

# The Newcastle upon Tyne Hospitals NHS Foundation Trust

## Management of Blunt Thoracic Trauma – Main Recommendations

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### 1 Scope of Guideline

This clinical guidance relates to patients who have sustained blunt chest trauma and as a result have threatened or actual respiratory failure secondary to injury to the chest wall and/or underlying lung. Out with its scope are major non respiratory sequelae to chest injury including cardiac and great vessel injury, major haemothorax, mediastinal injury, injury to the diaphragm, oesophagus, tracheobronchial tree or spine.

### 2 Main Recommendations

#### 2.1 Initial Management

Patients with blunt chest trauma will be managed in a standard fashion within the context of the well established trauma systems at the RVI. Specific points relating to chest injury include

- Application of high flow O<sub>2</sub>
- Intercostal drainage of pleural collections of blood and air at the direction of the trauma team leader.
- The immediate assessment by the attending anaesthetist/ intensivist regarding requirement for intubation and ventilation
- The early provision of adequate analgesia, most usually i.v. morphine.
- Imaging – CXR or CT if NUTH criteria for trauma CT are met.

If CT chest is performed, radiology should be asked to generate 3D rendered images to assist chest wall injury assessment and operative decision making. (Note: data to perform this is not stored on PACS beyond 7 days).

#### 2.2 Place of Care

The triage decision for this injury is essentially between management on the trauma ward (Ward 22) or on critical care (Ward 18). For many patients this will be a straightforward decision depending on other injuries, presence and severity of respiratory failure and requirement for support but a borderline group of patients requires thought and team discussion.

Major Indications for triage to Ward 18 Critical Care include:

##### **Group 1** – Clear cut indication for critical care

- Other traumatic injury requiring organ support

- Respiratory Failure requiring support from the outset

**Group 2** - Elderly and/or chronic CVS/ RS disease plus significant injury

- = 4 rib fractures PLUS one or more of
- Age >65
- Chronic lung disease
- Cardiovascular disease in particular coronary artery disease or known reduced ventricular function

**Group 3** – Signs of impending/threatened respiratory failure

- PaO<sub>2</sub> <8 kPa, SaO<sub>2</sub> <92% on high flow O<sub>2</sub> therapy
- Hypercapnia – PaCO<sub>2</sub> > 6.5 kPa
- Evidence of increased work of breathing – respiratory rate >20, use of accessory muscles, unable to speak in sentences
- Poor deep breathing/coughing despite appropriate analgesia
- Radiological evidence of significant early pulmonary contusion

Critical Care review for admission is via the ORANGE on call anaesthesia trainee (29999) or the on call Ward 18 ITU consultant (via switchboard).

### 2.3 Responsible Clinical Team and Specialty Review

On Ward 22, all patients will be under the care of the responsible Emergency Medicine consultant.

All patients admitted to Ward 22 with chest injury should be reviewed **daily** by an appropriate member of the critical care team. This should be at consultant level initially and ideally by the same individual over the course of the ward stay. The Emergency Medicine team should inform the Ward 18 critical care team of the presence of a chest injury patient on Ward 22 (Ward 18 resident – 21816, or consultant).

Patients deteriorating on Ward 22 and meeting criteria for ED triage to Ward 18 as outlined above should be referred urgently to ORANGE on call.

On Ward 18 the patient will be under the care of the responsible Critical Care consultant.

All patients on Ward 18 and 22 with  $\geq 4$  rib fractures should be reviewed by the orthopaedic trauma team within 48 hours for assessment of suitability for operative rib fixation.

The usual route of discharge from Ward 18 should be to the Trauma Ward, Ward 22. A certain subset of patients within ongoing respiratory issues may benefit from admission to respiratory medicine, particularly those with pre-existent lung disease.

Any patient with ongoing respiratory function problems following initial trauma care should be discussed with respiratory medicine regarding ongoing care and follow up.

This group of patients may benefit from assessment and review at the Intensive Care Follow Up Clinic – consider discussion and referral with Dr Kaye Cantlay on discharge from Ward 18.

## 2.4 Analgesia

All patients should receive early analgesia as part of their initial assessment and management. For patients with significant chest wall injury this is likely to require strong opioid, i.e. i.v. morphine titrated to response.

All patients should receive regular oral or i.v. paracetamol.

All patients should be assessed for appropriateness of NSAID treatment which is effective in this condition. All patients without a contra-indication or with low risk for NSAID therapy should receive it, e.g. diclofenac sodium 50mg tds.

