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## Rib injuries

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### Summary

- Common causes of rib injury include motor vehicle accidents and falls.
  - Since the ribs enclose vital organs, including the heart and lungs, chest trauma can cause life-threatening injuries such as a punctured lung or a ruptured aorta.
  - Broken ribs can't be set in a cast, so treatment aims to relieve pain while the injury heals.
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The ribcage supports the upper body, protects internal organs, including the heart and lungs, and assists with breathing. Rib injuries include bruises, torn cartilage and bone fractures. Chest trauma may also cause life-threatening injuries such as a punctured lung or a ruptured aorta.

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### Structure of the ribs

The ribcage consists of 24 curved ribs arranged in 12 pairs. Each pair is attached to a vertebra in the spine. At the front of the body, the first seven pairs of ribs are attached directly to the sternum (breastbone) by cartilage known as costal cartilage. These ribs are often called 'true ribs'.

The next three pairs of ribs aren't connected to the sternum. Instead, costal cartilage attaches these 'false ribs' to the last pair of true ribs. The remaining two pairs aren't attached at the front of the body at all and are known as 'floating ribs'.

The ribcage is supported by ligaments and muscles, including the muscles between the ribs (intercostal muscles). These muscles allow the ribcage to expand when you breathe in and to drop when you breathe out.

### Symptoms of rib injuries

The symptoms of rib injuries depend on the type and severity of the injury, but can include:

- Pain at the injury site
- Pain when the ribcage flexes – with movement, with a deep breath or when you cough, sneeze or laugh
- Crunching or grinding sounds (crepitus) when the injury site is touched or moved
- Muscle spasms of the ribcage
- Deformed appearance of the ribcage
- Breathing difficulties.

### Blunt force is the common cause of injury

Rib injuries typically occur when the chest is directly hit. Situations that could cause blunt injuries to the ribcage include:

- **Motor vehicle accidents** – for example, slamming the chest against the steering wheel
- **Crush injuries** – for example, a heavy object landing directly on the chest
- **Sports-related injuries** – for example, a heavy tackle
- **Falling from a reasonable height** – for example, off a roof or ladder
- **Assault** – for example, getting hit by a baseball bat.

### Soft tissue injuries

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Soft tissue of the ribcage includes the intercostal muscles and the costal cartilage. Common injuries include:

- **Bruising** – the blood vessels rupture and leak blood into the surrounding tissues. Bruising of the chest wall is a common rib trauma.
- **Intercostal strains** – intercostal muscles allow the ribcage to move up and down. These muscles can be strained by any activity that involves extreme or forceful twisting of the body or swinging of the arms. Sports that commonly cause this type of injury include golf and tennis.
- **Costochondral separation** – the rib is torn loose from the costal cartilage and is detached from the sternum.

### **Rib fracture**

The curved design of the ribs makes them resistant to fractures. Their ability to flex helps the bone to absorb the force of a blow. However, any bone will break if the force exerted against it is stronger than it can structurally withstand. A rib is most likely to fracture at its outer curve, which is its weakest point.

Older people are more prone to rib fractures because bones thin with age. Children are less likely to break ribs because their bones are relatively flexible.

### **Flail chest is a serious injury**

Flail chest is the most common serious injury to the ribs. It occurs when three or more ribs are broken in at least two places, front and back. This will only happen if there has been a great deal of blunt force. The key sign of flail chest is 'paradoxical movement', which means the natural movement of the ribcage during breathing is in reverse. For example, the injured area of ribcage sinks in when the person inhales, instead of lifting outwards.

This reversal is caused by changes to air pressure in the ribcage as a result of injury. However, it is the accompanying injury to the lungs that usually causes complications, not the broken ribcage. Intubating the person (putting oxygen into the lungs via a tube placed down the trachea, or windpipe) will create a 'normal' pressure in the lungs.

### **Risk of serious injury**

The ribs enclose vital organs such as the heart and lungs, so chest trauma can cause life-threatening injuries. These can include:

- **Pneumothorax** – collapsed lung due to changes in pressure within the chest. This could be caused by a broken rib tearing the lung or a puncture in the chest wall. Symptoms can include breathing difficulties, chest pain and coughing up blood.
- **Cardiac and associated blood vessel injury** – for example, trauma to the blood vessel servicing the heart (coronary artery) or a tear in the main artery of the body (aorta).
- **Splenic rupture** – the spleen is located on the left side of the abdomen. Its roles include filtering the blood to remove abnormal cells and the manufacture of some immune system cells including antibodies and lymphocytes. Splenic rupture means the outer capsule has split and the spleen bleeds into the abdominal cavity.

### **Diagnosis of rib injuries**

Rib injuries are diagnosed using a number of tests including:

- History of the injury (where you explain to your doctor what has happened)
- Physical examination
- Chest x-ray.

### **Treatment of rib injuries**

Unlike bones of the arms and legs, broken ribs can't be set in a cast. Treatment aims to relieve pain while the injury heals, which can take up to six weeks (in the case of fracture), and 12 weeks or more if the rib has been torn from the cartilage. Treatment for bruised ribs is the same as for fractured ribs, but with a shorter recovery time.

Options include:

- Rest
- Prescription strength pain-killing drugs
- Non-steroidal anti-inflammatory drugs (NSAIDs)
- Avoiding activities that aggravate the injury, such as sport
- Icepacks – may help to reduce inflammation in the early stages
- Mechanical ventilation (help with breathing) – may be needed in cases of severe flail chest.

### Where to get help

- Your doctor
- Doctor specialising in sports medicine
- Physiotherapist
- Sports Doctors Australia Tel. (02) 6241 9344
- Sports Medicine Australia – Victoria Tel. (03) 9674 8777
- Emergency department of your nearest hospital
- Always call an ambulance in an emergency Tel. 000

### Things to remember

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- Since the ribs enclose vital organs, including the heart and lungs, chest trauma can cause life-threatening injuries such as a punctured lung or a ruptured aorta.
- Broken ribs can't be set in a cast, so treatment aims to relieve pain while the injury heals.

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