Respiratory Chest Pain: Diagnosis and Treatment

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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

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]

Patients with chest pain from pleural inflammation usually have an exudative pleural fluid, characterized by elevated pleural fluid protein and lactate dehydrogenase concentrations, and leukocytosis. Markers of high metabolic activities (eg, low pH and glucose levels) are commonly seen with intense pleuritis (eg, empyema) and in pleural malignancies.

Inflamed pleura may appear thickened on CT scans, especially when performed with a pleural phase contrast protocol. Fluorodeoxyglucose positron emission tomography (PET) can reveal increased uptake of tracer material along the pleural surface, although it may not define the underlying cause. Ultrasound and CT may also reveal features that indicate other conditions, such as malignant invasion of the pleura or periosteum, which may explain the presence of chest pain. CT with pulmonary angiography (CTPA) is useful for detecting pulmonary emboli and any associated lung infarct as a cause of pain.

Tissue biopsies are often required to determine the pleural pathology and can be obtained by closed (blind) biopsies if generalized pleuritis is expected (eg, granulomatous inflammation such as tuberculosis), or under direct vision during thoracoscopy or thoracotomy.[10]

Pleural inflammation often resolves, either spontaneously or following treatment of the underlying diseases, without consequences. Chronic pleuritis and ongoing pain can occur. This chronic inflammation may result in pleural fibrosis and thickening, with restrictive changes in lung functions.[11] Examples include the development of diffuse pleural thickening following resolution of benign asbestos pleural effusions or tuberculous pleuritis. Common conditions leading to pleuritis and chest pain are discussed later.

MANAGEMENT PRINCIPLES

The general principle for the control of all pain is to initiate prompt, appropriate treatment, at the correct dosage, ensuring a favorable benefit to adverse effect profile. The World Health Organization introduced the conceptual framework of the pain ladder, guiding physicians to adopt a stepwise approach to the treatment of patients with pain.[12] Although originally described for patients with cancer-related pain, the concept is now widely used for the management of all types of pain. In the absence of high-quality clinical data, the use of such a systematic approach for respiratory, especially pleural, chest pain seems logical. Simple analgesics (eg, acetaminophen, acetylsalicylic acid) and nonsteroidal antiinflammatory drugs (NSAIDs) can be used regularly and in combination if necessary, for mild pain. Meta-analyses of clinical trials[13–17] suggest NSAIDs (eg, ketoprofen or ibuprofen) are more effective than opiates in controlling general postoperative pain. Conventional teaching often suggests NSAIDs are particularly effective against pleuritic pain, although this has not been formally tested.

Opioids (eg, codeine, oxycodone, dihydrocodeine) can be added, if simple analgesia is insufficient. Doses should be adjusted individually according to the degree of analgesia and side effects (eg, nausea and constipation). Stronger opioids (eg, morphine, fentanyl, or buprenorphine) may be indicated, especially for patients with underlying malignant disease. Parenteral administration may be necessary if oral analgesic drugs are not tolerated.

Adjuvant analgesic medications may be added in combination with the agents listed earlier. Their use for patients with acute pleuritic chest pain is limited but may have a role in those with neuropathic pain (eg, using tricyclic antidepressants or anticonvulsants)[18] and persistent pain syndromes.

The use of intrapleural local anesthetic agents for postoperative (eg, thoracotomy[19–28] and sympathectomy[29]) and posttrauma pain[30,31] has been studied with varying results. One randomized trial showed decreased pain with the use of intrapleural local anesthetic in patients with spontaneous pneumothorax.[32]

Radiotherapy

Radiotherapy has a role in palliating localized pain from malignancies, especially from tumor infiltration of parietal pleura or ribs (**Fig. 1**). For example, radiotherapy can relieve chest wall pain in more than 60% of patients with mesothelioma, although a sustained effect may not be achieved.[33,34] Side effects include tiredness, esophagitis at higher doses, local skin soreness, loss of hair in the irradiated area, and nausea, vomiting, or diarrhea (particularly if the lower chest is being treated). Pain relief from rib metastases can be achieved in approximately 80% of patients, with most of those achieving complete control within 4 weeks.[35] The effect is independent of underlying histologic tumor type and radiotherapy fractionation regimen.[36] Recurrence of metastatic bone pain at a previously irradiated site may be amenable to repeated treatment.[37]

