Recent updates of long-term outcomes after surgical/endovascular AAA repair

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Disclosure

 I have no potential conflicts of interest to disclose regarding the topic of this presentation.





Contents

- 1. Updated Guideline for management of AAA
- 2. Longer term outcomes of EVAR vs. Open surgical repair of AAA from RCT: DREAM, EVAR-1, OVER trial
- 3. Meta-analysis and Large cohort study for Long-term outcomes of EVAR vs. Open surgical repair

Trends in open surgical, endovascular aortic aneurysm repair

EVAR has been replacing open surgical repair as the preferred treatment for AAA.



Guideline for Management of AAA

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease

6.5.5.3. Threshold for AAA Repair

| COR | LOE | Recommendations |
|-----|-----|---|
| 1 | A | In patients with unruptured AAA, repair is rec- ommended in those with a maximal aneurysm diameter of ≥5.5 cm in men or ≥5.0 cm in women.¹⁻⁶ |

6.5.5.4. Open Versus Endovascular Repair of AAA

| 1 | A | In patients with nonruptured AAA with low to moderate operative risk and who have anatomy suitable for either open or EVAR, a shared decision-making process weighing the risks and benefits of each approach is recom- mended.¹⁻¹¹ |
|----|------|--|
| 1 | B-NR | 2. In patients undergoing elective endovascular repair for nonruptured AAA, adherence to manufacturer's instructions for use is recommended. ¹²⁻¹⁶ |
| 2a | B-NR | 3. In patients with nonruptured AAA and a high perioperative risk, EVAR is reasonable to reduce the risk of 30-day morbidity, mortality, or both. ^{9,10} |

Open surgical repair



Endovascular Repair



N Engl J Med 2008;358:464-74 Circulation. 2022;146:e334–e482

Abdominal Aorta Aneurysm

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease

Recommendations for Repair of Ruptured AAA Referenced studies that support the recommendations are summarized in the Online Data Supplement.

| COR | LOE | Recommendations |
|-----|------|--|
| 1 | B-R | In patients presenting with ruptured AAA who are hemodynamically stable, CT imag- ing is recommended to evaluate whether the AAA is amenable to endovascular repair.¹⁻³ |
| 1 | B-R | 2. In patients presenting with ruptured AAA who have suitable anatomy, endovas- cular repair is recommended over open repair to reduce the risk of morbidity and mortality. ^{1,4-6} |
| 2a | B-NR | 3. In patients undergoing endovascular repair for ruptured AAA, local anesthesia is preferred to general anesthesia to reduce risk of periop-erative mortality. ⁷⁻⁹ |
| 2a | C-LD | 4. In patients with ruptured AAA, permissive hypotension can be beneficial to decrease the rate of bleeding. ^{1,3,10-12} |

