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REGENT (NATIONAL REGISTRY ON THE ENDOVASCULAR TREATMENT OF FEMORAL TRIPOD LESIONS): RESULTS AND PROSPECTS

Maximilien Giovannetti, Caen, France, for the ARCHIV Group.

Objectives: Femoral tripod stenting is a reproducible technique, often used in specific situations. There are no data available to date on its practice at national level. The purpose of the questionnaire was to get an update on femoral tripod stenting in terms of population, strategy and techniques.
Material and methods: An electronic questionnaire was sent to the members of the French Society for Vascular and Endovascular Surgery, open for responses between 27-Sep-2023 and 14-Oct-2023. The questions focused on indications, anatomical choice criteria, techniques and follow-up. The data were collected with Google Form.
Results: There were 113 participating surgeons (49% were private practice surgeons, 44% were hospital surgeons, and 7% worked in mutual institutions), using endovascular techniques in more than 5 patients per year in 62% of cases (n=70), for Azema 3 or Medina 1-1-1, 1-0-1, or 0-1-1 lesions. The main indication was retained in 38.2% of the responses (n=43). The other two principal indications were the ASA score (71%; n=70) and a hostile Scarpa (85%; n=96). A preferential technique was mentioned by 66% (n=73) of the respondents. The "Eiffel Tower" technique and Y-stenting were the two principal techniques (48.2 and 42.4%, respectively). Sizing (81.3%; n=87), caliber disparity of the three arterial trunks (67%; n=64), and the angulation of the branches (68%; n=65) were the three major criteria influencing the technical choice. The two criteria that discriminated between the two main techniques were the degree of the angulation of the daughter branches (cut-off 45°), and a +2mm caliber disparity of the two branches. One-month, 6-month and 1-year ultrasound follow-up was obtained in 93.8% of the cases. Long-term dual anti-platelet therapy was prescribed in 88.4% of cases (n=100).
Conclusion: Femoral tripod stenting is more and more frequently used in France. The results indicate the homogeneity of indications, leading techniques and their selection criteria, as well as of the monitoring and the prescribed medical treatment. This suggests to initiate a nationwide study of the efficacy of these techniques.
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DISTAL RETROGRADE ARTERIAL PUNCTURES IN AMBULATORY PRACTICE

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Objectives: The endovascular management of peripheral occlusive arterial disease (POAD) became the first line technique for many surgical teams. In parallel, the ambulatory shift has been accelerated for these patients, especially since the Covid-19 pandemic. Nevertheless, for many surgeons, the retrograde arterial puncture of popliteal or leg arteries to use the SAFARI technique to cross a lesion is an obstacle to ambulatory care. To date, this practice is not a contraindication in the guidelines but no studies have validated its feasibility, which is the case.
Material and methods: This was prospective multicenter study including patients receiving ambulatory care for POAD with a retrograde arterial puncture for the realization of a SAFARI. The protocol for selecting patients eligible for ambulatory care was in accordance with the 2019 guidelines of the French Society for Vascular and Endovascular Surgery. The principal objective was to evaluate the one-month safety of the retrograde arterial punctures of popliteal or leg arteries in the endovascular treatment of POAD in ambulatory practice (Rutherford 2-5). The primary outcome was the occurrence of a

serious adverse event on the treated limb: acute ischemia, major amputation above the ankle, reoperation on the revascularized limb. Minor amputations were not included.
Results: Between March 2021 and November 2023, 22 patients were enrolled for 23 procedures, with an average age of 68.6 years; 20 presented with claudication, and two patients with rest pain. No intraoperative complications related to the retrograde punction were reported. The punction was popliteal in 12 patients and in the leg arteries for 11 procedures. The success rate of lesion crossing was 96% (22/23), with an average intervention duration of 103 minutes. At 1 month, no serious adverse event occurred (95% CI: [0.0 - 16.1]). Only one minor event (arteriovenous micro-fistula) related to the puncture was reported, with a spontaneous favorable evolution. The patency rate of the punctured arteries was 100% and the patency rate of the revascularizations was 96%, with one stent thrombosis.
Conclusion: These data showed that retrograde arterial puncture in an outpatient setting is feasible and safe. A new study with a larger cohort will clarify these results.
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THREE-YEAR RESULTS OF FEMOROPOPLITEAL ANGIOPLASTY WITH ACTIVE BALLOONS OBTAINED FROM THE FRENCH NATIONAL HEALTH DATA SYSTEM

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Objectives: Clinical studies demonstrated the safety and the efficacy of angioplasty with drug coated balloons (DCB) for femoropopliteal revascularization. Long-term studies in current practice remain limited. The objective was to evaluate the long-term results of DCB angioplasty to treat femoropopliteal atheromatous lesions in the French population.
Material and methods: Patients treated with at least one IN.PACT Admiral DCB between January 2018 and December 2018) were identified from the French National Health Data System (SNDS). Patients with intermittent claudication or critical ischemia in the symptomatic limb (CLI) attributable to de novo obstructive lesions or intra-stent restenosis were included. The primary criteria were overall survival, major amputation (including target and non-target limbs and vessels) and reintervention (any infra-inguinal intervention or re-intervention on target lesions, non-target lesions, target or contralateral limb) during the year following the index procedure. Three-year follow-up data were collected from January 2019 to December 2021.
Results: Overall, 3595 patients with a mean age of 71 years were included. 64% were men, 35% presented with CLTI, 38% were diabetics and 36% had previous revascularization. Mortality from all causes was 7.5% and 19.7% at 3 years. One-year and 3-year rates of major amputation were 2.7% and 4.6%, respectively. One-year and 3-year rates of reintervention were 25.9% and 43.4%, respectively. Rates were significantly higher in patients presenting with CLTI compared to patients with intermittent claudication, in diabetics, and in case of previous revascularization.
Conclusion: This population analysis demonstrated a satisfactory limb salvage rate and a low mortality rate after angioplasty with active balloons for the treatment of occlusive femoropopliteal lesions.
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SITUATIONAL ANALYSIS AND OBSTACLES TO THE DEVELOPMENT OF AMBULATORY SURGERY IN FRANCE AND THE BARRIERS TO ITS DEVELOPMENT: THE PRACTITIONERS' PERSPECTIVE

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Objectives: The ambulatory endovascular treatment of peripheral arterial occlusive disease (PAOD) remains marginal in France. In 2019, guidelines were published by the French Society for Vascular and Endovascular Surgery to facilitate this practice. However, the development of ambulatory care remains slow and obstacles persist. The objectives of this study were to give an overview of the ambulatory endovascular treatment of PAOD in France and to identify the barriers to its development, according to surgeons.
Material and methods: Between September 2022 and October 2023, the French vascular surgeons (n=654) were approached by the French Society for Vascular and Endovascular Surgery and Vascurisq to answer an online questionnaire on their ambulatory practice of the endovascular treatment of PAOD. The questionnaire, completed on a voluntary basis, focused on the medical and social criteria for selection of patients, the treatment, the follow-up, the number of procedures of performed and the potential barriers.
Results: Among the 279 (43%) respondents, 197 (71%) were private surgeons. All of the French regions were represented. 228 surgeons (82%) reported performing endovascular treatment for PAOD in an outpatient setting. 178 surgeons (79%) said that they had not changed their practices because of the ambulatory practice. 172 (75%) used manual compression on an outpatient basis. The patients

were on average monitored 4.7±1.5h after the procedure. Social isolation was considered as the main exclusion cause. Age, obesity, critical ischemia and chronic renal insufficiency were not considered as factors contraindicating ambulatory care by more than half of the surgeons. Iliac thrombosis and long femoropopliteal lesions were judged as exclusion criteria for 48 (21%) and 75 (33%) of practitioners, respectively. The rate of potentially eligible patients estimated by the surgeons was 58.3%±22.5%. Medicolegal risks were identified as the main brake for 39% of the surgeons who did not practice ambulatory surgery.

Conclusion: This study, carried out on almost half of the French vascular surgeons gives an overview of ambulatory practice and of the potential obstacles four years after publication of the guidelines. The medicolegal risks, social isolation and the complexity of the lesions appear as real obstacles to the development of the endovascular treatment of PAOD in an outpatient basis.

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THREE-MONTH PATENCY OF THE DISTAL ARTERIES PUNCTURED DURING SAFARI PROCEDURES

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Objectives: The SAFARI technique allows the retrograde recanalization of lower limb arteries in vase of failure of an anterograde approach. It requires the retrograde puncture of a distal artery at the risk of compromising its patency. The main objective of our research was to evaluate the 3-month patency of the punctured distal arteries during SAFARI.

Material and methods: We retrospectively collected the pre- per-operative data of the patients undergoing arterial recanalization with the SAFARI technique between April 2018 and April 2023 in our center. All patients had Duplex examination 3 months after the procedure. During this period, 99 of the 426 femoropopliteal recanalizations made with SAFARI. Nine (1%) procedures were excluded from the study due to puncture failure. Five patients were lost to follow-up.

Results: The population was composed of 62 (78%) men, with a mean age of 71±12.05 years. Indication was a severe claudication in 61% of the cases and critical ischemia in 39% of the cases. The retrograde puncture was done with a 4 or 5F introducer into the anterior tibial artery (59%), the posterior tibial artery (29%), the popliteal artery (5%), the fibular artery (4%), or the pedal artery (4%). A bolus of heparin, 50 IU/kg, was injected after arterial puncture. Arterial closure was obtained by manual compression and compression dressing in 100% of cases. Only one popliteal hematoma (1%) related to the distal puncture was observed, which did not require surgical revision. The 3-month patency of the punctured distal artery was 94%, with five arterial thromboses which involved 3 anterior tibial arteries, one fibular artery, and one pedal artery.

Conclusion: The SAFARI technique has a low complication rate with a good patency rate of the distal punctured artery. A larger cohort study should allow to confirm these results, particularly in presence of a single patent distal artery.

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SHORT AND MID-TERM RESULTS OF TUNNELING THROUGH THE OBTURATOR HOLE FOR ILIO-FEMORAL BYPASS

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Objectives: Tunneling through the obturator hole is one of the extra-anatomical tunneling techniques usable in case of hostile scarpa. Although this technique has been reported since the 1960s, it remains relatively little used and few current data are present in the literature.

Material and methods: This was a retrospective and single-center study including all the patients having a bypass tunneled through the obturator hole between 2002 and 2023.

Results: Between 2002 and 2023, 23 patients had a bypass tunneled through the obturator hole in our institution: 18 (78%) for infection, 3 (13%) for hostile scarpa due to multiple previous operations, and 2 (9%) for false aneurysm. Nineteen of the patients (83%) were men, and median age was 65±12 years. Bypass conduits were allografts in 14 cases (61%), greater saphenous veins in 4 cases (17%), superficial femoral veins in 2 cases (9%), synthetic prosthesis in 1 case (4%) and a compilation of superficial femoral vein, endarterectomized superficial femoral artery and allograft in one case (4%). Tunneling was done through the ipsilateral obturator foramen in 22 cases (96%). Four patients (17%) died within the first 30 postoperative days from multiple organ failure due to refractory sepsis. Five patients (22%) were reoperated within the 30 postoperative days, two for scarpa triangle washing without a new bypass surgery, one to evacuate a hematoma in the retroperitoneal approach, one for thrombectomy and distalization of the bypass surgery, and one for repair of the distal anastomosis. Two patients (7%) required secondary surgery, one to evacuate an abscess of the scarpa triangle, and one for bypass distalization for critical ischemia). We observed one bypass occlusion at D1 treated by bypass distalization, and the primary patency rate was 96%. Healing was achieved in the 19 surviving patients (82%). The average follow-up was 25 months.

Conclusion: Tunneling through the obturator foramen is a technique that surgeons should know to manage hostile scarpas. It allows satisfactory primary patency and healing rates, and reoperation for washing of the scarpa triangle

without exposure of bypass is possible. There is, however, a non-negligible mortality rate in connection with the initial very severe clinical presentation.
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HLA IMMUNOLOGICAL REACTIVITY OF THE RECIPIENTS OF CRYOPRESERVED ALLOGENIC VENOUS GRAFT (+2°C AND + 8°C)

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Objectives: In 2019, 10,000 venous allografts cryopreserved between +2°C and +8°C (CPVA) were implanted in France, particularly in to create hemodialysis accesses in patients who were waiting for a renal transplant and in whom the development of anti-HLA antibodies (DSA) could lead to an increased risk of rejection. It is recognized that the endothelium of these CPVAs is destroyed during implantation and that they are not likely to cause an immune reaction in the recipient. However, no immunological studies validated this hypothesis. The aim of this research was to evaluate the immunizing character of BIOPROTEC CPVAs by identifying the occurrence of DSAs directed against the donor in the recipient 30 days after implantation. A secondary outcome was to evaluate the occurrence of clinical events that might be associated with the rejection of the venous allograft such as the thrombosis of the allograft.
Material and methods: This monocentric descriptive blinded study included volunteers receiving a scheduled CPVA in our center. Patients with DSAs detected one day before receiving the venous graft were excluded from the study. Two blood samples were taken from the patients for HLA typing and anti-HLA-antibodies searching one day before implantation and 30 days after the operation to evaluate the appearance or the increase of DSAs. 30-day and 180-day patency of the CPVA was evaluated. In the event of modification of the DSAs at D30, the absence of any immunizing event since the implantation of the CPVA was verified.
Results: Between September 2022 and November 2023, 41 patients were included (28 men; average age: 71±12 years). CPVAs were implanted for PAOD (n=25) or to create a vascular access for hemodialysis (n=16). At D30, no DSAs appeared in patients that were ACAL- one day before implantation (n=20). In addition, in patients with presenting DSAs at D-1 (n=14), no change in the rate or appearance of DSAs was observed. The results of 7 patients are in progress. One-month primary patency was 97% (N=33/34) and primary assisted patency was 100%.
Conclusion: This study showed that CPVAs do not generate any HLA allergenic activity. They can therefore be used without risk of immunization in the patients waiting for a transplant.
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BALLOON EXPANDING OR SELF-EXPANDING STENT TO TREAT FEMORAL TRIPOD LESIONS?

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Objectives: To treat atheromatous stenoses of the femoral tripod by endovascular route, we used balloon-expanding stents (BS), with a more accurate placement but a risk of crushing, or the more flexible self-expanding stents (SS) characterized by a shape memory. We then compared the patency of the treated zone according to the type of stent used and the severity of calcifications of the stenosing plaque in the target zone.
Material and methods: Between January 2016 and December 2022, all patients presenting an atheromatous stenosis of the femoral tripod treated by stenting were included in this study. We compared BSs to SSs and examined demographic and perioperative data, the primary patency evaluated by Duplex at D1, M2 and M12. A >50% stenosis was defined by a peak systolic velocity ratio > 2.4. primary outcome was the one-year primary patency. Secondary outcome concerned the association between the primary patency, the volume of the arterial calcifications in mm3 and their Hounsfield units (UH) density measured on the angio-CT and classified in terciles (low, medium and high density).
Results: Ninety stentings (26 AS, 64 BS) of the femoral tripod were done in 77 patients. The one-year primary patency was similar in the two groups (BS, 72% vs AS 88%, p=0.14). The maximum densities of arterial calcifications were associated with a risk of early restenosis while medium densities were associated with the late restenosis.
Conclusion: In our experience, balloon stents and self-expanding stents obtained similar one-year primary patency rates to treat atheromatous stenoses of the femoral tripod. The density of the arterial calcifications influenced the patency. These data will require confirmation.
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SAFETY AND EFFICACY OF MECHANICAL THROMBECTOMY AND THROMBOASPIRATION IN PATIENTS SUFFERING FROM ACUTE LIMB ISCHEMIA: SYSTEMATIC REVIEW AND META-ANALYSIS

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Objectives: In the last few years, thromboaspiration (TA) and mechanical thrombectomy (MT), have emerged as endovascular alternatives to conventional treatment with surgical thrombectomy or direct catheter thrombolysis (DCT) to treat acute limb ischemia. To date, no meta-analysis evaluated the results of thromboaspiration and mechanical thrombectomy. The objective of this study was therefore to evaluate the safety and efficacy of these endovascular treatments of acute ischemia.
Material and methods: A systematic search on studies evaluating thromboaspiration or thrombectomy for acute ischemia was conducted in PubMed/Medline and Cochrane Central between 2010 and 2023. The meta-analysis was carried out in accordance with the requirements of the MOOSE recommendations. The primary outcome was the 30-day amputation rate. Secondary outcomes were 30-day mortality, technical success alone or assisted with an adjuvant therapy (angioplasty, stenting, DCT).
Results: 591 publications were identified. 10 studies fulfilled the inclusion criteria. Overall, 1083 patients and 1092 limbs were included. The 30-day major amputation rate was 0.05% [95% CI: 0.01 - 0.08]. In the TA subgroup, the amputation rate was null [95% CI: 0.00 - 0.01] vs 0.08% [95% CI: 0.04 - 0.13] in the MT subgroup. The 30-day mortality rate was 0.03% [95% CI: 0.01 - 0.05]. Technical success only was 0.57 [95% CI: 0.39, 0.75] in the meta-analysis, 0.73 [95% CI: 0.54, 0.93] in the TA subgroup, and 0.48 [95 % CI: 0.16, 0.80] in the MT subgroup. Assisted technical success was 0.97 [95% CI: 0.94-1].
Conclusion: Thromboaspiration and mechanical thrombectomy are safe and effective for the treatment of acute limb ischemia. Their use would reduce the use of fibrinolysis (DCT) and the need for intensive care.
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ULTRASOUND GUIDED PLACEMENT OF PROGLIDES APPEARS TO BE AN EFFECTIVE TECHNIQUE

Mickael Palmier, Hossam Amarouche, Tom Teniere, Geoffrey Bernard, Bruno Pochulu, Yara Fares, Sébastien Miranda, and Didier Plissonnier, Rouen, France.

Objectives: In endovascular aortic surgery, the percutaneous closure systems appear to be effective, particularly Proglide® (PG). We evaluated the clinical and economic efficacy of combining femoral puncture and PG's ultrasound guided deployment.
Material and methods: Our single-center study included consecutive patients having an endovascular aortic procedure in a tertiary center between May and September 2023. PGs were placed under ultrasound guidance. The deployment of the device was clearly visualized during intraluminal opening. PGs were mobilized under ultrasound guidance in ensuring of the absence of mobilization of the atheromatous plaque, of calcifications, or of the posterior arterial wall. Preoperative data of the patients were evaluated from preoperative angio-CTs. Clinical and technical successes were defined as the capacity to obtain a complete hemostasis confirmed by ultrasound 48 hours after the procedure.
Results: Twenty patients were enrolled over six months, totaling 34 common femoral arteries (CFA). Fourteen were men, with an average age of 72.8 ± 8.2 years. The average diameter of the 34 CFAs was 12.05±2.4 mm, and the depth of access was 38.0±13.4 mm. 28 of the CFAs (82%) had calcifications, anterior and/or circumferential in seven cases. Eleven arteries (32%) had previously been approached. The average diameter of the introducer sheath was 6.2±1.5 mm with a sheath-artery ratio of 0.54±0.18. The PG was successfully placed under ultrasound guidance in 100% of cases. No failures occurred during the placement of the PGs. The clinical and technical success were 95% and 100%, respectively. One small false aneurysm was observed at 48 hours and treated by compression only. No surgical or endovascular procedures on the vascular access were necessary.
Conclusion: PG deployment under ultrasound guidance in aortic surgery is a safe and effective method of hemostasis. It is effective to prevent PG failures at lower cost.
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POPLITEAL ENDARTERECTOMY FOR ATHEROMATOUS LESIONS OF THE POPLITEAL ARTERY

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Objectives: The purpose of this study was to evaluate the safety and long-term efficacy of popliteal endarterectomy for stenotic lesions.
Material and methods: This was a retrospective, observational, single-center, consecutive, non-controlled study on real life medical data. 14 patients were included between January1st, 2015 and December 31, 2022. The operative indication was established in patients presenting claudication (n=13) or rest pain (n=1)) due to a stenotic lesion of the popliteal artery accessible through a posterior approach. Endarterectomy was performed with a possible proximal extension with a Vollmar ring or with a proximal stent. Arterial closure was done with a saphenous vein or bovine pericardial patch. We then analyzed demographic, peroperative, postoperative and long-term date.
Results: 14 patients had popliteal endarterectomy (12 men and 2 women), associated with a remote stenting of the superficial femoral artery to fix the proximal plaque in 7 cases. The average age was 65 years. The mean duration of follow-up was 57 months [2-102] without lost to follow-up. The technical and clinical success rates were 100%. The average pre- and postoperative ABIs were

0.625±0.15 and 0.98±0.14, respectively. One patient presented an acute ischemia with paralysis on postoperative D1 which was treated successfully. The median duration of hospitalization was four days [3-7]. The primary patency rate was 90% at 3 years, and 86% at 6 years, and the secondary patency rate was 100% at 6 years.
Conclusion: Popliteal endarterectomy with or without proximal stenting of the superficial femoral artery is an effective and sustainable treatment of isolated stenoses of the popliteal artery, which preserves the saphenous vein capital. This invasive but safe technique should be taken into account in parallel with the development of endovascular techniques, which long-term results are not yet known.
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24-MONTH RESULTS OF THE ENDOVASCULAR TREATMENT OF COMPLEX OCCLUSIVE LESIONS OF THE EXTERNAL ILIAC ARTERY WITH THE VIABAHN STENTGRAFT ®

Bahaa Nasr, Maribel Hupelier, and Mélanie Carret, Nantes, France.

