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Interdisciplinary Evaluation and Management of Acute Pneumothorax: Roles of Pharmacists, Radiologists, and Nursing Professionals

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Abstract:

Background: Pneumothorax, characterized by air accumulation in the pleural cavity leading to lung collapse, presents variably—from asymptomatic cases to life-threatening respiratory failure. It is classified into spontaneous (primary or secondary), traumatic, and tension pneumothorax, each requiring distinct management approaches.

Aim: This article evaluates the interdisciplinary management of acute pneumothorax, emphasizing the roles of pharmacists, radiologists, and nursing professionals in diagnosis, treatment, and patient education to improve outcomes.

Methods: A comprehensive review of pneumothorax etiology, clinical presentation, diagnostic imaging (chest X-ray, CT, ultrasound), and treatment strategies (observation, needle aspiration, chest tube thoracostomy, pleurodesis) was conducted. The roles of healthcare professionals in patient care were analyzed.

Results: Primary spontaneous pneumothorax is often resolved with conservative management, while secondary cases require aggressive intervention due to underlying lung disease. Tension pneumothorax necessitates emergency decompression. Interdisciplinary collaboration enhances diagnostic accuracy, procedural safety, and long-term prevention, particularly through smoking cessation counseling and follow-up care.

Conclusion: Effective pneumothorax management relies on timely diagnosis, appropriate intervention, and coordinated care among physicians, nurses, radiologists, and pharmacists. Patient education on risk reduction is crucial to prevent recurrence.

Keywords: Pneumothorax, pleural cavity, chest tube, tension pneumothorax, interdisciplinary care, smoking cessation.

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Introduction:

Pneumothorax is defined as the entry of air or gas into the pleural cavity, the anatomical space situated between the visceral and parietal pleura within the thoracic cavity. This presence of air compromises the negative pressure that normally maintains lung expansion, resulting in partial or complete lung collapse. The degree of ventilation and oxygenation impairment depends on several factors, such as the volume of air collected, the rate of its accumulation, and the patient's baseline pulmonary function. The clinical spectrum of pneumothorax varies widely. While some individuals may remain asymptomatic, others can experience a rapid progression to a life-threatening condition marked by respiratory compromise and cardiovascular instability [1][2]. Pneumothorax can be broadly classified into three main types: spontaneous, traumatic, and tension pneumothorax. Each type has distinct etiological and pathophysiological features that influence both clinical presentation and management strategies. Spontaneous pneumothorax, which arises without direct external trauma or procedural intervention, is further divided into primary and secondary forms. Primary spontaneous pneumothorax typically affects individuals who have no previously diagnosed lung disease. It most commonly occurs in young adult males, especially those who are tall and thin. Subpleural blebs or bullae, often undetected in routine clinical evaluations, are believed to be the underlying anatomical lesions contributing to this form. Rupture of these blebs leads to the leakage of air into the pleural space, initiating lung collapse.

Secondary spontaneous pneumothorax, on the other hand, arises in individuals with a known history of pulmonary disease. Conditions such as chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, and cystic fibrosis are frequently implicated. In this subgroup, the underlying lung pathology already impairs respiratory function, and the development of a pneumothorax often results in more severe symptoms and greater physiological compromise compared to the primary type. This variant is more commonly associated with recurrent episodes and increased rates of hospital admission. Traumatic pneumothorax results from either penetrating or blunt trauma to the chest wall or thoracic structures. Common causes include stab or gunshot wounds, fractured ribs, and iatrogenic injuries. Medical procedures such as transthoracic needle biopsy, thoracentesis, or central venous catheter insertion are examples of healthcare-associated trauma that can lead to pneumothorax. Additionally, barotrauma from mechanical ventilation, especially in patients with high airway pressures, represents another iatrogenic mechanism. The recognition of traumatic pneumothorax is essential in acute trauma settings, as it often coexists with other thoracic injuries requiring simultaneous management. Tension pneumothorax is a critical and time-sensitive variant characterized by the continuous entry of air into the pleural space without a route for its escape. This one-way valve mechanism causes progressive intrathoracic pressure build-up. As the pressure rises, it compresses the ipsilateral lung, shifts the mediastinum toward the contralateral side, and impairs venous return to the heart, leading to obstructive shock. Clinically, tension pneumothorax presents severe respiratory distress, hypotension, distended neck veins, and tracheal deviation. Rapid diagnosis and emergency management are imperative. Needle thoracostomy, typically performed in the second intercostal space at the midclavicular line, serves as an immediate decompressive measure. This is followed by the placement of a chest tube to restore pleural integrity and ensure continued evacuation of air. Understanding these types and their respective clinical pathways is essential for accurate diagnosis and effective management. Prompt recognition, supported by clinical findings and imaging when available, directly impacts outcomes and can be life-saving in acute presentations.

