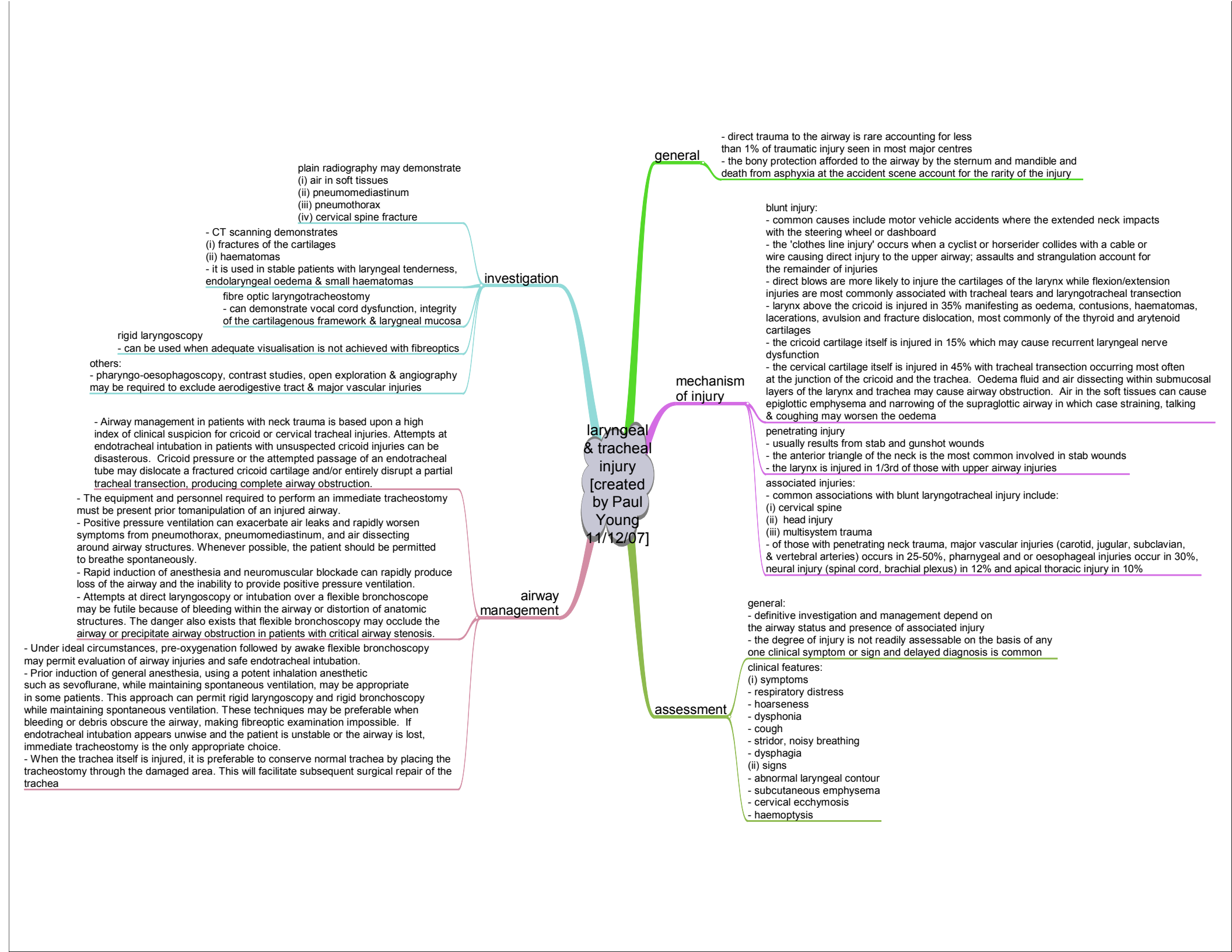
laryngeal & tracheal injury [created by Paul Young 11/12/07]
general
- direct trauma to the airway is rare accounting for less than 1% of traumatic injury seen in most major centres
- the bony protection afforded to the airway by the sternum and mandible and death from asphyxia at the accident scene account for the rarity of the injury
mechanism of injury
blunt injury:
- common causes include motor vehicle accidents where the extended neck impacts with the steering wheel or dashboard
- the 'clothes line injury' occurs when a cyclist or horserider collides with a cable or wire causing direct injury to the upper airway; assaults and strangulation account for the remainder of injuries
- direct blows are more likely to injure the cartilages of the larynx while flexion/extension injuries are most commonly associated with tracheal tears and laryngotracheal transection
- larynx above the cricoid is injured in 35% manifesting as oedema, contusions, haematomas, lacerations, avulsion and fracture dislocation, most commonly of the thyroid and arytenoid cartilages
- the cricoid cartilage itself is injured in 15% which may cause recurrent laryngeal nerve dysfunction
- the cervical cartilage itself is injured in 45% with tracheal transection occurring most often at the junction of the cricoid and the trachea. Oedema fluid and air dissecting within submucosal layers of the larynx and trachea may cause airway obstruction. Air in the soft tissues can cause epiglottic emphysema and narrowing of the supraglottic airway in which case straining, talking & coughing may worsen the oedema
penetrating injury
- usually results from stab and gunshot wounds
- the anterior triangle of the neck is the most common involved in stab wounds
- the larynx is injured in 1/3rd of those with upper airway injuries
associated injuries:
- common associations with blunt laryngotracheal injury include:
(i) cervical spine
(ii) head injury
(iii) multisystem trauma
- of those with penetrating neck trauma, major vascular injuries (carotid, jugular, subclavian, & vertebral arteries) occurs in 25-50%, pharnygeal and or oesophageal injuries occur in 30%, neural injury (spinal cord, brachial plexus) in 12% and apical thoracic injury in 10%
assessment
general:
- definitive investigation and management depend on the airway status and presence of associated injury
- the degree of injury is not readily assessable on the basis of any one clinical symptom or sign and delayed diagnosis is common
clinical features:
(i) symptoms
- respiratory distress
- hoarseness
- dysphonia
- cough
- stridor, noisy breathing
- dysphagia
(ii) signs
- abnormal laryngeal contour
- subcutaneous emphysema
- cervical ecchymosis
- haemoptysis
airway management