Objectives: Few studies evaluated the endovascular treatment of occlusive lesions of the external iliac artery with the Viabahn® stentgraft. However, the use of a covered stent may decrease the risk of rupture and restenosis by inhibiting myointimal hyperplasia. The objective of this study was to evaluate the efficacy of Viabahn® in the endovascular treatment of the complex occlusive occlusions of the external iliac artery.
Material and methods: This was a prospective, single-center, non-randomized study. Patients presented symptomatic PAD (Rutherford 2-6) and de novo external iliac artery lesions. Clinical evaluation and ultrasound evaluation was done at 1, 6 and 12 months. The primary outcome was the 12-month patency. Other criteria of evaluation were the rates of clinical improvement and hemodynamic improvement, and the rate of reintervention.
Results: 81 patients (83 limbs) were enrolled, with an average age of 67±9 years. 49% and 51% of the patients had intermittent claudication or critical ischemia, respectively. 73% of the treated lesions were TASC D. The average length of the lesions was 15.5±5.8 cm and in 57% of cases, the artery was occluded. An associated treatment of the common iliac artery was done in 63% of cases. The average duration of follow-up was 18 months. Twelve patients died, and six were lost to follow-up. At 24 months, the primary patency rate and the reintervention rate at the level of the treated lesion were 83% and 6%, respectively. Occlusion occurred after an average of 12 months. The 24-month rate of primary clinical improvement was 90%. There was a significant improvement in the index of systolic pressure (0.5 vs 0.8; $p<0.0001$).
Conclusion: The Viabahn® stentgraft appears to be effective to treat complex lesions (TASC C and D) of the external iliac artery.
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ACUTE ILIOFEMORAL DEEP VEIN THROMBOSIS: LONG-TERM RESULTS OF PHARMACO-MECHANICAL THROMBECTOMY

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Objectives: The techniques of thrombus removal are recommended to treat acute femoro-iliac deep venous thrombosis (FIDVTa) in selected patients (grade IIa, ESVS level A, 2021). Pharmaco-mechanical thrombectomy (PMT) developed, but no studies reported a follow-up exceeding two years. The purpose of this prospective study was to present the long-term results of PMT.
Material and methods: Between August 2013 and December 2017, 33 consecutive patients (23 women, including 3 pregnant women), were admitted for FIDVTa, (bilateral in five cases, and with pulmonary embolism in six cases) and included in a prospective registry with PMT treatment in 2 centers. These DVTas progressed since a median of 8 days (1-21) and affected the inferior vena cava in 6 cases. Nine patients were contraindicated for surgical thrombectomy and 7 for in situ thrombolysis (4 for the 2 techniques).
Results: The technical success rate was 100%. The PMT was performed with three different catheters (Angiojet, 16 cases, Aspirex, 4 cases, and Trellis, 13 cases). Embolic protection was used in nine cases. The median duration of intervention was 110 minutes (45-200). All patients had intermittent pneumatic compression and walked on the same day. No patient required hospitalization in ICU. Curative anticoagulant treatment was prescribed for at least 6 months. Two early thromboses occurred, and one was treated successfully. The median duration of postoperative stay was 3 days (1-9). During a median 76-month follow-up (3-121), 8 reoperations were required to maintain the patency. Three patients died from a cancer without detectable active lesions on the preoperative scanner. Primary patency, assisted primary patency, secondary patency, and survival rates were 76%, 86%, 96%, and 89%, respectively, at 72 months. Only one patient presented a minimal post-thrombotic syndrome. She had refused reoperation for early postoperative thrombosis. The VCSS, VDS and Villalta median scores at the end of the follow-up were 2, 0 and 1 respectively, and only one

patient experienced a deep reflux. Later pregnancy occurred in eight patients without complications.
Conclusion: Pharmaco-mechanical thrombectomy is an excellent percutaneous treatment modality for FIDVTa and avoids post-thrombotic syndrome and its complications.
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TREATMENT OF VENOUS POPLITEAL ANEURYSMS WITH THE AXILLARY VEIN: MID AND LONG-TERM RESULTS

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Objectives: Popliteal venous aneurysms are a rare but serious disease due to the risk of pulmonary embolism. The management is recommended for aneurysms >20 mm in diameter or in case of an embolic episode. The classic surgical technique is the tangential resection with venorraphy, which exposes to the risk of recurrence. We report a series of patients treated by a new technique consisting of aneurysmal resection and reconstruction with the axillary vein. Primary outcome was the patency of the transposed venous graft. Secondary objectives were to evaluate valve continence, aneurysmal recurrence, clinical consequences on the lower limb and at the donor site.
Material and methods: All the patients treated with this technique between October 2006 and May 2023 were included. Post-traumatic venous aneurysms, iatrogenic aneurysms, and those associated with vascular malformations were excluded. Ultrasound follow-up was obtained at 3 months, 6 months and 1 year after operation and then annually with verification of the patency of the graft, measurement of its diameter and testing of the valvular continence during a Valsalva maneuver. Lower limb neurological consequences were noted.
Results: 11 patients were enrolled, including seven men, with an average age of 55 years. All the patients were symptomatic: 10 had a previous history of at least one pulmonary embolism and one patient presented a deep venous insufficiency with dyspnea. The average size of the venous aneurysm was 29 mm (14-45). Mean follow-up was 65 months (4-191), and only one patient was lost to follow-up after nine months. No bypass thrombosis was observed during follow-up on Duplex examinations or venous-CT and the transposed valve remained continent in all patients. There were no embolic recurrences after surgical treatment. The average diameter of the bypass was 10.5 mm (7-12). No complications were observed at the site of venous harvesting.
Conclusion: This study confirmed the feasibility and the good long-term results of this technique alternative with a 100% patency and a complete absence of aneurysmal recurrence. It confirmed the viability of the transposed valve with a good tolerance at the donor site. This was a study with a limited number of patients, but it highlighted an alternative treatment with good long-term results.
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PREDICTION OF ARTERIOVENOUS FISTULAS MATURATION BY THE MEASUREMENT OF PEROPERATIVE FLOW

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Objectives: Arteriovenous fistula (AVF) for hemodialysis must have an optimum flow, guarantee of effective operation and durability, i.e. >170-200 mL/min intraoperatively, and 600-800 mL/min after 6 weeks of maturation. During their creation, we have tested the MiraQ (Medistim®, Norway) echo-Doppler device to evaluate the quality of the arteriovenous anastomosis via the measurement of the peroperative flow and to seek a predictive effect on the maturation at 6 weeks.
Material and methods: The creation of radio-cephalic FAVs in our center was prospectively controlled with a Medistim® probe by Transit Time Flow Measurement mode to measure the peroperative flow. In the case of flow rate < 170 mL/min, the AVF was revised at the same time. A 6-week echo-Doppler allowed to compare per- and postoperative flows and a search for juxta-anastomotic stenoses and stenoses of the drainage vein.
Results: Between January 1st, 2022 and October 31, 2023, 62 radio-cephalic AVFs were created in 38 men and 24 women. In six cases, the AVF was successfully redone due to a flow < 170 mL/min. Linear regression showed that the peroperative flow was significantly linked with the 6-week flow ($p<0.013$; 95% CI 0.322-2.565). The peroperative flow was 280 mL/min in the group without juxta- anastomotic stenosis (53 patients), and 237 mL/min in the group with stenoses (9 patients), $p=0.235$. The peroperative flow was 280 mL/min in the group without stenosis of the drainage vein (45 patients), and 256 mL/min in the group with stenosis (17 patients), $p = 0.388$. We also calculated the optimum threshold of peroperative flow between 255 and 265 mL/min, with a 0.66 sensitivity and a 0.75 specificity.
Conclusion: When creating an arteriovenous radio-cephalic fistula, the measurement of the peroperative flow with the Medistim system allowed to correct the technical errors at the same time and identified a threshold value of 255-265 mL/min as predictive of a satisfactory

maturation after six weeks. A multicenter study will be conducted to validate these measurements.
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IS ULTRASOUND GUIDED ANGIOPLASTY OF ARTERIOVENOUS FISTULAS A VIABLE ALTERNATIVE TO THE X-RAY GUIDED TECHNIQUE? FEEDBACK OF A HIGH-VOLUME CENTER

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Objectives: Percutaneous transluminal angioplasty is the reference treatment of the stenoses occurring on arteriovenous fistulas for hemodialysis. This technique is usually done using fluoroscopy (X-ray) in the operating room. However, some teams treat these patients using ultrasound (US) guidance only. The purpose of this study was to show that the latter is as reliable and efficient technique.
Material and methods: This was a retrospective single center observational study. All consecutive patients with AVF treated by angioplasty for one/several arterial or venous stenosis(es) between December 19, 2020 and April 29, 2021 in our center were included. We excluded patients with central venous stenoses, which are difficult to visualize by ultrasound. The main analysis was conducted on all the cohort of patients (n= 80) and compared the patients treated with US and X-ray guidance in terms of clinical success (at least one normal hemodialysis or a continuous palpable thrill without postoperative hyperpulsatility of the drainage vein) and 30-day complication rates.
Results: The characteristics of the patients treated with US (n=26) and Rx (n=54) were comparable. 52.5% of the AVFs were radio-cephalic and 25% were brachiocephalic. Angioplasty alone was done in 73% (US) and 72% (X-ray) of cases, or associated with other procedures (thrombectomy, surgery for hemorrhagic crust at the puncture site, or superficialization). Clinical success was 100% in the US group compared to 97% in the Rx group. The median operative time was higher in the Rx group (median: 46 minutes [33.5-69.5]) than in the US group (median 35 minutes [27.25-62.25], p=0.046). The 30-day rate of complications was 4% in the US group vs. 9% in the Rx group (p=0.66).
Conclusion: This study confirmed the safety and short-term clinical efficacy of US-guided angioplasties of AVFs. This technique appears promising: reduction of operating time, absence of the use of iodine contrast and of irradiation. However, it has limitations: (deep venous network, US experience). It is necessary to confirm these preliminary data by a patency study for at least 6 months as well as prospective studies of non-inferiority.
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MAGNETIC RESONANCE IMAGING OF PATHOPHYSIOLOGICAL CHANGES DUE TO CENTRAL VENOUS THROMBOSIS IN AN EXPERIMENTAL PORCINE MODE

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Objectives: Iliocaval thrombotic obstruction is a real diagnostic and therapeutic challenge, especially as the age of the thrombus and the thrombotic remodeling are unknown at the time of diagnosis, which has a direct impact on management. The purpose of this research was to evaluate the capacity of a combination of five different sequences of magnetic resonance imaging (MRI) to determine thresholds of chronicity of experimental inferior vena cava (IVC) thrombosis in the pig.
Material and methods: We used a porcine model of IVC thrombosis that we previously described. The animals had an MRI before the experiment, immediately after the formation of the thrombosis and after a follow-up period ranging from 2 to 28 days. Thirteen animals were divided into three groups according to chronicity of the central venous thrombosis: one acute group (AG, N1 = 5), one subacute group (SAG, N2 = 4) and one chronic group (CG, N3 = 4) with a mean age of the thrombosis of 6.40 ± 2.50 days, 15.70 ± 2.87 days and 28.00 ± 5.71 days, respectively. A three-dimensional T1 weighted gradient echo volumetric MRI sequence gradient was obtained in apnea and used to trace the contour of the IVC thrombus of the VCI in as an area of interest. Four other MRI sequences were used to evaluate the contents of the thrombus.
Results: The Kruskal-Wallis test showed a statistically significant difference in T1 relaxation times after injection of contrast product (p=0.026) between the three chronicity groups: AG was significantly different from CG (p=0.003) and SAG was significantly different from AG (p=0.0268). There was a statistically significant difference in the T2 relaxation times before contrast injection (p= 0.0381) between the three groups: AG was significantly different from SAG (p=0.0268) and SAG was significantly different from CG (p=0.0041).
Conclusion: This study revealed MRI features that distinguish three significantly different stages of chronic iliocaval

thrombosis, with potential clinical implications for the choice of the best therapeutical modality, which pave the way for evidence-based recommendations.
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CRITERIA OF SELECTION FOR THE PRESERVATION OF THE GREATER SAPHENOUS VEIN ACCORDING TO THE PRINCIPLES OF THE ASVAL METHOD

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Objectives: There are indications for preserving the greater saphenous vein (GSV) in the treatment of varicose veins (VVs) by limiting the intervention to the removal of the varicose tributaries constituting the varicose reservoir (VR), according to the principles of the ASVAL method. However, the criteria to determine the indications are disparate. We aimed to evaluate all the published criteria by including them in our database, in order to study the correlation with the clinical results.
Material and methods: Among the seven publications reporting criteria to preserve the GSV according to the ASVAL method, 11 criteria were mentioned including six ultrasound criteria (competence of the sapheno-femoral junction, segmental GSV reflux, GSV limited to the thigh, average diameter of the refluxing GSV $<$ 8mm, positive reflux elimination test (RET+), totally intrafascial crural GSV), and five demographic or clinical criteria (age$<$40 years, nulliparity, large VR, absence of C4-C6 trophic disorders, absence of symptoms). These 11 criteria were integrated in our database and systemically documented prospectively from January 2018. We evaluated the frequence of each of the criteria, and their positive predictive value (PPV) for good hemodynamic (abolition of the GSV reflux or reduction of the volume of reflux $>$90%), clinical (disappearance of the symptoms) and cosmetic (patient self-evaluation) results.
Results: A total of 840 lower limbs (LL) with VVs and GSV reflux in 730 patients were treated between January 2018 and December 2021, including 731 LL treated by ASVAL (87%) and 109 LL treated by endovenous laser ablation (13%). Six criteria were significantly more frequent in the ASVAL cohort, in more than 75% of cases: totally intrafascial crural GSV, competence of the sapheno-femoral junction, absence of C4-C6 trophic disorders, RET+, mean diameter of the refluent GSV $<$8 mm. The PPV of the ASVAL procedure for these six criteria was 89.0, 88.9, 88.5, 88.2, 87.8 and 87.3 %, respectively, for a good hemodynamic result, 97.3, 96.9, 97.8, 96.4, 96.6 and 96.5%, respectively, for a good clinical result, and 98.2, 97.2, 97.8, 97.6, 97.6 and 9%, respectively, for cosmetic improvement.
Conclusion: Six criteria of selection to choose the ASVAL method for VV treatment were identified with a PPV $>$ 87% for a good hemodynamic result and 96% for a good clinical and esthetic result. The use of these criteria in current practice could make it possible to select the patients who can obtain the greatest benefit from the ASVAL method.
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MID-TERM RESULTS OF IN-LINE VENOUS ALLOGRAFT BYPASS BETWEEN THE DISTAL RADIAL ARTERY AND THE PROXIMAL HUMERAL VEIN FOR HEMODIALYSIS VASCULAR ACCESS

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Objectives: High flow is a common complication of brachial AVF particularly in young people and may also contraindicate AVF in those with heart failure who do not have satisfactory forearm veins. Since 2014, we developed an innovative alternative technique for these patients, a venous allograft placed between the distal radial artery and the proximal humeral vein below the elbow fold. The purpose of this study was to strengthen results presented four years ago with a larger cohort and mid-term results.
Material and methods: All the patients who had an in-line bypass between the distal radial artery and the proximal humeral vein with venous allografts (Bioprotec®) for vascular hemodialysis access between November 2014 and February 2023 were included. The anatomical criteria used for the technique were a radial artery of at least 1.8 mm, a humeral vein of at least 3 mm and a venous allograft of 6-7 mm of diameter over a length of 20-25 cm. The main judgment criterion was the success of the technique, defined by the absence of need for creation of a new vascular access. The other judgment criteria were 12- and 24-month measurement of flow, and primary, assisted primary and secondary patency.
Results: Twenty-six patients were included with a mean age of 49±13 years. The most frequent indication (50%) was a young patient waiting for a renal transplant without available venous material in the forearm. The average follow-up time was 28±20 months. There were seven technical failures during follow-up. Three bypass grafts were used for several months, 3 were never used due to a lack of maturation and one patient never required dialysis. The average discontinuation time was 9±5.9 months. Eighteen bypass grafts were used for dialysis, and the first canulation occurred 3±2 months after the bypass. No high flow or infectious complication was observed. The average measured flow was 867±254 mL/min at 1 year and 952±199 mL/min at 2 years. Primary one- and two-year patency rates were 31% and 22%, respectively. Assisted one-year and two-year patency rates were 58% and

55%, respectively. Secondary1-year and 2-year patency rates were 84% and 67%, respectively.
Conclusion: This innovative technique appears should take part in the therapeutic arsenal in patients without forearm venous capital and those in which a brachial AVD is contraindicated, with a high technical success, an acceptable 2-year secondary patency rate, and an optimum average flow.
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TREATING PELVIC CONGESTION EFFECTIVELY: THE NETWORK THAT YOU NEED!

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Objectives: The taboo around pelvic pain of the woman is progressively lifted. Diagnostic errancy is decreasing, but the identification and treatment of these pains remains a challenge. At the crossroads of several specialties, it is essential to create a care network to manage these patients as quickly and efficiently as possible.
Material and methods: Patients consulting in vascular surgery for "pelvic pain" in 2021-2023 in our multidisciplinary network were included in this study. Systematic screening directed the patients to obtain one or more expert advices (urological, gynecological, gastroenterological, algological, rheumatological, etc.). Collected data were: demographic data, medical history and diagnostic wandering, number and results of phlebographies resulting from the multidisciplinary review, surgical treatments and results. In case of vascular pelvic congestion, dyspareunia during intercourse (DDI), vesperal pelvic pain (VPP), hyper-painful and hyper-hemorrhagic menstruation (HHM) and impact on the quality of life of the patients were evaluated in preoperative, postoperative, and during follow-up.
Results: Over three years, 169 patients consulted in vascular surgery for "pelvic pain". The multidisciplinary pathway allowed to treat 41 patients specifically for a non-vascular cause, to offer an associated treatment for 55 patients (pelvic mixed vascular pain and another cause of pain treated by a different specialty) and to guide 28 patients in whom a vascular consultation was not initially presented. In the end, 99 diagnostic phlebographies were done. The pathological entities were 31 Cockett's syndromes, 54 left gonadal vein (LGV) dilatations, 15 Nutcracker's syndromes, 5 right gonadal vein (RGV) dilatations and 6 pelvic varicose diseases caused by hypogastric hyper-pressure. Overall, 58 patients were treated (31 embolizations, 11 left common iliac venous stenting, 12 transpositions of LGV, 4 renocaval bypass grafts). The technical success was 100%. After an average follow-up of 14 months, dyspareunia during intercourse (DDI), vesperal pelvic pain (VPP), hyper-painful hyper-hemorrhagic menstruation (HHM) and the impact on the quality of life of patients were 8.9/7.8/9.1 and 8.2/10 in preoperative, and 2.1/2.4/3.7 and 3.1/10 in postoperative, respectively.
Conclusion: Pelvic congestion is a real challenge in its understanding and its treatment. Symptoms are varied and intricated at the crossroads of many specialties, and the impact on the quality of life not negligible in the young patients which are often in diagnostic wandering. The creation of a dedicated care network of skilled professionals is essential to manage these patients. It makes it possible not to miss other satellite pathologies, to treat them if needed, and to select the best option for the patients who require a vascular procedure. In these cases, the results of deep venous surgery and the improvement of the quality of life are excellent.
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NATIVE VASCULAR ACCESSES FOR HEMODIALYSIS: SUPERFICIALIZED BRACHIAL VEIN DOES AS WELL AS THE BASILIC VEIN

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Objectives: Brachial artery-brachial vein (BA-BV) arteriovenous fistula (AVF) is not a widespread vascular approach for hemodialysis because it uses a deep vein of the arm. Nevertheless, it appears to be an interesting autologous alternative in cases where the superficial veins are exhausted. Our research sought to evaluate this option.
Material and methods: The data of patients operated to create a one stage or two stage BA-BV AVF between June 2016 and March 2023 in our center were retrospectively analyzed. The study reports the characteristics, the complication and primary, assisted primary, and secondary patency rates according to the method of Kaplan-Meier.
Results: Twenty-three consecutive patients with an average age of 65 years (±14) were included (male: 61%; diabetes: 22%; arterial hypertension: 83%). Sixteen patients (70%) were under dialysis for an average of 120 months, mostly with a catheter before surgery (82%). Seven AVF (30%) were one stage accesses, in patients with previous ipsilateral AVFs. The other 16 (70%) were created in 2 stages. No complication occurred at 48h. The rate of remote complications (excluding stenosis/thrombosis) was 22% (one zone of cutaneous necrosis, 2 limb ischemia, one limb edema, one AVF hyperflow). At 12 months, the primary patency was 58%, the assisted primary patency was 82%, and the secondary patency was 87%. Six patients (26%) died during the follow-up.