Etiology:

Pneumothorax has traditionally been categorized into primary and secondary types based on etiology. This division aimed to distinguish cases occurring without known lung disease from those arising as a complication of preexisting pulmonary pathology. However, advances in diagnostic imaging and greater clinical awareness have revealed that the distinction is not always clear. Many cases formerly labeled as primary spontaneous pneumothorax (PSP) have been found to involve undetected or subclinical pulmonary abnormalities, such as emphysematous changes or parenchymal lesions, particularly in individuals with a history of smoking. Therefore, the clinical validity of this binary classification has been increasingly questioned. Primary spontaneous pneumothorax is most often reported in young adult males, particularly those with tall and thin body types, and has historically been considered idiopathic. Nevertheless, accumulating evidence links PSP with modifiable risk factors, the most significant being tobacco smoking. Smoking is strongly associated with structural changes in the lung parenchyma, including the formation of apical subpleural blebs and bullae. These weakened areas predispose to rupture, allowing air to leak into the pleural space. Epidemiological data suggest that the risk of PSP in smokers is 12 times higher in men and 6 times higher in women compared to non-smokers [3][5]. Furthermore, patients categorized as PSP often have microscopic or radiographic abnormalities suggestive of early emphysematous damage, which implies that many such cases might be better classified as secondary.

Secondary spontaneous pneumothorax (SSP) occurs in individuals with established pulmonary disease. In the United Kingdom, chronic obstructive pulmonary disease (COPD) has been identified as the most prevalent cause, accounting for between 70% and 80% of SSP cases. COPD is marked by air trapping, bullae formation, and alveolar wall destruction, which increase the risk of pleural rupture during events like coughing or changes in intrathoracic pressure. Other underlying conditions contributing to SSP include cystic fibrosis, pulmonary fibrosis, necrotizing pneumonia, and advanced interstitial lung disease. In these patients, even a small pneumothorax may result in significant respiratory compromise due to already reduced lung reserve [4][5]. Recent attention has also focused on the impact of alternative smoking habits on pneumothorax development. The use of cannabis has been linked to large bullae formation and spontaneous pneumothorax in several case reports and small clinical studies [6]. Similarly, vaping, especially of tetrahydrocannabinol (THC)-containing products, has emerged as a potential risk factor. The inhalation techniques used in vaping—often involving prolonged breath-holding and deep inhalation—may contribute to pressure-related barotrauma and bleb rupture. Though more studies are needed, current evidence supports a cautious approach to such exposures in at-risk individuals [7].

Infectious diseases also contribute to SSP. Pneumocystis jirovecii pneumonia, especially in immunocompromised individuals such as those with HIV/AIDS, is a well-established cause. The organism induces necrotizing alveolitis and cyst formation, which can rupture and lead to pneumothorax. Additionally, in the context of the COVID-19 pandemic, spontaneous pneumothorax has emerged as a recognized complication in severe cases. It is thought to arise from alveolar damage, barotrauma due to mechanical ventilation, and increased intrathoracic pressures during coughing [8][9]. Beyond spontaneous forms, pneumothorax can result from trauma, which includes both blunt and penetrating injuries. Traumatic pneumothorax may be seen following motor vehicle collisions, assaults, or falls, and commonly results from fractured ribs that puncture the pleura. Penetrating injuries from stab wounds or gunshots create direct pathways for air to enter the pleural space. Iatrogenic causes, a specific subset of traumatic pneumothorax, are increasingly common due to the rise in invasive diagnostic and therapeutic procedures. Central venous catheter placement, thoracentesis, percutaneous lung biopsy, pacemaker insertion, and barotrauma from positive-pressure ventilation are well-documented examples. Computed tomography

(CT)-guided lung interventions, though highly accurate, carry a risk of pleural breach and air leakage [10][11][12][13].