Nerve Blocks

Intercostal nerve blocks using local anesthetic injection (eg, 0.25–0.5% bupivacaine or 1%–2% lidocaine) provide reversible regional analgesia and are effective in controlling acute pain (eg, with rib fractures, or postthoracotomy) and chronic thoracic pain. In patients with pain of neuropathic origin, repeated blocks may afford permanent relief. Pneumothorax is a known but uncommon complication (1%). Paravertebral nerve blocks may be a useful adjunct in the treatment of postthoracotomy/thoracoscopy pain, multiple rib fractures, and chronic pain syndromes.[38,39]

Thoracic epidural with local anesthetic plus opioid, and intrathecal opioid analgesic techniques can provide effective pain control in postthoracotomy patients.[40]

Fig. 1. A 67-year-old smoker presented with an 18-month history of progressively severe gnawing pain in his right shoulder and posterior chest wall. On examination he had marked wasting and paresthesia of his right upper limb and hand. Regular acetaminophen and nonsteroidal antiinflammatory agents had been of limited benefit. This axial CT image shows a right-sided soft-tissue mass invading his adjoining rib and destroying the transverse process and pedicle of the vertebra. A histologic diagnosis of non–small cell lung cancer was made (Pancoast tumor) with his pain secondary to tumor extension into the adjacent brachial plexus, parietal pleura, vertebral bodies, and ribs. Successful palliation of pain was achieved following radiotherapy treatment.

Neurosurgical Measures

Various surgical interventions have been used successfully in selected patients to provide pain relief.

Percutaneous cervical cordotomy interrupts the spinothalamic tract at the C1/C2 levels to abolish pain sensation on the contralateral side. It is used in selected patients with malignancies, especially mesothelioma,[41] and severe chest pain refractory to other approaches. Cervical cordotomy is performed under local anesthesia using fluoroscopic or CT control. Potential complications include permanent ipsilateral limb weakness (0%–3%), bladder, bowel, or sexual dysfunction, and respiratory failure.[42] The latter may occur as a result of destruction of the reticulospinal fibers responsible for spontaneous respiration. A greater degree of functional impairment is seen following a bilateral procedure and with higher levels of analgesia.[43] The analgesic effect of cordotomy diminishes with time and there is a risk of development of delayed dysaesthesic pain. Hence, it is usually offered only to those with limited life expectancy from advanced malignancies.

Neurosurgical techniques for pain control may be considered for selected patients when conservative strategies for pain control have been exhausted. Neuromodulation procedures aim to preferentially stimulate nonnociceptive fibers to alleviate pain.

Deep brain stimulation is effective in well-selected patients with refractory neuropathic or nociceptive thoracic pain.[44] The exact underlying neural mechanism of action is unknown. Central neuroablative procedures such as cingulotomy are occasionally used as a last resort to relieve intractable pain. Modulation of the sensory component of pain is believed to play a key role. It is best considered in patients with a limited life expectancy (eg, mesothelioma or metastatic malignant disease), as recurrence of pain can be troublesome.[45] Dorsal root entry zone lesioning modulates pain pathways by using thermocoagulation, laser, or ultrasound to selectively cut nociceptive afferent fibers within the dorsal nerve root as they enter the spinal cord. Its main indication is in the control of deafferentation pain; however, it may be considered for neuropathic pain syndromes.

Other Considerations

Psychological factors may exacerbate patients' perception, and fear, of their pain and measures to minimize emotional distress can be as important as medication in optimizing pain control.[46] Physiotherapy input may be valuable in patients with pneumonia in whom pleuritic chest pain limits effective sputum clearance. Patients often seek complementary medical therapies, although no data from randomized clinical trials exist to support their routine use in acute pleuritic chest pain.

COMMON CONDITIONS CAUSING RESPIRATORY CHEST PAIN
Malignant Pleural Diseases

Dyspnea and chest pain are the most common presenting symptoms of cancer involvement of the pleura and chest wall. Pleural malignancies can originate from the pleura (the most common of which is pleural mesothelioma) or present as metastases from extrapleural cancers, especially lung and breast carcinomas.