Conclusion: BA-BV AVF is a native AVF with good patency results, similar to the published results for brachio-basilic AVFs. The complication rates are also lower than the published results for the dialysis prostheses. When anatomy permits, this technique appears as an interesting choice in the absence of a superficial vein and before the use of a prosthesis.
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WATER VAPOR THERMAL ABLATION TO TREAT NON-TRUNCAL VARICOSE VEINS

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Objectives: The recommendations concerning the management of non-truncal varicose veins are not very precise. Currently, the main method of treatment used in this indication is foam sclerotherapy which gives uncertain results and necessitates repeated interventions. Conventional endovenous thermal treatments (radiofrequency and laser) are effective, but catheters are not suitable for tortuous and short lesions of varicose recurrences and perforating veins. An interesting alternative is the use of water vapor, transmitted by an ancillary offering a good diffusion in branches and tortuosities. We report the results of this technique.
Material and methods: Between October 2017 and March 2020, 96 patients were treated with water vapor thermal ablation for non-truncal varicose veins in 2 centers. The collection of data was prospective. The primary outcome was the occlusion of the treated segment at 3 months. Secondary criteria were complications and postoperative events.
Results: Ninety-six procedures were performed for varicose recurrence (58) or de novo disease (38). The treated lesions were 58 incontinent perforating veins (25 in the popliteal fossa, 22 inguinal, 6 in the posterior thigh, and 5 in the leg), 12 sapheno-popliteal neojunctions, 10 sapheno-inguinal neojunctions, 7 sapheno-femoral neojunctions, 6 popliteal recurrences, and 3 inguinal recurrences. All treatments were provided with a local tumescent anesthesia with sedation. The procedure was interrupted for pain in two patients. At 3 months, 83 patients (86%) had complete occlusion, 4 (4%) had partial occlusion and 9 had a failed treatment (10%). 30 days after operation, 2 thromboembolic complications (2%), 2 neurological complications (hypoesthesia in the territory of the superficial fibular nerve) (2%) and one hematoma (1%) were observed. Postoperative pain was $<$2/10 as soon as the 2nd postoperative day and recovery was good with a resumption of normal or almost normal activities on the evening of operation.
Conclusion: Thermal vapor water of non-truncal varicose veins yields good short-term results without major complications. It could become the best technique in these indications but a longer-term follow-up is required to prove it.
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PROSTHETIC ARTERIO-ARTERIAL AXILLARY LOOP FOR HEMODIALYSIS: RESULTS IN 13 CASES

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Objectives: Dysfunctions of vascular accesses are a major problem in chronic hemodialysis due to their significant morbidity. They often lead to a complete exhaustion of the possibilities of creation of arteriovenous accesses. Several alternative techniques have been described including prosthetic arterial loops. This retrospective study reports our experience of the PTFE axillary arterial loops.
Material and methods: Thirteen consecutive patients (9 women, average age 57.9 years (41-74) were treated using this technique between October 2007 and September 2023. The indication was thrombosis of the large central venous trunks (84%), exhausting of the superficial and/or deep venous capital of the upper limbs (69% including 8 thromboses of the superior vena cava) and a steal syndrome in the upper limbs (15%). At least 2 causes were observed in 8 patients. They were under dialysis for an average of 5.8 years (1-15) and had yet had 4.6 accesses for hemodialysis (2-8). The procedures were done under general anesthesia with a prosthetic PTFE loop implanted on the axillary artery (average diameter 6.4 mm) with 2 terminal anastomoses.
Results: The average durations of intervention and postoperative hospitalization were 97 minutes and 1.8 days, respectively. The loops were used for hemodialysis after an average period of 20 days (15-30). The only postoperative complication was one approach lymphocele on the first postoperative day necessitating an intervention. At the end of the average 32-month follow-up (3-124), the survival rate was 82% at 12 months and 48% at 36 months, and no death was observed. The most common late complication encountered was the occurrence of false aneurysms requiring surgery. Primary, assisted primary, and secondary patency rates were 92%, 92% and 100%, respectively, after 12 months, and 67%, 80% and 100% after 36 months (one thrombosis after 92 months). The 12- and 36-month rates of indemnity of false aneurysm were 88% and 42%, respectively.
Conclusion: This study showed that the arterio-arterial axillary loop has a low postoperative morbimortality and much better patency rates than prosthetic arterio-venous

accesses. It is therefore a good alternative in patients with no more possibilities in terms of vascular arteriovenous creation in the upper limbs while avoiding the inherent risks of central veins accesses.
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DEVELOPMENT OF LAPAROSCOPIC ROBOTIC ASSISTED MINI-INVASIVE VASCULAR SURGERY IN A TERTIARY CENTER

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Objectives: The management of arterial and venous diseases in a tertiary vascular surgery center implies the implementation of minimally invasive techniques. Laparoscopic robotic assisted surgery (LRAS) may be appropriate for some indications and take a place in a rehabilitation program for surgical procedures (ARS). The objective of this research was to evaluate the implementation of the LRAS for indications selected for ARS.
Material and methods: Our prospective single-center study included, from November 2021 to November 2023, patients with few comorbidities and a good life expectancy, treated by open surgery for aorto-iliac aneurysmal or occlusive disease, splenic arterial aneurysms, renal aneurysms in-situ, arcuate ligament, and nutcracker syndrome (NCS). Demographic data, surgical indications, technical success, the number of conversions by scheduled or emergent lumbar approach, the number of ileus, the 30-day death rate, the number of wound complications at one year and the average duration of the hospital stays were evaluated.
Results: Fifty-three patients, 26 women and 27 men, 58±22 years old, had LRAS, including 13 abdominal aortic aneurysmectomies with aorto-biliac bypass, 18 occlusive pathologies with aorto-bifemoral bypass, 12 NCS, 2 arcuate ligaments, 6 splenic aneurysms and 2 renal aneurysms in situ. 92.5% of patients were ASA 1-2. Median BMI was 24.21±6.23. Technical success was 94.3% with 6.7% conversions through lumbar approach (2 scheduled and one emergency). Four cases presented postoperative ileus, two of which as a result of surgical conversion. The average duration of stay was 5.92±2.71 days, including 1.08±1.91 days in reanimation for 34% of patients. No case of wound dehiscence was observed during the 1st postoperative year. Two deaths occurred within 30 days of which one cardio-respiratory arrest due to postoperative cardiac decompensation and one due to aorto-bifemoral bypass thrombosis.
Conclusion: The development of a LRAS program for vascular surgery indications is possible for a tertiary center with a certain volume of activity, and represents a minimally invasive therapeutic option within the framework of RAS with a long-term absence of wound complications.
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INFECTIOUS AORTIC ANEURYSMS. SHORT- AND MID-TERM RESULTS OF VARIOUS TREATMENTS. REPIA REGISTRY

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Objectives: Infectious aortic aneurysms (IAA) are a rare but life-threatening condition due to their rapid growth. Management is multidisciplinary. The main purpose of this study was to evaluate the mortality of the patients treated for IAA by different types of treatments. The secondary objective was to evaluate the results of the different types of treatments and the rates of infectious recurrence.
Material and methods: Between September 2009 and October 2023, all the patients with an IAA confirmed through clinical, biological, microbiological, radiological, and nuclear medicine were included. The standard treatment consisted of the administration of pre- and postoperative antibiotics and a radical open surgery with reconstruction with biological material. Endovascular therapy was proposed to patients contraindicated for open surgery. The clinical, biological, bacteriological and imaging data were collected in the REPIA registry and the 30-day, 1-year and 3-year results were analyzed. Infectious recurrences were studied.
Results: 47 patients (67±10.8 years) were diagnosed with IAA. The aortic locations were: aortic arch (4%), descending thoracic aorta (21%), thoraco-abdominal aorta (30%), juxta-renal aorta (4%), and abdominal infrarenal aorta (41%). Cultured organisms were methicillin sensitive *S. aureus* (43%), Salmonella sp. (13%), *E. coli* (9%) and other species (35%). Radical surgery was performed in 27 patients (57.4%): a bovine tubular xenograft was used in 22 cases, and a cryopreserved allograft in 3 cases. Endovascular therapy was done in 12 patients (25.5%). Medical treatment alone was applied in 8 cases (17%). Overall survival at 30 days, 1 year and 3 years was respectively 78.7%, 52.4% and 41%; in the radical surgery group survival rates were 85.2%, 73.3% and 60%, respectively; in the endovascular group rates were 91.7%, 41.7% and 20%; in the medical group with a persistent infection survival rates were 37.5% and 0%. Les patients avaient bénéficié en moyenne de 7,3 jours d'antibiothérapie préopératoire et de 3 mois postopératoire. Une récidive péri-aortique avait été observée chez un sujet. Patients received antibiotics

during an average of 7.3 preoperative days and 3 postoperative months. A periaortic recurrence was observed in one patient.
Conclusion: The association of medical treatment and radical open surgery is effective in the treatment of IAA. The endovascular treatment gives acceptable results. Medical treatment alone should be used only in patients who are not operable due to a very high short-term mortality.
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CELIAC ISCHEMIA: DESCRIPTION OF A POORLY KNOWN ENTITY

Melinda Bajul, Iannis Ben Abdallah, Alexandra Nassar, and Jules Gregory, Clichy, France.

Objectives: Celiac ischemia (CI) is a rare and serious entity, which can be isolated (ICI) or associated with mesenteric ischemia (MCI). The purpose of this research was to describe this poorly known clinic entity, and to report on the management and results.
Material and methods: This was a two-center observational retrospective study including patients who had CI between January 2016 and May 2023. Patients with thrombotic or embolic occlusive disease were included. Patients with isolated dissection of the celiac trunk (CT), occlusion of a fenestrated/branched stentgraft with a branch in the CT, coverage of the CT by a thoracic stentgraft, or CI complicating a shock were not included.
Results: A total of 17 patients (women, 41%; median age, 64±18.5 years) were included. Initial symptoms and signs were predominantly abdominal pain with food intolerance (64%) or gastrointestinal bleeding (53%). The clinical presentations included gastroduodenal ischemic ulcers (n=14, 82%), gangrenous cholecystitis (n=6, 35%), splenic (n=6, 35%)/ hepatic (n=4, 23%) ischemia, and one case (6%) of ischemic pancreatitis. Nine patients had ICI and eight had CMI. The median time between the onset of the symptoms and the diagnosis of CI was 6 days (1-30). All patients had revascularization, targeting the celiac trunk (CT, n=15) and/or the superior mesenteric artery (SMA, n=11), including CT-SMA revascularization (n=9) in patients with CMI. The intra-hospital mortality was 41%. Severe morbidity (Clavien-Dindo score $\geq$ 3) was 82%, with an average of 2.8 reinterventions per patient. for s→ s©. 41% of the patients had an associated intestinal section - with stoma in 71% -, and 29% of patients had a cholecystectomy. In 47% of the cases, gastroduodenal ulcers healing after revascularization was documented by endoscopy.
Conclusion: Based on this retrospective study, CI was associated with a very high morbimortality. A better recognition of CI, an entity that is largely under-diagnosed, as well as an early revascularization of the celiac territory are crucial issues to improve the prognosis.
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RESULTS OF SURGICAL THROMBECTOMIES FOR ACUTE EMBOLIC MESENTERIC ISCHEMIA

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Objectives: To report the results of the management of patients with embolic acute mesenteric ischemia (AMI) treated by surgical thrombectomy in the Structure d'Urgence Vasculaire Intestinale (SURVI).
Material and methods: Between January 2016 and May 2023, patients managed within SURVI in two institutions for an embolic AMI and treated by open surgical thrombectomy of the SMA were included in this retrospective cohort study. The treatment of AMI was based on a standardized medical protocol and surgical thrombectomies of the SMA were reserved for cases of non-feasibility or failure of endovascular therapy. The analysis focused on pre-, per- and post-operative clinical, biological and radiological data.
Results: Over the study period, 787 patients were treated by SURVI, including 418 arterial AMI. Of these, 71 patients (56% males, median age, 68 years) were included. A SURVI score of 0, 1, 2 and 3, was found in 18%, 31%, 27% and 7% of patients, respectively. The 30-day mortality was 28% and 63% of patients had a bowel section resulting in 32% of short guts. The SMA patency rate evaluated on the postoperative scanner was 72%. The early reintervention rate was 49%. After a median 14-month follow-up, the secondary SMA patency rate was 90%. The rate of restoration of digestive continuity was 88% among survivors with a 21% long-term use of parenteral nutrition. The one-year mortality rate was 39%.
Conclusion: In our experience, SMA surgical thrombectomies are reserved to embolic AMI at high risk of in intestinal necrosis or in case of failure of an endovascular treatment. The rates of mortality→, of intestinal resection and of reinterventions remain very high. Early diagnosis remains the key to improve the prognosis of these patients.
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OUTCOMES OF THE TREATMENT OF RESIDUAL DISSECTIONS BY HYBRID SURGERY

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Objectives: Residual aortic dissections (RADs) after operated type A dissection are associated with 50% of aneurysmal evolutions and 20% of reinterventions. These complex procedures require a treatment of the aortic arch by conventional, hybrid or endovascular surgery. The objective of this study was to analyze the short and long-term results of hybrid surgery for the management of aneurysmal RADs.
Material and methods: In this retrospective monocentric study, between 2009 and 2023, all the patients who received a hybrid treatment, defined by the placement of a thoracic aortic stentgraft with proximal anchoring zone in the aortic arch for RAD were included. We analyzed the peroperative morbimortality, the aortic remodeling, and the rates of aneurysmal evolution and reinterventions during the follow-up.
Results: We included 54 patients (39 men and 15 women), with an average age of 58.2 years [37-80]. Eleven patients (20.3%) had Marfan syndrome or a similar disease. The mean maximum aortic diameter was 60.6 mm (SD, 10.4). Aortic debranching was performed in zone 0 in 50 cases (92.5%) and in zone 2 in 4 (7.5%) cases. Intrahospital mortality was 3.7% (2/54): one major stroke and one aortic rupture. There was no paraplegia and 2 strokes (3.7%) (1 major stroke and 1 regressive minor stroke). The rate of recurrent nerve paralysis was 9.2% (5/54) (3 completely regressive and 2 partially regressive). The rate of endoleaks was 22.2% (12/54): 2 type IA (3.6%), 6 type IB (11.1%), 3 type II (5.5%) and 1 type III (1.8%). The STABILIZE technique was used in 16 cases (29.6%). After an average follow-up of 65.7 months [8.9-231.9] mortality was 7.4% (4/52). Thrombosis of the thoracic aorta false channel was obtained in 82.6% of cases (43/52), and the rate of thoracic aneurysmal evolution was 9.6% (5/52). Aneurysmal evolution of the distal aorta was observed in 38.4% (20/52) of cases. The reintervention rate in the distal aorta was 25.0% (13/52), significantly associated with the presence of type I endoleaks ($p<0.01$). The STABILIZE technique was significantly associated with a reduction in the risk of distal interventions ($p<0.01$). The rate of restenosis of the reimplanted supra-aortic trunks was 7.6% (4/52), located at the reimplantation of the left common carotid artery.
Conclusion: Hybrid surgery for aneurysmal evolution of the residual dissections is associated with good results with a low rate of perioperative morbimortality. The long-term results show a high reintervention rate on the distal aorta due to the presence of a type IB endoleak.
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ANATOMICAL STUDY OF ABDOMINAL WALL MOTOR NERVES. OPTIMIZATION OF SURGICAL APPROACHES

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Objectives: Several approaches are used during aorto-iliac surgery, often requiring the section of the muscles anterolateral or anteromedial muscles of the abdominal wall. This causes a dysfunction of the abdominal muscles and the protrusion of the flank. Few studies exist on this issue. The purpose of this study was to describe the distribution of motor nerves in the abdominal wall. The secondary objective was to optimize the preservation of nerves.
Material and methods: We performed twelve dissections on fresh corpses. The communication between the intercostal (9th-10th-11th) and subcostal (12th) nerves, the distance between the extremity of the nerves and the median abdominal line or the iliac spine were measured. For the 11th and 12th nerves we calculated their angles of emergence at the exit of the costal groove and the distance between the point of emergence and the extremity of the corresponding rib, as well as the angle and the distance between the point of the emergence and the extremity of the rib.
Results: Our dissections showed communications and branches between the 10th and 11th intercostal nerves, and between the 11th and 12th nerves in the area situated between the anterior axillary line and the mid-clavicular line. The iliohypogastric nerve (IHN) and the 9th intercostal nerve had no communication with other nerves. The dominant motor nerve were the 12th (10 cases) and 11th (2 cases) nerves. The point of intersection of the umbilicus was 7.92±1.24 cm for the 9th intercostal nerve, 3.92±1.18 cm for the 10th, 1.08 ±1.52 cm for the 11th, and - 3.33±0.83 cm for the 12th nerve. The distance between the iliac spine and the IHN in lateral jackknife position was 2.54±0.65 cm. The 11th nerve had an angulation between -45° and -10° (-24.6°); the 12th nerve between -30° and 0° (-18.3°). For the 11th nerve, the distance was between 0 and 5.5 cm (2.92); for the 12th nerve, it was between 0 and 3.0 cm (1.71). To preserve the 11th nerve, the optimum approach is a straight incision from the upper edge of the 11th rib towards the median line, 4 cm above the umbilicus. For the 12th nerve, the approach should be a straight incision from the upper edge of the 12th rib towards the median line, 1 cm below the umbilicus. For the IHN, an incision close to the iliac spine should respect a distance <1.5 cm.
Conclusion: The intersection between the directions of the nerves towards the median line can provide indications on anatomic landmarks. This study is useful for optimizing surgical approaches. A clinical study should confirm the anatomical results.
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IS SYSTEMATIC SECOND LOOK FOR ACUTE MESENTERIC ISCHEMIA STILL JUSTIFIED? A PROSPECTIVE COHORT STUDY IN A STRUCTURE DEDICATED TO INTESTINAL VASCULAR EMERGENCIES (SURVI)

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Objectives: In patients with acute mesenteric ischemia (AMI), early revascularization makes it possible to limit or even avoid intestinal resection (IR). However, in the case of IR, systematic second look to guide iterative IR (IIR) is controversial. The objective of this study was to determine the prevalence and the factors associated with IIRs due to AMI.

Material and methods: We included all the patients from a prospective cohort hospitalized for AMI in the APHP North structure dedicated to intestinal vascular emergencies (SURVI) between January 2016 and September 2023 managed early (within 7 days after the onset of symptoms), and who required IR. Primary outcome was the necessity of IIR, and the factors statistically associated with IIR were submitted to uni and multivariate analysis. Secondary judgment criteria included the severe postoperative complications (Clavien-Dindo III-IV) and inhospital mortality.

Results: A total of 154 patients were enrolled in the study. IRs implied a small bowel resection in 97% of the cases (n=149) and/or a colon resection in 50% of the cases (n=77). IRs were done in SURVI in 74% of cases and out of SURVI in 26% of cases. Ostomy was immediately done in 84% of cases, and 14% of the stumps were left closed while awaiting a scheduled second look. An anastomosis was done in the remaining 2% of cases. SMA revascularization was done in 81% of the patients (n=128), endovascularly 42% (n=54) and/or 56% (n=71) by open vascular surgery. Revascularizations were performed before (20%) the index IR, synchronous (45%) or later than 24 hours after IR (35%). Postoperatively, a systematic second-look was proposed after 24-48h in 14% of the patients (n=21). An IIR was finally done in 25% of the patients (n=39), but out of the second-look in 69% (27/39) of the cases or during the scheduled second-look in 31% (12/39) of the cases, after a median period of two days (IQR 1-8). Among these patients, 79% had a single IIR and 21% had two. Inhospital death rate was 36% and the postoperative complications rate was 77%. After 11 (1-29) months of follow-up, 46% of patients had a short gut syndrome and digestive continuity was reestablished in 91% of survivors. In univariate analysis, IIR was associated with an increase in the duration of hospitalization (37 days vs. 23 days in the single resection group, p=0.01), and in the major complications (90% vs. 71%, p=0.02) and short gut syndrome (63% vs. 31%, p=0.04) rates. In multivariate analysis, the risk of IIR increased with a second look program (OR=6.66, 95% CI 1.52-29.2, p=0.012). Conversely, this risk was reduced by oral administration of perioperative antibiotics (OR=0.39 95% IC 0.16-0.9, p=0.047).

Conclusion: In our study, 25% of patients had an IIR, of which 1/3 were done during a routine second look. The need for an IIR was associated with an increase in the postoperative morbimortality. Oral antibiotics appeared as a protective factor. In conclusion, our results suggest that the routine second look could be questioned. A more targeted surgical revision strategy could be considered in revascularized patients, guided by perioperative findings, clinical-biological evolution, radiological appearance of the intestine, and the quality of revascularization evaluated on the early angio-CT. These results must be corroborated by a prospective study comparing routine second look and targeted surgical revision.

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COMPARISON OF THE RESULTS OF ENDOVASCULAR EXCLUSION AND OPEN SURGERY IN THE TREATMENT OF INFRA, JUXTA AND PARARENAL AORTIC ANEURYSMS

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Objectives: Endovascular treatment ((F)EVAR) is now a first-line treatment for abdominal aortic aneurysm (AAA). Open aortic surgery (OAS) remains a treatment of choice for patients at low surgical risk or with an unfavorable anatomy for an endovascular treatment. The objective of this study was to compare the results of these two surgical techniques.