| a) | | | | | | Odde Datie | | | Oulde Datie | | |
|---------------|--|--|---|---|--|---|--|--|---|---|--|
| | Study or Subgroup | log[Odds | Ratiol | SF | Weight | IV. Random, 95% (| 1 Year | | V. Random, 95% C | | |
| | Holt | -0 | 5534 | 0 1542 | 19.9% | 0.57 (0.43.0.7 | 31 2010 | 1 | | | |
| | Sagih | -0 | 5125 | 0 4486 | 5.8% | 0.60 (0.25, 1.4. | 1 2012 | | | | |
| | Piffaretti | | 2 679 | 0.5708 | 3.8% | 0.07 [0.02 0.2 | 1 2014 |) <u> </u> | I | | |
| | Edwards | -0 | 5812 | 0.0878 | 25.6% | 0.56 (0.47, 0.6) | 1 2014 | | + | | |
| | Sneicher | | 0 473 | 0.1243 | 22 5% | 0.62 (0.49, 0.8 | 1 2014 | | -8- | | |
| | Wang | -0 | 7397 | 0.1247 | 22.4% | 0.48 [0.37, 0.6 | 2020 | | + | | |
| | Total (05% CI) | | | | 100.0% | 0.53 (0.44, 0.64 | | | | | |
| | Hotorogonoity Tour | - 0.05. Chil- | 16 72 | df = E /E | - 0.000 | 18 - 60% | 9 | <u> </u> | | | |
| | Test for overall effect | Z = 5.54 (P | < 0.000 | 001) | - 0.000 | ,1 - 00 % | | 0.01 | 0.1 1 Favours EVAR Favours | 10 100 OSR | |
| | Perioperative m | ortality | | | | | | | | | |
| b) | | | | | | Hazard Ratio | | | Hazard Ratio | | |
| 2) | Study or Subgroup | log[Hazard | Ratio | SE | Weight | N, Random, 95% | CI Year | r. | IV, Random, 95% C | 1 | |
| | Sagib | | 0.09 | 0.29 | 13.5% | 1.09/0.62.1.9 | 31 2012 | 2 | | | |
| | Edwards | | -0.16 | 0.04 | 48.8% | 0.85 (0.79, 0.9 | 21 2014 | 1 | | | |
| | Wang | | 0.4447 | 0.1049 | 37.6% | 0.64 [0.52.0.7 | 9] 2020 |) | | | |
| | | | | | | | | 51 | 10100 | | |
| | Total (95% CI) | | | | 100.0% | 0.79 [0.62, 1.0 | 1] | | ٠ | | |
| | Heterogeneity: Tau ² = | = 0.03; Chi ² = | 7.39.0 | if= 2 (P= | 0.02); F | = 73% | | - | | 10 100 | |
| | Test for overall effect | Z = 1.88 (P = | 0.06) | | | | | 0.01 | 0.1 1 | 10 100 | |
| | | | | | | | | | Favours EVAR Favours | USR | |
| | Overall mortalit | v | | | | | | | | | |
| 0) | | · y | | | | Odde Patie | | | Odde Datia | | |
| () | Study or Subaroun | log[Odds F | Ratiol | SF | Weight | IV. Random, 95% | 1 Year | | IV. Random, 95% C | | |
| | Study of Study oup | -1 | 1616 | 0.4422 | 21 496 | 0.21 /0.12 0.7 | 11 2012 | 1 | | | |
| | Edwarda | -1. | 5061 | 0.9923 | 27.4% | 0.31 [0.13, 0.7 | 1 2012 | | | | |
| | Chaichar | -0. | 7702 | 0.0001 | 21.270 | 0.46 (0.27, 0.7 | 2014 | | | | |
| | Wand | -0. | 0202 | 0.1512 | 24.0% | 0.46 [0.27, 0.7 | 1 2014 | | | | |
| | eeang | | 9302 | 0.1515 | 20.0 % | 0.15 [0.11, 0.2 | J 2020 | | | | |
| | | | | | | | | | | | |
| | Total (95% CI) | | | | 100.0% | 0.34 [0.14, 0.7] | 1 | | | | |
| | Total (95% CI) | - 0.69· Chiž - | 66 71 | df - 2 /E | 100.0% | 0.34 [0.14, 0.7 | 1 | | - | | |
| | Total (95% Cl) Heterogeneity: Tau ² = Test for overall effect | = 0.68; Chi ² = | 66.71 | , df= 3 (F | 100.0% < 0.000 | 0.34 [0.14, 0.7 4 01); P = 96% | 1] | L 0.01 | 0.1 | 10 100 | |
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EVAR vs. Open repair of AAA: RCT (DREAM, EVAR trial 1)

ORIGINAL ARTICLE

Long-Term Outcome of Open or Endovascular Repair of Abdominal Aortic Aneurysm

- DREAM (Dutch Randomized Endovascular Aneurysm Repair) Trial
- 2000-2003
- EVAR 173 vs. Open 178
- Median follow-up: 6.4 years
- Previously DREAM trial showed that EVAR was better than Open surgery in the 30-day mortality.





- Endovascular versus open repair of abdominal aortic aneurysm in 15-years' follow-up of the UK endovascular aneurysm repair trial 1 (EVAR trial 1): a randomised controlled trial
 - EVAR (UK Endovascular Aneurysm Repair trial) Trial 1
 - 1999-2004
 - EVAR 626 vs. Open 626
 - Median follow-up: 12.4 years



EVAR vs. Open repair of AAA: RCT (OVER trial)

