

Sternal Fractures and Blunt Cardiac Injury

Sternal fractures are fairly common. They are generally caused by high energy blunt trauma to the chest - eg seatbelt or steering wheel impact. Undisplaced sternal fractures are rarely a cause of significant morbidity other than pain.

Diagnosis of Sternal Fractures

Lateral sternal x-rays can identify displaced fractures but plain chest x-ray is poor at identifying undisplaced fractures¹. In most cases CT is the diagnostic modality of choice. Sternal injuries themselves rarely cause significant problems - CT will identify other more important associated injuries.

Diagnosis of Blunt Cardiac Injury

There is an association between sternal fractures and blunt cardiac injury (BCI). BCI is a very broad category ranging from the immediately life-threatening (ventricular rupture, haemopericardium, acute myocardial infarction, valvular injury) to the much less significant (mild myocardial contusion). Mediastinal haematoma is relatively common (around $\frac{1}{3}$ of patients with SF on CT) but very rarely requires any specific intervention². Myocardial contusion (defined by 2 of ECG changes, cardiac enzyme rise, echo changes) is much less common (<5%).

ECG

All patients with sternal fracture should have a 12 lead ECG. Concerning features are:

- new conduction defects
- new arrhythmias (typically AF)
- new ST changes

¹ <https://doi.org/10.1016/j.injury.2015.03.015>

² <https://doi.org/10.1016/j.injury.2015.03.015>

- tachycardia (persisting despite appropriate resuscitation and pain management).

Troponin

All patients with sternal fracture and **either** new ECG abnormalities **or** mediastinal haematoma on CT should have a troponin blood test performed. The precise timing of this test has not been established. We recommend performing an initial Tnl at 3 hours post injury, with a repeat at 6 hours if the initial Tnl is abnormal.

Echo

Abnormalities on ECG, or patients with an elevated Tnl should be discussed with a cardiologist to assess the need for an echocardiogram.

Who can be discharged?

Patients with an undisplaced sternal fracture, normal Tnl (if Tnl measurement was indicated), no new ECG abnormalities, no pericardial effusion (on CT) or mediastinal haematoma (on CT) can be discharged **if** they have no other injuries requiring admission **and** their pain is adequately controlled. Patients should be given the sternal fracture information leaflet (appendix 1) and referred for thoracic surgical clinic follow up.

Who should be admitted and where to?

1/ Patients with multiple injuries

In most cases **other injuries will be more significant** than the sternal fracture and admission location should be dictated by these injuries as per usual guidelines.

2/ Patients with no other associated serious injuries

Factors requiring admission relating to a sternal fracture are:

- A: Evidence of myocardial contusion (based on new ECG abnormality / arrhythmia or elevation in cardiac enzymes).
- B: Patients with displaced sternal fractures
- C: Patients with mediastinal haematoma on CT
- D: uncontrolled pain

MTC patients with A alone, or A&B should be admitted to the MTC HDU at the LGI for 12 hours of cardiac monitoring with cardiology review and echocardiogram. TU patients should be admitted to an appropriate local bed.

Patients with B alone, or B&D should be admitted to a standard thoracic surgical bed (SJUH) if at the MTC. Patients at a Trauma Unit should be referred via Patientpass to Thoracic Surgery at SJUH though may require local admission if the thoracic surgical team do not feel there is an indication for transfer.

MTC Patients with C, or B&C and no evidence of active bleeding (eg from internal mammary artery) should be admitted to a thoracic surgical HDU bed (SJUH). TU patients should be referred to thoracic surgery but may require local admission if the thoracic surgical team do not feel there is an indication for transfer. In any patient, any evidence of active bleeding in the mediastinal region requires involvement of vascular surgery +/- vascular radiology +/- cardiac / thoracic surgery and case by case senior decision making. Such patients should be transferred to the MTC ED immediately. If active bleeding is evident ensure anti-coagulation is reversed prior to transfer.

Patients with D alone should be admitted to a standard thoracic surgical bed (SJUH) if at the MTC, or to the most appropriate bed at the TU (decided by local agreement).

Follow up

All patients with sternal fractures should be referred via patientpass to the thoracic surgical team to determine and arrange appropriate follow up.

APPENDIX one – Example discharge advice leaflet

(with thanks to St George's Major Trauma Centre)

Sternum (Breast Bone) Fracture

This leaflet is for anybody who has sustained a fracture to their sternum. It tells you about symptoms you may experience while you recover and how to prevent complications. If you have any further questions or concerns, please speak to a doctor or nurse caring for you.

What is a Sternal fracture?

A sternal fracture is a break in your breastbone. This normally occurs following a high impact trauma such as falling from a height, a road traffic accident or high impact sports. As a result you may also have bruising to the underlying lung tissue or your heart.

Signs and Symptoms

Sternal fractures can be painful but you can expect this discomfort to improve over a period of six to eight weeks. This may take longer for more severe injuries which have required surgery to fix them. The sternum moves continuously with the ribcage while we breathe. Following sternal fractures, this movement becomes painful and can stop us from taking deep breaths, coughing or laughing. Due to the muscle attachments on your sternum you may also have some discomfort in your chest when moving your arms or lifting objects.

Treatment

Sternal fractures are managed differently depending on how the bone has broken and the symptoms which you are experiencing. While some people require surgery, for most the fracture heals on its own over a period of weeks. When you are in hospital, you may require some oxygen to help your breathing. You will undergo tests to ensure your heart has not been damaged. You should take painkillers to control your pain and to enable you to move around and resume your normal activities.

Possible complications

Following sternum fractures, some people develop pain and stiffness in the shoulder and spine. This mainly results from not using your arms due to pain caused by the injury. It is important you continue to use your arms but avoid any heavy lifting or pushing for six to eight weeks. If you have had surgery on your fracture, your physiotherapist will advise you on a time frame for returning to normal activities. The sternum moves continuously while we breathe. Following sternum fractures, this movement becomes painful and can stop us from taking deep breaths, coughing or laughing. This in turn prevents us from clearing our natural lung secretions. These secretions can build up and cause a chest infection.

What can I do to help my recovery?

To reduce the risk of developing an infection you should:

- a) Take deep breaths regularly throughout the day - aim to take ten deep breaths every hour
- b) Do not suppress the need to cough or take cough suppressing medicine as it is important to clear any phlegm that builds in your lungs.
- c) Take regular pain relief
- d) Support your chest wall with your hands when you cough
- e) Alternate periods of rest with gentle activity over the next few weeks.

What happens after I have left hospital?

You should contact your GP if you:

- a) Feel unwell
- b) Develop a fever
- c) Feel short of breath
- d) Start coughing up yellow, green or blood stained phlegm
- e) Experience pain on the chest wall that persists after eight weeks
- f) Feel heart palpitations.

Do I need follow-up physiotherapy?

You should contact your GP for a referral to your local physiotherapy service if:

- a) You have difficulty in achieving full movement of your arms or spine
- b) You have pain in your chest, back or shoulder which does not settle after six to eight weeks
- c) You find it difficult to return to full work duties or hobbies
- d) Breathlessness stops you from returning to previous levels of fitness.

Contact Details

You can contact the ward you were on via the hospital switchboard.