Spontaneous pneumothorax, whether primary or secondary, occurs in the absence of external trauma. PSP affects individuals without known lung disease, but often with risk factors like smoking and underlying but undetected pleural blebs. SSP affects those with established pulmonary disease, including structural changes such as bullae, cysts, and fibrotic processes. Bleb rupture, often following exertion or pressure changes, remains a common mechanism in both forms [14]. Pneumothorax classification also includes categories based on physiological impact. A simple pneumothorax does not involve direct communication with the external environment and typically presents without displacement of mediastinal structures or diaphragmatic shift. It may result from internal injury, such as a sharp rib fragment lacerating the pleura during blunt trauma. This type often remains stable if small but can progress if not monitored [15]. In contrast, a communicating pneumothorax occurs when a direct channel exists between the pleural cavity and the atmosphere. An example is a penetrating injury like a gunshot wound or large open chest wound. In such cases, with each respiratory cycle, air moves in and out of the pleural space through the external wound rather than the trachea, resulting in ineffective ventilation, paradoxical breathing motion, and potentially fatal hypoxia. Clinical management requires the application of an occlusive dressing and prompt thoracic drainage [16]. Tension pneumothorax represents a critical and rapidly deteriorating state. It develops when a one-way valve mechanism traps air inside the pleural space with no exit route. With each breath, more air accumulates, increasing intrathoracic pressure. This pressure displaces mediastinal structures, compresses the superior and inferior vena cava, and reduces venous return to the heart. The result is decreased preload, compromised cardiac output, and hemodynamic collapse. Clinical presentation includes severe dyspnea, hypotension, distended neck veins, and tracheal deviation. Immediate needle decompression followed by chest tube insertion is required to prevent cardiac arrest.

Another unique form is catamenial pneumothorax, a rare subtype occurring in women of reproductive age. It typically presents within a few days after menstruation onset and most often affects the right hemithorax. The condition is strongly associated with thoracic endometriosis, though its pathophysiology remains under investigation. Proposed mechanisms include transdiaphragmatic passage of endometrial tissue and cyclic pleural changes. Recurrence is common, and treatment often involves hormonal therapy combined with surgical intervention. Additional causes include barotrauma, which can occur during rapid changes in ambient pressure, such as in scuba diving or high-altitude air travel. Individuals with preexisting lung cysts or bullae are particularly vulnerable in these situations. During ascent or descent, the change in external pressure may cause gas expansion within lung spaces, leading to rupture and pneumothorax. Similarly, in intensive care settings, mechanical ventilation, especially with high tidal volumes or pressures—can induce barotrauma and subsequent pneumothorax in patients with compromised lungs. Underlying structural lung abnormalities also predispose individuals to pneumothorax under conditions of increased stress or pressure. Congenital cystic lesions, emphysematous bullae, and interstitial lung diseases such as lymphangioleiomyomatosis or Birt-Hogg-Dubé syndrome represent high-risk profiles. These patients may experience recurrent pneumothoraces and often require ongoing surveillance or prophylactic surgical measures. In summary, the etiology of pneumothorax is multifactorial and extends beyond the traditional binary classification of primary versus secondary. Tobacco smoking, underlying pulmonary disease, iatrogenic trauma, infections, environmental exposures, and even hormonal influences all contribute to its development. A comprehensive understanding of these causes supports timely diagnosis and individualized management, which are essential to prevent complications and recurrence. Given the wide range of potential triggers and clinical contexts, clinicians must maintain a high index of suspicion, particularly in vulnerable populations or those undergoing invasive procedures.

Epidemiology

Nontraumatic pneumothorax has an estimated annual incidence ranging between 7.4 and 18 cases per 100,000 individuals. This broad range reflects variations in diagnostic sensitivity, population risk factors, and regional healthcare reporting. Notably, smoking remains the most important modifiable risk factor, with a lifetime incidence of pneumothorax reaching approximately 12% in smokers compared to only 0.1%

in nonsmokers. The effect of smoking on lung parenchyma, including the formation of apical blebs and subpleural emphysematous changes, explains its strong correlation with the development of spontaneous pneumothorax [18][19]. Primary spontaneous pneumothorax (PSP) is observed more frequently in tall, thin adolescent or young adult males. The majority of affected individuals are between 20 and 30 years old, and the risk increases substantially in those who smoke. Although often initially self-limiting or responsive to conservative management, PSP has a high recurrence rate. Clinical studies report that 20% to 60% of patients will experience another pneumothorax within three years after the first episode. Recurrence risk increases with each additional episode and is also influenced by factors such as the presence of visible blebs on imaging, smoking status, and the initial treatment strategy applied [20].

