

2. The number of CEAs under loco-regional anesthesia increased significantly from 10.1% to 28.1% ( $p < 0.0001$ ). Intraluminal shunting was performed less frequent (48.1% to 43.5%,  $p < 0.0001$ ), whereas an intra-operative morphological control of the carotid artery was performed more often (44.5% to 68.3%,  $p < 0.0001$ ). Any neuro-monitoring method was used increasingly (CEA: 49.8% to 61.4%, CAS: 33.7% to 35.8%;  $p < 0.0001$ ). The portion of patients who were neurologically assessed before or after CEA increased from 61.7% to 69.0% and 36.5% to 57.2% respectively. In CAS 78% of the patients were assessed before and 70% after the procedure. The median time interval between the neurological index event and CEA was reduced from 25 in 2003 to 8 days in 2013 (CAS: 9 days in 2012 and 2013).

3. Combined peri-procedural stroke and death rates decreased significantly in asymptomatic patients after CEA (2.0% to 1.3%,  $p = <0.001$ ) and remained stable for CAS (1.7%). In symptomatic patients with a 50–99% stenosis peri-operative complication rates decreased significantly (4.6% to 2.7%,  $p = 0.001$ ) whereas CAS was associated with a risk of 3.9% in 2012 and 4.2% in 2013.

**Conclusion:** The analysis of the annual quality reports demonstrates that CEA and CAS were performed within acceptable stroke and death rates. While patient age is increasing the clinical outcomes after CEA have improved significantly over time. Most importantly the time interval between the neurological index event and CEA or CAS could be reduced to 8 to 9 days.

### How EVAR Changed the Game: Trends in Patient Characteristics, Surgical Techniques and Outcomes of Non—ruptured AAA Repair in Germany from 1999 to 2010

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**Introduction:** In this study we looked at trends in patient characteristics, surgical techniques and outcomes of non-ruptured abdominal aortic aneurysm (AAA) repair in Germany from 1999–2010, when endovascular aortic repair (EVAR) took over to be the standard of care.

**Methods:** Using the quality assurance registry of the German Vascular Society (DGG) between 1999 to 2010 we looked at a total of 36,594 operations (23,037 Open Repair (OR), 13,557 EVAR) for infrarenal AAA in >200 hospitals in Germany. Patient characteristics (age, ASA score, AAA diameter), surgical techniques (OR, EVAR, operation time) and outcomes (peri-operative mortality, organ complications, local complications) were analyzed using Spearman's correlation coefficient for quantitative and the Cochran-Armitage test for binary outcomes.

**Results:** Patient characteristics: The patient's mean age increased from 69.6 to 72.0 years ( $p < 0.001$ ), a trend that was conducted especially by the increase of operation on octogenarians ( $p < 0.001$ ). Also the amount of patients with an ASA score of 3 increased significantly while the amount of ASA 2 patients decreased ( $p < 0.001$ ). There were no major changes in aneurysm morphology (mean AAA diameter  $58 \pm 32$  mm; 31.2% concomitant iliac aneurysms; 3.5% inflammatory aneurysms). Surgical techniques: The use of EVAR increased significantly (1999: 16.7%; 2010: 62.7%;  $p < 0.001$ ) and since 2009 EVAR is used more frequently than OR. The median operation time was 150 minutes in 1999 and 135 minutes in 2010 ( $p < 0.001$ ).

**Outcomes:** The overall in hospital mortality decreased from 3.1% in 1999 to 2.3% in 2010 ( $p < 0.001$ ). Over the observation period, cardiac (1999: 8.1%; 2010: 5.1%;  $p < 0.001$ ) and pulmonary (1999: 7.8%; 2010: 4.8%;  $p < 0.001$ ) complications decreased significantly. The rate of post-operative renal failure increased slightly (1999: 3.6%; 2010: 4.1%;  $p = 0.017$ ), without increasing the rate of patients needing dialysis (1999 and 2010: 1.7%; ns.). The median length of stay was reduced from 17 days in 1999 to 10 days in 2010 ( $p < 0.001$ ).

