

# Technical Details That Make Endovascular Aneurysm Repair for Ruptured Abdominal Aortic Aneurysms Easier and Safer

NOTES

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## Background

Endovascular aneurysm repair (EVAR) in patients with ruptured abdominal aortic aneurysm (rAAA) has to be performed in a stressful environment and the anatomy is more challenging than in smaller non-ruptured AAAs. The following algorithm and key points allow us to perform EVAR in an easier and safer manner.

## Methods

A feasibility study in 10 selected patients with ruptured AAA (stable hemodynamics and favorable anatomy) from August 1998 to December 1999 was followed by an intention to treat protocol for all patients with rAAA from January 2000 to June 2005. Controlled hemostatic hypotension (systolic blood pressure < 90 mm Hg) was started immediately when ruptured AAA (rAAA) was suspected and all patients were transferred to the emergency room for a quick check (anesthetist, vascular surgeon, and interventional radiologist). Patients with very poor hemodynamics (systolic blood pressure < 50 mm Hg), non-responsive shock state (despite fluid and/or catecholamine administration) and/or untreatable pain were immediately treated by conventional open surgery (COS). Thoracoabdominal spiral computed tomographic angiography was performed in all other patients (90%) in order to confirm the diagnosis and to assess feasibility of EVAR. Bifurcated stent grafts (SG) were used in all patients with accessible iliacs on both side (n = 59) and aortouniliac SG (n = 3) when one iliac was occluded. In a hostile anatomy (short and/or tortuous necks, iliac diameter > 20 mm), hybrid stent grafts (components of at least two manufacturers) were used (n = 7) to achieve proximal/distal sealing. Position of the iliac short limb (anterior, posterior, ipsi- or contralateral position) was based on the spontaneous positioning of the contralateral guidewire, which resulted in a so-called ballerina position (Figure 1) in 30% of the cases. Each implantation was performed hand-in-hand by a vascular surgeon and an interventional radiologist (overall, 10 different vascular surgeons and five interventional radiologists). Local anesthesia was standard for all transfemoral implantations, even when a cross-over bypass was mandatory. Transfemoral balloon occlusion (n = 13) of the suprarenal aorta was performed in patients with apparent or developing unstable hemodynamics during EVAR. Abdominal compartment syndrome was treated after completion of EVAR by open abdomen treatment (switch to general anesthesia) when intra-abdominal pressure was > 20 mm Hg (n = 7). Immediate postprocedural thoraco-abdominal CT angiography with reduced contrast loading (80 mL) was performed in all patients, in order to detect attachment endoleaks.

## Results

From August 1998 to June 2005, 62 patients out of a total 140 patients with rAAA have been treated by EVAR. Mean age was 73 years  $\pm$  10 years (median 74 years). Overall, 44% of rAAAs were treated by EVAR. This rate was increased to up to 70% during the last 3 years. On-table mortality was 1.6% (1 of 62) and 30-day mortality was 12% (7 of 62). On-table switch to open surgery was performed in three cases. In the follow-up period of 7 years, three late switches to COS were performed without mortality.

## Conclusions

Standard endovascular techniques combined when necessary with some adjunct tools allow to treat nowadays up to 70% of patients with rAAA. EVAR for rAAA leads to a lower on-table and 30-day mortality than open surgery.<sup>1,2</sup> Long-term follow-up shows satisfactory results,<sup>3</sup> especially concerning ballerina position and/or hybrid stent grafts. Late conversion to open surgery seems not to carry a high risk.

Figure 1. Ballerina position. Hybrid stent graft (Excluder bifurcated SG, combined with a Zenith iliac extension on the left side) with a 180° rotation so that the contralateral iliac orifice (which should be on the right side) is located on the left side (easiest way for cannulation from the right side).

## References

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