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aorta) was achieved in only six patients (7.1%). Thirty-nine patients (46%) would have required total arch debranching to obtain a 2-cm proximal seal. After TEVAR deployment in intramural hematoma, two RTADs underwent operative repair, and one patient had a sudden death. No RTADs occurred after TEVAR deployment in nondissected aorta without intramural hematoma. Overall reintervention-free survival was 52% at 24 months. Mean expansion of thoracic true lumen diameters were 151%, 177%, 191%, 202%, and 211% of baseline at the 1-, 6-, 12-, 24-, and 36-month follow-up, respectively. Regression of thoracic false lumen diameters was seen in 87%, 83%, 73%, 71%, and 70% at the 1-, 6-,12-, 24-, and 36-month follow-up. Complete thoracic false lumen thrombosis was seen in 55%. Aortic remodeling, such as false lumen thrombosis, true lumen expansion, and false lumen regression, was not different between the patients who had a proximal landing zone in the intramural hematoma and those who did not.

Conclusions: Achieving a 2-cm proximal seal zone in TEVAR for aortic dissections often requires extensive arch debranching. Stent graft deployment with shorter than a 2-cm proximal seal zone in a normal aorta without intramural hematoma avoids RTAD, and induces aortic remodeling.

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VESS30.

Secondary Interventions After Fenestrated Endovascular Aneurysm Repair

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Objectives: Type Ia endoleak represents failure of the primary mode of therapy to treat juxtarenal abdominal aortic aneurysm (jAAA) with endovascular means. Fenestrated endovascular aneurysm repair (FEVAR) is associated with low rates of type Ia endoleak and low rates of reintervention. In most modern series of standard EVAR, the rate of secondary intervention is between 3.8% and 37% (Nordon et al. Eur J Vasc Endovasc Surg 2010;39:547-54), and up to two-thirds of these are due to endoleak. Our objective was to characterize the incidence and types of secondary interventions in a modern series of FEVAR.

Methods: Patients with jAAA who were not candidates for open repair were enrolled into an investigational device exemption clinical trial (#NCT01538056) and treated with FEVAR. Clinical and imaging data were collected out to 5 years.

Results: A total of 92 patients were treated with FEVAR over the reporting period. There were 22 secondary interventions in 16 subjects (17.4%). Of these 22 interventions, 8 were access related (36%), 7 were branch related (32%), and 6 were related to endoleak (27%). One was both branch related and due to endoleak. There were one type II, one type Ib, and four type III endoleaks that required treatment. The rate of type Ia endoleak requiring secondary intervention was zero (0%). The overall rate of endoleak requiring intervention was 6.5%, and the incidence of branch vessel complication requiring intervention was seven of a total of 242 fenestrations (2.9%). All patients underwent an attempt at a completely percutaneous procedure (n = 184), and 20 access devices failed (10.9%) requiring immediate surgical conversion and common femoral artery repair during the index operation. Of 184 vessels accessed for the procedure, eight (4.3%) required a secondary intervention after the index procedure. No patient in this series ruptured at any time with a mean of 22 months of follow-up.

Conclusions: These data compare favorably with all other reported FEVAR series. Access-related complications are infrequent but still the most common after FEVAR. When performed for appropriate indications, type Ia endoleaks are rare if not absent after FEVAR. It appears that secondary intervention for endoleak is much less common than in contemporary series of standard EVAR. Branch vessel patency after FEVAR is excellent.

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C1: INTERNATIONAL FORUM

IF01.