Material and methods: All patients treated electively for an infra, juxta or para-renal abdominal aortic aneurysm (AAA) between January 2014 and December 2019 were included and analyzed retrospectively in the OAS or (F)EVAR groups depending on the type of reparation. The primary endpoint was the early (30-day) major adverse events (EMAEs) according to SVS standards. Secondary criteria were the early reintervention rate and the estimated mid-term survival. The impact of the surgical technique on the survival was evaluated with a Cox model.

Results: 1000 patients were included. 357 (36%) patients were treated by OAS and 643 (64%) by (F)EVAR including 257 treated with a fenestrated stentgraft. Most aneurysms were infrarenal (OAS: n=259 (73%), (F)EVAR: n=386 (60%; p<.001). Patients in the (F)EVAR group were older with more cardiovascular risk factors (CVRF), chronic heart disease and COPD (p<.05). The 30-day mortality was comparable (OAS: n=4 (1.1%), (F)EVAR: n=9 (1.4%); p=.78). Patients in the (F)EVAR presented less EMAEs (11% vs. 25%, p<.001), of renal (2.2% vs. 8.1%, p<.001), respiratory (8.7% vs. 2.2%, p<.001) and gastrointestinal (7.6% vs. 1.7%, p<.001) origin. We also observed more surgical complications (8.6% vs. 16%, p<.001) and early reinterventions (2.7% vs. 15%, p<.001) in the CAD group. Median follow-up was 37 [17, 61] months in the (F)EVAR group and 16 [2, 46] months in the OAS group. The estimated 5-year survival was 53%±4.4% in the OAS group and 68%±2.4% in the (F)EVAR group. After adjusting for age and comorbidities, patients treated by (F)EVAR presented a lower risk of

mortality (HR=0.57 95% CI 0.44-0.74).
Conclusion: The treatment of AAAs by (F)EVAR is associated with a lower rate of EMAEs and confers an advantage on the overall mid-term survival compared with OAS. Patient selection allows however to obtain a low mortality rate. The postoperative mortality is comparable between both types of treatment.
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ENDARTERECTOMY OF THE VISCERAL AORTA: POSTOPERATIVE AND LONG-TERM RESULTS IN THE MODERN OPEN AORTIC SURGERY ERA

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Objectives: Coral reef lesions of the visceral aorta (ACR) is a rare atheromatous lesion. It can cause, or be associated with, peripheral arterial occlusive disease (PAOD), renovascular arterial hypertension (RVAHT) and chronic mesenteric ischemia (CMI). The most common treatment is endarterectomy of the visceral aorta, with little room for endovascular treatment. There are also few data in the literature on the short-, mid- and long-term results of visceral aorta endarterectomy.
Material and methods: This was a retrospective study conducted between January 2009/June 2023, including all the patients treated by open surgery for ACR. Patient's demographic characteristics, operative indications and peroperative data were collected. Postoperative and mid-term mortality and complications were evaluated. A survival study was then done to evaluate the clinical improvement of the patients (walking distance, better blood pressure control, disappearance of gastro-intestinal symptoms) in association with the imaging follow-up. Postoperative survival and the patency of the revascularized visceral and renal arteries were evaluated according to the Kaplan Meier's method.
Results: Thirty-eight patients were included, with a mean age of 65 years [60-68]. The surgical indication was intermittent claudication in 71.9% of patients, RVAHT in 40.6%, and CMI in 25%. All patients had an endarterectomy of the visceral aorta by thoracophrenolumbotomy. A direct or indirect reimplantation of a visceral artery was needed in 11 patients (31.4%). Fourteen patients necessitated an associated aorto-iliac revascularization (36.8%). One patient died from an acute mesenteric ischemia (AMI) occurring on the 7th postoperative day surgery in a patient operated in emergency (2.6%). Three patients developed a cardiological complication (7.9%). 11 patients presented a postoperative acute renal failure which resolved without dialysis (28.9%). Median follow-up was 32.5 months [21-54]. Postoperative clinical improvement was observed in all the patients (100%). Blood pressure control was better in 17 patients (56.7%), including two normalizations (6.7%). Assisted primary patency rate of the visceral arteries was 81.3% at 1, 3 and 5 years and six secondary stenoses could be treated by endovascular route. No vascular death occurred during follow-up with Kaplan-Meier 1-year, 3-year, and 5-year survival rates of 91.9%, 66.7%, and 61.6%, respectively.
Conclusion: Endarterectomy of the visceral aorta is an effective and sustainable treatment of ACRs with a low morbimortality. Postoperative clinical improvement is immediate, in particular regarding the walking distance. Long-term follow-up is necessary, and ostial stenosing lesions may occur, which should be treated mainly by endovascular surgery.
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PROSPECTIVE STUDY OF THE QUALITY OF LIFE AFTER OPEN ABDOMINAL AORTIC SURGERY

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Objectives: Open aortic surgery (OAS) for occlusive disease (OD) or aneurysm (AAA) is often perceived as invasive with a sizable morbidity leading to a complicated postoperative rehabilitation. We carried out an objective evaluation with the QOR15 questionnaire which is a dedicated scale for the perioperative evaluation of invasive surgeries.
Material and methods: We performed a prospective observational study between 2019 and 2023 including all the patients having a scheduled OAS between 2019 and 2023. The evolution of the quality of life of the patients was evaluated with the QOR15 questionnaire which was validated for this indication, with a simple self-filling of the 15 questions judged by 10 points each, i.e. a total score of 150. The questionnaire was collected 4 times: in preoperative as reference, on the day of discharge, during the postoperative visit six weeks after discharge, and at six months. An item-by-item comparison and of average data evaluated the postoperative recovery of patients. Postoperative morbimortality data were also collected.
Results: 217 patients were included in this study with 171 AAA (78.8%) and 46 OD (22.2%). The mean age of the patients was 72±3.4 years. Overall postoperative morbidity was 30%: respiratory complications in 28 patients (12.9%), transient acute post-operative renal failure in 45 patients (20.7%), and reoperation before D30 in 21 patients (9.6%). Postoperative mortality was 2.3% with 5 deaths. The average duration of stay was 10.2 days (±3.1) with 196 patients (90.3%) returning home. The average preoperative QOR15 score was 120±12, with a homogenous distribution between the AAA and MO groups. The average score at discharge was 100±8 with

a homogenous distribution between the groups. The main variance criteria were the items "good sleep during the 24 last hours" and "enjoying food during the 24 last hours", with average values dropping from 8/10 to 5/10 at discharge, respectively. At the time of the postoperative visit, the average score was 132/150, which was a significant increase compared with the discharge score and exceeded the preoperative score without significance. The main criterion which changed between the preoperative and the postoperative visit corresponded to a "feeling of anxiety and fear" which increased from an average of 6/10 to 8.4/10 ($p<0.05$). The results remained stable over time with an average of 128/150 on the 6-month questionnaire.

Conclusion: The evaluation of the postoperative quality of life with a dedicated scale showed an excellent rehabilitation of patients after OAS. The postoperative decrease of the quality of life does not persist over time with an excellent rehabilitation associated a durably cured aortic pathology. A prospective randomized comparative study with endovascular surgery was started in 2023 for the management of abdominal aneurysms.

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BOVINE PERICARDIAL PATCH VS CRYOPRESERVED ARTERIAL ALLOGRAFT IN THE TREATMENT OF NATIVE AND PROSTHETIC ABDOMINAL AORTIC INFECTIONS: A MULTICENTRIC COMPARATIVE STUDY

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Objectives: While surgery with anatomical reconstruction for aortic prostheses infections and native infectious aortitis became established over time, the ideal substitute is not clearly defined. Cryopreserved arterial allografts (CAA) are recognized as resistant to infection but poses problems due to a lack of availability which make their use difficult, especially in emergencies, and a possible aneurysmal evolution in the long term. Tubularized pericardial patch (TPP) is available in all cases and appears to give promising results in the recent literature. We propose a comparative study of these two substitutes in this indication.

Material and methods: This was a bicentric observational study including retrospectively all the patients operated for an aortic graft infection of a native infectious aortitis with reconstruction by CAA between January 2010 and July 2023, and prospectively the patients having a TPP reconstruction between July 2018 and July 2023. The diagnosis of infection was established according to the MAGIC criteria. The preoperative comorbidities of the patients were collected to compare the groups. Postoperative morbimortality was then compared. The mid-term evaluation consisted in Kaplan Meier comparisons regarding postoperative mortality, patency, and reinfection or reintervention rates.

Results: 163 patients were included with a mean age of 70.6 years (±9.15) treated for 100 prosthetic infections (61.3%), 32 EVAR infections (19.6%), and 31 native aortic infections (19%). 107 patients had reconstruction by CAA (65.6%) 56 by TPP (34.4). The two populations were comparable in terms of preoperative cardiorespiratory comorbidities and types of surgery. Pathogens were also evenly spread in particular with 25% of aorto-digestive fistula in each group. There was no significant difference in terms of postoperative complications with a comparable day duration of stay (24.3 days in the CAA group vs. 24.6 days in the TPP group). One patient died from a postoperative septic shock in the TPP group (2%). With a median follow-up of 16.7 [2.5-41] months, survival was comparable with 74.3%, 69.3% and 65% 6-, 12-, and 24-month for CAA vs. 74%, 67.8% and 67.8% for TPP ($p>0.05$); the absence of reinfection was similar with 85.9%, 83.5% and 80.6% rates for CAA vs. 87.9%, 85% and 85% for TPP ($p>0.05$). Patency rates were comparable with 92%, 90% and 88% rates for CAA vs. 88.3%, 85.2% and 85.2% for TPP ($p>0.05$), and the absence of reintervention was similar with 95%, 93.7% and 92% rates vs. 94.7%, 91.5% and 91.5% ($p>0.05$).

Conclusion: TPP offers a possibility of reconstruction in this context of aortic infection without any problem of availability and with results comparable to CAA in terms of survival, resistance to infection, patency, and absence of reintervention. A longer-term follow-up is necessary to validate this comparability over the time.

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SURGICAL CONVERSION OR FEVAR FOR TYPE 1A ENDOLEAKS: RESULTS OF A MULTICENTER STUDY

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Objectives: Type 1A endoleaks (1A EL) after EVAR are responsible for the expansion of the aneurysmal sac that can lead to rupture. The two possible treatments are open surgical conversion with explantation (OS-exp) or the placement in a fenestrated stentgraft (FEVAR). This study compares the results of the two techniques and proposes a management flow chart.

Material and methods: This multi-center retrospective study was conducted in 10 French university centers,

including all the patients treated for 1A EL between 2012 and 2022. The technical choice was left to the discretion of the centers. Patient comorbidities and CT-scan data were collected. Postoperative morbimortality and the mid-term follow-up date were analyzed in order to compare the effectiveness of the treatment and the rate of secondary procedures according to the Kaplan Meier method.

Results: 88 FEVAR and 120 OS-exp were performed. Patients in the FEVAR group were statistically significantly older than those in the OS-exp group (76.8 years vs. 72.9 years; $p<0.001$) with a higher ASA score than those of the OS-exp group ($p=0.01$), in particular with a higher rate of COPD (36.78% vs. 23.21%, $p<0.03$). Postoperative mortality rates were comparable in the OS-exp group and the FEVAR group (5.6% vs. 6, 6% $p>0.05$). More postoperative complications were observed in the OS-exp group vs. the FEVAR group, with more resolutive acute renal (38% vs. 14%, $P<0.001$) and respiratory (25% vs. 10% $P=0.01$) failures and a higher mean duration of stay (10 days vs. 16 days $P<0.05$). The rate of paraplegia was significantly higher after FEVAR (6% vs. 0% $p=0.008$). EF1A were successfully treated in 96% of cases in the FEVAR group, but the total thrombosis of the aneurysmal sac was obtained in 32% of the cases only at the 3-month postoperative follow-up. With a median 9-month follow-up [2-25] the 6-, 12-, and 24-month rate of reintervention was statistically higher in the FEVAR group, i.e. 13.2%, 26.2% and 46.6% vs. 0.9%, 4.4% and 4.4% in the OS-exp group ($p<0.001$). 62% of the reinterventions were due to the initial EVAR module. The main risk factor for reintervention after FEVAR was the presence of a preoperative Type 2 endoleak (EL2) ($p<0.05$). 10 FEVAR patients (11.3%) necessitated a secondary infrarenal conversion (5 explantations of the EVAR module and 5 aneurysmorrhaphies for persistent EL2).

Conclusion: The management of 1A EL by OS-exp is an effective and perennial treatment compared to the FEVAR treatment, despite a higher postoperative morbidity, without impact on the mortality. The rate of persistent EL 2 after EVAR associated with 1A EL incites to favor the surgical conversion technique as a first choice if the patient's comorbidities are low treat definitively the aneurysmal sag.

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USE OF ARTIFICIAL INTELLIGENCE WITH "DEEP LEARNING" TO MONITOR INFRARENAL AORTIC STENTGRAFTS

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Objectives: Endoleaks (EL) are one of the major complications of EVAR and can lead to increased rates of reintervention and secondary rupture. Life monitoring is necessary and involves cross-sectional imaging with repeated manual axial measurements. Analyzes based on artificial intelligence (AI) have been developed and could provide a more accurate and faster evaluation. The purpose of this study was to evaluate the capabilities of an AI software to analyze post-EVAR morphological changes over time, and to detect ELs and predict undesirable events.

Material and methods: Patients treated by EVAR in our center between March 2020 and January 2017 with at least two postoperative angio-CTs separated by 6 months were analyzed with PRAEVAorta (Nurea, Bègles, France). The software was compared with the human expertise using sensibility (Se), specificity (Sp), negative predictive value (NPV) and positive predictive value (PPV). The major adverse events (MAEs) were defined as death due to the aneurysm, ELs, leg occlusion and reintervention.

Results: 56 patients were included with a 27-month follow-up (IQR: 20-40). There was no significant difference in the evolution of the maximum diameters (mean, 56.92 mm vs 55.97 mm; $p=0.21$), but a significant increase in lumen volume ($p=0.0124$, +4.689%) and a decrease in thrombus volume ($p=0.0216$, -9.578%). The volume of the aneurysm showed a better Se in the prediction of the increase in size of the maximum diameter ($p=0.0222$). Se and Sp of PRAEVAorta were 0.7500 (95% CI: 0.5510-0.8800) and 0.8438 (95% CI: 0.6825-0.9314) in the detection of ELs, respectively, with a PPV of 0.7826 (95% CI: 0.5810-0.903) and a NPV of 0,8182 (95%: 0.6561-0.9139). The prediction of undesirable events based on the overall volume showed an area under the curve (AUC) of 0.7806 vs 0.7277 for the maximum diameter. The same trend was observed in the prediction of ELs (AUC 0.7331 vs. 0.6790).

Conclusion: The PRAEVAorta software based on AI allowed a detailed anatomical characterization of post-EVAR aortic remodeling and showed its benefit for the automatic detection of ELs during follow-up. The measurement of the aneurysmal aortic volume was the most robust predictive factor of MAEs including ELs.

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OPTIC FIBERS: THE END OF X-RAYS?

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Objectives: Currently, endovascular navigation relies on the use of X-rays. It is enabled by a two dimensions and black and white dynamic projection image. Despite recent technical advances, complex endovascular procedures remain a source of troublesome irradiation for patients and health-care personnel. Fiber optic navigation is a recent technological innovation enabling 3-dimensional endovascular navigation without the use of X-rays. It uses an optical fiber integrated in a hydrophilic guide or navigation catheter. A laser signal and the analysis of the signal reflection along the fiber allow the reconstruction

of the shape of the device which can be visualized directly and in 3 dimensions, according to any angle of view. The purpose of this report was to introduce the technology and to share our preliminary experience by describing the advantages and potential drawbacks of the technique.
Material and methods: Since the end of November 2023, our department integrated a program using optical fiber navigation for fenestrated stentgrafts. At the present time, two cases were done: one patient received a fenestrated stentgraft (one renal fenestration) to treat a type I endoleak and one patient presenting a type III thoracoabdominal aneurysm had FEVAR with three fenestrations, with one renal artery occluded before operation.
Results: In the first case, the fiber optic navigation system was successfully used for aortic navigation and to catheterize the renal artery. In the second case, the navigation system was successfully used for aortic navigation and to catheterize the renal and superior mesenteric arteries. The celiac trunk was catheterized using conventional techniques. During this very preliminary experience, we were able to observe the potential benefits of this technology: reduction of fluoroscopy time, facilitation of navigation and catheterization with the possibility of visualizing several 3D projections plans without modification of the position of the image intensifier. Nevertheless, there is a certain learning curve, necessitating a change in the usual flow of work, the duration of which remains to be determined.
Conclusion: Navigation using optical fibers allows 3D navigation without needing X-rays. Additional clinical studies are needed to determine the role of optical fibers navigation to reduce irradiation during complex endovascular procedures.
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RESULTS OF A SURGICAL TECHNIQUE USING VOLLMAR RINGS TO TREAT THE PLICATIONS OF AORTO-FEMORAL BYPASS GRAFTS LIMBS

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Objectives: Plication of the limbs of prosthetic aorto-bifemoral bypasses (ABB) is often due to an excess of length of old prostheses. Historically, their treatment required partial or complete replacement of the bypass with a new abdominal approach. Endovascular therapy may be proposed but the plications are often surrounded by a rigid fibrosis that responds poorly to dilation or stenting. We propose a new surgical technique for the treatment of limb plications using Vollmar rings through a femoral approach.
Material and methods: This single center retrospective study included all the patients who treated for ABB limb occlusions with Vollmar rings between October 2020and December 2023. Intra-abdominal plications were multiple. Limbs with iliac anastomoses were excluded. The technique followed the following steps: 1/ approach of the prothesis in the Scarpa triangle 2/ transection of the prothesis which was liberated from periprosthetic fibrosis 3/ Vollmar rings were passed around the prosthesis to free the leg. This last step was done by rotational movements up towards the bifurcation of the prosthesis under X-ray control [Video 1] 4/the excess of length was corrected and the distal anastomosis is redone. Angiography control was obtained in all cases.
Results: Five interventions were done in four men aged 71-86 years. The first patient was treated urgently for acute ischemia of the lower left limb with thrombosis of an AFB. A false aneurysm developed on the right femoral anastomosis of an AFB was treated in the second patient with a realignment of the limb. The third patient presented a proximal aneurysmal evolution on his right iliac to left femoral bypass with a limb plication. A FEVAR was done after the treatment of the left limb plication to introduce the launcher of the stentgraft. In the last patient, bilateral anastomotic femoral false aneurysms with plication of the limbs were treated in two stages. The 5 interventions were successful.
Conclusion: The treatment of limb plications of AFB with rings of Vollmar appears to be a sure solution with a good technical success.
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EVALUATION OF BOTULINUM TOXIN IN THE CONSERVATIVE MANAGEMENT OF NEUROLOGICAL THORACIC OUTLET SYNDROME

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Objectives: Neurological thoracic outlet syndrome (NTOS) remains a pathology whose management remains controversial. Unfortunately, the diagnostic and therapeutic approaches not supported by any recommendations. The first-line treatment of the NTOS combines physiotherapy, correction of professional, personal and sports practices. The local injection of local anesthetics and corticosteroid agents has shown encouraging results, but with short duration of efficacy. More recently, in order to increase the durability of action, the injection of botulinum toxins (BOTOX) was evaluated. The objective of this work was to evaluate the effectiveness of BOTOX injections in the conservative management of NTOS.
Material and methods: 76 patients had injection of BOTOX into the scaleni and/or the pectoral minor. Depending on the clinical effect, the injections could be repeated 2 or 3 times. Patients were mostly women with an average age of 39 years. The disability assessment was done with the QUICK DASH TEST. It was realized

during the initial stage of management then at the end of the follow-up. Data were collected retrospectively in a single center.
Results: With an average follow-up of more than 16 months, the QUICK DASH score decreased by -25% with a statistically significant difference. The importance of this evolution was classified in 3 groups: 0-9%: no improvement, 10-49%: moderate improvement, >50%: important improvement. These groups represented 30, 38 and 32% of the cohort, respectively. Thus, more than 70% of patients reported an improvement of their symptoms. Despite the injections, 26 patients were operated through a supra- and infra-clavicular approach. We analyzed gender, any history of cervical trauma, the presence of a cervical rib, apophysomegaly, vascular compressions, the history of symptoms and the number of injected muscles. None of these factors impacted the results.
Conclusion: In the majority of cases, the injections of BOTOX improve the symptoms of subjective neurological thoracic outlet syndrome. However, there are still 30% of resistant patients, which highlights the lack of understanding of the pathophysiology of this syndrome and consequently the selection of patients to treat.
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PROSPECTIVE STUDY OF A SINGLE-CENTER MULTIDISCIPLINARY SIMULATION PROGRAM FOR THE MANAGEMENT OF AORTOILIAC HEMORRHAGIC SHOCK