Secondary spontaneous pneumothorax (SSP) occurs in patients with preexisting lung disease, and its incidence varies with the underlying condition. In individuals with chronic obstructive pulmonary disease (COPD), SSP accounts for 50% to 70% of spontaneous pneumothorax cases. The presence of bullous disease, chronic inflammation, and poor lung reserve increases susceptibility in this group. Infections are also significant contributors. Approximately 11% of SSP cases are associated with bacterial pneumonia, and 5% to 10% occur in the context of Pneumocystis jirovecii pneumonia, particularly in immunocompromised patients such as those with HIV/AIDS or undergoing immunosuppressive therapy [21][22]. These epidemiological trends underscore the need for targeted prevention strategies. Smoking cessation is the most effective intervention for reducing both incidence and recurrence of pneumothorax. In patients with chronic lung disease or a history of spontaneous pneumothorax, close clinical monitoring and risk modification can help in reducing the likelihood of recurrence or progression to more severe forms such as tension pneumothorax. Understanding the population groups most at risk allows for earlier diagnosis and optimized management.

History and Physical

The clinical presentation of pneumothorax varies widely and is influenced by the underlying cause, the size of the air accumulation in the pleural space, and the patient's respiratory reserve. In some individuals, particularly those with small pneumothoraces or good baseline lung function, the condition may produce no noticeable symptoms. These cases are often identified incidentally during imaging studies performed for unrelated complaints or as part of routine evaluations. However, in symptomatic individuals, the most frequent complaints are chest pain and shortness of breath, reported in approximately 64% to 85% of cases. These two symptoms remain the primary indicators prompting medical evaluation and imaging confirmation of the diagnosis [23][24]. The chest pain experienced in pneumothorax is usually described as sudden in onset and localized to one side of the chest. It is often sharp, stabbing, or pleuritic in nature, worsening with deep breaths or coughing. The pain may radiate to the shoulder or upper arm on the same side and tends to be more intense in larger or rapidly developing pneumothoraces. In contrast, smaller or slowly accumulating pneumothoraces may cause only mild discomfort or pressure. Dyspnea severity correlates with the degree of lung collapse and the patient's underlying pulmonary function. Individuals with primary spontaneous pneumothorax and normal lung function often experience transient symptoms that may begin to improve after 24 hours, likely due to spontaneous reabsorption of air from the pleural cavity. Other symptoms can include a dry cough, anxiety, or a vague sense of chest tightness, but these are less common and nonspecific.

On physical examination, findings depend largely on the size and extent of the pneumothorax. In small pneumothoraces, clinical signs may be entirely absent, and the examination may appear normal. As the pneumothorax increases in size, clinicians may detect decreased or absent breath sounds on the affected side. Hyperresonance to percussion and reduced tactile fremitus may also be present, although these findings can be subtle and influenced by patient positioning, body habitus, or examiner experience. Tachypnea and mild hypoxia may be noted, though oxygen saturation remains above 90% in most cases. Studies report that hypoxia—defined as an oxygen saturation below 90%—occurs in only 3% to 11% of spontaneous pneumothorax cases. This relatively low incidence is attributed to preserved oxygenation capacity in individuals with normal baseline lung function [25]. Importantly, many patients experiencing their first spontaneous pneumothorax may delay seeking care, especially if the symptoms are mild or improve spontaneously. This delay complicates timely diagnosis and can result in a larger pneumothorax at the time of presentation. It also highlights the need for patient education in high-risk groups, such as smokers or those with known bullous lung disease, regarding early symptoms and when to seek evaluation.

