



The effect of centralization of abdominal aortic aneurysm repair procedures on perioperative outcomes

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The effect of centralization of abdominal aortic aneurysm (AAA) repair procedures on perioperative outcomes is a controversial issue. A balanced debate a few years ago provided the arguments both in favor, as well as against centralization of AAA repair procedures (1). The main argument supporting centralization of AAA repair procedures is the inverse volume-outcome relationship, i.e., that high-volume centers will be more experienced and will subsequently have lower mortality and morbidity rates, whereas low-volume centers will be relatively less experienced and will have higher mortality and morbidity rates (1). This argument is supported by the results of a meta-analysis, including 421,299 elective and 45,796 ruptured AAA procedures showing a strong negative association between annual volume of repair procedures with mortality (2). The weighted odds ratio (OR) was 0.66 [95% confidence interval (CI), 0.65–0.67] at a weighted mean threshold between higher- and lower-volume hospitals of 43 AAAs/year for elective AAA repair procedures, while the same OR was 0.78 (95% CI, 0.73–0.82) at a weighted threshold of 15 AAAs/year for ruptured AAAs (2). This meta-analysis provided proof that higher-volume hospitals have lower mortality rates and vice versa.

Patient preference was another factor in favor of centralization of AAA repair procedures (3). A questionnaire was given to patients attending a regional AAA screening service. This questionnaire consisted of specific questions which aimed to determine the willingness of each patient

to travel to a service providing specific attributes (e.g., lower waiting list times, free or low-cost visitor parking, anticipated length of hospital stay, availability of EVAR, risk of perioperative stroke/amputation, the volume of surgery, etc.). A total of 237 patients of the 258 respondents (91.9%) were willing to travel at least 1 hour to go to a hospital with a 5% lower perioperative mortality (237 patients; 91.9%), a 2% lower perioperative stroke rate (241 patients; 93.4%) or amputation rates (242 patients; 93.8%), demonstrable evidence of safety (237 patients; 91.9%), performing >50 AAA repair procedures/year (233 patients; 90.3%) and routine availability of endovascular AAA repair (EVAR) procedures (233 patients; 90.3%). This study provided proof that individuals screened for AAAs were willing to travel further to access a hospital with lower postoperative mortality and complication rates, with available endovascular techniques delivered by an experienced team (3).

In contrast, a recent study from the South West of England failed to show an immediate effect of centralization of AAA repair procedures on perioperative outcomes (4). This study showed no difference in overall 30-day mortality rates (11% before *vs.* 12% after centralization; $P=0.44$), neither for elective (1% before *vs.* 3% after centralization; $P=0.35$) nor for ruptured AAA repair (35% before *vs.* 38% after centralization; $P=0.49$). Similarly, the median duration of hospitalization did not differ before, as compared with after centralization in elective (5 *vs.* 3 days, respectively; $P=0.56$) or ruptured AAAs (18 *vs.* 19 days, respectively;

P=0.23). Finally, the proportion of admissions to intensive care did not differ before *vs.* after centralization (54.3% *vs.* 59%, respectively; P=0.27) and neither did the median length of stay in intensive care (3 days before *vs.* 3 days after; P=0.74) (4).

At first glance, the report from the South West of England (4) may seem non-convincing. It seems common sense that high-volume, more experienced surgeons/hospitals are more likely to achieve better outcomes compared with low-volume (and, consequently, less experienced) ones. In support of this, a recent study reported outcomes on all patients undergoing open AAA repair from 2003 to 2016 from the Vascular Quality Initiative (5). Of a total of 8,880 open AAA repair procedures, 3,470 AAAs were juxtarenal. Those centers with low (<4) or medium [4–14] volumes had considerably higher perioperative mortality rates when compared with hospitals with high (>14) volumes (9.0% *vs.* 4.9% *vs.* 3.9%, respectively; P<0.01). It was demonstrated that hospitals with a smaller number of open juxtarenal repair procedures had higher perioperative mortality (5). Importantly, this association was not influenced by the total volume of open aortic repair procedures (5).

A different view on the effect of centralization of AAA repair procedures on perioperative outcomes supports that this does not apply equally to open AAA repair and EVAR (6). This report from Boston studied 122,495 individuals undergoing elective AAA repair during 2001–2008 (open AAA repair: 45,451; EVAR: 77,044 patients). There was no association between perioperative mortality and surgeon volume for EVAR [1st quintile (0–6 EVARs): 1.8%; 5th quintile (28–151 EVARs): 1.6%; P=0.29]. Nevertheless, a significant association was observed between perioperative mortality and number of EVAR procedures [1st quintile (0–9 EVARs): 1.9%; 5th quintile (49–198 EVARs): 1.4%; P<0.01]. In contrast, for open repair procedures the perioperative mortality decreased in parallel with higher number of procedures/surgeon [1st quintile (0–3 open repairs): 6.4%; 5th quintile (14–62 open repairs): 3.8%; P<0.01], as well as with hospital volume [1st quintile (0–5 open repairs): 6.3%; 5th quintile (14–62 open repairs): 3.8%; P<0.01] (6). The conclusion reached was that for EVAR, there is no association between perioperative mortality with surgeon volume, whereas for open repair, there is a strong association between both surgeon and hospital volume with perioperative mortality. This report once again argued for centralization of open AAA procedures in high-volume surgeons and hospitals (6).

These results were replicated in an independent study from Germany presenting the outcomes of a total of 96,426 AAA repair procedures, of which 11,795 (12.2%) presented as ruptured AAAs (7). Volume was inversely associated with mortality after both open AAA repair and EVAR. High-volume hospitals demonstrated lower rates of use of blood products, complication rates, and length of hospital stay. Similarly, for ruptured AAA repair procedures, a negative association was demonstrated between volume and mortality. It was shown that an annual caseload of 75–100 elective cases was associated with the lowest mortality risk (7). Other independent studies also seem to support an association between increased surgeon volume with better patient outcomes (8–11).

In conclusion, the vast majority of studies seem to support an association between increased surgeon volume and improved outcomes after AAA repair procedures (1–3,6–11), thus supporting the centralization of these procedures. Although in some cases low-volume surgeons may achieve similar outcomes with high-volume surgeons (1), it makes more sense to support centralization of AAA repair procedures to ensure the highest possible expertise and optimize patient care delivery/perioperative outcomes.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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