Post-operative management after

OPEN TAAA SURGERY
TYPE 1 / 2 / 3 / 4 / 5 REPAIR

procedure-specific guidance on page 2

SCOTTISH NATIONAL TAAA AND COMPLEX AORTIC SERVICE
ROYAL INFIRMARY OF EDINBURGH

NHS Lothian

CARDIOVASCULAR RISK

Issue

- Pre-existing coronary artery disease is common.
- Haemodynamic change, especially tachycardia, may result in coronary plaque rupture.
- Patients with arterial disease tolerate hypovolaemia poorly.
- A hypercoagulable state usually develops post-operatively.

Targets

- **5 lead ECG** monitor with ST segment alarms on (alarm range -1.0 mm to +1.0 mm for II and V5).
- **12 lead ECG** on arrival to recovery / critical care, if ST segment alarm or patient complains of chest pain.

- Aim **HR <80**. If patient is on a beta-blocker, maintain beta blockade. Treat hypotension by other means - omit other anti-hypertensive drugs, give fluid / vasopressor. Give beta blocker NG if oral route not available. NG beta blockers may be poorly absorbed - if HR >80 switch to IV route (e.g. atenlolol 5mg IV once daily, omit if HR <60).
- Aim **MAP >70** or higher if specified on 'Spinal Cord Ischaemia Guideline'. Fluid challenges to limit vasopressor.
- Aim **SBP <180**. Use oral / IV agents to lower BP if necessary.
- Keep **Hb >80 g.L^{-1}** (or higher if spinal cord ischaemia suspected - see 'Spinal Cord Ischaemia Guideline').

- Continue **aspirin** and **LMWH / Minihep** therapy provided there is no severe coagulopathy or significant bleeding.
- Continue **statin** therapy (give NG if oral route not available) to stabilise coronary plaques.
- Normalise electrolytes, particularly **potassium** & **magnesium** to reduce risk of arrhythmias.

HAEMORRHAGE / HAEMATOLOGY

Issue

- Bleeding, anaemia, thrombocytopenia and coagulopathy can occur, particularly in the first few hours after surgery.
- Early identification & treatment of coagulopathy can prevent significant post-operative haemorrhage.
- Subsequently thrombotic complications become more common e.g. MI, PE.

Targets

All patients:

- Immediate post-op bloods (recovery or critical care admission) should include FBC & coagulation screen.
- Repeat FBC & coagulation screen 12 hours post-op.
- Immediate post-op ClotPro / ROTEM (recovery or critical care admission). Anaesthetist may advise subsequent ClotPro / ROTEM depending on clinical context.

First 48 hours post-op:

- **Aim platelet count ≥70 x 10^{9}.L^{-1}.** Treat with platelets. Discuss with haematology if platelets persistently low.
- **Aim INR ≤1.5.** Treat with FFP.
- **Aim fibrinogen ≥1.5.** Treat with FFP.
- **APTT ratio** may be moderately elevated post-op because heparin is given in theatre. Treatment of an isolated moderately raised APTT ratio (e.g. 2-3) is not required unless there are clinical signs of significant bleeding.

Significant ongoing bleeding suspected:

- Contact on call vascular surgeon urgently.
- Use serial ClotPro / ROTEM assays to rapidly assess coagulation. Treat as per ClotPro / ROTEM protocol.
- Ensure formal lab FBC & coagulation screen also sent.

RENAL / FLUIDS

Issue

- Pre-existing renal impairment is common.
- Period of renal ischaemia intra-operatively.

Targets

- Patients without established oral intake should receive maintenance IV fluid, not >30 ml/kg/day.
- If sustained urine output of <0.5 ml/kg/hr check U&E, give IV fluid challenge & reassess.

FEED

Issue

- Ileus common.
- NG tubes usually avoided after type 4 repair.

Targets

- See Trak handover for plan.
- If in doubt sips only & check with surgeons.
- **Aim blood glucose 6-12 mmol/L.**

LEGS

Issue

- Distal ischaemia may develop postoperatively due to graft thrombosis or embolism.

Targets

- **Check leg pulses, temperature & colour** every hour for 6 hours post-op then every 6 hours.
- Some pulses may not be assessable - confirm with vascular surgeons.

VTE

Targets

- **Minihep 5000 units BD.**
- 1st dose 6 hours post op unless otherwise specified in Trak handover, or significant bleeding suspected.
- **No TEDS or calf compression boots**, unless explicitly stated in Trak handover.
- Patients deemed to be at very low risk for spinal cord ischaemia may be switched to LMWH following discussion between critical care & vascular anaesthetic consultants.

WOUNDS

Targets

- **Mepore** dressing: leave intact for 2 days.
- **Blue swabs / tegaderm**: leave intact for 5 days.
- If strike through more than a very small amount change dressing & inform surgeon.
- Daily observation for haematoma / infection.

DRAINS

Targets

- Low grade suction if specified by surgeons.
- Document output hourly.
- **Alert surgical team if >500 ml out in 1 hour.**

Dr I Young / Dr A Ruthven / Mr O Falah. Published June 2022. Review June 2027.

