

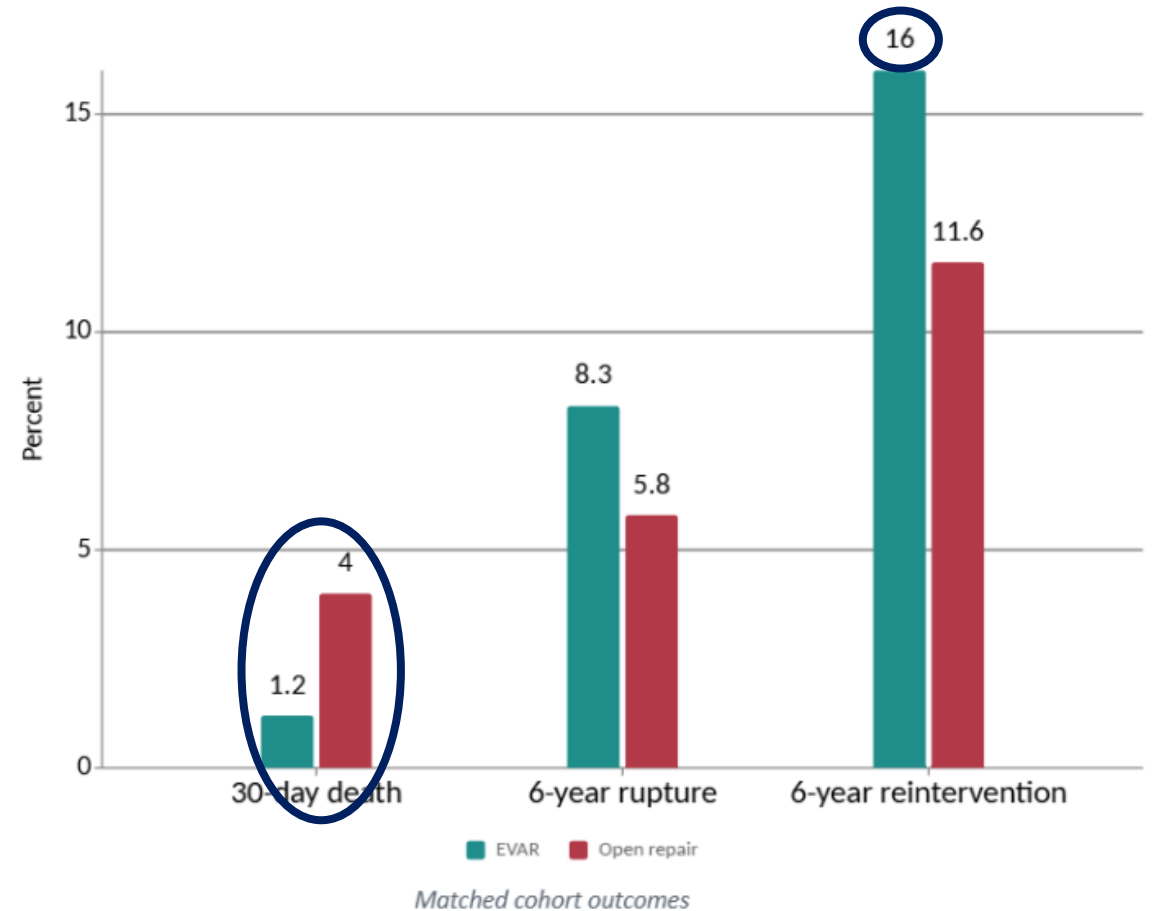
AAA - Complications after open and endovascular repair