Collected Worldwide Experience From the PERICLES Registry With the Use of Chimney Grafts in the Treatment of Type I Endoleaks After Previous Endovascular Aneurysm Repair Shows Reproducible Results

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Objectives: Type Ia endoleak after previous endovascular aortic repair (EVAR) is a challenging pathologic process. Patients often experience symptoms requiring treatment in the urgent setting with also often coexisting anatomically demanding conditions with the migrated endograft in angulated and short necks. Aim of the study was to evaluate the repro-

Table I. Operative data of 39 patients with type Ia endoleak after previous endovascular aneurysm repair (EVAR; 5 patients excluded because of unknown follow-up loss time)

Operative variables	No. (%) or mean ± SD	Total observations (No.)	Missing (No.)
Device			
Endurant	20 (51.3)		
Other devices	19 (48.7)		
Zenith	7 (18.0)		
Gore TAG	4 (10.3)		
Excluder	3 (7.7)		
Jotec	2 (5.1)		
Zenith TX	2 (5.1)		
Other	1 (2.6)		
Total chimney grafts (n = 70)			
Right renal	25 (35.7)		
Left renal	31 (44.3)		
Superior mesenteric artery	9 (12.9)		
Celiac	4 (5.7)		
Accessory renal	1 (1.4)		
Chimney grafts per patient			
1	18 (46.1)		
Multiple chimneys	21 (53.9)		
2	14 (35.9)		
3	4 (10.3)		
4	3 (7.7)		
Intraoperative data			
Operative time (min)	231.2 ± 84.1	27	(12)
Fluoroscopy time (min)	75.8 ± 48.2	27	(12)
Contrast medium (mL)	144.1 ± 69.3	28	(11)
Type I endoleak	7 (18.0)		
Type Ia	4 (10.3)		
Type Ib	3 (7.7)		
Treated type Ia/Ib endoleak	6 (15.4)		

SD, Standard deviation.

Table II. Outcomes of 39 patients with type Ia endoleak after previous endovascular aneurysm repair (EVAR; 5 patients excluded because of unknown follow-up loss time)

Outcomes	No. (%) or median (range)	*P*
Follow-up (months)		
Time to last CTA/MRA	21.9 (0.23-72.3)	
Time to death or censoring	7.3 (0.03-50.0)	
Mortality (n = 3)		
30-day	1 (2.6)	
Overall	3 (7.7)	
Cause of death		
Cardiac	1 (33.3)	
Pneumonia	2 (66.7)	
Any complication (n = 8)		
Late type I endoleak	3 (7.7)	
Treated late type I endoleak	1 (2.6)	
Chimney occlusion	4 (10.3)	
Late type I endoleak (n = 3)		
Other devices (n = 19)	2 (10.5)	.605[a]
Endurant (n = 20)	1 (5.0)	
Treated late type I endoleak (n = 1)		
Other devices (n = 19)	0 (0.0)	1.000[a]
Endurant (n = 20)	1 (5.0)	

CTA, Computed tomography angiography; *MRA*, magnetic resonance angiography.
[a]Fisher exact test.

ducibility and the midterm results of the chimney/snorkel endovascular technique (ch-EVAR) in the treatment of type Ia endoleaks after standard EVAR.

Methods: Between January 2008 and December 2014, 517 ch-EVAR abdominal procedures were performed in 13 United States and European vascular centers (PERICLES registry). Of these, 39 (25 men) were treated due to persistent type Ia endoleak after standard EVAR and had at least one radiologic postoperative follow-up with computed tomography angiography (CTA).

Results: Mean age of the treated patients was 76.2 ± 7.6, and all were classified as American Society of Anesthesiologists III or IV. Mean aneurysm diameter was 71.5 ± 29.0 mm. Mean infrarenal neck length was 3.9 mm, requiring lengthening of the sealing zone by placement of chimney grafts. The newly created sealing zone increased to 21.2 mm. Operative variables are summarized in Table I. Endurant abdominal devices were used in 20 patients (51.3%). Single chimney graft placement was performed in 18 patients (46.1%) and multiple in 21 (53.9%). Overall, 70 visceral vessels were revascularized by chimney grafts. Operative outcomes are summarized in Table II. The 30-day mortality was 2.6% (1 cardiac death). Two other deaths occurred during the mean follow-up of 21.9 months due to nonaneurysm-related causes. Primary patency of the chimney grafts was 89.7%. Three type Ia endoleaks were detected. Two of them were treated conservatively by radiologic surveillance, and one, with an additional increase of the aneurysm sac of >5 mm, was treated invasively. No statistically significant difference was noted in from type Ia endoleak at follow-up between ch-EVAR performed by the Endurant device (1 of 20 [5%]) vs other devices (2 of 19 [10.5%]; $P = .6$) as well in terms of reintervention (1 of 20 [5%] vs 0 of 19 [0%]; $P = 1.000$), respectively.

