Respiratory Chest Pain: Diagnosis and Treatment

Fraser J. H. Brims, MRCP, MD[a,b], Helen E. Davies, MRCP[c], Y.C. Gary Lee, MBChB, FRACP, PhD[b,c,d,*]

KEYWORDS

• Respiratory • Chest pain • Pneumothorax • Pneumonia
• Pleural infection • Pulmonary embolism

Chest pain from respiratory disease is common. In the United States in 2006, 10% of all admissions to emergency departments were a result of diseases of the respiratory system, and chest pain was the most frequent presenting complaint.[1] The nature and underlying pathophysiology of respiratory chest pain are poorly understood and studies of its quantification, clinical course, and management are limited.

Respiratory chest pain most commonly arises from parietal pleura (including the diaphragmatic pleura), chest wall, and the mediastinal structures.[2] The lung parenchyma and the visceral pleura are insensitive to most painful stimuli. This review summarizes the available literature and the authors' clinical experiences in the diagnoses of common respiratory conditions associated with chest pain, and provides an overview of therapeutic options.

ORIGINS OF RESPIRATORY CHEST PAINS

The main site of respiratory chest pain is the parietal pleura. The pleura costalis, or parietal pleura, lines the inner thoracic cavity, including the diaphragm and mediastinum, whereas the pleura pulmonalis, or visceral pleura, covers the entire surface of the lung, including the interlobar fissures.[3] Although the two surfaces

Conflict of interests: None of the authors has a conflict of interests to declare.
Professor Lee receives a project grant from the State Health Advisory Council of Western Australia, the NH&MRC (Australia), the Raine Foundation of Western Australia, and the MRC (UK).
[a] Respiratory Department, Portsmouth Hospitals NHS Trust, Portsmouth, UK
[b] Respiratory Department, Sir Charles Gairdner Hospital, Perth, Australia
[c] Oxford Centre for Respiratory Medicine, Churchill Hospital, Oxford, OX3 7LJ, UK
[d] School of Medicine and Pharmacology and Lung Institute of Western Australia, University of Western Australia, Perth, Australia
* Corresponding author.
E-mail address: gary.lee@uwa.edu.au

Med Clin N Am 94 (2010) 217–232
doi:10.1016/j.mcna.2010.01.003 **medical.theclinics.com**
0025-7125/10/$ – see front matter

embryologically originate from the same coelomic membrane, their microscopic anatomy differs, with clinically important distinctions. The peripheral part of the diaphragm and costal portion of the parietal pleura are innervated by somatic intercostal nerves, thus pain felt in these areas is often localized to the cutaneous distribution of the involved neurons over the adjacent chest wall. The central portion of the diaphragm is innervated by the phrenic nerve, and central diaphragm irritation is referred to the ipsilateral shoulder tip or even the neck. The visceral pleura is extensively innervated by pulmonary branches of the vagus nerve and sympathetic trunk, with no specific nociceptors.[2] Therefore, the presence of a localized pleuritic chest pain indicates involvement of the parietal pleura. Recent animal studies suggested that pleural adhesions bridging the visceral and parietal pleurae may become innervated, although this has not been documented in humans.[4] The remainder of this review focuses on clinical conditions involving the parietal pleura.

Pains arising from the parietal pleura or chest wall are often exaggerated during deep respiration, coughing/sneezing, or body trunk movement involving the chest wall. The intensity may vary amongst patients with the same pathology, from asymptomatic to agonizing, and is not an indicator of the underlying cause. The description of the pain may also vary significantly amongst patients, for example, from sharp to dull, from burning to catching. The temporal evolution of the pain can be useful. Sudden onset of pain may accompany spontaneous pneumothorax or a rib fracture, whereas pain arising from malignant involvement of the pleura is often of insidious onset. Intercostal neuritis has been listed as a differential diagnosis of respiratory chest pain, but is rare.[5]

Parietal pleural inflammation is commonly termed pleurisy, a localized inflammation of the parietal pleura, which clinically produces a sharp localized pain, made worse on deep inspiration or coughing, and occasionally twisting or bending movements. A pleural rub may be heard over the site of localized pleuritic pain. Although dry pleurisy occurs, pleural inflammation is generally associated with an exudative pleural effusion.

Direct infiltration of the chest wall by a malignancy involving the parietal pleura frequently produces a chronic dull ache localized to the relevant anatomic region, although referred neuropathic pain from intercostal nerve involvement is possible. Less frequently, trauma to the chest wall, ribs, or vertebrae may present in a similar way. Selected specific disease processes that give rise to pain from the parietal pleura or chest wall are discussed later.

CLINICAL ASPECTS

Exudative pleural effusion affects as many as 1800 patients per million population every year.[6] Most of these patients have evidence of parietal pleural inflammation, which may arise from more than 40 different diseases, many of which can present with chest pain. The most common causes of pleuritis and exudative effusions are lung infections (parapneumonic effusions), pleural malignancies (primary pleural mesothelioma or metastatic cancers to the pleura), and systemic disorders (eg, autoimmune diseases).[7]

Pleural inflammation is characterized by neutrophil influx to the pleural cavity, a complicated process mediated by cytokines, especially interleukin eight.[8] Inflammation is often accompanied by increased vascular permeability and resultant plasma extravasation, leading to the accumulation of pleural effusions. These can be detected clinically by percussion (stony) dullness, and by imaging. Thoracic ultrasound and computed tomography (CT) are more sensitive in detecting the presence of pleural fluid than plain radiographs.[9]