ENDOVASCULAR REPAIR OF THORACIC AORTIC DISEASES

Information for patients

Introduction

- Endovascular repair (TEVAR) is a less invasive alternative to surgical treatment of thoracic aortic diseases. It can be used to treat suitable cases of thoracic aortic aneurysm, traumatic thoracic aortic rupture and aortic dissection (Stanford type B). A stent graft is placed inside the aorta and covers the aneurysm in aneurysmal disease, site of aortic rupture in aortic injury or the entry point of tear in dissection. 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. TEVAR is also used in treatment of other thoracic aortic diseases.
- After a successful operation, the aneurysm, the rupture point or the thoracic aortic false lumen in aortic dissection will be excluded from the blood flow in the aorta.
- 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 cardiothoracic surgery or 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. For non-emergency cases, a detailed CT scan of the thoracic aorta and its branches will usually be performed; the size of the iliac arteries in the pelvis and the femoral arteries in the groin regions will be measured. Other imaging methods like angiogram, MRI and ultrasound may be used. For emergency cases, a CT scan may be the only pre-operative investigation performed.
- The procedure will usually be done under general anaesthesia. In rare situation, epidural anaesthesia may be used. A small catheter may be inserted through an artery in your wrist or elbow and reaches the aorta inside the chest, this catheter is used for angiogram and to mark important landmarks during release of the stent graft.
- The femoral artery will be exposed in one groin. Through a small cut in the artery, an instrument of 7 to 9mm in diameter will be inserted into your thoracic aorta under X-ray guidance. The stent graft inside is then released in the aorta to cover up the aneurysm, rupture site or entry tear. Angiogram or endoscopic ultrasound will be used to confirm that the operation is successful. Additional short stent may be necessary if the initial stent graft cannot fully exclude blood flow to the aneurysm or cover up the rupture or tear.
- If your femoral artery is too small, your external iliac artery in the pelvis will be exposed and the instrument introduced through it. In rare situation, a synthetic vessel will be connected to the common iliac artery or abdominal aorta for this procedure.
- Depending on the distance between the left subclavian artery and the aneurysm, rupture or entry tear, the doctors may need to cover up the left subclavian artery to ensure a good seal from the aortic disease. In less than 20% of patients, there are signs of marked decrease blood flow to the left upper limb; a synthetic vessel connecting the left carotid artery and the left subclavian artery may be necessary at a later stage.
- Occasionally, the left common carotid artery or the innominate artery on the aortic arch

- If the aneurysm involves the upper abdominal aorta as well, the doctors may need to occlude the celiac axis (the artery supplying the liver, spleen and stomach) with metallic fibred coils and then cover the origin of the celiac axis with the stent graft.
- The average duration of the procedure is 3 to 5 hours.
- The femoral artery will be closed with surgical sutures.
- After the procedure, 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 examinations, mostly with CT scan or MR. 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 leakage); -this leakage will increase the risk of subsequent aortic rupture. Leakage may also occur through other small arteries into the aneurysm (type II leakage). The average percentage of leakage is about 14%. The leakage may stop spontaneously.
- Paraplegia due to occlusion of blood flow to the spinal cord: (<4%). The average rate from multiple medical reports is about 3%. The incidence increases with longer coverage of the descending thoracic aorta and in patients with previous history of ascending thoracic aortic surgery or abdominal aortic surgery.
- Occlusion of the left subclavian artery (intentionally or unintentionally):
  - May cause left upper limb coldness and pain; need a bypass graft between the left carotid artery and left subclavian artery in less than 20% of patients.
  - May cause cerebro-vascular accident if there is diffuse vascular disease, or the right vertebral artery is very small (rare).
- Direct procedure related death is rare. The average 30-day death rate is about 10%. The risk is higher in patients with poor pre-operative condition, especially in patients with complications due to aortic dissection or in trauma patient.
- Incomplete cover of all the tear entry points in aortic dissection, the false lumen is not thrombosed.
- Uncontrolled tearing of the intimal flap in aortic dissection, or conversion to a Type A dissection (involving the ascending aorta), which may require surgical treatment.
- Formation of new aneurysm after successful occlusion of the false lumen in aortic dissection (7%).
- Systemic complication – frequency depends on the general medical condition and coexisting diseases

Heart	-	heart failure, myocardial infarct (heart attack)
Lung	-	chest infection
Brain	-	stroke (<4%)
Gastrointestinal	-	bleeding or infarct
Kidneys	-	also related to amount of contrast medium used (<3%)

- Access site complication including intimal tear requiring surgical repair, blood clot accumulation, abnormal outpouch from the femoral artery, wound infection, lymph collection, damage to adjacent femoral nerve (<6%).

- Unintentional occlusion of the left carotid artery may cause massive brain infarct and death (rare).
- Delayed abnormal communication between the thoracic aorta and esophagus (aorto-esophageal fistula) (rare). This is reported in 1.9% of patients in one series. It is almost invariably fatal.
- Tear or rupture of the iliac arteries (<1.5%).
- Embolism to lower limbs (<0.3%).
- Leakage through tear in graft material or in junctions (rare).
- Graft infection (rare).
- Compression of the left main bronchus by the stent graft (rare).
- Rupture of aorta during procedure (rare).
- Acute aortic rupture even after successful stent graft placement (rare).
- Dilatation of more than 3mm in the aorta proximal or distal to the stent graft has been reported, and is up to 43% in one study. It can be associated with migration of more than 5mm and subsequent kinking of stent graft. Further study and clarification is needed.
- Fracture in the metallic wire of the stent graft (rare and depends on product).
- Stent graft collapse (rare and depends on product).
- 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.

Disclaimer

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