Tension Pneumothorax

Tension pneumothorax represents a medical emergency that requires immediate recognition and intervention. Unlike other forms, tension pneumothorax is characterized not just by air accumulation in the pleural space but by a progressive increase in intrapleural pressure that leads to severe cardiopulmonary compromise. The underlying mechanism involves a one-way valve effect, where air enters the pleural space during inspiration but is unable to escape during expiration. This trapped air increases pressure within the thoracic cavity, causing a shift of the mediastinal structures to the contralateral side. The resulting compression of the superior and inferior vena cava impairs venous return to the heart, reducing preload, and subsequently decreasing cardiac output. The end result is a life-threatening drop in blood pressure and oxygen saturation [26].

Clinically, patients with tension pneumothorax present with more severe symptoms compared to those with non-tension variants. In addition to chest pain and dyspnea, patients exhibit signs of hemodynamic instability, such as hypotension, cyanosis, and altered mental status due to poor perfusion. Tracheal deviation away from the affected side is a late and unreliable sign, but when present, it strongly suggests advanced tension physiology. On examination, the clinician may note absent breath sounds on the affected side, tachycardia, and distended neck veins due to impaired venous return. The respiratory rate is often markedly elevated, and the patient may appear in significant distress. Without rapid intervention, the condition can quickly progress to cardiovascular collapse and death. Patients undergoing positive-pressure ventilation who develop a pneumothorax are at particularly high risk of developing tension physiology due to the added intrathoracic pressure from mechanical breaths. These patients may deteriorate rapidly and present with sudden hypotension, bradycardia, or pulseless electrical activity. This presentation requires high clinical suspicion and immediate decompression to prevent cardiac arrest. In such cases, a diagnosis is often made based on clinical presentation alone, without waiting for imaging confirmation. The emergent procedure of needle thoracostomy is performed to relieve intrapleural pressure, followed by chest tube placement to achieve definitive management [27]. Early and accurate recognition of tension pneumothorax is critical for survival. Any delay in diagnosis or management can result in irreversible outcomes. Clinicians must maintain a high index of suspicion, especially in trauma patients, mechanically ventilated patients, or those with a known history of recurrent pneumothorax. A focused history and physical examination, combined with rapid bedside assessment, form the cornerstone of timely intervention in life-threatening pneumothorax.

Evaluation

The diagnostic process for pneumothorax relies on integrating clinical history, physical examination, laboratory data, and imaging. Among these, chest radiography remains the primary imaging modality. A standard posteroanterior upright chest x-ray is typically the first diagnostic step due to its accessibility and rapid availability. It allows visualization of the visceral pleural line and absence of lung markings peripheral to this line, which are key features of pneumothorax. However, small pneumothoraces are frequently missed during routine physical examination and may not always be evident on initial x-rays. These smaller collections of air in the pleural space are sometimes discovered incidentally during computed tomography (CT) scans performed for unrelated conditions, such as evaluation of rib fractures or pulmonary nodules [1][28]. In moderate-to-large pneumothoraces or in cases involving patients with underlying respiratory disease, arterial blood gas analysis may provide further information. Hypoxemia is commonly observed, especially if the pneumothorax significantly compromises ventilation. In patients with chronic obstructive pulmonary disease (COPD), hypercapnia may also be present due to impaired gas exchange and reduced ventilatory reserve [29]. However, blood gas analysis should not delay imaging or clinical management, particularly when the diagnosis is evident based on symptoms and risk factors.

Clinicians should maintain a high index of suspicion for pneumothorax in individuals presenting with sudden-onset pleuritic chest pain and dyspnea, particularly if they have risk factors such as smoking, lung disease, or recent chest trauma. Spontaneous pneumothorax should be considered even in younger patients with no known comorbidities if their symptoms are consistent. In trauma patients, the presence of blunt or penetrating chest injury should prompt immediate evaluation for pneumothorax, as delayed recognition can result in progression to life-threatening complications [14]. The choice of imaging technique depends on clinical urgency and patient stability. While chest x-ray is the standard for initial evaluation, tension pneumothorax represents an exception. In these cases, diagnosis is made clinically rather than radiographically, as waiting for imaging can lead to fatal delays. Signs such as hypotension, tracheal deviation, jugular venous distension, and absent breath sounds warrant immediate decompression without confirmatory imaging.

