal group; secondary technical success was 100% in both groups. In the hypogastric group, 6% (4/66) of patients required secondary gluteal extension to restore distal sealing. The median duration of follow-up was 25.5 months in the hypogastric group and 11 months in the gluteal group. At 1 year, BIS patency was 100% in both groups. Survival without device-related reintervention was comparable (21% vs 20%; p >0.99). Endoleak rates were similar (11.2% vs 13.3%, mainly type II). No severe pelvic ischemia was observed. Mortality at 1 year was higher in the gluteal group (p=0.009), but interpretation is limited due to the small size of the cohort, the shorter follow-up, and the referral role of this strategy.
Conclusion: Gluteal anchoring is a reliable alternative when hypogastric anchoring is not possible, with comparable technical success and mid-term clinical stability. The occasional need for gluteal extension in the classical group underscores its value in securing distal anchoring. Larger-scale prospective studies are needed to clarify the durability of this strategy in complex anatomies.