Blunt Chest Trauma and Rib Fractures - Adults

INTRODUCTION

- Chest trauma is common.
- Rib fractures and lung injuries are the commonest site of chest injury.

SCOPE OF THIS GUIDELINE

- This guideline covers the general management of blunt chest trauma and on whom to consider further investigations or intervention.

INDICATIONS FOR THORACIC SURGICAL OPINION or for a CT SCAN OF THE CHEST

(note that these are *relative* indications and not absolute, particularly in the case of subcutaneous emphysema and sternal fracture)

CT scan of the chest should generally be obtained prior to referral

- 3 or more rib fractures on a CXR
- Radiological or clinical suspicion of a flail chest
- Sternal fracture
- Pneumomediastinum
- Subcutaneous emphysema
- Significant symptom burden
    - Failure of pain control
    - Inability to cough effectively / clear pulmonary secretions
    - Ventilatory compromise
- Patients at high risk of developing complications e.g. anticoagulant medication, who would not otherwise be admitted.

RIB FRACTURES

- Rib fractures are the commonest injury in blunt trauma.
- Ribs 4 – 8 are the commonest fractured ribs.
- Fractures of the 1st to 3rd ribs indicate high energy trauma
    - Consider subclavian or brachial plexus injury
- Fractures to ribs 9 – 12 can be associated with intra-abdominal injury.
- The commonest injuries associated with rib fractures are haemothoraces and pneumothoraces.
- Elderly patients (>65yrs) with rib fractures are at greater risk of death and pneumonia; the greater the number of fractured ribs, the higher the risk of death.

PULMONARY CONTUSION

- Blunt force trauma to the chest wall results in pulmonary contusion. This may or may not be associated with rib fractures.
- Pulmonary contusion can result in respiratory failure requiring invasive respiratory support.

FLAIL CHEST

- This is defined as 3 or more ribs that are fractured in at least 2 places.
- The clinical significance of a flail chest is the presence of an incompetent segment of chest wall large enough to impair respiration.
- Despite the radiological appearance of a flail chest, patients may not have a clinically apparent flail segment. This could be because the patient may be in too much pain to breathe effectively or the chest wall musculature may be in spasm; either may mask paradoxical chest wall movement. Alternatively the patient may have required early intubation for other reasons.
- The combination of flail chest and pulmonary contusion is associated with higher mortality than either isolated contusion or flail.

MANAGEMENT OF BLUNT CHEST TRAUMA

- This is guided by the degree of respiratory impairment (due to, for example, contusion, atelectasis, pneumothorax or haemothorax) and presence of other clinical factors, such as shock, associated head injuries or the need for a GA due to extrathoracic injuries.
- Initial management is ABC, as per ATLS
- **'**Breathing'
    - Early anaesthetic input is essential
    - Drainage of haemo- and pneumothoraces.
- 'Circulation'
    - This is not easy in the presence of pulmonary contusion.
        - Fluid resuscitation in the presence of hypovolaemic shock is essential; this has to be balanced against the need to avoid fluid overload and development of acute lung injury / ARDS in a contused lung.
- Patients who have sustained significant blunt chest trauma should be managed on a high dependency unit as a minimum, where close observation of their respiratory and circulatory parameters is essential. Escalation of care should be considered as appropriate.