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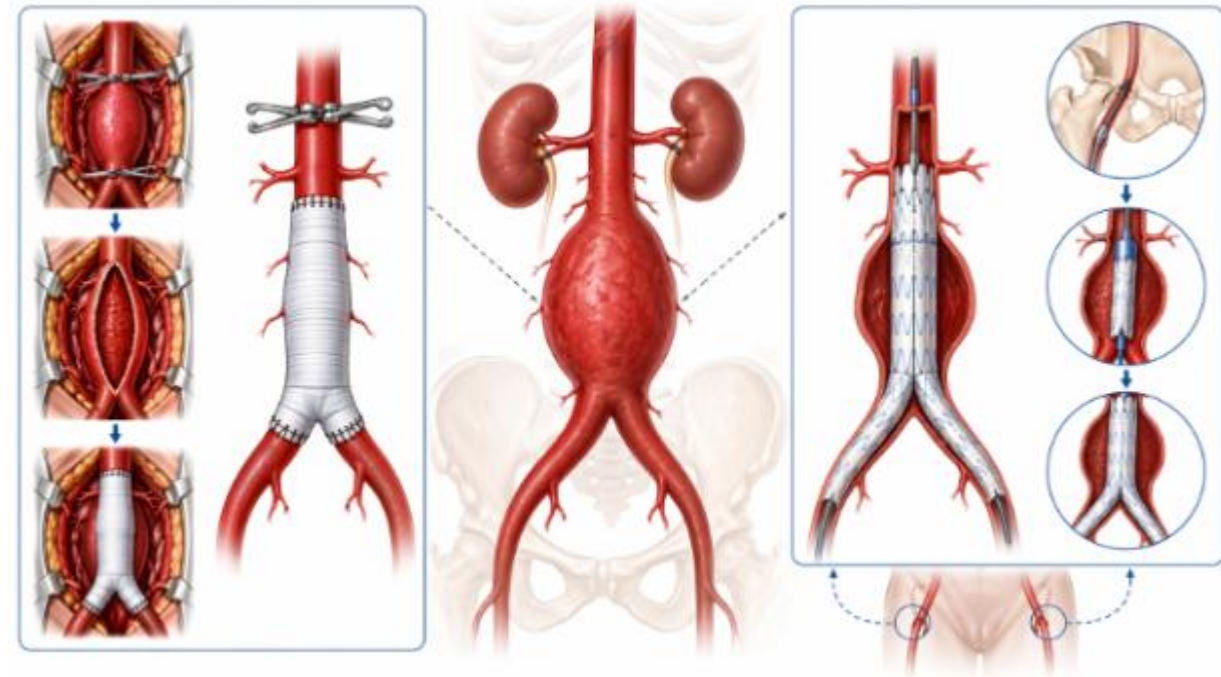
Types of complications

- early and late complications
- common complications
- specific complications of open surgical repair (OSR)
- specific complications of endovascular abdominal aortic aneurysm repair (EVAR)



Common complications

- cardiac complications (myocardial infarction)
- pulmonary complications
- acute kidney injury : not the same way
- infection : early and late complic.
- bleeding