In the United States, lung cancer is the second most common solid organ malignancy and in 2008 was responsible for an estimated 181,840 deaths.[47] Chest pain associated with lung cancer is frequently a dull ache on the affected side, which may signify the presence of malignant pleural or chest wall infiltration. The classic Pancoast tumor in the lung apex may present with pain from brachial plexus invasion and

localized shoulder and chest pain. Patients with lung cancer and chest pain often have additional symptoms (eg, dyspnea, cough, hemoptysis, and weight loss).

Malignant pleural mesothelioma is an incurable cancer, and its incidence is rising exponentially in western Europe.[48] In the United Kingdom, 1 patient dies from mesothelioma every 4 hours. Mesothelioma affects 2500 to 3000 patients each year in the United States.[49] Patients often present with breathlessness and chest pain, both of which can be debilitating. The median survival is less than 12 months.[50,51] In 1 study 44% of the patients developed chest pain during the course of disease,[52] although this is likely an underestimation compared with our experience. The tumor arises from the parietal pleura and the visceral pleura is secondarily affected. Mesothelioma has a high propensity to spread along the serosal surfaces, to the contralateral pleura, the peritoneum, and to pleural puncture sites, producing needle-track metastases. Especially in the advanced stages, pain can be diffuse and involve distant sites, and its management can be challenging.[53]

Malignant pleural disease affects about 660 patients per million population each year. Up to 25% of those with lung carcinoma, 95% of patients with mesothelioma, and about 30% of patients with breast cancer develop a pleural effusion during their disease course.[54] Positive histocytologic confirmation is required for diagnosis, usually by pleural fluid cytology or via thoracoscopic or CT-guided pleural biopsy. In patients with chemotherapy-sensitive tumors (eg, lymphoma), pain may resolve/improve when tumors regress after treatment. However, cure is usually not possible in most cases of pleural malignancy. Management is thus directed toward improving symptom control (especially pain and dyspnea) and quality of life. Localized pain can respond to radiotherapy, especially when pharmacologic approaches fail (see **Fig. 1**). In refractory cases, intercostal nerve block can be tried. Limited surgical resection has been used in occasional cases (eg, for ulcerated needle-track metastases). In selected mesothelioma patients with protracted and diffuse chest pain, cervical cordotomy can provide dramatic clinical benefit.

Pleurodesis or other fluid drainage strategies (eg, indwelling pleural catheters) can help control effusion-related breathlessness. The pleural fluid per se does not cause pain.

Clinicians should also bear in mind that patients with any underlying malignancy are also at higher risk of developing pleuritic chest pain from nonmalignant causes (eg, pulmonary embolism [PE] and pneumonia). A community-based study in the United States has shown an increased risk of venous thromboembolism and a 4.1- to 6.5-fold increased risk of developing PE in these patients.[55]

PE

The annual incidence of PE is up to 200 cases per million people.[55,56] Patients may classically present with sudden onset of chest pain, dyspnea, and possibly collapse.[57] In 1 study, two-thirds of patients experienced pleuritic chest pain, which, together with dyspnea, were the 2 most common symptoms (**Fig. 2**).[58] Concurrent illnesses, such as pneumonia or underlying cancers, are frequent and can also give rise to pain. A recent meta-analysis of 550 hospitalized patients with acute chronic obstructive pulmonary disease (COPD) from the United States and Europe concluded that the prevalence of PE is up to 24.7% in this population.[59]

