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Clinical and economic impact of "Pevar-first" approach in daily practice – a single-center experience

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ABSTRACT

Background: Aim of our study was to demonstrate the feasibility of a "percutaneous first" approach through the comparison in terms of clinical outcome between percutaneous endovascular aortic aneurysms repair (PEVAR) and standard endovascular aortic aneurysm repair (SEVAR) as well as a careful analysis of its economic impact and its sustainability in daily practice of a community Hospital.

Methods: Single-center retrospective study of patients undergoing elective endovascular aortic aneurysms repair (EVAR) at our institution was carried out between May 2015 and september 2017. A clinical and economical comparison between percutaneous endovascular aneurysms repair (PEVAR) and standard endovascular aneurysm repair (SEVAR) with femoral cutdown was performed. The PEVAR procedure was routinely performed at our center by vascular surgeons applying Perclose Proglide arteriotomy closure device (ACD) using the "Preclose technique." One single ACD for stent-grafts with delivery system profiles up to 14F and 2 crossed ACDs for delivery system profile devices greater than 14F were implanted. Percutaneous access was always ultrasound-guided. Essentially 3 different EVAR devices were implanted, including Medtronic Endurant (Medtronic, Santa Rosa, CA, USA) in 72 patients, Gore Excluder C3 (W.L. Gore & Associates, Flagstaff, AZ, USA) in 36 patients and Cook Zenith Alpha (Cook Medical, Bloomington, IN, USA) in 8 patients, with profiles that range from 12F to 20F.

Results: The study included 116 patients (66 PEVAR, 50 SEVAR) who underwent elective EVAR. Technical access success was 100% for SEVAR accesses and 96% for PEVAR accesses. Related access complications were 6 out of 95 SEVAR accesses (2 underwent reintervention); 5 out of 125 PEVAR accesses (4 converted intraoperatively and 1 underwent reintervention). The mean duration of postoperative stay was 5.0 days for SEVAR and 2.2 days for PEVAR (P=0.003). The mean duration of intervention was 148.0 minutes for SEVAR and 105.4 minutes for PEVAR (P<0.001). Major adverse events were 6 out of 50 for SEVAR and 4 out of 66 for PEVAR; there was no mortality. Our cost impact assessment showed a slightly higher cost of the PEVAR technique (€ +334) due substantially to the ACDs, largely offset by the reduction in the postoperative length of stay (€ -1960). According to provider perspective, an average € 1647 savings per patient in favor of the PEVAR approach has been found.

Conclusions: The study showed that PEVAR is a safe and effective technique and can be used in daily clinical practice. The PEVAR approach would allow a significant cost-saving for provider prospective.

BACKGROUND

Percutaneous endovascular aneurysm repair (PEVAR) has shown to be safe and effective when compared with standard endovascular aneurysm repair (SEVAR); several studies reported advantages of the PEVAR technique in terms of shorter operative times, shorter length of stay (LOS) and fewer postoperative complications.

PURPOSE

Aim of the study was to demonstrate the feasibility of a PEVAR-first approach through the comparison in terms of clinical outcome between PEVAR and SEVAR as well as a careful analysis of its economic impact and its sustainability in the daily practice of a community Hospital.

METHODS

A single-center retrospective study of patients undergoing elective endovascular aortic aneurysms repair (EVAR) at our institution was carried out between may 2015 and september 2017. A clinical and economical comparison between PEVAR and SEVAR with femoral cutdown was performed. The PEVAR procedure was routinely performed at our center by vascular surgeons applying Perclose Proglide (Abbott Vascular Inc., Santa Clara, CA, USA) arteriotomy closure device (ACD) using the "Preclose technique." Demographic features, clinical characteristics and baseline antithrombotic therapy were similar between the 2 groups. Percutaneous access was always ultrasound-guided.

RESULTS

The study included 116 patients (66 PEVAR, 50 SEVAR) who underwent elective EVAR. Technical access success was 100% for SEVAR accesses and 96% for PEVAR accesses. Access-related complications were 6 out of 95 (6.3%) SEVAR accesses (2 underwent reintervention); 5 out of 125 (4.0%) PEVAR accesses (4 converted intraoperatively and 1 underwent reintervention).

RESULTS

Table I: CLINICAL PRIMARY & SECONDARY ENDPOINTS

PATIENTS = n 116	PEVAR n(%) 66 (56.9)	SEVAR n(%) 50 43.1)	P-Value
Total femoral access = n 220	125 (56.8)	95 (43.2)	
Postoperative hospital stay (days). Mean (SD)	2.2 (1.8)	5.0 (7.4)	0.003
Technical access success	120 (96.0)	95 (100)	NS
Intraoperative surgical access conversion	4 (3.2)	0 (0)	NS
Access-related complications	5 (4.0)	6 (6.3)	NS
Access-related reinterventions	1 (0.8)	2 (2.1)	NS
Procedure time minutes – mean (SD)	105.4 (36.4)	148.0 (51.5)	< 0.001
Procedural technical success	66 (100)	50 (100)	NS
Blood transfusion	2 (3.0)	1 (2.0)	NS
MAE	4 (6.1)	6 (12.0)	NS
Access-related complications + MAE	9 (13.6)	12 (24.0)	NS

Table II: PROCEDURE VARIABLE COSTS ANALYSIS

COSTS (€)	PEVAR N=66	SEVAR N=50	Delta
Procedure costs per patient	1.144	811	334
Staff	228	321	- 92
Operating room occupancy	264	370	- 107
Arteriotomy closure device	553	0	553
Other procedure costs	100	120	- 20
Lenght of stay costs per patients	1.540	3.500	- 1.960
Postoperative costs per patients	0	21	- 21
Outpatient visits	0	21	- 21
Total per patient	2.684	4.332	- 1647

RESULTS

The mean duration of postoperative stay was 5.0 days for SEVAR and 2.2 days for PEVAR (mean reduction 2.8 days).

The mean duration of intervention was 148.0 minutes for SEVAR and 105.4 minutes for PEVAR (mean reduction 45 minutes).

Major adverse events (MAE) were 6 out of 50 (12.0%) for SEVAR and 4 out of 66 (6.1%) for PEVAR; there was no mortality.

Our cost impact assessment showed a slightly higher cost of the PEVAR procedure (€ +334) due substantially to the ACDs, largely offset by the postoperative LOS reduction (€ -1960).

According to provider perspective, an average € 1647 savings per patient in favor of the PEVAR approach has been found, resulting in a total cost saving of € 164.700 per 100 patients treated.

CONCLUSION

- The study showed that PEVAR is a safe and effective technique and can be used in daily clinical practice.
- Despite its higher costs, substantially due to the ACDs, the PEVAR technique would allow a significant cost-saving, mainly linked to shorter postoperative LOS and operating room occupancy time.

DISCLOSURES

The authors declare no conflict of interest.