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Objectives: Initial surgical training of the team management of aortic hemorrhagic emergencies is complex. It requires individual responsiveness within the team, interdisciplinary collaboration and respect for specific therapeutic activities. The frequency of these emergencies is also variable. High-fidelity simulation makes it possible to reproduce a situation identical to that of the clinical situation. The purpose of this study was the analysis of the results the 7-year experience of a simulation center in this area of multidisciplinary competence.
Material and methods: A scenario of massive post-traumatic hemorrhagic shock in an 18-year-old male was constructed. It involved anesthetists (A), nurse anesthetists (IADEs), vascular surgeons (VSs) and surgical nurses (IBODE) in training. In addition to the collective management of the hemorrhagic shock, there was a specific objective for each learner, adapted to his specialty. The VS could in particular produce aortic endoluminal occlusion (REBOA) as well as the embolization of hypogastric arteries. A SimMan Vascular© mannequin (Laerdal Medical), specifically designed in a realistic clinical environment and using a true hospital equipment was used. The four expert practitioners, knowing the scenario, made the briefing, monitored the session and facilitated the debriefing. Debriefing was conducted to examine the case, the team's performance, judge latent threats and analyze human factors. A questionnaire of evaluation was completed at the end of the session.
Results: 28 sessions were fully organized (100%). They involved 28 VSs, 51 As, 28 IADEs, 42 IBODEs in training. 100% of the teams had correctly identified the objectives and 100% of the learners identified simulation as a tool for decision-making, for the acquisition of technical skills, for teamwork and for communication. The debriefing allowed for the detection of security threats that were corrected. The experts observed a leadership assumed by the VS alone, by the A alone, by the 2 simultaneously in 39%, 10% and 50% of the sessions, respectively.
Conclusion: The multidisciplinary and interdisciplinary simulation training for aortic emergencies is representative and complements significantly the training. It gives encouraging prospects for possible clinical applications.
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EVALUATION OF THE EFFICACY OF AN ORIGINAL MODALITY OF PERCUTANEOUS HEMOSTASIS OF ARTERIAL PUNCTURES

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Objectives: The alternative to the use of percutaneous closure systems (PCSs) is manual compression, especially after anterograde femoral puncture (AFP) or retrograde brachial puncture (RBP), where these devices are not recommended. An original compression modality using a new hemostatic pad (Axiostat®, Biotronik®), less expensive in time of realization than conventional manual compression and less expensive than PCSs, has shown its efficacy for radial and femoral punctures. The purpose of this study was to evaluate the efficacy of Axiostat® for common arterial punctures, or when a PCS cannot be used in endovascular surgery.
Material and methods: A prospective single-center study was conducted in our tertiary center between December 2022 and June 2023, including all consecutive patients having endovascular surgery with retrograde femoral puncture (RFP) and AFP, by RBP with use of Axiostat® and manual compression™ for a number of minutes equivalent to the French size of the introducer. The introducers used ranged from 4Fr to 7Fr, with compression times between 4 and 7 minutes. All patients had a clinical and ultrasound evaluation in the postoperative period in the search for a hemorrhagic complication. The outcomes were

technical success, with an adequate hemostasis, and the rate of postoperative hemorrhagic complications.
Results: One hundred and nine patients with an average age of 73.5±12.8 years and a 1.7 ratio of men women were included. Eighty-four femoral punctures (17 AFPs and 67 RFPs) and 30 RBPs were done. The technical success rates were respectively 95.2% (including 1 complication in the RFP group and one in the AFP groups) and 90%, respectively. Seven patients (6.4%) presented a postoperative hemorrhagic complication: one hematoma and six false aneurysms. Five patients required a surgical revision for hemostasis.
Conclusion: This study showed the safety and efficacy of Axiostat® for percutaneous arterial punctures, with a low complication rate. This technique is less onerous than PCSs. A prospective comparative study between the two techniques could guide the technical choice for the hemostasis of the percutaneous arterial punctures.
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IMPACT OF THE « FUNDAMENTAL TECHNICAL SKILLS OF ENDOVASCULAR SURGERY » SIMULATION PROGRAM ON DEXTERITY AND STRESS DURING PROCEDURES

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Objectives: To determine whether the simulation on a dexterity training program (Fundamental technical skills of EndoVascular Surgery ([FEVS]) allowed the residents to reach the level of seniors (SE) and to evaluate their stress.
Material and methods: The eight tasks of the FEVS were done by nine residents (beginners (Beg) and advanced (Adv) and by five SEs. Primary outcome was the total time of completion (TTC) of the 8 tasks. The Analgesia Nociception Index (ANI) was monitored. A questionnaire based on the Likert scale was filled after the completion of the tasks.
Results: TTCs were shorter for Advs than for SEs and Begs ($p=0.0163$). After 5 simulations, Advs reached or exceeded the level of SEs in terms of TTC (10.8 min [9.58-11.2] for Advs and 11.9 min [9.72-15.3] for SEs), and of movements of the wires during cannulation (4.44 mm [3.72-5.96] for Advs and 4.17 mm [3.87-5.26] for SEs). SEs were more precise than Advs in the manipulation of wires (movements after cannulation), 4.17m (3.87-5.26) and 4.44m (3.72-5.96), respectively. The stress measured on the Likert scale was the same in SEs, Begs and Advs ($p=0.0618$). The initial ANI of SEs and their average ANI during the sessions were lower than for the residents, $p=0.0358$ and $p=0.0250$ respectively.
Conclusion: Five sessions on FEVS allowed residents to achieve the performance of SEs regarding the TTC. The participants presented a similar stress, making the exercise transposable to all levels.
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DIGITAL MEDIA AND POAD: A MEDICO-ECONOMIC ADVANTAGE AT THE HEART OF AMBULATORY SHIFT

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Objectives: In 2040, 850,000 people will be followed for POAD in France, i.e. 20% more than in 2020, for health costs of €2.1 billion. In parallel, the shift to ambulatory care accelerates, both to compensate for the shortages in health care personnel and to meet budgetary constraints in a context of aging of the population which increases the needs.
Material and methods: How can we meet with quality the growing due to a disease source of recurrent decompensations and hospitalizations, a fortiori when their risks and modes of occurrence are not explained by educational therapy? How to act on disorganizations and extra costs linked to emergency hospitalizations which are aggravated by the patient's non-compliance, 3.5 times more costly and 7.5 times more frequent in the event of emergency care? These reflections led us to design a digital personalized and automated tutoring system for POAD, NAOMIFEEL, with a double patient/caregiver's portal.
Results: The patient's portal combines therapeutical education and reminders of needs for follow-up, systemically adapted to the comorbidities and the severity of POAD. The aim is to relay the caregivers in their functions of therapeutical education, to secure the care pathways, to promote patient compliance, to limit the risks of evolution of the disease and thus to become a public health tool. The physician portal allows easy monitoring of the of the patient's symptomatology, a source of gain in time in terms of visits. It also allows us to monitor the situation in advance through the use of warnings triggered by critical answers to automated follow-up questionnaires. Finally, it aims to limit late and emergency hospitalizations, sources of care disorganizations and of increased health costs. Beyond the concept of digital therapy, we present the health cost savings that can be obtained with NAOMIFEEL through the improvement of compliance, the reduction of hospitalizations and of preventable illness, with an estimation of 200 million euros per year.

Conclusion: Thus, by supporting organizational changes and structural reforms for both patients, caregivers and health organizations, the NAOMIFEEL digital telehealth system presents medico-economic advantages justifying the development refundable by health insurance schemes.
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DESIGN AND VALIDATION OF A COATING MIMICKING THE ENDOTHELIUM FOR AN OPTIMAL INTEGRATION OF ENDOVASCULAR DEVICES

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Objectives: Endovascular devices (EDs), such as stents and flow-diverters really enriched the therapeutic arsenal for arterial pathologies. However, a pathological reaction of the host triggered by the DE limits the mid- and long-term results of endovascular treatments. New generations of eluting stents were developed to address this issue. However, the eluted drugs are not selective and limit the proliferation and migration of endothelial cells rather than promoting the integration of EDs. The objective of this study was to design a coating capable of providing EDs the trans-homophilic properties of CD31 (which is the most abundant homeostatic blood glycoprotein), to 1-deactivate the initial inflammatory reaction induced by the ED implantation, and 2-promote arterial healing without neointima formation in the recipient vessels.
Material and methods: Five synthetic peptide sequences (IRBM, Italy) mimicking the 1 and 2 domains of CD31 were developed and immobilized by click chemistry on disks of nitinol and cobalt-chromium (CoCr, AlchiMedics, France) functionalized with polydopamine (PDA). The action of human aortic endothelial cells (EHACs) on the surface of these alloys was evaluated by fluorescence, using the ratio of CD31 expression and cytoskeletal stress expression (phalloidine, marking the F-actin fibers of stress) after a 24-hour culture (AxioObserver®, Zeiss, Germany). The peptide showing the greatest capacity to promote the endothelialization of inorganic surfaces (SP1072) was immobilized on the surface of flow-diverters (AlchiMedics). These EDs were implanted in the healthy abdominal aorta and in saccular right subclavian artery aneurysms induced by elastase in rabbits. In parallel, CoCr stents functionalized with SP1072 were implanted into healthy rabbit abdominal aortas and iliac arteries. The biocompatibility of these EDs mimicking the action of CD31 was evaluated "in front" by scanning electron microscopy and on axial histological sections of the arterial segments at various time intervals after implantation. Each experimentation included a control group (bare for flow-diverters, bare, PDA and sirolimus for stents, n=2/3/group/period of time).
Results: EHACs seeded on the disks of nitinol and CoCr alloy functionalized with the CD31 peptides presented a significantly higher CD31/F-actin ratio compared to the control disks (non-functionalized, $p < 0.01$). EDs functionalized with the SP1072 peptide were completely endothelialized at D7 in vivo with a decreased leucocyte and platelet aggregation in comparison with bare EDs in electron microscopy Histological analysis of the saccular and healthy vessels revealed a luminal face of the functionalized EDs covered by a thinner neointima and a lower white blood cells and platelets adhesion compared to the bare Eds at each interval of time. The organization of the thrombus was also more important in the group of functionalized flow-diverters.
Conclusion: Surfaces mimicking the endothelium obtained by immobilization of synthetic peptides with the trans-homophilic properties of CD31 promote endothelialization and reduce the pathological biological reaction of cells interacting with EDs. Our preliminary results demonstrate the feasibility of functionalization of such EDs, and that such a surface treatment improves their biocompatibility. Further in vivo studies are required, which could pave the way for improvements in EDs clinical outcomes.
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INTERVENTIONAL HOLOGRAPHY OR THE APPLICATION OF AUGMENTED REALITY IN ENDOVASCULAR SURGERY

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Objectives: Accessibility to images with direct vision dominate the organization and ergonomics of endovascular surgery rooms, whether in hybrid rooms or with a mobile arch. An application using augmented reality was developed to enable the surgeon to become independent of the positioning of the screens which carry the peroperative imaging.
Material and methods: The capture of video streams integrated as holograms in Microsoft Hololens headsets allows operators to liberate themselves of any structural constraints imposed by the equipment of the room for the visualization of images. Up to three streams can be simultaneously captured and controlled by voice or digitally, with the possibility of choosing the positioning of the images in the field of vision, of changing image size with a digital zoom, and adapting contrast and brightness. 250 test consecutive procedures were done in real surgical conditions with different types of equipment.

Results: This experience allowed to establish the criteria of latency time and image stability. By confronting the requirements of endovascular surgery and the technological possibilities, it has been possible to propose a "wireless" solution adapted to the realization of endoluminal procedures independently of the position of radiological and ultrasound screens. The operator can move very freely and can access the various approaches while keeping a stable and fixed image in his field of vision. Latency time is reduced to a minimum and does not interfere with the endoluminal manipulations. The transparency of the glasses allows a direct vision of the operative field for open surgical gestures.
Conclusion: In the light of this experience integrated in a routine activity, the concept of interventional holography is well established and can be proposed whatever the endovascular procedure. This adaptation of augmented reality holds out the possibility of an operating room without screens.
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ANALYSIS OF AORTIC GEOMETRY AFTER TEVAR: WHICH PARAMETERS ALLOW THE EARLY PREDICTION OF AN UNFAVORABLE EVOLUTION?

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Objectives: The purpose of this study was to evaluate the aortic geometry and to determine its influence on the changes of an aneurysmal thoracic aorta (TA) after TEVAR over a 3-year follow-up, in order to identify the predictive characteristics of an unfavorable evolution.
Material and methods: Twenty-five patients treated by TEVAR for an atheromatous aneurysm of the thoracic aorta were retrospectively included in this monocenter study. All patients had clinical and radiological follow-up for 3 years after TEVAR, and two groups of patients could be defined: those with a favorable aortic evolution (FAE) and those with an unfavorable aortic evolution (UAE). Four angio-CT scans (CT) were analyzed: preoperative CT (T0) and three postoperative CTs at 6-12 months (T6), 24 months (T24) and 36 months (T36). An innovative software with image processing was used to obtain, beyond the traditional diameter estimates, an extraction of length, angles, and tortuosity indices for each segment of the thoracic aorta. Descriptive statistical methods and Bayesian methodology were used to express the results and to assess the link between geometric parameters and the risk of poor prognosis after each postoperative follow-up.
Results: At T0, none of these geometrical parameters was associated with a risk of unfavorable evolution. In contrast, between T0 and T6, the length, the angulation, and the index of tortuosity showed a significant increase in the UAE group (22.3±5.1 mm, 23.8±7.2° and 0.1±0.01 compared with a stability in the FAG group of 0.01±0.05 mm, -1±0.9°, 0.01±0.02, respectively, $p<0.05$).
Conclusion: The quantification of the post-TEVAR time evolution of the geometrical parameters from 6 months onward makes it possible to distinguish a favorable aortic evolution from an unfavorable aortic evolution.
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CURRENT RESULTS OF CAROTID ARTERY BYPASS SURGERY IN A MULTICENTER STUDY: A STILL VALID ALTERNATIVE

Audrey Besutti, Aurélien Hostalrich, Yannick Georg, Georges Ghorayeb, Benjamin Hentgen, Nicla Settembre, Blandine Maurel Desanlis, Éric Steinmetz, Laurent Fouilhe, Romain Lepilliet, Patrick Feugier, Jonathan Sobocinski, and Simon Rinckenbach, Besançon, Toulouse, Strasbourg, Rouen, Paris, Nancy, Nantes, Dijon, Reims, Marseille, Lyon, Lille, and Besançon, France, for the AURC.

Objectives: The carotid-carotid bypass (CCP) remains useful in specific circumstances in carotid pathology, although these cases are not very documented. The purpose of this study was to report the indications and the results of this technique from a multicenter experience.
Material and methods: This multicenter observational study conducted in 12 centers included retrospectively all the patients treated by CCB between January 2010 and October 2023. Outcomes were the 30-day morbimortality rate (CRMM) and the surgical revision rate during follow-up.
Results: 459 patients were included (mean age: 70 years, 81% of men). The principal indication was secondary conversion after endarterectomy (233 cases, 51%). Other indications were preoperative in case of extensive lesions (100 cases, 22%), restenosis or post-endarterectomy thrombosis (67 cases, 14%), aneurysmal lesions (24 cases, 5%), previous radiotherapy (16 cases, 4%), traumatic injury (10 cases, 2%), post-endarterectomy infection (3 cases, <1%), neoplastic processes (3 cases, <1%), stenting failure (1 case, <1%), and two cases with missing data. CRMM was 5.8% (27/459), with stroke and mortality rates of 4.3% (20/459) and 2.8% (13/459), respectively. The causes of death were a stroke in 6 cases (1.3%), a compressive cervical hematoma in 3 cases, one acute respiratory distress, one degradation of the general state, one

septic shock due to mediastinitis and one death of unknown cause. During follow-up, 3% of bypass grafts were reoperated for restenosis (15 cases) or thrombosis (4 cases, <1%), with an average delay of 1.94 years (min 0.3; max 7.2) after initial management or infection (2, <1%). In multivariate analysis, the use of prosthetic material (vs. autologous vein) increased the CRMM (OR 4.03; 95% CI 1.02-15.90; p=0.046) while preoperative statin treatment decreased this risk (OR 0.22; 95% CI 0.22-0.64; p=0.005).

Conclusion: This work clarified the current place of CCBs among surgical alternatives in carotid pathology, with a specific indication in the case of complex lesions, for which 30-day results remain correct. The low rate of reoperations demonstrates the mid-term reliability of the technique and validates its relevance.

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CAROTID SURGERY REMAINS FULLY JUSTIFIED IN FRANCE, WITH AN EXCEPTIONALLY LOW RATE OF MAJOR COMPLICATIONS: A CMMR UPDATE

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Objectives: Carotid endarterectomy is currently challenged both by the improvement of medical treatment and by endovascular techniques. We realized a multicenter study (TREC) to look for surgical risk factors of carotid restenosis due to myointimal hyperplasia, and final one-year results will be available at the end of 2024. The purpose of this presentation was to report the cumulative morbimortality (CMMR) rate in this prospective study.

Material and methods: This study was approved by an ethical committee (2021-133) and calculation of the sufficient number of patients, we included all the patients treated by eversion carotid endarterectomy in eight French public hospitals between September 2021 and November 2022. The demographic data and the operative indications were collected, as well as the complications of surgery including early deaths and stroke rates.

Results: 601 patients (70% of men with a mean age of 73±9 years) were included in TREC. They were operated for carotid stenoses measured as <50%, 50-69%, et >70% in 2%, 15%, and 83% of cases, respectively. Patients were symptomatic and asymptomatic in 36.3% and 63.7% of cases, respectively. During the 30-day postoperative period, 2 and 7 strokes were observed. These 9 major complications occurred in patients with symptomatic stenoses. The overall CMMR of the study was 1.5%. CMMR was 4.1% in symptomatic patients and 0% in asymptomatic patients.

Conclusion: CMMR was a secondary criterion of the TREC study, but the low rate observed are important to highlight because they are inferior to the various recommendations. They reflect the quality of carotid surgery in France and justify the role of endarterectomy in particular for asymptomatic stenoses.

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RESULTS OF EXTRACRANIAL CAROTID STENOSES ENDARTERECTOMY OR STENTING IN FRANCE BETWEEN 2010 AND 2019

Éric Steinmetz, Jonathan Cottenet, Anne-Sophie Mariet, Lucas Morin, Alain Bernard, Yannick Bejot, and Catherine Quantin, Dijon, and Besançon, France.

Objectives: The role of carotid stenting (CAS) as an alternative to carotid endarterectomy (CEA) in the treatment of extracranial carotid stenoses has been debated for years. The main objective of the present study was to compare postoperative ischemic strokes and mortality after CAS or CEA within a national cohort.

Material and methods: The data of all patients treated by CEA or CAS between 2010 and 2019 in France were obtained the French SNDS national database. We collected information concerning the characteristics of the patients (age, gender, comorbidities, symptoms and high-risk status) and the characteristics of the institution (type, volume of activity). We used a random effects logistic regression model to compare the cerebrovascular accidents and postoperative mortality, taking into account the high-risk status thanks to a correspondence of the propensity score and an adjustment according to the characteristics of the patients and the institution. We also used the same model after stratification by condition of the symptoms.

Results: Between January 1st, 2010 and December 31, 2019, 164248 patients had CEA (n=156561) or CAS (n=7687) in France. Of these, 2514 had an acute stroke or died in the 30-day period following surgery, 2327 after CEA (1.5%) and 187 after CAS (2.4%). This rate was 3.3% in symptomatic patients and 1.3% in asymptomatic patients. Matching and adjustment showed that CAS patients had a significantly greater risk of stroke compared to CEA patients (aOR=1.4 [1.1-1.8]). This risk was observed in symptomatic (aOR=2.7[1.8-4.0]) and asymptomatic (aOR=1.4[1.1-1.8]) patients.

Conclusion: This real-life study showed that CEA performed better than CAS, not only in symptomatic patients, but also in asymptomatic patients. Further research is required to determine whether this difference

in observation is due to the effects of the election or whether endarterectomy is actually more than stenting.
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FIVE-YEAR RESULTS OF THE STABILISE TECHNIQUE FOR THE TREATMENT OF COMPLICATED AORTIC DISSECTIONS

Jean-Marc Alsac, Marie Corniquet, Alice Topolanski, Marie Bonnet, Rita Cherkaoui, Ghazi Harika, and Pierre Julia, Paris, France.