The pleuritic chest pain characteristic of PE may develop after the initial symptoms and is caused by irritation to the parietal pleura following local inflammation and infarction of the underlying visceral pleura overlying the lung segment affected by the embolus. Some patients may experience a central pain believed to be a result of distension of mechanoreceptors in the pulmonary artery.[60]
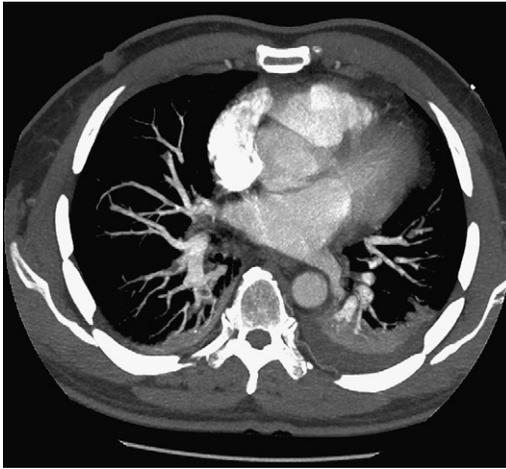
Fig. 2. A 58-year-old patient presented with pleuritic chest pain and dyspnea following hip surgery. CTPA showed bilateral pulmonary emboli, peripheral atelectasis, and a small pleural effusion.

Two recent studies described the characteristics of pleural effusions in patients diagnosed with PE.[61,62] Detailed discussion of the diagnosis and management of PE can be found in recent clinical guidelines,[63] and is outside the scope of this review.

Pneumonia and Pleural Infection

Pneumonia classically presents with fever, cough productive of purulent sputum, leukocytosis, and often pleuritic chest pain localized to the area overlying the infection. In the United States and Europe, community-acquired pneumonia (CAP) has an incidence of 500 to 1100 per million adults,[64–66] and is markedly higher in elderly people. Hospitalization rates for CAP are consistently high (between 110 and 400 cases per million population) in several North American and European series.[65–67]

Nearly half of all patients with pneumonia may have pleuritic chest pain[68] and 13% still complained of pain after 30 days.[69] The pain is believed to arise from parietal pleural inflammation secondary to infective involvement of the peripheral lung parenchyma. The lack of peripheral parenchymal involvement may explain why pleuritis is uncommon in patients with chronic airway (but not distal lung parenchymal) inflammation, such as bronchiectasis and cystic fibrosis. Chest pain was not listed as a presenting complaint in a recent report from Mexico on severe pneumonia associated with H1N1 viral infection.[70] Details on diagnosis and management of pneumonia can be found elsewhere (eg, British Thoracic Society guidelines).[71]

The frequent involvement of the pleura is supported by the finding that 40% of patients with pneumonia develop exudative parapneumonic effusions during their disease course.[72] Pleural infection develops as a result of secondary infection of these simple parapneumonic effusions. Such patients may continue to complain of pleuritic chest pain and are likely to have clinical features consistent with infection (fever and raised inflammatory markers) and a pleural effusion. The size of the effusion varies, and cannot be used to predict infective cause. Treatment is based on drainage of the infected material and antimicrobial therapy as guided by national communicable disease surveillance reports and international guidelines.[73]

Pneumothorax

A pneumothorax refers to the presence of air within the pleural space and may occur spontaneously, after trauma, post-surgery, or viaiatrogenic means. Spontaneous pneumothorax may develop in patients with no known underlying lung disease (primary pneumothorax) and in those with known underlying lung disease (secondary pneumothorax), especially COPD. A spontaneous pneumothorax of either cause is likely to present with a sudden onset of ipsilateral pleuritic chest pain, with variable degrees of breathlessness, depending on the severity of the underlying lung disease. In one study of 155 patients, 90% had pain[74] and all patients had pain in a smaller study of 17 children with spontaneous pneumothoraces.[75] The precise cause of the pain is not known, although recent experimental evidence suggests pleural inflammation (often eosinophilic) does occur with pneumothorax.[76,77] Ongoing chest pain in patients with pneumothorax should alert the clinicians to either a persistent airleak or concomitant pleuropulmonary diseases.

Spontaneous pneumomediastinum is a rare condition defined by the presence of free air in the mediastinum that is not preceded by trauma or interventional procedures. A recent report from the Mayo Clinic identified that two-thirds of patients present with pleuritic chest pain, with an additional pneumothorax evident in one-third of cases.[78] In most cases the pneumomediastinum resolved with conservative management.