- Airway management in patients with neck trauma is based upon a high index of clinical suspicion for cricoid or cervical tracheal injuries. Attempts at endotracheal intubation in patients with unsuspected cricoid injuries can be disasterous. Cricoid pressure or the attempted passage of an endotracheal tube may dislocate a fractured cricoid cartilage and/or entirely disrupt a partial tracheal transection, producing complete airway obstruction.
- The equipment and personnel required to perform an immediate tracheostomy must be present prior tomanipulation of an injured airway.
- Positive pressure ventilation can exacerbate air leaks and rapidly worsen symptoms from pneumothorax, pneumomediastinum, and air dissecting around airway structures. Whenever possible, the patient should be permitted to breathe spontaneously.
- Rapid induction of anesthesia and neuromuscular blockade can rapidly produce loss of the airway and the inability to provide positive pressure ventilation.
- Attempts at direct laryngoscopy or intubation over a flexible bronchoscope may be futile because of bleeding within the airway or distortion of anatomic structures. The danger also exists that flexible bronchoscopy may occlude the airway or precipitate airway obstruction in patients with critical airway stenosis.
- Under ideal circumstances, pre-oxygenation followed by awake flexible bronchoscopy may permit evaluation of airway injuries and safe endotracheal intubation.
- Prior induction of general anesthesia, using a potent inhalation anesthetic such as sevoflurane, while maintaining spontaneous ventilation, may be appropriate in some patients. This approach can permit rigid laryngoscopy and rigid bronchoscopy while maintaining spontaneous ventilation. These techniques may be preferable when bleeding or debris obscure the airway, making fibreoptic examination impossible. If endotracheal intubation appears unwise and the patient is unstable or the airway is lost, immediate tracheostomy is the only appropriate choice.
- When the trachea itself is injured, it is preferable to conserve normal trachea by placing the tracheostomy through the damaged area. This will facilitate subsequent surgical repair of the trachea
investigation
plain radiography may demonstrate
(i) air in soft tissues
(ii) pneumomediastinum
(iii) pneumothorax
(iv) cervical spine fracture
- CT scanning demonstrates
(i) fractures of the cartilages
(ii) haematomas
- it is used in stable patients with laryngeal tenderness, endolaryngeal oedema & small haematomas
fibre optic laryngotracheostomy
- can demonstrate vocal cord dysfunction, integrity of the cartilagenous framework & larygneal mucosa
rigid laryngoscopy
- can be used when adequate visualisation is not achieved with fibreoptics
others:
- pharyngo-oesophagoscopy, contrast studies, open exploration & angiography may be required to exclude aerodigestive tract & major vascular injuries