Post-operative management specific to
OPEN TYPE 4 TAAA REPAIR
(laparotomy)

SPINAL CORD ISCHAEMIA

Issue

- Most type 4 TAAA repairs = **MODERATE RISK** of spinal cord ischaemia (SCI) and paraplegia.
- Spinal cord perfusion can remain precarious for several weeks after surgery.
- CSF drain not routinely inserted pre-operatively.
- Weakness due to SCI is more common than epidural haematoma.

Targets

- **Assess leg power EVERY 2 HOURS for the first 48 hours post-op** (same frequency as leg motor scoring with an epidural). Thereafter, at least 6-hourly (or more frequent if specified).
- Aim **MAP >70** or higher if specified on Trak.
- **Avoiding hypotension / hypoxia is critical.**
- Respond quickly to drops in BP & SpO2, particularly if patient unstable (e.g. reintubation).

- If **leg weakness** develops:
  - Notify medical staff.
  - Stop the epidural (if applicable).
  - Raise the MAP target by 10 (usual max 100).

- If weakness persists for 30 minutes despite these interventions:
  - **CSF drainage should be considered**.
  - Discuss with the critical care consultant urgently (0800-1800 Mon to Fri also discuss with the vascular anaesthetist in theatre 18).
  - Ensure the patient has had a FBC & coag screen checked within the past 4 hours.
  - If mini-hep given within the past 4 hours, check an 'unfractionated heparin assay'.

- Urgent imaging for epidural haematoma should be considered (although SCI is more common).
- MRI is best but CT is easier to facilitate quickly. Seek advice from radiology / neuroanaesthesia.

VISCERAL ISCHAEMIA

Issue

- All patients have a period of intra-operative visceral ischaemia where blood flow to liver, GI tract and kidneys is interrupted.
- Abdominal organ ischaemic injury may result.

Targets

- Avoid excessive vasopressor administration. Frequent fluid challenges & reassessment.
- Daily LFTs.
- Beware suddenly rising creatinine without another explanation which may reflect renal ischaemia.
- Beware rising lactate not responding to fluid resuscitation, or unexplained abdominal pain which may reflect GI tract ischaemia.

RESPIRATORY

Issue

- Pre-existing lung disease is common.
- Division of left crus of diaphragm with risk of left sided pleural effusion / haemothorax.
- Risk of post-operative atelectasis / pneumonia.

Targets

- Aim **SpO2 94-98%**.
- Optimise analgesia (usually thoracic epidural) to permit deep breathing & coughing.
- Aim for early mobilisation.

Post-operative management specific to
OPEN TYPE 1 / 2 / 3 / 5 TAAA REPAIR
(thoraco-laparotomy, one-lung ventilation, left heart bypass)

SEE ALSO: SPINAL CORD ISCHAEMIA GUIDELINE

SPINAL CORD ISCHAEMIA

Issue

- Type 1 / 2 / 3 / 5 TAAA repairs = **HIGH RISK** of spinal cord ischaemia (SCI) and paraplegia.
- Spinal cord perfusion can remain precarious for several weeks after surgery.
- **CSF drain** usually inserted pre-operatively.
- Weakness due to SCI is more common than epidural haematoma.
- **Optimising spinal cord perfusion is time critical & may prevent permanent paraplegia.**

Targets

- **Assess leg power EVERY HOUR for the first 48 hours post-op.** Thereafter, at least 6-hourly (or more frequent if specified).
- Lighten sedation to assess if necessary.
- Aim **leg movement score ≤2** (can bend knees).
- Aim **MAP >70** or higher if specified on the 'Spinal Cord Ischaemia Guideline'.
- **Avoiding hypotension / hypoxia is critical.**
- Respond quickly to drops in BP & SpO2, particularly if patient unstable (e.g. reintubation).

- If **leg weakness** develops:
  - Notify medical staff.
  - Stop the epidural (if applicable).
  - Raise the MAP target by 10 (usual max 100).
  - Consider lowering CSF pressure - see 'Spinal Cord Ischaemia Guideline'.

- Urgent imaging for epidural haematoma should be considered (although SCI is more common).
- MRI is best but CT is easier to facilitate quickly. Seek advice from radiology / neuroanaesthesia.

VISCERAL ISCHAEMIA

Issue

- Most patients have a period of intra-operative visceral ischaemia where blood flow to liver, GI tract and kidneys is interrupted.
- Abdominal organ ischaemic injury may result.

Targets

- Avoid excessive vasopressor administration. Frequent fluid challenges & reassessment.
- Daily LFTs.
- Beware suddenly rising creatinine without another explanation which may reflect renal ischaemia.
- Beware rising lactate not responding to fluid resuscitation, or unexplained abdominal pain which may reflect GI tract ischaemia.