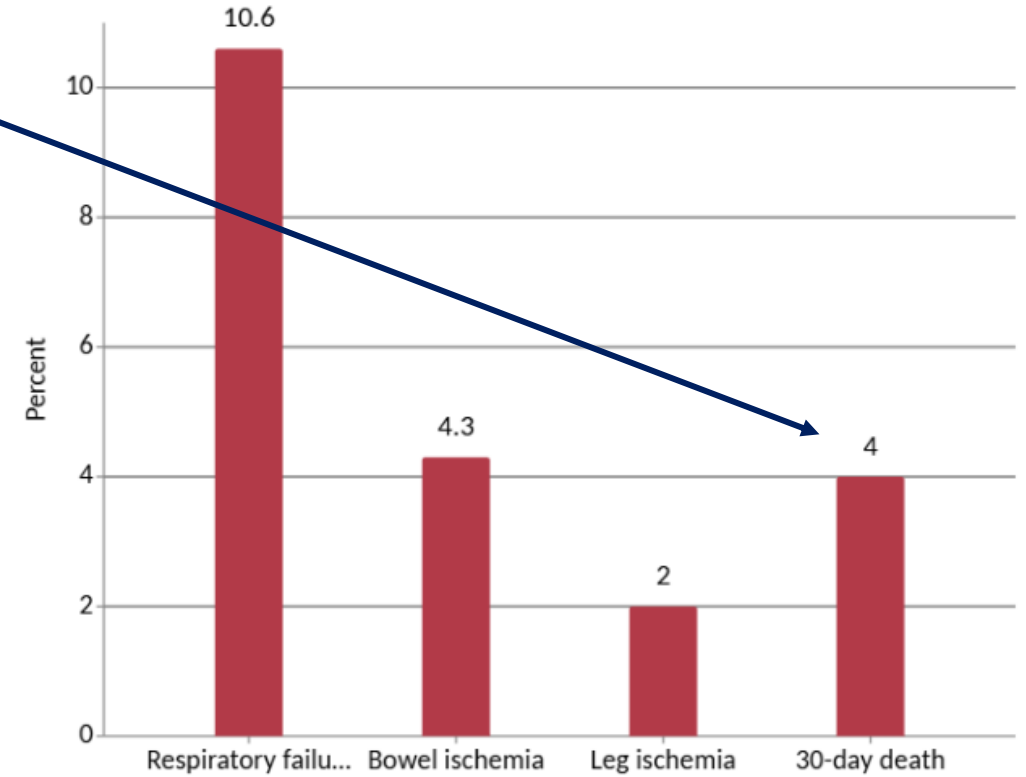
Early complications after OSR

- cardiac events
- hemorrhage
- respiratory complications
- acute kidney injury
- sexual dysfunction
- distal embolism
- bowel ischemia
- wound infection, graft infection
- paraplegia



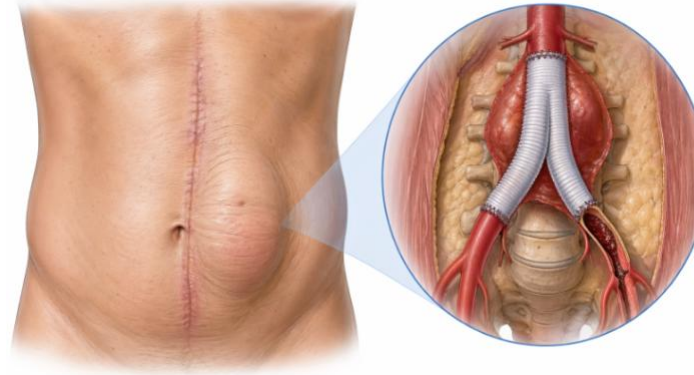
Matched cohort 30-day event rates

Open repair concentrates early cardiopulmonary and abdominal morbidity.



Late complications after OSR

- incisional hernia
- graft infection
- aortoenteric fistula (closure)
- graft occlusion
- para-anastomotic aneurysm
- persistent sexual dysfunction
- ureterohydronephrosis and small bowel erosion (technique)



Recommendation 55			
Changed			
For open abdominal aortic aneurysm repair, prophylactic use of mesh reinforcement of midline laparotomies should be considered.			
Class	Level	References	ToE
Ila	A	Nicolajsen <i>et al.</i> (2020), ³⁸⁴ Indrakusuma <i>et al.</i> (2018), ⁴⁰⁸ Dewulf <i>et al.</i> (2022), ⁴⁰⁹ Jairam <i>et al.</i> (2017) ⁴¹⁰	