**Conclusion:** While EVAR merged to be the standard of care for infrarenal AAA within the observation period, the patients got older and less fit. Nonetheless in hospital mortality and severe systemic complications could be reduced. This study provides evidence for a significant improvement of AAA treatment.

### Abdominal Compartment Syndrome in Open Repair for Ruptured AAA: Can a Selective Prophylactic Open Abdomen Strategy Improve Survival?

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**Introduction:** Abdominal compartment syndrome (ACS) after open repair(OR) for ruptured AAA(rAAA) carries a high risk for mortality. A selective prophylactic open abdomen (POA) strategy may help reduce the development of ACS and improve survival. The objectives of this retrospective analysis were to identify ACS incidence on a group of patients submitted to OR for rAAA, compare mortality of POA strategy with primary abdomen closure + intra-abdominal pressure(IAP) monitoring and analyse the relationship of predisposing factors for intra-abdominal hypertension(IAH)/ACS and the development of ACS.

**Methods:** All patients in our institution for rAAA between January 2010 and January 2015 were analysed. IAH and ACS were defined according the consensus definitions of the WSACS.

**Results:** 84 patients were treated with OR for rAAA during the period of the study. Patients who died in the first 24 h after admission ( $n = 21$ ) or with missing data on intra-abdominal pressure (IAP) monitoring ( $n = 17$ ) were excluded. Predisposing factors for IAH/ACS were considered at Hospital admission (blood pressure  $<70$  mmHg; hemoglobin  $<8$  g/dL; cardiopulmonary arrest) and at the end of the surgery (transfusion  $>6$  packed red cells; lactate  $>40$ ; pH  $< 7.30$ ). A POA using a Bogota-VAC technique was primarily applied in 8 patients (17.4%), due to difficult primary closure of the abdomen or if a significant risk for ACS existed. Of the 38 patients with primary abdominal closure, IAH occurred in 26 patients (68.4%) and ACS developed in 13 (34.2%), with 3 patients (7.9%) requiring subsequent decompressive laparotomy.

The overall 30 day mortality was 47.6%. In the subgroup of patients who developed ACS the mortality was significantly higher than in those with normal IAP/moderate IAH (grades I/II): 61.5% vs. 12.0%,  $p = 0.0026$ . POA strategy was associated with reduced mortality (37.5% vs. 61.5%;  $p = NS$ ) than in those with ACS, irrespective of secondary decompression laparotomy. None of the patients with normal IAP had 3 positive factors; 61.5% patients with ACS and 75.0% patients treated with a POA presented 3 or more predictive factors for ACS.

**Conclusion:** ACS is frequent in OR for rAAA and carries a high mortality risk despite secondary decompression. A strategy of POA applied to patients with high risk for ACS was associated with reduced mortality after OR for rAAA. Further research in identifying high risk patients for ACS is required to validate a standardised selective POA strategy.

### 5 Year Results of EVAR Used According to Instructions for Use Gives a Good General Outcome for AAA

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**Introduction:** When EVAR has been used with low compliance to instructions for use (IFU), considerable percentages of the patients have faced AAA sac enlargement and complications. In our institution EVAR has been used according to IFU. We wanted to explore the results after 5 years for EVAR and the disease in general with this approach.

**Methods:** 123 patients were intended to be treated electively with EVAR 2002–2007 using Cook Zenith stent grafts. Mean aneurysm diameter at operation was 62.7 mm (40 mm–105 mm). Indications for EVAR were as follows, aortic neck: length 15 mm or more, diameter 32 mm or less, straight configuration (cone shaped neck only with distal narrowing); iliac arteries: length  $>10$  mm, 7.5–20 mm in diameter. In the same period 139 patients were treated by open repair.