ORIGINAL ARTICLE

Open versus Endovascular Repair of Abdominal Aortic Aneurysm

- OVER (Open Versus Endovascular Repair) Trial
- **2002-2008**
- EVAR 444 vs. Open 437
- Median follow-up: 8.4 years



| Time since Developmination | Forders and a Density | On an Danaia | Hazard Ratio | DValue | P Value for | | | | |
|----------------------------|-----------------------------|----------------|------------------|---------|-------------|--|--|--|--|
| Time since Randomization | Endovascular Repair | Open Repair | (95% CI) | P value | Interaction | | | | |
| | no. of deaths/total no. (%) | | | | | | | | |
| Any time | 302/444 (68.0) | 306/437 (70.0) | 0.96 (0.82–1.13) | 0.61 | 0.25 | | | | |
| 0 to 6 mo | 11/444 (2.5) | 14/437 (3.2) | 0.77 (0.35-1.69) | 0.51 | 0.43 | | | | |
| >6 mo to 4 yr | 59/433 (13.6) | 70/423 (16.5) | 0.81 (0.57-1.14) | 0.22 | 0.88 | | | | |
| >4 to 8 yr | 93/374 (24.9) | 76/353 (21.5) | 1.18 (0.87-1.60) | 0.29 | 0.50 | | | | |
| >8 yr | 139/281 (49.5) | 146/277 (52.7) | 0.94 (0.74-1.18) | 0.59 | 0.25 | | | | |

- Endovascular-repair devices, techniques, and strategies were changing rapidly.
- Evaluation strategies in the early years of endovascular repair involved high doses of radiation, which may have been responsible for the significantly higher number of deaths from cancer in the endovascular-repair group.
- Postoperative mortality was lower.

EVAR vs. Open repair of AAA: META-ANALYSIS

SYSTEMATIC REVIEW

Editor's Choice – Endovascular *vs.* Open Repair for Abdominal Aortic Aneurysm: Systematic Review and Meta-analysis of Updated Peri-operative and Long Term Data of Randomised Controlled Trials

 Meta-analysis of 7 RCTs (n=2,983)
 : ACE, DREAM, OVER, EVAR-1, Chen et al, Lottman et al, Soulez et al.





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28th TCTAP

EVAR vs. Open repair of AAA: Large cohort study

Original Investigation | Surgery

Long-term Outcomes Associated With Open vs Endovascular Abdominal Aortic Aneurysm Repair in a Medicare-Matched Database

Kevin Yei, BS; Asma Mathlouthi, MD; Isaac Naazie, MD, MPH; Nadin Elsayed, MD; Bryan Clary, MD; Mahmoud Malas, MD, MHS

- 2003-2015
- Retrospective large cohort study from the US analyzed data from the VQI-VISION database
- EVAR (n=28,281) vs. Surgery (n=4,479)
- Propensity score matching
- Analysis of nearly 3,000 paired patients
- Primary outcome

6-year all-cause mortality, rupture, and reintervention.

Secondary outcomes

30-day mortality and perioperative leg ischemia, intestinal ischemia, MI, respiratory complications, and nonhome discharge.



28th TCTAP

Updated real-world registry

Editor's Choice — Five Year Outcomes of the Endurant Stent Graft for Endovascular Abdominal Aortic Aneurysm Repair in the ENGAGE Registry

Joep A.W. Teijink ^{a,*}, Adam H. Power ^b, Dittmar Böckler ^c, Patrick Peeters ^d, Steven van Sterkenburg ^e, Lee H. Bouwman ^f, Hence J. Verhagen ^g, Marc Bosiers ^h, Vincente Riambau ⁱ, Jean-Pierre Becquemin ^j, Philippe Cuypers ^a, Marc van Sambeek ^a

^a Catharina Hospital Eindhoven, Eindhoven, the Netherlands ^b Western University, London, Ontario, Canada



- Long-term outcomes of advanced stent grafts
- Freedom from reintervention at 5 years: 80% in ENGAGE registry
- In DREAM Trial,

Freedom from secondary interventions at 6 years

: 81.9% for open surgical repair

70.4% for EVAR

Endurant stent graft proves efficacious and durable in ENGAGE 10-year data

27th April 2023 💿 865



"The ENGAGE registry evaluated more than 1,200 patients. The 10-year data, which included follow-up from approximately 400 of these patients, **showed a 94.7% freedom from aneurysm-related mortality** and 64.1% sac regression (or decreased AAA sac diameter) at 10 years." "acceptable long-term durability of these advanced stent grafts"



Conclusion

1. Despite of early benefit of survival, **longer follow-up** of these trials showed **similar mortality** between EVAR and open surgery.

2. In recent meta-analysis and large cohort study of EVAR vs. open surgery of AAA, longterm outcomes show mixed results.

3. Significant advancements have been made in EVAR technology over the years, including graft design, deployment techniques, and imaging modalities. **Newer-generation endografts with longer follow-up** are needed to better understand the outcomes of modern EVAR.

4. Shared decision-making between interventionist and surgeon, or patients, is crucial in selecting the most appropriate treatment option for AAA.