Connective Tissue Disease

Pleuritis and pleural effusions are common in connective tissue diseases, affecting up to 50% of patients with systemic lupus erythematosus (SLE) and 5% of patients with rheumatoid arthritis. Pleuritis and pleural effusions in SLE are often bilateral and typically exudative (occasionally hemorrhagic) with a lymphocytosis (if chronic).[79] NSAIDs may relieve pleuritic chest pain, and corticosteroid treatment may produce a swift clinical response if the patient remains symptomatic. Pleural effusions as a consequence of drug-induced lupus erythematosus are rare.

Wegener's granulomatosis is associated with pleural effusion in approximately 30% of patients and responds to treatment of the underlying condition with immunosuppressant therapy. Pleural effusion may occur in up to 30% of those with Churg-Strauss syndrome; typically the fluid is rich in eosinophils. The effusions are not usually of any clinical consequence and most resolve with corticosteroids.

Tracheobronchitis

Patients with tracheobronchitis may complain of a central burning sensation localized to the sternal region. This symptom may occur in otherwise normal subjects or those with underlying lung disease, such as *COPD*, who may more frequently suffer bronchitis. A similar sensation is occasionally reported during heavy exercise or hyperventilation, particularly in cold environments.[2]

Rare Conditions

Pulmonary arterial hypertension (PAH) can be idiopathic, or occur in association with underlying pulmonary and systemic conditions.[80] PAH of any cause can present with various symptoms, including fatigue, lethargy, worsening dyspnea, and, rarely, chest pain. The exact mechanism by which the chest pain occurs is unclear, with more typical anginal pain sometimes described, even in the presence of normal coronary arteries[81]; pulmonary artery dilatation and stretching or right ventricular ischemia may contribute. Patients with secondary PAH often have symptoms that reflect the

underlying cause, for example recurrent pulmonary thromboembolic disease, or collagen vascular disease.

Rarely, asbestos-related pleural plaques have been associated with an angina-like chest pain[82]; there is no treatment possible or required for asbestos-related pleural plaques.

Epidemic myalgia (Bornholm disease) is caused by viral infection from the Coxsackie B virus. It most commonly affects young adults in late summer and autumn in the northern hemisphere and is characterized by upper respiratory tract illness followed by pleuritic chest pain with a normal chest radiograph. Treatment is supportive and the illness usually clears within a week, although relapses are characteristic, particularly during the weeks following the acute illness.

IATROGENIC CAUSES OF CHEST PAIN

Pleural interventions, frequently needed for diagnostic and management of pleural effusions, are another important, but often neglected, cause of chest pain. Careful attention to provision of local and systemic anesthesia can help minimize iatrogenic chest pain from pleural procedures.

Thoracentesis

Pleural aspiration (thoracentesis) is performed daily around the world, most commonly for the diagnosis of pleural effusions. Pain mainly arises as a consequence of puncture of the skin and parietal pleural surface. Inadvertent contact with the rib surface can result in severe pain, caused by stimulation of numerous nociceptors present on the periosteal surface. Diligent and generous use of local anesthesia (eg, up to 3 mg/kg of 1% lidocaine) to the skin, intercostal tissues, and parietal pleura is recommended before aspiration. Anaesthetizing the periosteum of the rib for simple thoracentesis is often unnecessary if good technique is ensured, but can be useful before closed needle pleural biopsy.

Chest pain may also be related to the evacuation of pleural fluid, especially with rapid or large volume (usually several liters) drainage. Its nature may vary from a vague aching discomfort to severe pleuritic pain. Slowing the rate of drainage can ease this discomfort; negative pressure suction is best avoided as it frequently aggravates pain. Reexpansion pulmonary edema, although rare, is a potentially life-threatening complication, especially after evacuation of a large effusion in patients with a chronically collapsed lung.[83,84]

Chest Tube Insertion

Chest pain is common during and following intercostal chest drain insertion (thoracostomy). Adequate use of local anesthesia (see section on pain management), often together with conscious sedation, is recommended. The pain is presumed to result from direct irritation of the (often inflamed) pleura or periosteum by the chest tube, together with trauma to the skin and underlying tissue during the insertion process.

