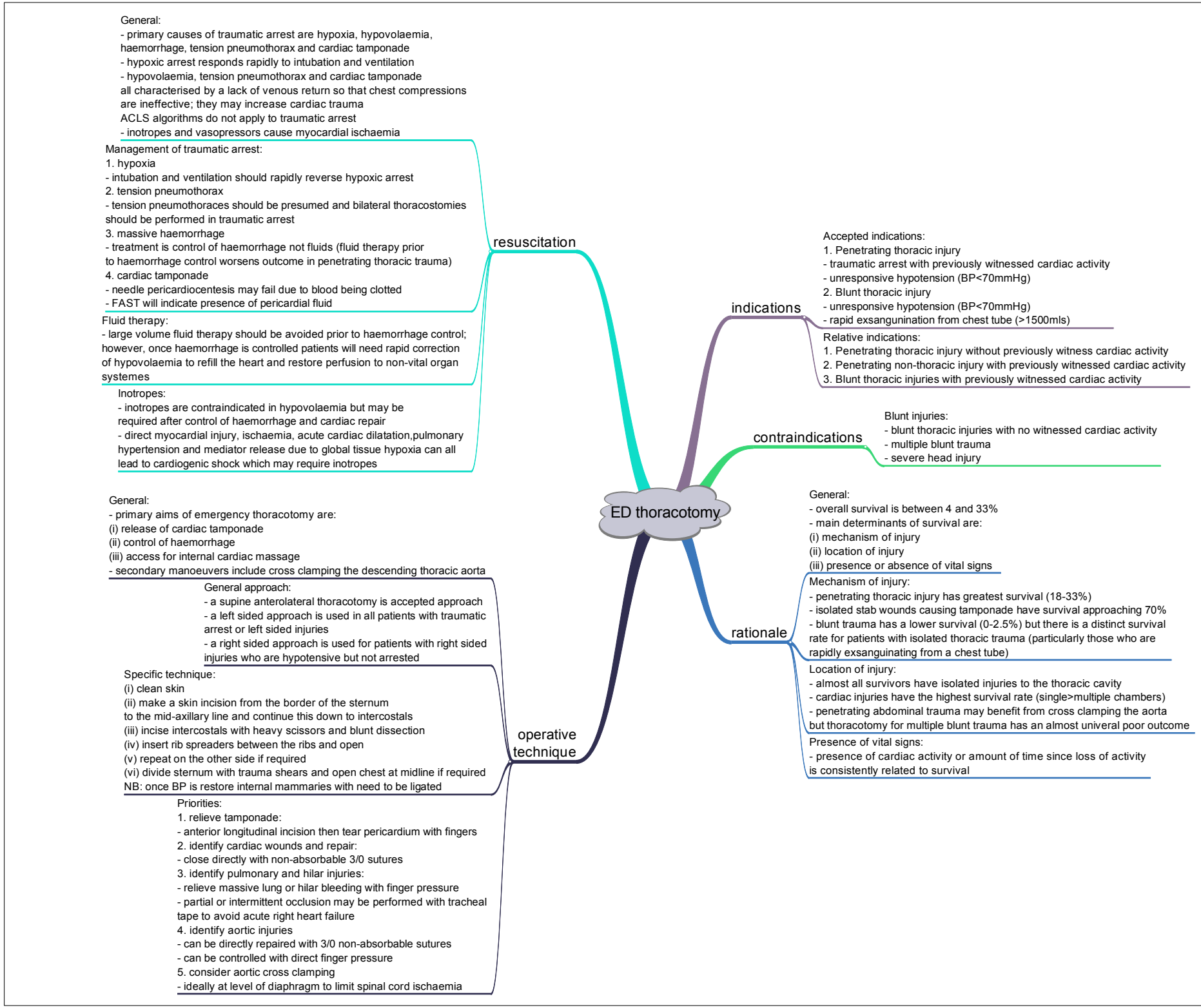
ED thoracotomy
resuscitation
General:
- primary causes of traumatic arrest are hypoxia, hypovolaemia, haemorrhage, tension pneumothorax and cardiac tamponade
- hypoxic arrest responds rapidly to intubation and ventilation
- hypovolaemia, tension pneumothorax and cardiac tamponade all characterised by a lack of venous return so that chest compressions are ineffective; they may increase cardiac trauma
ACLS algorithms do not apply to traumatic arrest
- inotropes and vasopressors cause myocardial ischaemia
Management of traumatic arrest:
1. hypoxia
- intubation and ventilation should rapidly reverse hypoxic arrest
2. tension pneumothorax
- tension pneumothoraces should be presumed and bilateral thoracostomies should be performed in traumatic arrest
3. massive haemorrhage
- treatment is control of haemorrhage not fluids (fluid therapy prior to haemorrhage control worsens outcome in penetrating thoracic trauma)
4. cardiac tamponade
- needle pericardiocentesis may fail due to blood being clotted
- FAST will indicate presence of pericardial fluid
Fluid therapy:
- large volume fluid therapy should be avoided prior to haemorrhage control; however, once haemorrhage is controlled patients will need rapid correction of hypovolaemia to refill the heart and restore perfusion to non-vital organ systemes
Inotropes:
- inotropes are contraindicated in hypovolaemia but may be required after control of haemorrhage and cardiac repair
- direct myocardial injury, ischaemia, acute cardiac dilatation,pulmonary hypertension and mediator release due to global tissue hypoxia can all lead to cardiogenic shock which may require inotropes
indications
Accepted indications:
1. Penetrating thoracic injury
- traumatic arrest with previously witnessed cardiac activity
- unresponsive hypotension (BP<70mmHg)
2. Blunt thoracic injury
- unresponsive hypotension (BP<70mmHg)
- rapid exsangunination from chest tube (>1500mls)
Relative indications:
1. Penetrating thoracic injury without previously witness cardiac activity
2. Penetrating non-thoracic injury with previously witnessed cardiac activity
3. Blunt thoracic injuries with previously witnessed cardiac activity
contraindications
Blunt injuries:
- blunt thoracic injuries with no witnessed cardiac activity
- multiple blunt trauma
- severe head injury
rationale
General:
- overall survival is between 4 and 33%
- main determinants of survival are:
(i) mechanism of injury