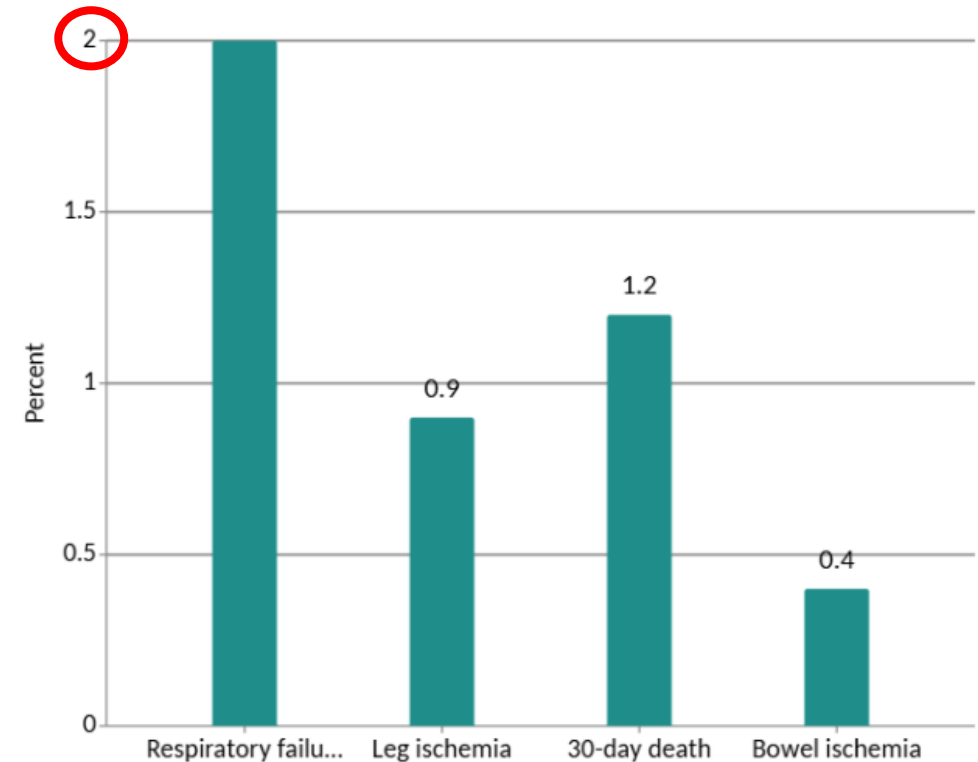
Late complications after OSR

Table 19. Long term complications after open surgical repair of abdominal aortic aneurysm, and their incidence within five and 10–15 years. ^{403,404,465,468,706–710}

Complication	Estimated incidence within five years	Estimated incidence within 10–15 years
Para-anastomotic aneurysm	1–2%	4% at 10 years – 12% at 15 years
Graft occlusion	1%	5% at 15 years
Incisional hernia	5–12%	5–21%
Graft infection	0.5–5%	—
Secondary aorto-enteric fistula	< 1%	—

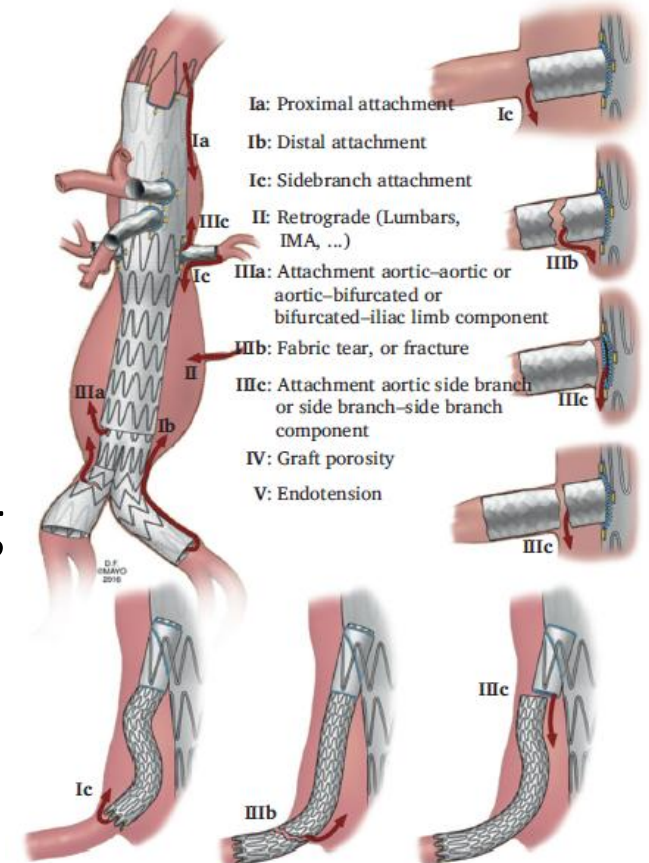
Early complications after EVAR

- access site complications (hematoma, pseudoaneurysm)
- **endoleak** (type I or III)
- device malposition
- limb occlusion → acute limb ischemia
- contrast-induced nephropathy
→ acute kidney injury (8,1% in our series)



Endoleaks

- primary vs secondary
- **type I** : leak at sealing sites
a, b or c → reintervention
- **type II** : retrograde flow from arterial branches
a or b → reintervention when sac growing
- **type III** : graft disconnection or defect
a or b → reintervention
- **type IV** : graft porosity
- **type V** : endotension → reintervention when sac growing



Type II Endoleaks

Recommendation 63

New

For patients undergoing endovascular abdominal aortic aneurysm repair, routine pre-emptive embolisation of accessory renal arteries is not indicated.