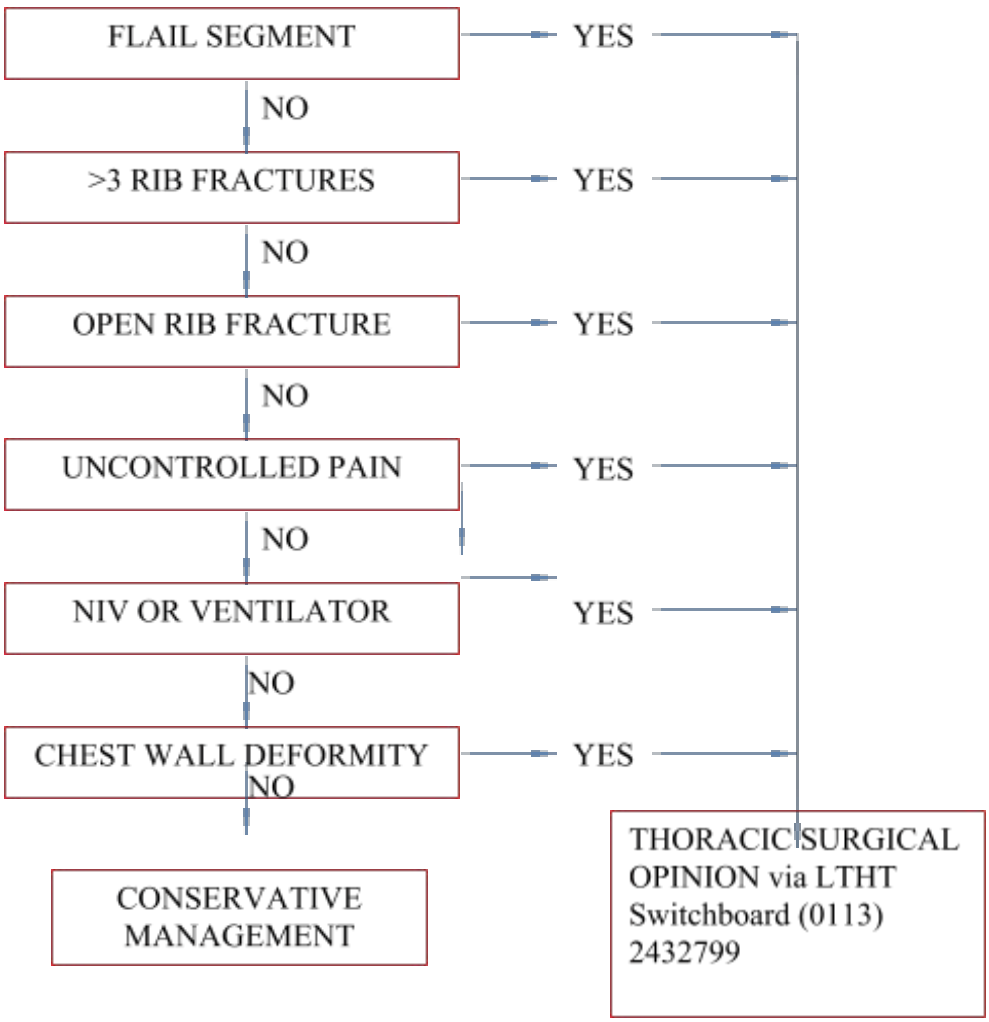
PAIN MANAGEMENT

- Pain relief in these patients is essential. This is to allow for early mobilisation (depending on other injuries), chest physiotherapy and to ensure an effective cough.
- Refer to the guideline for pain management. Most of these patients will require a PCA. Specific techniques in the management of chest trauma include epidurals & paravertebral injections or catheters. Discussion with the acute pain team is recommended.
- Some patients with uncontrollable pain due to the presence of rib fractures can be considered for rib fracture fixation. See below.
- Refer also to WYMTN guidance for analgesia in chest trauma.

SURGICAL MANAGEMENT OF RIB FRACTURES

- Most patients with rib fractures can be managed conservatively without the need for specific surgical intervention.
- Some patients with multiple rib fractures, with or without a flail chest, can develop long-term problems, including persistent pain, chest wall deformity and dyspnoea on exertion.
- There is evidence that surgical fixation of rib fractures in selected patients can improve short and long-term outcomes. The elderly especially are at increased risk of respiratory complications following blunt chest trauma.
- The patient's co-morbidity and extra-thoracic injuries should be taken into account in deciding on the appropriateness or otherwise of surgical rib fixation.
- Indications for considering rib fracture fixation during their admission
    - Need for a thoracotomy to repair other intrathoracic injuries
    - Open rib fracture
    - Stabilisation of a flail chest, especially if associated with pulmonary restriction due to paradoxical movement
    - Patient failing to wean from prolonged intubation
    - Deteriorating pulmonary function in non-intubated patient due to failure of chest wall mechanics
    - Uncontrolled pain due to rib fractures
    - Progressive chest wall deformity ('stove in' chest)
- Timing of surgical fixation
    - Earlier stabilisation is technically easier than delayed surgery and has a more predictable benefit in terms of pain relief
    - Delayed surgery in an elective setting may be considered, particularly if other injuries have taken priority in the early period. Indications include painful non-union, reduction of overriding ribs or correction of a chest wall deformity or defect; the results are less predictable in terms of pain relief.
- Follow-up is still recommended for these patients.
- Delayed complications include haemothorax,
  chronic pain and progressive chest wall deformity or restriction.
- Follow-up either locally or in Thoracic surgical clinic.

GUIDELINE FOR OPERATIVE INTERVENTION IN RIB FRACTURES



SUMMARY

- Blunt chest wall trauma is common.
- The combination of underlying pulmonary contusion coupled with hypoventilation from an unstable chest wall and pain is potentially life threatening.
- Risk factors predicting mortality include elderly patients (>65 years); 3 or more rib fractures; pre-existing disease especially cardiorespiratory; and the development of pneumonia.
- Seek Thoracic opinion early.