Larger bore chest tubes have been associated with a higher level of discomfort, and 2 studies reported that all patients experienced moderate or intense pain at some point during chest drainage.[85,86] Severe pain and anxiety of 9 or 10 (on a scale of 1 to 10) was reported in 50% of patients during chest tube drainage in 1 study.[87] Large-bore (28–32 F) chest tubes were favored by many clinicians in the management of pleurodesis for malignant pleural effusions in a survey of 859 pulmonologists from 5 English-speaking countries.[88] Guidelines (eg, the British Thoracic Society Pleural Guidelines 2010) presume that small-bore catheters result in less pain but robust,

validated study data supporting this are scant.[89] A randomized clinical trial comparing the optimal chest tube size for pleurodesis is currently under way in the United Kingdom.

Indwelling tunneled ambulatory pleural catheters are increasingly used for the management of recurrent pleural effusion.[79] Chest pain is common in the first week following insertion, with patients often reporting a bruised sensation related to dissection of the subcutaneous tract. This pain is usually mild and can be controlled with regular analgesia (eg, acetaminophen or NSAIDs). Pain experienced with indwelling catheters is significantly less than those associated with intercostal chest drain insertion and pleurodesis in treating malignant pleural effusions.[90]

Thoracoscopy/Thoracotomy

Thoracoscopy is often required for diagnosis of pleural effusions, and video-assisted thoracoscopy can further be used for lung biopsy or lobectomy. Thoracotomy is the conventional method employed for lung resection, amongst other indications. Rib displacement and, occasionally, resection is required during the procedure.

Persistent pain (chronic intercostal neuralgia) is common following these procedures. Furrer and colleagues[91] reported that one-third of 30 patients reported persistent pain or discomfort 3 to 18 months following video-assisted thoracic surgery (VATS) and thoracotomy. Dajczman and colleagues[92] found that in 56 postthoracotomy patients, 9% suffered from severe chronic pain requiring daily analgesia, nerve blocks, acupuncture, or referral to pain specialist clinics. A retrospective survey[93] reported persistent postthoracotomy pain for more than 6 months in 44% of patients; and a further study of 60 patients noted chronic pain in 19 of 60 patients following thoracotomy, especially if pleurectomy was performed.[94] A systematic review favored VATS over thoracotomy, reporting lower analgesia requirements and a shorter length of hospital stay.[95]

Pleurodesis

Iatrogenic induction of pleural fibrosis to obliterate the pleural cavity (pleurodesis) is performed therapeutically for recurrent pleural effusions or pneumothoraces. Whether performed by chemical (injection of a sclerosing agent) or surgical means (eg, mechanical pleural abrasion, pleurectomy), the principle is to damage the pleural mesothelial surface.[96] The resultant inflammation, if sufficiently intense, heals with pleural fibrosis. This intense pleuritis is known to cause severe pain. More than 60% of patients in 1 observational study reported moderate to severe pain with pleurodesis.[97] In the International Survey of Pleurodesis Practice, pain was the most commonly reported complication by pulmonologists, irrespective of sclerosing agents used.[88]

No quality data exist on the best analgesic regimes for pleurodesis. Most physicians use opiate for pleurodesis pain.[88] Respiratory society guidelines recommend instillation of lidocaine before the pleurodesing agent[10] and up to 90% of physicians routinely used intrapleural lidocaine in the International Survey of Pleurodesis Practice.[88] Readers should be aware that this practice is based on conventional wisdom, and has not been tested in clinical studies. Premedication with opioids or conscious sedation should be used, provided no contraindications exist. Patients undergoing pleurodesis are often at risk of respiratory compromise; lower doses or alternative agents may need to be considered.[98,99] Antiinflammatory effects from NSAIDs and corticosteroids can theoretically reduce efficacy of pleurodesis by dampening pleural inflammation. This result has been shown in animal studies[100,101] and is the subject of a multicenter, randomized controlled trial.

SUMMARY

Chest pain is a common clinical presentation in patients with respiratory diseases. Respiratory pain has been poorly studied. Better knowledge of the pain, its character, origin, regulation, and quantification will help guide clinicians to appropriate differential diagnoses and improve management. Clinical examination and radiological imaging are important in directing clinicians to appropriate further investigations. Optimal treatment of pain associated with common respiratory diseases remains uncertain in most cases, and focused studies are urgently needed.

ACKNOWLEDGMENTS

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