Point-of-care ultrasound (POCUS) has gained increasing importance in pneumothorax evaluation. It is especially valuable in emergency and critical care settings, offering higher sensitivity than chest radiography in detecting even small air collections. The absence of lung sliding, presence of a "lung point," and visualization of the "barcode sign" on M-mode are diagnostic indicators on ultrasound. Unlike x-ray and CT, ultrasound avoids radiation exposure and can be performed rapidly at the bedside, making it ideal for unstable patients or in resource-limited environments [30]. Pneumothorax is classified by size to guide treatment decisions. Radiologically, this classification is determined by measuring the distance between the lung margin and the chest wall. A small pneumothorax is defined as having a visible rim of less than 2 cm, while a large pneumothorax has a rim exceeding 2 cm. This measurement helps estimate the volume of air in the pleural space and influences the urgency and type of intervention. However, chest x-rays often underestimate pneumothorax size. In cases where clinical suspicion remains high despite a negative x-ray, CT imaging offers a more accurate and sensitive assessment. CT scans can also detect air-fluid levels, which indicate hydropneumothorax, as well as reveal small, loculated, or posterior pneumothoraces not visible on standard radiographs [31][32].

Figure 1: Primary Spontaneous Pneumothorax. Radiographic image revealing a left apical pneumothorax.

