

ENDOVASCULAR REPAIR OF ABDOMINAL AORTIC ANEURYSM **(EVAR)**

Information for patients

Introduction

- Endovascular repair is a less invasive alternative to surgical repair of abdominal aortic aneurysm (AAA). A stent graft is placed inside the aorta and covers the aneurysm. A stent graft consists of some self-expandable metallic stents knitted together, and there is graft material outside the stents. Both materials have been used and put inside human body for many years and are proven safe.
- The appearance of a stent graft is similar to a pair of trousers and the procedure is similar to joining one leg of the trousers to the main part inside the aorta. EVAR can also be performed with straight stent-grafts joining together (aorto-uniiliac device), plus a femoro-femoral bypass. In highly selected patients, branched grafts or grafts with holes (fenestrated stent-grafts) can be used.
- After a successful operation, the aneurysm will be excluded from the blood flow in the aorta, thus preventing further expansion and rupture of the aneurysm.
- It will be performed by a team of experts from different specialties, including radiologists with special training in interventional radiology, surgeons with special training in vascular surgery, anaesthetists and other medical experts.
- It will be performed in the operation theatre or in the Department of Radiology under image guidance. Contrast medium will be used.

Procedure

- Before the operation, the patient will be assessed for feasibility of endovascular repair. This will include assessment of the general medical condition and other coexisting diseases, the surgical and anaesthetic risk of the operation and whether the vascular configuration is suitable for stent graft. Usually, a detailed CT scan of the abdominal aorta and its branches will be performed. Other imaging methods like MRI and ultrasound may be used.
- The procedure will be done under general anaesthesia or deep sedation. Your femoral arteries will be exposed in both groins. Anticoagulant drugs will be given to prevent blood clotting formation.
- Through a small cut in one artery, an instrument of 6 to 9mm in diameter will be inserted into your abdominal aorta under X-ray guidance. Contrast medium is injected for mapping the vascular anatomy. The main body and one limb of the stent graft inside are then released.
- The opposite limb of the stent graft is held inside another smaller instrument and is joined to the main body through the opposite femoral artery. The aneurysm is covered. Angiogram or intravascular ultrasound will be used to confirm that the operation is successful. Additional short stents or occlusion of the internal iliac artery with small metallic coils may be necessary to fully exclude blood flow to the aneurysm.
- If your femoral artery is too small, the external iliac artery or common iliac artery in the pelvis will be exposed for introduction of the stent graft.

- In some situation, it may be necessary to puncture other arteries e.g. brachial artery. This facilitates the procedure of guidewire manipulation for joining of stent grafts. It may also be used for angiography during the procedure.
- Femoral-femoral by-pass surgery is needed to maintain the blood supply to the lower limb if an aorto-uniiliac device is used. One iliac artery will be intentionally blocked by an occluder (a short graft with blind end).
- Branched grafts may be used in the iliac arteries to preserve blood flow to the internal iliac arteries. Fenestrated graft may be used for AAA with unfavourable anatomy around the renal arteries. Short covered stents will be inserted through the holes to preserve blood flow to the kidneys and other organs. Your operator will discuss with you about this option beforehand.
- The average duration of the procedure is 3 to 6 hours. The procedure will be longer if branched grafts or fenestrated grafts are used.
- After the procedure, the femoral arteries will be repaired with surgical sutures.
- You may be transferred to intensive care unit where you may stay for 1 day or more. You will then stay in general ward for recovery. You may have a low-grade fever for a few days, because of body reaction to the graft material. If the recovery is good, you will be discharged from hospital.
- You will have regular follow up in the outpatient clinic and also with radiological investigations, usually CT scan. Ultrasound and MR may also be used. If there is any late complication or delayed leakage, you may be admitted again to hospital for other procedures.

Potential Complications

- Leakage into the aneurysm because of incomplete seal in either ends of the stent graft (type I endoleak, 3.5-6.7%). This leakage will increase the risk of subsequent aortic rupture and need early treatment.
- Leakage through other small arteries into the aneurysm (type II endoleak, 10.2-18.9%). The risk of aortic rupture is much less in this situation. It can initially be followed up by radiological imaging, such as CT scan. 40% of type II leakage will seal off spontaneously.
- Leakage at the anastomosis between different components or through a perforation of the stent graft (type III endoleak, 4%). This leakage will increase the risk of subsequent aortic rupture and need early treatment.
- Blood may leak into aneurysm due to the porosity of the fabric graft (type IV endoleak). It is uncommon and usually resolves spontaneously.
- Sometimes the aneurysm may continue to expand even though no definite leakage can be demonstrated (type V endotension). It is uncommon but further intervention or surgery may be necessary in order to prevent aortic rupture.
- Overall, the reported incidence of endoleak within 30 days postoperatively is 15-25%.
- The stent graft may be infected (0.2-0.6%).
- Late rupture in absence of leakage (0.25%).
- Delayed leakage, kinking or other causes of graft failure requiring secondary intervention (30% in 4 years).
- Systemic complication: frequency depends on the general medical condition and coexisting

diseases

Heart: heart failure, myocardial infarct (heart attack)

Lung: chest infection

Brain: stroke

Gastrointestinal: bleeding, bowel ischemia (0.6-2%)

Kidneys: renal function impairment, this is also related to amount of contrast medium used (2.1-19%)

- Access site complication including blood clot accumulation, abnormal outpouch from the femoral artery, wound infection, lymph collection, damage to adjacent femoral nerve (1-10%).
- Tear or rupture of the access arteries and iliac arteries (3-12.9%).
- Occlusion of one or both internal iliac arteries (<6.3%), which may lead to buttock pain, reduced blood flow to colon and causes intestinal bleeding or bowel perforation, erectile dysfunction in male, loss of power in lower limbs, and incontinence. The occlusion may be necessary to prevent leakage into the aneurysm or may be unintentional.
- Failure to deploy the additional short covered stent in branched graft and fenestrated stent-graft.
- Occlusion of one graft limb due to blood clot (<6.4%).
- Occlusion of renal artery or branches by small clots or cholesterol plaques (<4%).
- Rupture of aneurysm even after successful endovascular repair (<0.8%): may be related to insecure fixation.
- Lower limb ischemia (<4.2%).
- Kinks and twists of graft limb (rare).
- Occlusion of whole stent graft (rare).
- Renal artery covered by graft (rare).
- Occlusion of blood flow to spinal cord and nerve roots (rare).
- Rupture of aneurysm during procedure (very rare).
- Delayed aortic neck enlargement – may cause delayed graft migration.
- Delayed graft migration (1.4-2.6%): depends on initial appearance of aneurysm and device - may require re-intervention if the migration is excessive
- Late metal wire failure, breakage and fracture (<5%) -- depend on devices, usually with no adverse effect. The devices are modified after this discovery and wire fracture is now uncommon.
- Erosion of stent graft into gastrointestinal tract causing life-threatening bleeding (very rare).
- Procedure related death is rare.
- The overall adverse reactions related to iodine-base non-ionic contrast medium is below 0.7%. The mortality due to reaction to non-ionic contrast medium is below 1 in 250000.

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