(ii) location of injury
(iii) presence or absence of vital signs
Mechanism of injury:
- penetrating thoracic injury has greatest survival (18-33%)
- isolated stab wounds causing tamponade have survival approaching 70%
- blunt trauma has a lower survival (0-2.5%) but there is a distinct survival rate for patients with isolated thoracic trauma (particularly those who are rapidly exsanguinating from a chest tube)
Location of injury:
- almost all survivors have isolated injuries to the thoracic cavity
- cardiac injuries have the highest survival rate (single>multiple chambers)
- penetrating abdominal trauma may benefit from cross clamping the aorta but thoracotomy for multiple blunt trauma has an almost univeral poor outcome
Presence of vital signs:
- presence of cardiac activity or amount of time since loss of activity is consistently related to survival
operative technique
General:
- primary aims of emergency thoracotomy are:
(i) release of cardiac tamponade
(ii) control of haemorrhage
(iii) access for internal cardiac massage
- secondary manoeuvers include cross clamping the descending thoracic aorta
General approach:
- a supine anterolateral thoracotomy is accepted approach
- a left sided approach is used in all patients with traumatic arrest or left sided injuries
- a right sided approach is used for patients with right sided injuries who are hypotensive but not arrested
Specific technique:
(i) clean skin
(ii) make a skin incision from the border of the sternum to the mid-axillary line and continue this down to intercostals
(iii) incise intercostals with heavy scissors and blunt dissection
(iv) insert rib spreaders between the ribs and open
(v) repeat on the other side if required
(vi) divide sternum with trauma shears and open chest at midline if required
NB: once BP is restore internal mammaries with need to be ligated
Priorities:
1. relieve tamponade:
- anterior longitudinal incision then tear pericardium with fingers
2. identify cardiac wounds and repair:
- close directly with non-absorbable 3/0 sutures
3. identify pulmonary and hilar injuries:
- relieve massive lung or hilar bleeding with finger pressure
- partial or intermittent occlusion may be performed with tracheal tape to avoid acute right heart failure
4. identify aortic injuries
- can be directly repaired with 3/0 non-absorbable sutures
- can be controlled with direct finger pressure
5. consider aortic cross clamping
- ideally at level of diaphragm to limit spinal cord ischaemia