Objectives: We evaluated the 5-year clinical and morphological results of the patients treated for a complicated aortic dissection using the STABILISE technique.
Material and methods: All the clinical and morphological data of patients operated for complicated aortic dissection by the STABILISE technique between February 2012 and October 2023 in our university center dedicated to aortic emergencies were analyzed.
Results: 156 patients (129 men, mean age 59±12 years) were treated with the STABILISE technique for a complicated aortic dissection (62 residual type A / 94 type B, 100 in the acute phase, and 56 in the chronic phase), including 76 acute type B dissections, and 17 patients with connective tissue disease. Technical success was achieved in 95% of cases, and 32% of the procedures were associated with a visceral stenting (56 stented arteries/624 =9%). 30-day mortality, spinal cord ischemia, and stroke rates were 3.8%, 1.9%, and 1.3%, respectively. The mean follow-up was 42±30 months, with 4 patients lost to follow-up, and 97% adhering to their follow-up program. At 5 years, all causes mortality, aortic mortality, and aortic reintervention rates were 5%, 3%, and 8%, respectively. The false lumen was totally thrombosed or healed in 98% of the cases at the thoracic level, and in 95% of the cases in the visceral aorta at the level of the uncovered stent. Only 3.8% (n=6) of the patients required surgery on their residual sub-renal aortic dissection during follow-up.
Conclusion: The STABILISE technique appears to be effective for treating complicated aortic dissections with a low mortality perioperative rate and excellent 5-year clinical results. The healing of the false channel down to the infrarenal artery persists after 5 years, and appears to protect effectively the patients from a secondary aneurysmal evolution, and from complex aortic procedures.
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CONTRIBUTION OF CONTRAST TEE DURING TEVAR FOR AORTIC DISSECTION

Louis-Marie De Beaufort, Laurent Brisard, Tom Le Corvec, Justine Mougin, Eglantine Marne, Guillaume Guimbretiere, and Blandine Maurel Desanlis, Nantes, France.

Objectives: Endovascular closure of the main entry tear and the principal reentry tears constitute the management of choice of complicated aortic dissections (AD). However, specific complications such as endoleaks, d-SINE, bone marrow pain, or retrograde dissections may occur. We report our experience on the contribution of TEE with Sonovue (cTEE) in the management of AD by TEVAR.
Material and methods: Single-center observational study between May 2019 and December 2022. We collected the parameters of Rx exposition, the impact of cTEE on the operative decision-making (localization of guidewires, length of coverage, bloating...), and the comparison between the final arteriographic (ART) and the postoperative angio-CT (CT) results in terms of technical successes and endoleaks done by two blinded surgeons.
Results: Out of 29 patients (16 residual TADs, 31 TBD, 79% of men, mean age 64 years), 7 were in the acute phase, 5 in the subacute phase and 17 in the chronic phase, for an average length of coverage of 250 mm. The correct positioning of wires and the successful closure of the entry tears was controlled in 100% of cases. cTEE detected two type 1a, 8 type 1b, and 5 type 2 endoleaks. By comparison, ART objectified 1 type 1A, 9 type 1b and 0 type 2 endoleaks. And finally, CT also found no type 1a, 13 type 1b and 3 type 2 endoleaks. In 12 procures (41%), cTEE contributed to the peroperative decisions: additional modules in five cases, absence of additional module of 4 patients, 2 balloon expansions, and one adjustment of the wire path. No severe complication occurred in relation with cTEE.
Conclusion: These preliminary results encourage the use of preoperative cTEE during AD management. Some hemodynamic information appears to be more effective than arteriography in confirming the quality of the aortic repair. The clinical benefit, particularly in terms of reduction in exposure to ionizing radiation, remains to be confirmed.
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PATENCY OF THE VERTEBRAL ARTERY AFTER CAROTID-SUBCLAVIAN BYPASS OR TRANSPOSITION FOR REVASCULARIZATION PRIOR TO AORTIC STENTGRAFT COVERAGE

Aude Gatinot, Lucie Salomon Du Mont, Simon Rinckenbach, Justine Mougin, and Blandine Maurel, Nantes, and Besançon, France.

Objectives: Carotid-subclavian bypass or transposition are the two techniques to revascularize the left subclavian artery before endovascular coverage during TEVAR. Their interest in the prevention of spinal cord ischemia by

preserving the spinal cord circulation via the vertebral artery has been demonstrated. The objective was to evaluate the patency of the vertebral artery after these two types of revascularizations.
Material and methods: This was a comparative two-center retrospective study of the patients who had a carotid-subclavian bypass or transposition in the scheduled treatment of a pathology of the thoracic aorta (dissection, aneurysm, arteria lusoria) between 2017 and 2022. Per- and postoperative complications due to the procedure and mortality were collected, as well as the patency of vertebral and subclavian arteries on the postoperative and follow-up angio-CTs. Chi-square or Fisher tests were used to compare the groups with a significance threshold of .05.
Results: 90 patients had 50 transpositions (3 patients had bilateral transposition for arteria lusoria) with a 24.5-month median follow-up, and 45 bypasses (2 patients had bilateral bypass for arteria lusoria) with a 27-month median follow-up. The treated thoracic aortic pathology was an atheromatous aneurysm in 31.5% of cases, a dissection in 60%, and an arteria lusoria in 8.5%. In the bypass graft group, six vertebral thromboses occurred, of which one with bypass thrombosis, and two bypass thromboses without vertebral thrombosis occurred. In the transposition group, two isolated vertebral thromboses were observed. No significant difference was observed in the vertebral patency and the primary patency of the revascularization in univariate analysis (86.7 vs 96%, p=0.14, and 93.3 vs 100%, p=0.1). The complication rate was 24.4% for bypass surgery vs. 8% for transpositions (p=0.03). The rates of stroke were 2.2 and 2%, and the rates of spinal cord ischemia were 4.4 and 2%, respectively. The 12-month mortality rate was 6.7%: 6 deaths in the bypass group, and none in the transposition group (p=0.01).
Conclusion: Bypass or transposition are effective and efficient techniques. We observed a non-significant trend towards a higher rate of vertebral occlusion among bypass grafts, but larger studies are needed.
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APPROPRIATENESS OF THE TREATMENT OF NON-COMPLICATED ACUTE TYPE B DISSECTIONS IN ZONE 0 AND 1

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Objectives: The surgical treatment of uncomplicated type B dissections (nc-TBD) is suggested in the subacute phase in case of pejorative predictive factors based on morphological (aortic diameter, characteristics of the false channel, and entry tear) and clinical (recurrent pain, poorly controlled hypertension) criteria. The purpose of the study was to describe the results of TEVAR for nc-TBD in Zone 0 and 1 in order to evaluate the risk-benefit ratio.
Material and methods: Consecutive patients treated by TEVAR in Zones 0 and 1 for nc-TBD between 2018 and 2023 were included in this observational retrospective study. Surgery was indicated in the presence of clinical (refractory HBP or recurrent pain) or morphological (aortic diameter>40 mm, entry tear >10 mm, increase of 5 mm or more in one month). Primary outcome was the one-month mortality. Secondary outcomes were the rates of paraplegia, retrograde dissection, stroke, reintervention, and aortic remodeling.
Results: Between 2018 and 2023, 370 acute aortic syndromes were hospitalized by "SOS aorta". Among these patients, 102 acute type B dissections were diagnosed, and 66 of them were operated. 14 (21%; 10 men, 4 women, average age 60 +/- 12 years) necessitated repair in zone 0 and 1, with 4 (28%) fenestrated arch TEVAR, 5 (35%) in situ laser, 5 (35%) cervical debranching with two parallel stents. The STABILISE technique was used in seven patients (50%), and one (7%) candy plug was implanted. One-month mortality was null, as was the rate of paraplegia. Three (21%) patients presented a retrograde dissection, including 2 asymptomatic cases. Two of these dissections were late (J21 and 14 months), and had a replacement of the ascending aorta with uncomplicated postoperative course. One (7%) patient had a postoperative stroke and four (28%) patients required reintervention.
Conclusion: "Preventive" intervention in zones 0 and 1 for nc-TBD is associated with good clinical results, but a significant rate of retrograde dissection, predominantly asymptomatic, necessitating aggressive tracking. The validity of the indications in zones 0 and 1 should be reevaluated.
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ACUTE TYPE B AORTIC DISSECTIONS: OPTIMAL MEDICAL TREATMENT OR ENDOVASCULAR TREATMENT?

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Objectives: The management of acute type B aortic dissections (ATBAD) remains a challenge for vascular surgeons, because of significant morbidity and mortality rates, and a high risk of aneurysmal evolution (up to 50% after 5 years). This study compared the results of optimal medical treatment alone or associated with stentgraft coverage of the proximal entry tear during the acute phase in an expert center. We also compared the long term aortic aneurysmal evolution in each group and analyzed the risk factors of aneurysmal evolution.
Material and methods: In this single-center retrospective study, we recruited all consecutive patients treated for

ATBAD (n=130) between 2008 and 2020. Our primary analysis looked at the whole cohort and compared the results based on the initial management, i.e., medical treatment alone for uncomplicated ATBADs (n=67) or combined with a thoracic stentgraft to cover the main entry tear (n=63). We also made a sub-group analysis to study the risk factors that are associated with a long-term aneurysmal evolution.
Results: During a median 29.5-month follow-up, 42.4% of the patients receiving medical treatment alone presented an aneurysmal evolution, mainly in the thoracic aorta, compared to only 21.8% in the stentgraft group. Aortic remodeling was significantly better in the stentgraft group, with a decrease in the diameter of the thoracic aorta and the false channel. An initial aortic diameter≥40 mm and a false channel ≥22 mm were independent risk factors of aneurysmal evolution. The five-year survival rate was consistent with the literature (76.1%) for the two groups combined.
Conclusion: This study confirms the effectiveness and safety of endovascular treatment with coverage of the proximal entry tear with a stentgraft in patients with an ATBAD. The initial treatment with TEVAR appears to reduce the aneurysmal evolution of the aorta by promoting the remodeling of the aorta. Systematic management with TEVAR may be considered in patients hospitalized with uncomplicated ATBAD associated with an initial aortic diameter ≥40 mm and/or a false channel≥22 mm.
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IMPACT OF ETIOLOGY ON THE OUTCOMES OF AORTIC ARCH ENDOVASCULAR SURGERY

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Objectives: Endovascular surgery of the total aortic arch (zone 0) appeared as an alternative to open surgery for high-risk patients. However, the patient population treated with this new technique is heterogeneous. In this study, we tried to characterize this population and examine the impact of etiology on the results.
Material and methods: Between April 2017 and August 2023, endovascular exclusion of the aortic arch was performed in 72 consecutive patients in our establishment, including 42 for chronic dissection (CD) and 30 for a non-dissecting pathology (ND). The composite primary outcome was intra-hospital death and the presence of a stroke (modified Rankin score 3-6). Mid-term survival was analyzed according to Kaplan-Meier. A multivariate logistical regression was done to identify the independent predictive factors of postoperative stroke.
Results: A total of 50 (70.4%) 3 branches and 21 (29.6%) 2 branches stentgrafts were implanted. The technical success was 97.2%. The mean age of the CD-subgroup was 68.5 ± 9.9 years and that of the ND-subgroup was 75.4 ± 6.8 years ($p < 0.01$). In the ND group the rates of COPD and open thoracoabdominal aortic surgery or endovascular surgery were higher, whereas the CD patients had more previous aortic surgery done through sternotomy. The CD subgroup was more likely to have a zone 0 and thoracoabdominal extension of the disease, requiring extensions with a thoracic stentgraft. The composite outcome of postoperative death and stroke was double in the ND group, but this difference was not significant (4.8% vs. 10.0%; p=0.39). The result was the same for hospital mortality (4.8% vs. 10.0%; $p = 0.39$). The number of postoperative strokes and TIAs was higher in the ND group (2.4% vs. 13.3%; p=0.07). In multivariate analysis, degenerative aneurysmal disease in the zone 0 was a predictive factor of postoperative stroke (OR 25.8; IC 2.6 - 257.1). Three-year survival rates were 87.0±7.4% and 81.0±8.8% in the NG group and the CD group, respectively (p=0.97). No branch stenosis or thrombosis was observed during the follow-up.
Conclusion: We did not find any significant difference in the composite primary outcome between patients treated for different etiologies; however, a degenerative etiology without dissection in zone 0 was a predictive factor for postoperative stroke. The risk of death and stroke was twice was twice as high as for patients with a dissection. These results are to be confirmed by studies evaluating larger populations.
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POSTOPERATIVE AND MID-TERM OUTCOMES OF TEVAR FOR ANEURYSMS OF THE DESCENDING THORACIC AORTA

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Objectives: TEVAR is the first intention treatment of descending thoracic aortic aneurysms (DTAA) in presence of a favorable anatomy. The neurological risk remains the main complication and there are controversial data about the long-term efficacy of this treatment. The objective of this study was to evaluate the early and mid-term results of TEVAR for DTAA.
Material and methods: All consecutive patients treated electively for DTAA between February 2009 and June 2022 in our center were included and analyzed retrospectively. Patients with aortic dissection were excluded. DTAAs were classified according to the proximal zone of extension (Ishimaru). Patients with extension to zone 1 or 2 were treated by hybrid surgery with debranching of the supra-aortic trunks (SAT) followed by TEVAR or surgical

replacement of the aortic arch. The incidence of 30-day major adverse events (MAEs) defined according to the SVS standards was noted. The risk of aortic reintervention, the overall survival and aortic survival were estimated according to Kaplan Meier (KM).

Results: 120 patients (86% of men, median age 69 [62-74] years) were treated for degenerative DTAA. Of these, 30 (26%) had respiratory insufficiency, 17 (14%) had renal insufficiency, 17 (14%) had a history of stroke, and 5 (4%) presented Marfan's disease. The proximal extension of the DTAA was localized in zone 1 in 18 (15%) patients and in zone 2 in 1 (0.8%) patient. Ten patients were treated by hybrid surgery and eight by aortic arch replacement followed by TEVAR. Twenty-four (20%) DTAAs started in zone 3 and 75 (63%) in zone 4. In these patients, the left subclavian artery (LSCA) was revascularized before TEVAR in three patients and concomitantly in 18 patients. The procedure was performed under general anesthesia in 108 (90%) patients, and 35 (29%) patients required vascular access to the upper limb. The technical success was 100%. Postoperative mortality and death rates were 2.5% (n=3) and 14% (n=17), respectively, with 1.7% (n=2) of postoperative grade 3 spinal cord ischemia and 2.5% (n=3) of postoperative strokes. Of these patients, none had concomitant SAT revascularization, and all had proximal extension of the DTAA in zone 4. The rate of postoperative ipsilateral vocal cord paralysis in patients with SAT revascularization was 3.3% (n=4). Median follow-up was 66 [24, 94] months. Twenty-five patients (21%) necessitated an aortic reintervention with proximal or distal extension of the previous coverage. The 5-year risk of aortic reintervention was 31±6.1%. The cause of death was known in all patients. The overall 5-year survival according to KM was 62%±4.7% and the 5-year aortic mortality was 0.9%.

Conclusion: The TEVAR treatment of DTAAs has a good rate of technical success; the mortality rate and the risk of postoperative complications are low. During the follow-up, the mortality is low (0.9%±0.9% at 5 years), but the risk of reintervention due to the aorta is high, requiring a strict radio-clinical monitoring.

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PREVENTIVE REVASCULARIZATION OF THE SUPRA-AORTIC TRUNKS DURING THE TREATMENT OF TYPE A DISSECTIONS IMPROVES THE NEUROLOGICAL PROGNOSIS OF THESE PATIENTS: RESULTS OF MULTIDISCIPLINARY CARE IN AN AORTIC CENTER

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Objectives: Type A aortic dissection (TAD) is a surgical emergency with a poor prognosis, all the more when it is associated with a malperfusion of the supra-aortic trunks (SAT) malperfusion. The purpose of this study was to evaluate the perioperative results of the patients operated for type A aortic dissection with symptomatic or asymptomatic cerebral malperfusion in a high-volume center with multidisciplinary management.

Material and methods: This was a retrospective single-center analysis of the data collected prospectively from all patients treated for TAD. The following parameters were noted: initial neurological presentation, extension of the dissection, severe malperfusion defined as compression of the true channel > 80% or an absence of flow in the true channel, in-hospital mortality, the occurrence of a postoperative stroke, and neurological worsening defined as a Glasgow score lower than the preoperative value or a new neurological deficit.

Results: Between March 2017 and November 2023, 420 patients presented with TAD, including 71 (16.9%) with symptomatic SAT malperfusion (28 strokes and 43 TIAs (39.4% vs 60.6%)). Among the 335 available preoperative imaging studies, the dissection involved the brachio-cephalic trunk (BCT) in 191 patients (45%), the right common carotid artery in 126 patients (30%), and the left common carotid in 100 patients (24%). Intra-hospital mortality was 12.4% (52/420). The initial neurological presentation had no significant impact on mortality (11.3% (8/71) vs 12.6% (44/349), p=0.84). Symptomatic or asymptomatic dissection of the SATs was associated with a significant increase in postoperative mortality (16.2% 31/191 vs 7.6% 11/144, p=0.01). A preoperative SATs revascularization was performed in 63 cases (55 aorto-carotid bypass grafts and 8 stentings) (14.96%), for 20 symptomatic patients (28.2%) and 43 asymptomatic patients with a severe malperfusion. It was significantly associated with a better postoperative neurological recovery in the event of SAT dissection (55.5% vs 29.45%, p>0.01) without affecting mortality.

Conclusion: Patients treated for TAD with cerebral malperfusion have an increased risk of postoperative mortality. Management with combined surgery treating the SATs and the aorta improves neurologic outcome.

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THE TRANS-AXILLARY APPROACH ALLOWS THE SURGICAL TREATMENT OF MOST PATIENTS WITH THORACIC OUTLET SYNDROME

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Objectives: The surgical treatment of thoracic outlet syndrome (TOS) is recommended in case of failure of a

conservative treatment. First rib resection or resection of a supernumerary rib opens the costoclavicular space. Transaxillary approach may be challenging, but it reduces the manipulations of the brachial plexus and exposes all the rib. The objective of the study was to evaluate the results of the trans-axillary approach in the treatment of TOS.

Material and methods: The demographic and operative data of the patients records operated for TOS in our center between 2012 and 2021 were retrospectively collected from their files after approval of the ethical committee.

Results: Between 2012 and 2021, 475 upper extremities were operated in 346 patients, including 242 women (69.9%). Average age was 37.9±10.6 years. TOSs had an arterial, neurological and/or venous clinical component in 395 (83.1%), 161 (33.8%) and 117 (24.6%) operated upper extremities, respectively. Bone abnormalities occurred in 104 (30%) patients, including 81 cases of (17%) C7 apophysis hypertrophy and 24 (5%) cervical ribs. A transaxillary approach was used in 458 cases (96.4%) by five different operators. This approach allowed the complete resection of 466 first ribs and the section of 208 pectoralis minor muscles. Seventeen (3.6%) supraclavicular approaches were used primarily when an arterial reconstruction was necessary. The major post-operative complications consisted of 13 (2.7%) hematomas and 4 (0.8%) neurological lesions of the brachial plexus. Minor complications were 21 (14%) drained pleural breaches and 57 (37%) sensory lesions of the medial brachial cutaneous nerve. The average duration of stay was 4±1 days.

Conclusion: The main difficulty in the management of TOS lies in the selection of patients and not in the transaxillary approach which remains safe when practiced regularly. This approach allows the treatment of a majority of patients. From our point of view, it should not be either overlooked or forgotten.

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SHORT- AND MID-TERM RESULTS OF RENAL STENTING IN PATIENTS TREATED FOR AN ACUTE TYPE B AORTIC DISSECTION COMPLICATED BY RENAL MALPERFUSION

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Objectives: Renal malperfusion is a frequent complication encountered in patients with type B acute aortic dissection (acute ABD). The endovascular management of these malperfusions relies both on the treatment of entry tear of the dissection in the thoracic aorta, and on the stenting of the thoracic aorta. We studied the short- and mid-term results of renal stenting in patients treated for an ABD complicated by renal malperfusion.

Material and methods: We collected the data of patients operated for an acute ABD, either by the STABILISE technique or by TEVAR, and having presented a renal malperfusion during their hospitalization. The interventional and follow-up data were collected at 1 month, 6 months and 1 year.

Results: 35 patients with acute ABD were admitted between 2017 and 2023 in our center. Among these patients, 15 presented a renal malperfusion during their management (10 operated by STABILISE, and 5 by TEVAR). During the study period, we performed 12 stenting of the renal arteries (6 right RAs, 6 left RAs) with a median stent diameter of 7±2mm. The stents were bare (Omnilink type, n=6) or covered (Advanta V12 type, n=6) stents. 13 patients presented an initial renal malperfusion, 2 patients presented malperfusion during STABILISE with renal stenting. Initial malperfusion resolved in 3 patients after the coverage of the entry tear, and did not necessitate complementary stenting of the renal artery. In our study, the 1- and 6-month patency of the renal stenting was 92.7% (n=14). Two patients developed a downstream infarction without consequences on the renal function, one patient developed early thrombosis of the stenting, and one patient developed post-stenting dissection without consequences on the renal function. In our cohort, we did not observe deterioration of the renal function (average serum creatinine 96 micromol/L at D0 vs. 82 micromol/L at M1), aneurysmal evolution of the renal arteries, or renal atrophy at one month and six months. Nevertheless, one patient was placed on dialysis at 1 year after postoperative acute renal failure following surgery for aneurysmal evolution of an aortic dissection.

Conclusion: The stenting of renal arteries offers good results in terms of patency and preservation of renal function in patients operated for an acute ABD complicated by renal malperfusion.

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EARLY RESULTS OF FIRST RIB RESECTION FOR THORACIC OUTLET SYNDROME: AXILLARY VS. SUPRACLAVICULAR APPROACH

Mohammed Alkhani, Marine Bordet, François Tronc, Philip Tresson, Antoine Million, Nellie Della Schiava, and Matthieu Arsicot, Lyon, and Marseille, France.

