Abstract  Chest trauma is one of the most important causes of death, in particular in individuals under the age of 40 years. The mortality rate for chest trauma, often related to motor vehicle accidents, is approximately 15.5%; it increases dramatically to 77% with associated shock and head injury (Glasgow scores of 3–4). The accurate diagnosis of pathologies consequent to blunt chest trauma depends on a complete knowledge of the different clinical and radiological manifestations. The first diagnostic approach is classically based on chest X-ray often carried out on supine position at the hospital admission. A CT study must then be performed in all chest trauma patients in whom there is even the smallest diagnostic doubt on plain film. In particular, spiral CT (SCT) assumes a fundamental role in the demonstration of mediastinal hemorrhage and direct signs of aortic lesions. At present, SCT is routinely part of a diagnostic evaluation which also includes scans of the brain and the abdomen in polytraumatized patients. Magnetic resonance is the ideal method for visualizing diaphragmatic lesions. Furthermore, recent reports have demonstrated the high diagnostic value of MR in evaluating aortic injuries. The purpose of this article is to review the most common radiological patterns related to chest trauma.

Keywords  Chest trauma · Thorax · Thoracic injuries · Imaging
monstration of arterial lesions and mediastinal hemorrhage. Computed tomography of the chest is a routine work-up which also includes scans of the brain and the abdomen in polytraumatized patients.

The mortality rate for chest trauma is approximately 15.5%. It increases dramatically to 77% with associated shock and head injury (Glasgow scores of 3–4) [1].

In studying chest trauma, MRI has a limited role and arteriography is used less and less.

The use of ultrasound at the bedside of the patient is still not well defined in the study of chest trauma, but it is, however, widely used in the comprehensive evaluation of the traumatized patient.

In this article we present the principal radiological pictures which can be reported in patients who have undergone blunt chest trauma.

**Thoracic cage injury**

Flail chest is caused by a fracture, in at least two different sites, of three or more ribs. An abnormal mobility of a segment of the thoracic wall is created with a consequent paradoxical movement during respiration which favors the onset of atelectasis and hinders physiological drainage of the bronchial secretions.

Flail chest is the most severe lesion of the thoracic wall found in patients with blunt chest trauma (Fig. 1).

The resulting morbidity and mortality rates depend on the age of the patient and the extension and gravity of the thoracic lesions (contusions and/or parenchymal lacerations, atelectases, mediastinal lesions, hemothorax, and/or pneumothorax and associated extrathoracic lesions).

Isolated fractures of the ribs, scapula, or clavicle rarely have particular clinical significance; however, mobilization of the patients in these conditions is not suggested in order to avoid soft tissue lesions (Fig. 2). Only 18% are diagnosed on a chest radiograph with respect to the total number of relative findings at autopsy [2].

Fractures of the first three ribs or of the first two ribs and the clavicle indicate a violent trauma and can cause lesions of the brachial plexus or the vessels [3].

More than 90% of tracheobronchial lesions are associated with fractures of at least one of the first three ribs, whereas the fracture of the lower ribs can be associated with traumatic lesions of the liver, spleen, and kidneys.

Study of the subclavian vessels must be carried out in emergency when bone fragments are widely dislocated, when there is evidence of mediastinal hemorrhage, extrapleural hematoma, and if neuropathy of the brachial plexus can be demonstrated clinically.

Costal fractures are often accompanied by focal extrapleural hematomas which can be seen as a bulging of soft tissue density convexly bordering the lung.

An apical extrapleural hematoma which increases in dimensions is highly suggestive of active arterial bleeding and requires angiographic intervention.

In 8–10% of blunt chest traumas, sternal fractures are found [4] usually diagnosed by chest radiographs carried out in a lateral projection. The most common site of the sternal fractures is approximately 2 cm from the manubrio-sternal joint (Fig. 3).

A spiral CT scan with coronal reconstruction can confirm or identify fractures with minimal dislocation which are often unrecognized on conventional radiographs; CT is also able to depict fractures of the chondral part of the ribs.

Sternal fractures, especially those with dislocation of the “bony stump” (so-called displaced sternal fracture), can cause vascular lesions, mediastinal hemorrhage, and cardiac contusions, and, therefore, carry mortality at a rate varying from 25 to 45%.

Computed tomography is the most suitable method for evaluating spinal fractures which can cause paraspi-