

Congenital Malformation of the Thoracic Aorta

Thoracoabdominal Aneurysm (TAA)

Classification:

- Type 1 : involves most of the descending thoracic and upper abdominal aorta
- Type 2 : involves the descending thoracic and most of abdominal aorta
- Type 3 : involves the distal descending thoracic aorta and most of abdominal aorta
- Type 4 : involves most or the entire abdominal aorta including the visceral artery segment

Etiology:

- Most common is atherosclerotic medial degenerative disease (82%)
- Dissection (17%)
- Other: Marfan syndrome, Ehlers-Danlos syndrome, mycotic aneurysm, Takayasu aortitis
- Hypertension is frequent in both dissecting and non dissecting TAA

History:

- Only about $\frac{1}{4}$ of unoperated patients who have TAA are alive at 2 years
- Patients who have undergone surgery for TAA have a 71% 2-year survival rate
- The expansion rate for TAA is less than 5mm/year
- However, the larger the aneurysm, the higher the expansion rate
- The size threshold recommended for surgery is 5cm

Clinical presentation:

- Asymptomatic presentation occurs in 43%
- Pain is located in the back, flank or chest
- It could be acute (expansion, rupture, or dissection) or chronic
- May cause adjacent compression : hoarseness, cough, hemoptysis, dyspnea, dysphagia

Diagnosis:

- Accurate radiologic evaluation is essential
- A contrast-enhanced CT scan provides essential information including proximal and distal extent of the aneurysm, status of visceral arteries, location and topography of the renal arteries, and size and perfusion of kidneys
- Standard contrast angiography is performed in all elective cases
- It is helpful in assessing the patency of intercostal vessels for reimplantation and the status of iliac arteries in cases in which retrograde aortic perfusion is planned

Treatment:

- Surgical repair with graft replacement is the only effective treatment for TAA
- Nonoperative therapy is reserved for patient with prohibitive surgical risk or limited life expectancy
- Surgical technique described by Crawford 1965, consisting of opening the aneurysm sac after cross clamping the aorta and replacing the diseased segment with graft
- The major intercostal arteries and the visceral aortic segment will be included or reimplanted in the graft
- Exposure is achieved through a left TA incision

- Adjunctive measures used for spinal protection include spinal drainage with or without epidural cooling
- Others : - large bore IVs in upper extremities or neck for high flow volume replacement
- arterial and Swan-Ganz monitoring
- double-lumen endotracheal tube normally used
- transoesophageal echocardiography is helpful in monitoring myocardial contractility and detecting early ischemia
- thoracic epidural catheter is used for perioperative pain management and possible spinal cooling
- a lumbar intrathecal catheter can be used for CSF drainage
- Post operatively, patient is maintained on mechanical ventilation for 24-48 hours - Spinal drainage is maintained for about 3 days, because neuronal swelling and ischemia can occur during this period

Postoperative complication:

1. Neurological complication:

Second to mortality, this is the most dreaded and the most devastating complication

Multiple surgical adjuncts that help:

- Maintain adequate perfusion pressure to the spinal cord – by having proximal aortic pressure in the 150 – 170 mmHg systolic range and decreasing CSF pressure with spinal drainage
- Distal aortic perfusion during cross clamp
- Spinal drainage
- Steroids and barbiturate

2. Pulmonary complication:

Respiratory failure- 25-45%

Optimization of pulmonary function should be done preoperatively in elective cases

Intraoperatively, radial division of the diaphragm should be avoided when possible, replaced by a diaphragm-sparing technique

3. Renal insufficiency:

Referred to as doubling of the baseline creatinine or creatinine greater than 3 mg/dL

Etiologic factors include duration of renal ischemia, baseline renal dysfunction, and embolization during aortic manipulation

Can be minimized by:

- Limit the use of postoperative nephrotoxic contrast agents
- Intraoperative treatment of renal artery stenosis
- Preoperative volume expansion and intraoperative use of mannitol
- Minimizing renal ischemia time
- Postoperative low-dose dopamine (2-3mg/kg/min)
- Hemodialysis is better withheld unless absolutely necessary

4. Cardiac complication:

Second most common complication after respiratory failure

5. Bleeding complication:

Reoperation for bleeding is about 7% of cases

Etiology may include inadequate hemostasis, preoperative coagulopathy, coagulopathy secondary to heamolulution, hypothermia and mesenteric and hepatic ischemia/reperfusion

Common source include splenic tears and unrecognized lumbar or intercostal back-bleeding

Clinical outcome:

- Survival at 5 years after surgery is around 60%
- Most patients return to independent-living status

Reference

Essential of surgey - Chapter 38, Aneurysm, page 456