Class	Level	References	ToE
III	C	Lareyre <i>et al.</i> (2019) ⁴⁴⁶	

Recommendation 64

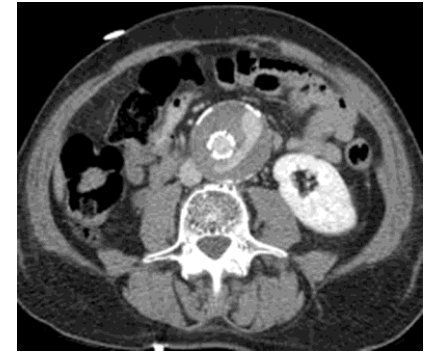
New

For patients undergoing endovascular repair of an abdominal aortic aneurysm, routine pre-emptive embolisation of the inferior mesenteric artery, lumbar arteries, and non-selective aneurysm sac embolisation is not indicated.

Class	Level	References	ToE
III	B	Zhang <i>et al.</i> (2022), ⁴⁵⁶ Samura <i>et al.</i> (2020), ⁴⁵⁷ Li (2020), ⁴⁵⁸ Kontopodis <i>et al.</i> (2023) ⁴⁵⁹	

Late complications after EVAR

- persistent primary or secondary endoleaks
 - stentgraft migration
 - aneurysm sac enlargement
 - device failure
 - stentgraft infection (including aortoenteric fistula)
 - stentgraft occlusion
- *need for reinterventions*



Late complications after EVAR

Table 20. Long term complications after endovascular repair of abdominal aortic aneurysm.^{465,468,469,711–720}

Complication	Meaning	Estimated incidence within five years	Rupture risk*
Type 1 endoleak	Sealing zone failure	5%	High
Type 1a	From proximal seal		
Type 1b	From distal seal		
Type 1c	From iliac occluder†		
Type 2 endoleak	Retrograde flow from aortic side branches	20–40% of which 10% persistent at two years	Low if no AAA sac expansion Intermediate if AAA sac expansion
Type 2a	One vessel visible		
Type 2b	More than one vessel visible		
Type 3 endoleak	Midgraft failure	1–3%	High
Type 3a	Separation or poor apposition of modular components		
Type 3b	Graft disruption		
Type 4 endoleak	Graft porosity		Low
Undetermined endoleak	Visible endoleak with no clear origin		Intermediate
Post-EVAR growth without endoleak		1%	Intermediate
Graft infection		0.5–1%	High
Post-EVAR rupture		1–6%	–
Graft obstruction	Partial or total obstruction of blood flow, including kinking	0.5–1%	Low
Migration	Proximal (descending) or distal (ascending) migration	0–9%	High if associated with Type 1 endoleak

* Rupture risk based on rough estimates indirectly derived from literature and expert panel opinion (low: < 1% year, intermediate 1 – 5%/year, high > 5%/year).

† In treatment with aorto-uni-iliac devices.

How to reduce complications

1

Choose the right patient

Optimize smoking cessation, cardiac status, lung disease, and renal function before elective repair.

2

Respect the anatomy

Avoid EVAR outside instructions for use when neck length, angulation, or iliac access are hostile.

3

Protect organs

Reduce embolization, contrast load, clamp time, and hypotension, maintain distal perfusion when needed.

4

Use meticulous technique

Secure sealing zones, adequate component overlap, careful access, and good hemostasis. Perform the correct surgical technique.

5

Plan follow-up

Surveillance only works if the patient returns and abnormal findings trigger timely action.

Complication prevention is multimodal: patient selection, anatomy, technique, peri-operative care, and reliable surveillance all matter.

Conclusions

- **OSR** : more systemic and surgical **early** complications → more death
- **EVAR** : more device-related **late** complications → more reinterventions
- preoperative **planning** and good **technique** are essential to prevent as much as possible complications
- **long-term surveillance** is mandatory, especially with EVAR

the question is not “which operation is better?”, but “**which complication profile fits the patient, anatomy and life expectancy?**”



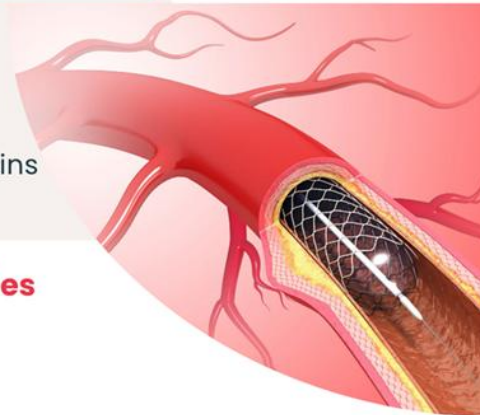
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