Objectives: The first-line treatment of thoracic outlet syndrome (TOS) is conservative, with analgesia, physical therapy, botulinum toxin. In the event of clinical failure, resection of the subclavian, scalene muscles, adherences and of the first rib may be indicated. Several surgical approaches are used, supraclavicular (SC), transaxillary (TA), and, less commonly, transthoracic. The purpose of our study was to compare the results of surgery conducted through the supraclavicular or transaxillary approach.

Material and methods: This was a one-center retrospective study involving all the patients having a 1st rib resection for TOS between January 2017 and December 2022. Primary outcome was the 30-day rate of neurological complications. Secondary criteria were other surgical complications, postoperative pain, operating time, duration of hospital stay, reinterventions, and death.
Results: Fifty-four patients were included, 29 in the axillary route group and 25 in the supraclavicular route group. The syndrome was classified as neurological in 54% of cases, arterial in 43%, and venous in 23%. The two groups were comparable in terms of demographics. There was one monoplegia in the SC group and one Claude Bernard Horner syndrome in the TA group. The median operating time in the TA→ group was 117 minutes versus 166 minutes in the SC group ($p < 0.001$). The median duration of hospitalization was 2 days in the TA group versus 4 days in the SC group ($p<0.001$). Minor complications were observed in 18% of patients with no difference between the two groups ($p=0.53$). There were two reinterventions in the SC group, one for pneumothorax and one for lymphorrhea drainage, and none in the TA group. No 30-day mortality was observed. The mean follow-up was 27.08 ± 19.9 months in the TA group and 37.3 ± 20.6 months in the SC group. There was no difference in symptom improvement between the two groups at the end of follow-up.
Conclusion: The two surgical approaches were both safe and effective for the surgical treatment of TOS. The TA route, more esthetic, seems to bring advantages in terms of operating time and duration of stay with the same efficacy without an increased neurological risk.
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LONG-TERM OUTCOMES OF THE ENDOVASCULAR TREATMENT OF RENAL TRANSPLANT ARTERY STENOSIS

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Objectives: Renal transplant artery stenosis is one of the causes of early or late kidney dysfunction. Among causes discussed are the atheromatous character of the transplant. Enlarging donor selection criteria potentially increases the risk of this complication. Endovascular treatment remains the first-line option with various possible techniques. The purpose of this work was to analyze the long-term results of angioplasty and/or stenting.
Material and methods: Between 2007 and 2022, among the 1098 renal transplants performed in our center, we included the patients presenting a significant renal transplant artery stenosis treated by endovascular techniques. The technical and clinical success and the patency were analyzed and compared between the angioplasty and stenting groups.
Results: 40 patients, with a mean age of 59.2 years, were treated endovascularly. The average time between transplantation and the diagnosis of stenosis was 14.5 months. The clinical indication was graft function deterioration (n=16), uncontrolled hypertension (n=4); hypertension with graft dysfunction (n=5); and acute renal failure (n=4). Imaging showed anastomotic stenosis (n=7), juxta-anastomotic stenosis (n=5), or post-anastomotic stenosis (n=28). The treatment consisted of balloon angioplasty (n=8) or stenting (n=31). The technical success rate was 97.5%, with one failure treated by open surgery. The clinical success rate was 82.5%. At the end of a 66.3-month average follow-up, 7 restenoses (17.5%) were observed which necessitated endovascular intervention except in one patient treated by bypass, and the 1- and 5-year patency rates were 96 and 84%, respectively. One case of graft loss in connection with the arterial stenosis was observed. The comparison between the angioplasty group and the stenting group did not show a significant difference in terms of patency ($p=0.62$).
Conclusion: The endovascular treatment of renal transplant artery stenosis appears to be effective in the mid-term and should be considered as a good treatment choice. Angioplasty and stenting give similar results. The indication of the first or the second technique must be chosen according to the anatomy and the location of the renal lesion.
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PREVENTION OF SYSTEMIC AND PULMONARY DAMAGE BY AN ANTI-HEPARANASE DRUG AFTER SUPRA- AORTIC CLAMPING IN THE RAT

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Objectives: Pulmonary complications due to open surgery for thoracoabdominal aortic aneurysms may be partly due to the visceral ischemia-reperfusion (I/R) induced by aortic clamping. Glycocalyx, a component of the endothelium, is broken down by heparanase. It is at the center of the critical phenomena observed during I/R. Our objective was to evaluate the prevention of systemic and pulmonary damage observed after supra-celiac clamping by λ-carrageenan (λC), a non-anticoagulant competitive heparanase inhibitor.
Material and methods: Three groups of rats were clamped for 40 min followed by a reperfusion of 3 h. A control group (0.9% saline; n=10), the non-fractionated heparin group (UFH, 100 IU/kg, n=10), a λC group (150 IU/kg,

n=10), and a control group without clamping who received λC (150 IU/kg, n=10). The agents were administered in a volume of 0.3 ml (0.9% saline), 5 min before clamping. Systemic inflammation was evaluated by 12 cytokines (multiplex ELISA), and the lactates/pyruvates ratio. Lung inflammation was evaluated by IL-1β, IL-6 and TNF-α (qPcR). Endothelial glycocalyx was measured in plasma by ELISA (heparane sulfate (HS) and syndecan-1 (SDC1)), in the lung by Western Blot (heparanase activity). The statistical analysis was carried out by Kruskall-Wallis and Mann-Whitney (threshold $p<0.05$).

Results: Aortic clamping induced an increase of 9 plasma cytokines (IFN-γ, IL1-α, IL-2, IL-4, IL-5, IL-6, IL-10, IL-12, and TNF-α; $p<0.05$), an alteration of the anaerobic metabolism (lactates/pyruvates, $p<0.01$), an increase in pulmonary cytokines (TNF-α, IL6, IL1-β, $p<0.0.0.01$), an increase in the plasmatic degradation products of glycocalyx (HS, SDC1; $p<0.001$), and an increase in the activity of the lung heparanase ($p<0.001$). λC showed a protective effect on four plasma cytokines (IFN-γ, IL-2, IL-5 and IL-12; $p<0.05$) and on the aerobic metabolism ($p=0.0016$). Neither UFH nor λC decreased pulmonary cytokines or glycocalyx degradation products in plasma. The heparanase activity in the lung was inhibited by UFH and λC ($p<0.0001$).

Conclusion: This model characterizes the systemic and pulmonary effects of supra-celiac aortic clamping level in the rat. Heparanase is a promising therapeutic target in the prevention of these damages.

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INITIAL RESULTS AND TECHNICAL ASPECTS OF RETROGRADE STENTING OF THE SUPERIOR MESENTERIC ARTERY

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Objectives: Retrograde stenting of the superior mesenteric artery (RSSMA) is a hybrid technique combining laparotomy-based surgery and the retrograde endovascular revascularization of the superior mesenteric artery. This technique has the advantage of combining in the same procedure a rapid revascularization of the SMA and the evaluation/resection of the digestive tract. However, many specific complications of this technique can lead to high rates of reinterventions, which induce additional morbimortality in severely compromised patients. The objective of this research was to describe the technical aspects and initial results of RSSAM to treat mesenteric ischemia in three university centers.

Material and methods: We conducted a multicenter retrospective study in three university hospitals and collected the data of all the patients operated by RSSMA. RSSMA indications included complex lesions of the SMA unfavorable for anterograde approach and/or the presence of an intestinal distress associated with the lesions of the SMA. The outcomes were the technical success, intrahospital mortality, the occurrence of specific complications, and the primary and assisted primary patency of the RSSMA.

Results: Sixty-four patients (34 males, mean age 69±9 years) enrolled in the study. SMA lesions were either stenoses >70% (n= 18, 28%) or SMA occlusions (46, 72%). All patients presented significant lesions of the other gastrointestinal arteries. The technical success of RSSMA was 91% with four reentry failures and two recanalization failures. The implanted stents were balloon expandable covered stents (n= 59, 92%) or bare stents (n=5, 8%). The average length of SMA stenting was 32±8 mm. Widening angioplasty of the SMA was required in 34% (n = 22) of cases using an autologous saphenous vein segment (n = 12), a prosthetic (n = 8), or a biological (n = 2) patch. The rate of intestinal resection associated with the RSSMA was 22% (n=14). Intrahospital mortality was 28%. D-30 rate of reintervention due to the stenting procedures was 17% (n=11) and included plications at the exit of the stent (n=5), residual lesions (dissection/thrombus of the SMA, n=4), occlusion of the RSSMA (n=2), and one migration of stent. The average durability of the follow-up was 22±0.7 months. No stent infection was reported during follow-up. The 1-year survival of the cohort was estimated as 54%. The primary and assisted one-year primary patency rates RSSMA 80% (95% CI: 62-94.2) and 95% (95% CI: 61.1-98.4), respectively.

Conclusion: RSSMA provides good results in terms of technical success and short and mid-term patency with frequent reinterventions. Technical complications related to RSSMA are not exceptional but most of them can be avoided by optimizing the quality of imaging and by refining the operative technique (installation, material, edge and overinflation of the intra-aortic part of the stent, distal prolongation of the stenting).

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SCOPE OF ACTIVITY OF VASCULAR SURGERY IN FRANCE BETWEEN 2018 AND 2022

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Objectives: The development of endovascular procedures has profoundly modified the profession of vascular surgeons in France, while administrations consider our perimeter of activity as circumscribed to traditional open surgery as practiced thirty years ago. In order to enable vascular surgeons to legitimately claim their expertise, in

particular endovascular expertise, it is crucial to identify, for all the classical and endovascular surgical procedures, those who perform them and with which proportions among the different interventional specialties.

Material and methods: We constituted a thesaurus of open and endovascular vascular procedures from the French Medical Classification of Medical Procedures (CCAM), classified into 13 superfamilies (carotid, supra-aortic trunks and upper limbs, thoracic aorta, aorto-iliac level, digestive arteries, infra-inguinal arteries, superficial veins, deep veins, arteriovenous fistula, amputations of limbs, plastic and vascular surgery, thrombectomies, other types of procedures), with several families of procedures in each superfamily (open reconstructions, bypasses, endarterectomies, thrombectomies, exclusion, aneurysmectomy, endovascular desobstruction, embolization, angioplasty) and we interviewed the Technical Agency for Information on Hospitalization (ATIH).

Results: During the years 2018, 2019, 2020, 2021 and 2022, we obtained for each CCAM procedure of the thesaurus, the total number achieved in France, the repartition between the public institutions, without any possible distinction of the specialties involved) and the private institutions, with a repartition by discipline.

Conclusion: For the first time, the activity of vascular surgeons in France (number of procedures and ratio vascular surgeons/other specialties) is officially is described. These data show our involvement in areas claimed by other interventional specialties and justify our demand to participate in the dedicated strategic choices.

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MANAGEMENT OF BLEEDING COMPLICATIONS WITH A CEPHALIC DUODENOPANCREATECTOMY: COMPARISON OF EMBOLIZATION AND COVERED STENT

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Objectives: Hemorrhagic complications of cephalic duodenopancreatectomies (CDPCs) are common and are generally treated with endovascular techniques. Two treatments are discussed, selective embolization or the use of covered stents. The objective of this work was to compare the two techniques.

Material and methods: Between January 2013 and May 2023, all the patients who presented a hemorrhagic complication after CDPC treated with an endovascular technique were enrolled in two centers. The rates of technical and clinical success, perioperative morbidity, the duration of hospitalization and the mortality were compared between covered stent and embolization.

Results: 79 patients were included, 29 (37%) had embolization, and 49 (63%) received a covered stent. The rate of hepatic complications ($p=0.034$), the length of hospitalization ($p=0.07$), and the mortality were higher in the embolization group. The rate of radiological complications ($p=0.02$) was higher in the covered stent group. The rates of technical and clinical success and the rates of minor and major complications are similar in the two groups.

Conclusion: The treatment with covered stents of hemorrhagic complications after CDPC gives better results than embolization in particular by preserving the hepatic blood flow.

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FEASIBILITY AND EFFICACY OF A MULTIMODAL PREHABILITATION PROGRAM BEFORE SURGERY: A PILOT STUDY

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Objectives: Abdominal aortic aneurysm (AAA) is a frequent pathology for which repair by conventional open surgery (COS) is revived by the long-term complications of endovascular exclusion. Multimodal prehabilitation (MP) has shown a significant decrease in postoperative complications accompanied by an improvement of the quality of life in oncology and digestive surgery. The purpose of our study was to evaluate the applicability and the results of this method in patients operated for AAA by COS.

Material and methods: This was a monocentric controlled interventional study including the patients operated for AAA by COS in 2023 who accepted to participate. We present our mid-term results with half of the total inclusions. The patients of the MP group had a consultation for the implementation of the personalized protocol of prehabilitation by a specialist of physical and rehabilitation medicine. This consultation was based on a three steps process: screening of potential fragilities, then proposal of a personalized protocol corresponding to the specific fragilities found in each patient, and discussion around the postoperative orientation. Patients in the COS group were managed in accordance with the best conventional rules. The main outcome was the evaluation of the quality of life 3 months after the operation with the WHODAS score 2.0. Secondary outcomes were postoperative complications and the duration of stay.

Results: 30 patients were included, 15 in each group. Preoperative comorbidities were similar in the two groups, in particular in terms of history of COPD (38% of MP and 41% of COS patients, respectively) and ischemic heart disease (45% in MP patients and 39% in COS patients). The type of AAA was comparable with 60% of juxta-renal AAAs. 86.6% of the patients in the MP group felt that they had

followed the protocol correctly. Respiratory complications and average duration of stay were lower in the MP group than in the COS group, 9% vs 38.5% and 9.9±2.7 days vs 11.1±5.1 days, respectively. The preoperative Whodas 2.0 score was similar the two groups (18.6 in the MP group and 18.7 in the COS group). The 3-month score was improved with an average decrease in the impairments of 2.4 points in the MP group while the impairments increased by 3.9 points in the COS (p=0.2) compared to the preoperative evaluation.

Conclusion: The interim results of this study show a good feasibility of a MP protocol in patients operated for AAA by COS. The first results are promising with a significant decrease in respiratory complications and duration of stay in the MP group. The initial hypothesis of an improvement in the postoperative quality of life of patients thanks to MP protocols appears confirmed by these early results. The final results of this pilot study should allow us to carry out a larger multicenter study.

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IMPLEMENTATION OF ERAS IN OPEN ABDOMINAL AORTIC SURGERY: RESULTS OF A SINGLE CENTER PILOT STUDY

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Objectives: Conventional aortic surgery remains associated with relatively high levels of morbidity and mortality. Enhanced Recovery After Surgery (ERAS) consists of a multimodal approach aimed at reducing the incidence of postoperative respiratory complications and promoting the early recovery of patients after major surgical procedures. ERAS has been little evaluated in vascular surgery. The purpose of this study was to evaluate the influence of the implementation of ERAS in our center.

Material and methods: In November 2021, we defined in our center a pilot ERAS protocol in accordance with the recommendations of the Francophone Group of Enhanced Recovery After Surgery (GRACE). The eligibility of all patients suitable for conventional aortic surgery was evaluated with a three stages protocol (preoperative, peroperative, and postoperative). The three stages involved various health care disciplines and aimed to minimize the response to surgical stress, optimize pain management, facilitate early mobilization, and improve the postoperative functional recovery. The data of the patients included in the ERAS protocol were recorded in a prospective cohort register and compared to the data of a historical observational cohort of patients treated for AAA by conventional surgery before the introduction of the protocol. The primary outcome was a composite criterion grouping all intrahospital complications after surgery. Secondary outcomes were the average duration of hospital day, the duration of stay in ICU, the complications of epidural analgesia and medical complications three months after the operation.

Results: From January 2022 to March 2023, 27 patients scheduled for open abdominal aortic surgery were included in the ERAS protocol. These patients were compared with 64 similar patients who had open abdominal surgery prior to the implementation of the ERAS protocol between January 2019 and December 2021. There was no significant difference between the two groups in terms of aneurysm size, operating time, clamping time, proportion of supra-renal clamping, or of blood loss. One death occurred in the control group (1.6%), versus none (0%) in the ERAS group. The composite primary outcome was present in 55% of the control patients vs. 30% of the ERAS patients ($P<0.05$). We observed significantly fewer medical complications at D90 (p=0.03) in the ERAS group. Recovery of intestinal transit was faster in the ERAS group in comparison with the control group (1 day [1-2] vs. 3.00 days [2-3]); $p < 0.01$).

Conclusion: In our center, the implementation of the ERAS protocol in open aortic surgery was associated with a significant reduction of postoperative medical complications.

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ENDOVASCULAR PREPARATION FOR KIDNEY TRANSPLANTATION - ENDOPREKIT

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Objectives: Conventional aortoiliac surgery to prepare a renal transplantation is a major procedure, with morbimortality rates of 20-30%. Transplant is contraindicated in case of non-clampable, non-suturable iliac arteries. We conceived and developed a specific stentgraft for endovascular arterial preparation which could enlarge renal transplant accessibility.

Material and methods: This innovation, inspired by the iliac limb of the Anaconda stentgraft (Terumo Aortic®), is constituted of 3 segments. The proximal and distal extremities (A1 and A3) include complete sealing nitinol rings. The intermediate portion (A2) comprises half-rings on its posterior side, with an anterior side free of stent for suturing the renal transplant. Using a 16Fr launcher, the stentgraft is positioned percutaneously in the proximal external iliac artery with an antero-posterior orientation thanks to radio-opaque markers. At the time of transplant, the anterior side of the A2 segment is exposed by resecting the corresponding arterial wall. External or endo-clamping of A1 and

A3 segments allows the direct suturing of the transplant artery onto the PTFE of the anterior surface of the A2 segment.
Results: A preclinical study on cadavers confirmed the feasibility of the implantation of the custom-made stentgraft on massively calcified arteries. External clamping and endo-clamping were effective without impact on the structure of the stentgraft. The anastomosis of the transplant artery on the prosthetic tissue was simple with a perfect sealing. Eight stentgrafts were successfully percutaneously implanted in patients waiting for transplants without complications. One patient died before receiving a transplant. The first renal transplant was successfully done in July 2023, four months after the endovascular procedure, with an immediate recovery of the renal function. The kidney function and the iliac artery and stentgraft hemodynamics were satisfactory four months after renal transplantation.
Conclusion: This innovative stentgraft makes possible renal transplantation despite hostile iliac axes without a morbid aortoiliac surgery. Custom-made stentgraft appears to reduce morbidity and mortality from surgical arterial preparation and avoids iterative retroperitoneal approaches. A national study is underway to evaluate the results (Endovascular Preparation for Kidney Transplantation - EndoPreKiT).
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EVALUATION UNDER REAL CONDITIONS OF THE EFFICACY OF AORTIC STENTGRAFTS IN THE PREVENTION OF RUPTURE OF INFRARENAL ABDOMINAL AORTIC ANEURYSMS (EFFEVAR STUDY)

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Objectives: Abdominal aortic aneurysms are a serious pathology, with the risk of rupture in the absence of treatment responsible for a high mortality. Their management is therefore a public health objective, with the implementation of an optimal strategy that will allow an early diagnosis in relation to their evolution. This strategy could be the placement of an aortic stentgraft to prevent the risk of rupture. However, several devices are available on the French market, and design differences can have an impact on the morbidity and the mortality. The objective of this study was to compare the efficacy of these devices under real conditions, in terms of reintervention and any cause mortality.
Material and methods: All adult patients in which an infrarenal aortic stentgraft was implanted between 2014 and 2019 in France were included. The data were extracted from the French National Health Data System (SNDS), a unique administrative database in Europe. The search for secondary interventions and for all-cause mortality until the end of the follow-up, i.e. December 31, 2022.
Results: 8948 patients were included, hospitalized between January 1, 2014 and December 31, 2019 and treated with Zenith and Zenith LP (COOK©, n = 1706), Endurant II (MEDTRONIC©, n = 3342) and Excluder (GORE©, n= 376). Median follow-up was 5.4 years, with no significant difference between the groups. With regard to the main outcome, the composite criterion "reintervention and all-cause mortality", 58.6% of the patients (n = 4984) were concerned in our population. Compared with the GORE© device, we observed a 13% risk excess (HR 1.13, 95% CI [1.05 - 1.22]) for the COOK© device.
Conclusion: The evaluation under real conditions of the efficacy of aortic stentgrafts in the prevention of rupture of infrarenal abdominal aortic aneurysms using the SNDS data, demonstrated a higher risk of "reintervention and mortality" with the COOK device. These results could be generalized with a better use of the SNDS database or even by merging other national databases.
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DEVELOPMENT OF A DYNAMIC IMAGING PROTOCOL: « ARTERIO-LIKE » ANGIO-CT DETECTS POST-EVAR ENDOLEAKS

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Objectives: To develop a new protocol of dynamic imaging by angio-CT to obtain an "arterio-like" imaging to improve the classification of post-EVAR endoleaks.
Material and methods: Eight patients with known or suspected endoleak and expansion of the aneurysmal sac of about 5mm over 1 year) were concerned by this new protocol of dynamic CT acquisition. It includes a three-phase acquisition, including a dynamic arterial phase (arterio-like) centered on the stentgraft with an acquisition window of 16cm, sufficient to cover the abdominal visceral aorta and the iliac arteries. These acquisitions were done on a REVOLUTION CT APEX scanner (GE Healthcare®, Milwaukee, USA), then the images were analyzed in cine dynamic mode using multiplanar reconstructions.
Results: The duration of dynamic acquisition was 26 seconds (40 phases every 650 ms) compared to 3 seconds with classic acquisition. Since images are obtained between the acquisition without injection and the late one, the total time of the examination is not extended. In addition, the total dose of contrast agent injected is 80 mL, which is the same as for routine examination. Due to a sequential acquisition limited to the stentgraft and to the use of an algorithm of reconstruction, additional irradiation does not exceed 10%-20% compared to the usual

protocol, depending on the patient's morphotype. The average estimated Dose Length Product (DLP) of dynamic acquisition was 600 mGy.cm. Dynamic angio-CT allowed to identify precisely the centrifugal or centripetal character of endoleaks. One endoleak could be reclassified as type III instead of type II and new Ia and Ib endoleaks were discovered in 2/8 patients. A suspect endoleak was also eliminated in 2/8 patients. The concordance of the results with the usual standard triphasic angio-CT in the last 3 patients with type II endoleak was noted.