RESPIRATORY

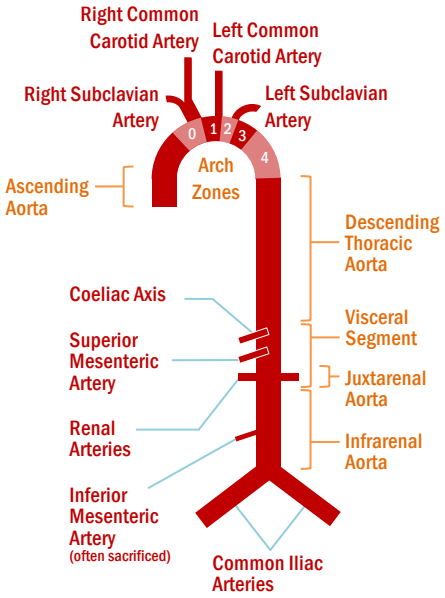
Issue

- Pre-existing lung disease is common.
- Thoraco-laparotomy with chest and abdominal wounds, rib division or resection.
- Division of the diaphragm.
- One-lung ventilation (left lung collapse intra-op). Bloody secretions from the left lung common.
- Left sided pleural effusion / haemothorax.
- Pulmonary remote ischaemia-reperfusion injury.
- Post-op pneumonia (common).

Targets

- Lung protective ventilation.
- Aim **SpO2 94-98%, PaO2 >8, PaCO2 <8** initially pending ongoing critical care review.
- Optimise analgesia (usually thoracic epidural) to permit deep breathing & coughing.

NORMAL AORTA

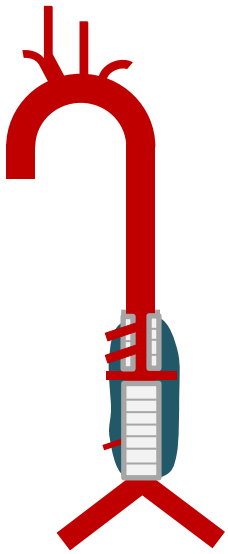


LAPAROTOMY

TYPE 4 OPEN REPAIR

proximal anastomosis:
visceral segment

distal anastomosis
infrarenal aorta, aortic bifurcation or may be extended as branched graft to iliac / femoral arteries



spinal cord ischaemia risk
MODERATE

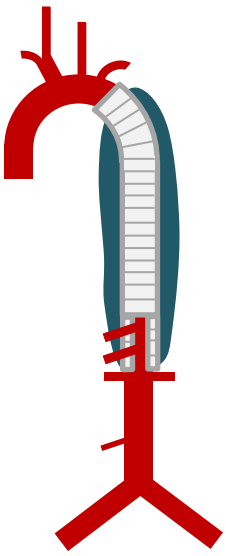
visceral ischaemia risk
HIGH

THORACO-LAPAROTOMY, ONE-LUNG VENTILATION, PARTIAL LEFT HEART BYPASS

TYPE 1 OPEN REPAIR

proximal anastomosis
proximal descending thoracic aorta

distal anastomosis
visceral segment



spinal cord ischaemia risk
HIGH

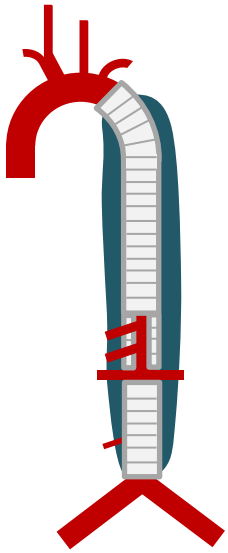
visceral ischaemia risk
HIGH

TYPE 2 OPEN REPAIR

proximal anastomosis
proximal descending thoracic aorta

middle anastomosis
visceral segment
usually as a patch

distal anastomosis
infrarenal aorta, aortic bifurcation or may be extended as branched graft to iliac / femoral arteries



spinal cord ischaemia risk
HIGH

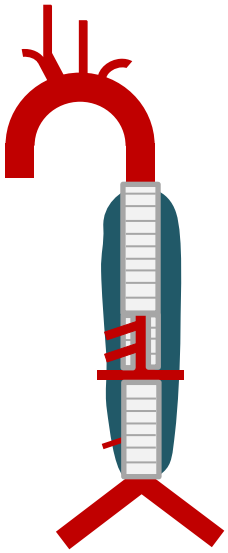
visceral ischaemia risk
HIGH

TYPE 3 OPEN REPAIR

proximal anastomosis
distal descending thoracic aorta

middle anastomosis
visceral segment
usually as a patch

distal anastomosis
infrarenal aorta, aortic bifurcation or may be extended as branched graft to iliac / femoral arteries



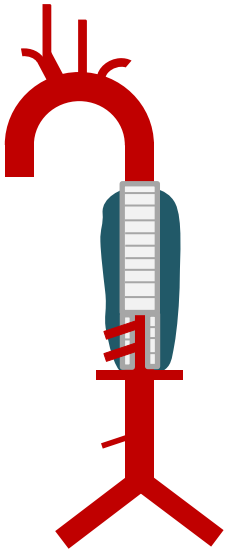
spinal cord ischaemia risk
HIGH

visceral ischaemia risk
HIGH

TYPE 5 OPEN REPAIR

proximal anastomosis
distal descending thoracic aorta

distal anastomosis
visceral segment



spinal cord ischaemia risk
HIGH

visceral ischaemia risk
HIGH