Conclusions: The present largest series in the literature regarding ch-EVAR in the treatment of type Ia endoleaks after previous EVAR showed reproducible results independent of the abdominal and chimney grafts combinations that were used. Longer follow-up is needed to ensure the durability of the present findings.

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IF02.

Surgical and Endovascular Treatment of Extracranial Carotid Artery Aneurysms: Early and Long-Term Outcome and Experience of a Single Center

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Objectives: This study investigated the early and long-term results of surgical and endovascular therapy of extracranial carotid artery aneurysms (ECAA).

Methods: A retrospective review of patients diagnosed with ECAA who underwent surgery from 1997 to 2016 was performed. Symptoms, aneurysm classification, etiology, treatments, and outcomes were reviewed.

Results: During the study period, 44 patients with ECAA underwent surgical interventions. The mean age was 52 years (range, 19-75 years), and 18 patients (41%) were men. There were 30 true aneurysms (68%) and 14 pseudoaneurysms (32%). Five aneurysms (11%) were asymptomatic, whereas 39 (89%) had symptoms (22 pulsatile masses, 9 local compressions, 4 strokes, 3 transient ischemic attacks, 1 rupture). Among 44 patients, 29 patients (66%) underwent open surgical treatment (op), whereas endovascular treatment (endo) was undertaken in 15 patients (34%). Surgical procedures were technically successful in all cases. In op group, 10 patients received aneurysm resection with succeeding end-to-end anastomosis. Interposition bypass grafting was performed in 10 patients, either with prosthesis or autogenous grafts. Two patients received ligation. Aneurysm resection and vein patch repair was performed in two patients. In the endo group, three patients received bare stents, and 12 patients received covered stents. Hospital length of stay was significantly shorter in endo group than in the op group (14 ± 2.7 vs 30 ± 17.0 days; $P = .017$). The incidence of cranial nerve injury in the endo and op groups were 17.2% vs 0% ($P = .088$), respectively. The 30-day stroke/transient ischemic attack rates in the op and endo groups were 6.9% vs 0% ($P = .298$), respectively. During a mean follow-up of 3.5 years (range, 3 months-18 years), no patient suffered death or major morbidity related to the aneurysm. In the op group, one permanent cranial nerve injury was recorded, and one patient suffered from transient ischemic attack 7 years after surgery. In the endo group, all aneurysms were completely excluded, and all patients were free from neurologic or other adverse events.

Conclusions: In our series, endovascular stenting for ECAA was found to be safe and effective and proved to have promising midterm results. Although long-term results need to be further explored, advantages, including fewer procedure-related complications and a shorter recovery time, make endovascular stenting an attractive option for ECAA, especially for patients who are unfit for traditional open surgery.

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IF03.

NIRS Monitoring for Carotid Endarterectomy in Awake Patients

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Objectives: Near-infrared spectroscopy (NIRS) as a monitoring tool for regional cerebral oxygenation (rSo_2) has been studied extensively during general anesthesia carotid endarterectomy (CEA). However, no clear threshold of rSo_2 indicating critical cerebral ischemia requiring shunt insertion could be determined. We therefore aimed to correlate rSo_2 with neurologic function in awake patients during CEA under regional anesthesia (RA).

Methods: In this prospective study, 154 consecutive patients scheduled for CEA under RA were investigated. The study cohort was divided into patients with and without neurologic dysfunction after clamping. Measurements of rSo_2 (INVOSTM System, Somanetics Inc, Troy, Mich) were made on both hemispheres to compare the ipsilateral and contralateral