Conclusion: The protocol of CT dynamic acquisition is reliable and applicable on a standard CT imaging console. Dynamic angio-CT has been used to reclassify and identify major endoleaks in some patients who could receive an adapted treatment. Of course, this was a preliminary study which needs to be confirmed by a multicenter study with a larger cohort of patients.

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COMPARATIVE RESULTS OF TWO ILIAC BRANCH STENTGRAFTS (IBE) IN THE ENDOVASCULAR TREATMENT OF ILIAC AND AORTOILIAC DISEASES: A COHORT STUDY BASED ON THE DATA OF THE FRENCH HEALTH INSURANCE

Elixène Jean-Baptiste, Audrey Lajoinie, Marine Bordet, Fanny Raguideau, Nirvana Sadaghianloo, Meriem Benmerad, and Antoine Million, Nice, and Lyon, France.

Objectives: The aim of this study was to compare the morbidity and mortality of the two iliac branch stentgrafts available in France that are reimbursed by the health insurance.

Material and methods: This cohort study was based on the data of the National Health Data System (SNDS) which contains individualized data on health care that is reimbursed for almost all of the population (>99%). All patients implanted with IBE GORE® EXCLUDER ® or with IBE COOK® ZENITH® (ZBIS®) between November 1, 2017 and December 31, 2019 were identified thanks to a simultaneous combination of the implant code and associated surgical procedure codes. The patients were split into two groups based on the type of IBE implanted: EXCLUDER IBE® (group 1) or ZBIS® (group 2). Individual matching by propensity score was done according to the demographic and clinical characteristics at the time of implantation. Hospital and ambulatory care were identified during follow-up after the index stay until December 31, 2020. The primary outcome was a composite criterion of morbidity and mortality combining death, endovascular aortic reinterventions, endoleak embolizations, bypass and/or limb thrombectomies.

Results: A total of 361 patients were identified in group 1 and 281 in group 2. Mean age was 72.4±9 and 73.8±8.8 years, respectively; 96.1% were men in both groups. The median duration of the index stay was 4 days (T1-T3: 3.0; 6.0) in Group 1 vs. 5 days (T1-T3: 4.0; 7.0 in Group 2). Median follow-up was 23.1 months (T1-T3: 15.7-29.0) in Group 1 vs. 23.3 months (T1-T3: 16.1-31.5) in Group 2. The crude death rate was 5% in group 1 vs 6% in group 2 at one year, and 7% in group 1 vs 14% in group 2 at 2 years. Among the 231 patients covered by the general health insurance system for which death data were reliable, the proportion of patients free of any event of the composite outcome was 85.0% (95 CI [80.0-89.0]) in Group 1 vs 79.0% [73.0-83.0] in Group 2. The 2-year results were 81% [75.0-86] and 63 [55.0-69.0], respectively. The 2-year morbidity and mortality were significantly different in group 1 and group 2 in favor of group 1 (HR: 0.51, 95 CI [0.35; 0.73], p=0.0003 during all the follow-up). The total morbidity was also significantly different in favor of group 1, at 2 years and during all the available follow-up when death was considered to be a competitive risk (sub-HR: 0.54, 95 CI [0.35-0.84], p=0.0058).

Conclusion: This is the first real-life analysis of the treatment of iliac and aorto-iliac aneurysms with IBEs available in France. After matching, EXCLUDER IBE® was associated with a lower relative risk of morbidity and mortality compared with the ZBIS® during follow-up. Next analyzes with a longer follow-up will allow these results to be evaluated over the long term.

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PREDICTING THE RISK OF TYPE 1A ENDOLEAKS BY NUMERICAL MODELLING HELPS WITH THE TECHNICAL CHOICE IN THE SURGICAL MANAGEMENT OF INFRARENAL AORTIC ANEURYSMS

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Objectives: EVAR for short neck abdominal aortic aneurysms (AAA) is at risk of occurrence of type IA endoleaks (T1AE). Preoperative planning and modelling software systems provide information on the proximal neck sealing length and the behavior the stentgraft in the AAA. The purpose of our study was to evaluate the risk of occurrence of T1AE in AAAs with short proximal necks treated by EVAR using numerical tools as an aid to the therapeutic decision.

Material and methods: This single-center, retrospective, preliminary study was conducted in a tertiary center between 2021 and 2023 and included patients operated for AAA by open surgery, with a preoperative angio-CT neck measuring 4-10 mm. Modeling of the body's affixation was obtained with the 3mensio® software (Pie Medical Imaging®), allowing the calculation of the exact neck sealing length. Another numerical simulation model using finite elements or digital tweens (PlanOp Aortic®, PrediSurge®, Saint Etienne, France) was then used to model the behavior of a stentgraft with suprarenal fixation (Endurant III®, Medtronic®) in the proximal neck. The results were able to predict the risk of T1AE in the event of EVAR in these patients.
Results: Five patients with a median age of 73 years (interquartile range (IQR) 72-74), all men, were included. The median AAA diameter was 61 mm (IQR 59-69) with a median aortic neck length measuring 5 mm (IQR 4-6), a median neck diameter of 21.2 mm (IQR 21.1-23.2), and a median neck angulation of 28.6° (IQR 28.1-50.3). The models created with 3mensio® had a median sealing length of 9 mm (IQR 0-9). After modeling help from PlanOp Aortic®, 100% of the cases were at risk of T1AE, with a high level of confidence.
Conclusion: The risk of T1AE after EVAR in patients with a short AAA neck is high, justifying the use of a different therapeutical modality, either by conventional surgery or by endovascular surgery with a suprarenal sealing technique. The use a numerical model to predict the risk of T1AE allows the vascular surgeon to guide objectively the treatment choice.
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RELATIONSHIP BETWEEN THE VOLUME OF IODINE CONTRAST DURING VASCULAR SURGERY AND THE OCCURRENCE OF POSTOPERATIVE RENAL FAILURE

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Objectives: Vascular surgery almost systematically requires the use of iodinated contrast agents (ICAs), which may be nephrotoxic. Preventive measures exist in order to avoid or reduce the occurrence of postoperative acute kidney failure (PO-ARF), but there is currently no data concerning the link between the quantity of contrast used and the occurrence of PO-ARF in this context. The objective of this research was to evaluate the link between the volume of ICA injected during interventional procedures and the occurrence of PO-ARF.
Material and methods: This was an analytical monocentric and retrospective study. Any patient having vascular surgery between January 1st and December 31, 2019 was included. Exclusion criteria were preoperative stage V chronic renal failure, suprarenal clamping, surgery of the renal arteries, placement of central venous catheters, emergency surgery, ruptured aneurysms, and venous surgery. Patients were divided into three groups: Group 1 included the patients who had not ICA injection, Group 2 the patients who received about 100 mL of ICA, and Group 3 the patients who received more than 100 mL of ICA. PO-ARF was defined according to the KDIGO classification.
Results: 537 patients were included: 166 in group 1, 328 in group 2 and 43 in group 3. The groups were comparable regarding the known risk factors of acute renal failure, but more patients of Group 1 had major surgeries which required a more significant anesthetic management. Among the patients of group 1, 7.83% developed PO-ARF compared to 4.3% of patients in group 2 and 14.0% patients in group 3 ($p=0.0251$). There was also a significant difference in the severity of PO-ARF, and 33.3% of the patients in group 3 developed PO-ARF vs. 23.1% for patients of group 1 and 7.1% of patients of group 2 ($p=0.0251$).
Conclusion: The results of this study show a direct link between the volume of ICA injected and the occurrence and severity of PO-ARF. A 100 mL appears to be a threshold that must be respected in common practice.
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EXPERIMENTAL ANALYSIS OF THE IMPACT OF ENDOANCHOR ON THE TEXTILE STRUCTURE OF AORTIC STENTGRAFTS

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Objectives: The impact of the introduction of an EndoAnchor (EA; Medtronic Ltd., Minneapolis, MN, USA) on the textile structure (TS) of an endoprosthesis (EP) is unclear. Our objective was to study the possible alterations of the TS of EPs due to the implantation of EA.
Material and methods: EAs were applied in vitro in four different endocuffs, two of which (Medtronic Ltd., Minneapolis, MN, and Cook Medical, Bloomington, IN, USA) were made of polyethylene terephthalate (PET). The two others (Endologix, Irvine, CA, and W.L. Gore and Assoc., Flagstaff, AZ, USA) were made of polytetrafluoroethylene. The angle between the axis of EAs and the surface of the endocuffs was calculated for each EA. EAs were removed and the impact of their implantation on the textile

was examined by numerical and electronic microscopy. The area and the perimeter of the holes were calculated numerically.

Results: Among 13 implanted EAs, the mean angle between the EA axis and the surface of the endocuff was 79°. ePTFE perforations were oval in shape, while PET perforations were round. After the removal of EAs, the areas and perimeters of the ePTFE perforations were significantly larger than with PET ($p = 0.013$, $p = 0.005$, respectively). ePTFE perforation channels kept their shape after the removal of the EA. Nevertheless, the local damage due to the dissection of the ePTFE layers extended far. The perforations of PET endocuffs showed similar characteristics with multiple stretched, damaged or ruptured PET fibers.

Conclusion: During the placement of EAs, the TS of the EP undergoes alterations. These alterations may be increased by the mechanical constraints due to the arterial pressure, resulting in additional damage to the material. Additional studies are needed to confirm our results in the long-term.

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MECHANISMS OF THE POTENTIAL FAILURES OF THE NELLIX DEVICE. AN EXPLANT ANALYSIS

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Objectives: The objective of this study was to understand the reasons for the poor durability of the Nellix® (Endologix, Irvine, Calif) endovascular sealing device.

Material and methods: A total of 21 EVAS explanted for endoleaks and/or migration were analyzed. The spongy structure of the polyethylene glycol polymer contained in four EVAS. Two grams of slices of polymer were cut from each EVAS. The samples were then submitted to three cycles of wet exposure and dry exposure. The weight of the samples was measured every 20 minutes. The wet phase samples were placed in a beaker containing a saline solution (SS), mimicking the filling of the endobags during implantation. During the dry phase, the polymer was placed in a 37°C incubator with 60% humidity. This condition mimicked the post-implantation conditions in an aortic aneurysm. Each phase was considered as finished when the $1.0x10^{-3}$ grams tolerated difference in weight between two consecutive measurements was reached.

Results: Endobag perforations were observed in 95% of cases, while the EVAS polymer disintegrated in 71% of cases. The measurements of the weight of the samples showed that the polymer could lose more than 70% of its initial weight when it was partially dehydrated and regained 80% when it was placed in an SS. We observed a decrease in volume and a fragmentation of the polymer during these phases.

Conclusion: The polymer can lose weight and volume by dehydration and fails to maintain its shape in the aneurysm. This structural degradation may thus lead to the development of endoleaks and/or migration of the device.

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SHORT-TERM RESULTS OF CUSTOM MADE FENESTRATED ILIAC STENTGRAFTS FOR THE ENDOLUMINAL TREATMENT OF AORTOILIAC ANEURYSMS

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Objectives: The preservation of the internal iliac artery during the endovascular treatment of an aortoiliac aneurysm allows the prevention of pelvic and gluteal ischemic complications. Two companies currently market an iliac branch endoprosthesis, but the morphological eligibility criteria do not make it possible to treat all the patients.

Material and methods: Retrospective single center study of the custom-made Terumo Aortic fenestrated iliac stentgraft aiming to preserve the internal iliac vascularization.

Results: 21 patients were treated de novo and 25 limbs were deployed in our center by 3 operators since December 17, 2019. 100% of patients were men whose average age was 69.1 years. The average follow-up was 8 months (0-24.4). An additional aortic procedure was carried out in 15 patients. Four procedures were bilateral, three of which with an aortic stentgraft. Fenestration catheterization was obtained by axillary route in two cases. The average proximal diameter of the limb was 16.1 mm (12-23±4.2), and the distal diameter was 11.7 mm (10-13±1.02). The average diameter of the limb at the fenestration level was 18.0 mm (13-23±3), and the fenestration diameter was 8.0 mm (6-10±1.5). The average duration of intervention was 123±39 min in case of additional aortic procedure and 143±47 min for isolated iliac procedures, respectively. The average duration of fluoroscopy was 27±15 min and 35±13 min. The average volume of contrast injected was 102±42 cc and 110±69 cc. The average duration of hospitalization was 3.5 days (1-25±5). Five patients had a postoperative complication (one arm ischemia, 3 in femoral approaches, 1 scrotal hematoma and one coverage of the left renal artery. During follow-up, one patient was reoperated for acute ischemia due to popliteal emboli and bilateral hypogastric thrombosis. No patient reported any buttock symptoms or signs, all the stents were patent during follow-up (ultrasounds or angio-CT).

Conclusion: Custom-made fenestrated iliac stentgrafts allow to treat a larger number of patients with an aortic and/or iliac pathology, either in the presence of an iliac associated aneurysm, or in case of an isolated pathological or ectatic iliac artery with a low complication rate, acceptable operating times, and satisfactory short- and mid-term patency.

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LONG-TERM RESULTS OF FENESTRATED STENTGRAFTS FOR THE TREATMENT OF JUXTA-RENAL ABDOMINAL AORTIC ANEURYSMS

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Objectives: Since 2005, fenestrated stentgrafts are used in our center for patients with juxta-renal abdominal aortic aneurysms non-eligible for a conventional open surgery. The purpose of our study was to evaluate the long-term results of fenestrated stentgrafts used for the treatment of juxta-renal aneurysms.

Material and methods: We conducted a retrospective analysis of monocentric data that were collected prospectively. The follow-up was obtained from automated database. Pre-, per- and postoperative data were analyzed. The analysis of demographic and peroperative data was descriptive. Overall survival and survival without secondary procedures were determined according to Kaplan Meier.

Results: Between September 2005 and December 2021, 181 patients (92% of men), with an average age of 74.5 years were treated for a juxta-renal aneurysm. The average aneurysmal diameter was 57.3 mm. Co-morbidities included smoking (140/181; 77%), hypertension (136/181; 75%), ischemic heart disease (91/181; 50%) and COPD (86/181; 47%). The rate of technical success, defined as the deployment of all the modules, the success of the catheterization and stenting of the target arteries and the absence of type 1 or 3 endoleaks or target arteries occlusion on the control angiography was 95.5% (173/181). The average number of fenestrations was 3.16. Average follow-up was 55.1 months. The median survival was 72 months. Mortality due to the aneurysm was 3.87%. At least one secondary procedure was required in 35 patients (19.3%), and the 50-month indemnity of secondary procedures was 72%. After exclusion of the reinterventions performed within the 30 postoperative days, the 50-month indemnity of secondary procedures was 76%.

Conclusion: This study showed a low rate of secondary procedures after the implantation of fenestrated stentgrafts for the treatment of juxta-renal abdominal aortic aneurysms and confirmed the necessity of a long-term follow-up.

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PREDICTIVE FACTORS OF POSTOPERATIVE MAJOR ADVERSE EVENTS AFTER ENDOVASCULAR EXCLUSION OF AORTIC ANEURYSMS WITH FENESTRATED AND/OR BRANCHED STENTGRAFTS

Erol Lerisson, Thomas Mesnard, Maxime Dubosq, Richard Azzaoui, Stephan Haulon, and Jonathan Sobocinski, Lille and Le Plessis-Robinson, France.

Objectives: The aim of the study was to evaluate the predictive factors of early mortality and major adverse events (MAE) after endovascular exclusion of complex abdominal aortic aneurysms (CAAA) and thoraco-abdominal aneurysms (TAA) with fenestrated and/or branched aortic stentgrafts (F/BEVAR).

Material and methods: The clinical data of consecutive patients who had F/BEVAR to exclude CAAAs and TAAs between December 2012 and May 2020 in our center were analyzed retrospectively. Patients were distributed into three groups based on the proximal extension of the aneurysm: PRA group (juxta and para-renal aneurysms), TAA 4 group, and TAA 1/2/3 group. The demographic and operative characteristics, the incidence of MAE, the mortality and the reinterventions during the early postoperative period were compared in the three groups. Multivariate logistical regression was conducted on the whole cohort in order to define anatomical, demographic and peroperative variables associated to MAEs.

Results: 439 patients (129 PRAs, 193 type4 TAAs and 117 type 1/2/3 TAAs) with 1718 target arteries were included. The technical success rate was 94.1%, with an average operating time of 185±68 min. 43 patients (9.8%) presented MAEs. The early death rate was 3.6%. The incidence of grade 3 spinal cord ischemia was 1.6%, and higher in patients with type 1/2/3 TAAs (4.3%, p=0.023). The most frequent major adverse event was acute renal failure (n=21, 4.8%). The rate of early reintervention was 8.2%; 2.7% of these reinterventions were due to the stentgraft, and 3.4% to the accesses. After adjustment, women (OR=9.20, CI 95 [1.34-36.10], p=0.016), chronic heart failure (OR=10.33, CI 95 [1.35-67.68], p=0.016), aortic diameter>80 mm (OR=14.07, CI 95 [2.01-100.50], p=0.007), and vascular filling >2 L during the procedure (OR=15.30, CI 95 (1.29-153.93), p=0.021) were at risk of developing MAEs.

Conclusion: 10% of patients treated by F/BEVAR are at risk of experiencing early postoperative major adverse

events (MAEs). Female gender, large aortic diameters were identified as major prognostic factors of MAE. Volume filling >2000mL during the procedure also appears to be associated with a higher rate of MAEs. A new predictive score for MAEs including female gender, aortic diameter and the occurrence of peroperative events appears to be necessary in order to improve the postoperative orientation of the patient.
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REINTERVENTIONS AFTER FENESTRATED AND/OR BRANCHED STENTGRAFTS: DESCRIPTIVE ANALYSIS OF A BICENTRIC EXPERIENCE

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Objectives: Reinterventions remain one of the main challenges of the endovascular treatment of aortic pathologies that require life-long monitoring. While the use of fenestrated or branched stentgrafts continues to increase due to the short-term benefice of these techniques, long-term data are lacking.
Material and methods: We retrospectively reviewed the files of all patients treated for a complex aortic aneurysm between November 2005 and November 2021 with fenestrated and/or branched custom-made stentgrafts in two centers. Primary outcome was the rate of reinterventions and their etiologies according to their early (within the first 30 days) or late (beyond 30 days) occurrence. Secondary outcomes were the overall mortality analyzed according to the method of Kaplan Meier and compared between the groups with and without reintervention and the indemnity of reintervention.
Results: 269 patients, with a mean age of 72±8 years, were treated for a juxta-renal (n=142) or a supra-renal (n=45) aneurysm, a type 4 TAA (n=32), a type 3 TAA (n=28), or a type 2 TAA (n=22). The procedures were 229 FEVAR, 19 BEVAR and 21 combined F-BEVAR. The stentgrafts were Zenith (n= 143), and Anaconda (n= 126). A total of 95 reinterventions were needed in 73 patients (27%), 37 early reinterventions and 58 late reinterventions. The reinterventions occurred after an average of 11.2 months. Early reinterventions (n=37) were mainly linked to vascular accesses (n=10; 10.5%), and late reinterventions (=58) could be classified into 3 types: reinterventions due to target arteries (n=14; 14.7%), those linked to the dynamics of the aneurysmal sac (endoleaks and aneurysmal evolution) (n=47; 49.5%), and those linked with the iliac limbs (n=13; 13.7%). The treatment was endovascular (64.2%), surgical (16.8%), or hybrid (19%), with no 30-day mortality. The 1-, 3-, and 5-yeas rates of indemnity of reintervention were 78%, 70%, and 66%, respectively. The 1-, 3-, and 5-year survival rates were 86%, 76%, and 61%, respectively.
Conclusion: The reinterventions after F-BEVAR remain relatively frequent, but they are mainly conducted by the endovascular route with a low morbidity/mortality. These procedures mostly occur during the first year after implantation, which may suggest strengthening the surveillance during this period to detect the occurrence of complications.
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