All patients admitted to NUTH (Ward 18 and 22) with significant chest trauma with significant pain arising from one or more rib fractures **should be assessed by an anaesthetist within 24 hours of admission or sooner** if possible for consideration of a continuous regional analgesic technique (epidural or paravertebral block).

This may be achieved by:

- Monday – Friday 0900 – 1600 – ring Day Case Unit Block Room – 25102
- Out of hours/ weekends – ring PINK on call anaesthesia - 29214

Decision making regarding use of regional blocks v morphine PCA should follow the flow chart in Appendix 1.

Continuous epidural and paravertebral blocks may both be managed on Ward 22 if no other indication for critical care.

All patients on regional analgesic techniques or requiring morphine PCA should be referred to the acute pain team – 29912 or 29996.

## 2.5 Respiratory Support

### 2.5.1 Ward 22

All patients should have supplemental O<sub>2</sub> therapy, ideally humidified and titrated to a target SaO<sub>2</sub> of 94 – 98% as per British Thoracic Society Guidance.

The majority of patients will receive 4l/min O<sub>2</sub> via variable performance device, e.g. Hudson mask or nasal specs.

High flow O<sub>2</sub> via non-rebreath/ reservoir bag mask will deliver approximately 60 – 80% O<sub>2</sub>. Prolonged requirement for this level of oxygen should prompt critical care review.

### **2.5.2 Critical Care**

Heated humidified gases should be administered.

Early use of CPAP should be used to prevent pulmonary complications and reduce the likelihood for requiring formal mechanical ventilation.

High flow Nasal Cannula may be an effective alternative to facial CPAP in certain individuals and should be considered, particularly in those patients unsuited to the CPAP face mask or hood.

Pre-emptive invasive or non-invasive ventilation is not effective. Decisions for institution of respiratory support should be based on usual criteria relating to gas exchange and work of breathing.

There is no specific evidence demonstrating benefit or not of NIV in this patient group.

Invasive ventilation should follow a best practice ARDS model of open lung, limited tidal volume.

Early tracheostomy should be considered.

High frequency oscillation may be considered in those patients failing conventional modes of support but this mode of ventilation has not been shown to demonstrate a survival benefit in ALI/ARDS.

Rescue therapies for those in whom adequate gas exchange is proving impossible include:

One lung ventilation – may improve V/Q matching  
ECMO – requirement for full anti-coagulation may be problematic in the setting of trauma

## **2.6 Fluid Management**

Patients with blunt chest injury should not be excessively fluid restricted but should be resuscitated to maintain signs of adequate tissue perfusion.

Initial fluid resuscitation should be with crystalloid or blood products at the direction of the trauma team leader and subsequent medical team.

Following initial resuscitation, unnecessary fluid administration should be avoided and an even fluid balance targeted.

An appropriate diuretic regime may be utilised to achieve this goal.

## **2.7 Physiotherapy**

The goals of physiotherapy are to maintain lung volume, prevent and treat lung collapse and consolidation, aid secretion clearance and facilitate mobilisation.

Of note, physiotherapy techniques are unlikely to be possible/ effective if there is inadequate analgesia.

Main techniques involve recruitment – incentive spirometry and use of positive pressure devices such as the Mk 7 ventilator (Bird) (not in the presence of undrained pneumothorax) – and secretion clearance – suction, positioning, cough assist device.

During weekday, working hours, physiotherapy will see those patients admitted to Ward 18/22 without need for specific referral. Out of hours and at weekends, referral should be made to the on-call physio via switchboard.

Patients should be seen by physiotherapy twice per 24 hours or more as needed.

## **2.8 Operative Rib fixation**

Regardless of respiratory status, all patients admitted with blunt chest injury and  $\geq 4$  rib fractures on CT should be referred to the orthopaedic trauma service within 48 hours of admission for assessment. This applies to patients on both Ward 18 and 22.

CXR and 3D rendered images of chest CT should be available at the time of referral.

In selected patients, operative rib fixation (open reduction) may prevent the development of actual respiratory failure requiring mechanical ventilation or in those already ventilated, may reduce time on the ventilator.

Decision making regarding patient selection and timing of surgery is made jointly at consultant level between critical care, orthopaedic and thoracic surgical teams.

Current broad indication for intervention at NUTH include

- Flail segment
- Multiple single rib fractures contributing in a significant way to pain which limits deep breathing and coughing and/or is contributing significantly to impending/actual respiratory failure.
- Significant chest wall deformity/ rib displacement.

Authors: Dr A Vincent, Dr MK Varma, Senior Physio R Moses, Mr J Williams for the NUTH Trauma Peer Review Group

## Appendix 1

### Flowchart for selection of analgesia in multiple rib fracture:

