



# Does sex really matter?

## Differences between men and women in repair type and mortality risk after AAA repair

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The existence of sex-related differences of abdominal aortic aneurysm (AAA) is subject of ongoing discussion: AAA are 2–6 times more often in men than in women, but are more dangerous in women with faster rates of growth and higher risks of rupture even though their smaller diameters [1]. Therefore, current guidelines recommend a cutoff repair diameter  $\geq 5.0$  cm in women. Nevertheless, women with AAA less often receive a repair and are often underrepresented in clinical AAA studies with a range of 0.6%–9% of the study population [2]. It is not surprising that there is a lack of information about risks and efficacy of treatment strategies like open surgical repair (OSR) vs. endovascular repair (EVAR) in women, especially in long-term outcome [3].

Ramkumar et al. focused on this topic in their retrospective cohort study [4] with 16,386 patients derived from a VQI-Medicare-linked registry. The Vascular Quality Initiative (VQI) is a network of the Society for Vascular Surgery Patient Safety Organization approved by the Agency for Healthcare Research and Quality that collects data on vascular procedures in the U.S. and Canada. The authors included data from patients  $\geq 65$  years old with AAA who underwent either OSR or EVAR in the period of 2003 to 2015. The analysed cohort consisted of 78% men and 22% women. The majority of patients ( $n = 13,075$ ) underwent EVAR.

The primary exposure was sex, the outcomes were repair type and all-cause long-term mortality. Confounding comorbidities, cardiovascular risk factors and previous aneurysm repair were accounted as well as disease severity (aneurysm diameter, elective, symptomatic (urgent) or ruptured AAA).

In this study it was 65% more likely for women to undergo OSR compared to men (RR: 1.65; 95% CI: 1.51–1.80). Women who underwent EVAR were more likely to be poor candidates for OSR than men (22% vs. 16%,  $p < .001$ ). Looking to sex-based disparities in long-term mortality after OSR, no differences were found. In contrast to this, after EVAR women had a statistically significant higher risk of death than men in the first decade after the treatment (HR: 1.13; 95% CI: 1.03–1.24), even in an elective setting.

In cases of ruptured aneurysms women had higher mortality rates than men after EVAR as well as after OSR. All of the findings remained unchanged after excluding patients who underwent EVAR because they were no candidates for OSR.

At time of AAA presentation women were older than men (77 vs. 75 years;  $p < .001$ ), were more often active smokers (33% vs. 28%;  $p < .001$ ), and had smaller aneurysms (mean [SD] diameter, 57 [11.7] mm vs. 59 [17.7] mm;  $p < .001$ ). In part of the data (14% of the patients undergoing EVAR, starting from year 2012), measurements on aortic anatomy were available. These data support the finding of more challenging anatomic situation for EVAR in women, as they had a shorter and smaller neck of the aneurysm compared to men (23.1 vs. 25.1 mm and 22.8 vs. 24.3 mm, resp.) and a larger aorta-neck and neck-AAA angle ( $\geq 45^\circ$ , 20 vs. 12%;  $p < .003$  and  $\geq 45^\circ$ , 32 vs. 17%;  $p < .001$ , resp.).

In their review (PubMed search 1999–2018) Stoberock et al. reported similar results in AAA repair gender differences [5]. All these data support the idea, that on one hand some comorbidities and circumstances exclude women from OSR and qualify them for EVAR in consistence with the overall shift from OSR to EVAR. On the other hand women's AAA anatomy makes the EVAR procedures technically challenging, even in elective situations with time to plan. The question is: Are the available EVAR grafts and devices suitable enough for use in women, or are practitioners forced to compensate for deficiencies with treatments outside the device's indication resulting in a potential device failure? Because women were at an increased risk of developing major complications, particularly following EVAR, a careful patient and device selection is indicated. However, so far no risk criteria have been validated to facilitate the decision between EVAR and OSR in women [6].

One thing is for sure: There is a strong need for specific treatment strategies in women, preferably in specific centres, grafts that take female anatomy into account, and studies with balanced or at least a higher proportion of women. The two authors wish to take up the cudgels for us women. It's time to reinvent modern medicine. Because sex matters.

## References

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