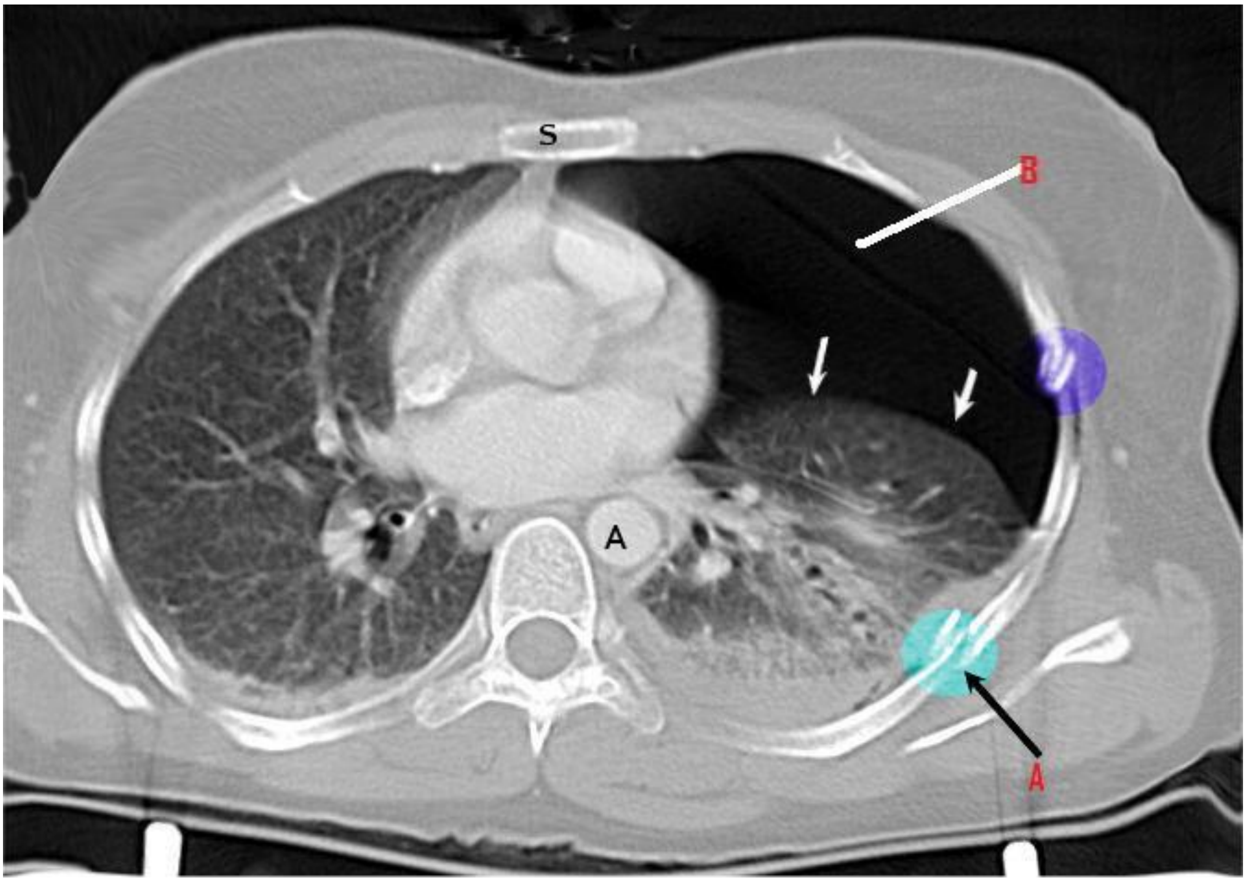

Figure 2: Rib Fracture. Computed tomography of a patient who sustained a rib fracture (A) complicated by a pneumothorax and collapsed lung.

CT imaging plays a critical role in complex or unclear presentations. In trauma settings or in patients with persistent symptoms despite negative initial studies, CT provides detailed visualization of lung structures, pleural space, and associated injuries. It is also useful in evaluating complications, such as persistent air leaks or suspected pleural adhesions, and can guide management decisions regarding surgical intervention. Special consideration is required for bilateral pneumothorax, a rare but potentially serious condition. Referred to as "buffalo chest" in certain contexts, bilateral pneumothorax can occur spontaneously, congenitally, or as a result of medical procedures. The congenital form involves an abnormal communication between the pleural cavities, allowing air to pass from one side to the other. The more commonly encountered iatrogenic variant is seen following thoracic surgical procedures such as lung transplantation, esophagectomy, or cryobiopsy. These interventions can disrupt the mediastinal pleura, creating a continuous pleural space. Such cases necessitate high clinical vigilance and careful postprocedural monitoring [33][34][35]. Overall, timely and accurate evaluation of pneumothorax depends on a combination of thorough clinical assessment and appropriate imaging. Recognizing subtle signs, selecting the right imaging modality, and tailoring the approach to the patient's clinical status are key to effective diagnosis and management.

Treatment / Management

The treatment strategy for pneumothorax depends on multiple factors, including the underlying cause, patient symptoms, clinical stability, and risk of recurrence. The core objectives of management are to evacuate air from the pleural space, control air leakage, promote pleural healing, restore lung expansion, and prevent future episodes [14][28][36]. These principles apply across various subtypes of pneumothorax, although specific interventions differ based on etiology and clinical severity.

Asymptomatic Patients

Patients diagnosed incidentally with a pneumothorax and who do not display symptoms generally do not require emergency intervention. These individuals are typically stable and are often identified through imaging performed for unrelated conditions. In such cases, further evaluation is deferred to outpatient follow-up. Referral to a pulmonologist is recommended to assess the risk of recurrence, monitor radiographic progression, and determine if any preventive measures, such as surgical intervention, are needed. Immediate intervention is usually reserved for high-risk patients or those whose pneumothorax progresses despite initial observation.

Symptomatic Patients

Management decisions become more complex when symptoms are present. In patients who are hemodynamically stable but symptomatic, minimally invasive interventions such as needle aspiration or small-bore catheter insertion (e.g., pigtail catheter) may be used in the emergency setting. These options are suitable for patients with primary spontaneous pneumothorax, particularly when the air collection is moderate to large. Several studies suggest that needle aspiration is a safe and effective alternative to chest tube thoracostomy, with comparable success rates and fewer complications [37]. A randomized clinical trial examining patients with unilateral, moderate-to-large primary spontaneous pneumothorax found that conservative observation alone was not inferior to invasive interventions. Patients managed without drainage had a lower incidence of serious adverse events, suggesting that select cases may be suitable for close observation and supportive care, especially when symptoms are mild [38]. Some clinicians may provide supplemental oxygen and monitor the patient with serial chest radiographs; however, evidence supporting this approach remains limited [39]. Use of positive pressure therapies such as noninvasive ventilation or high-flow nasal cannula should be avoided in patients with active pneumothorax, as these modalities may exacerbate air leaks and worsen the condition [40]. Patients with secondary spontaneous pneumothorax—those with underlying lung pathology—require a more aggressive approach. Observation or needle aspiration alone is often inadequate. These cases typically require hospitalization and placement of a chest tube (20–28 French) connected to a water-seal drainage system. Suction may be applied if spontaneous reexpansion is delayed or air leak persists [41]. This method facilitates lung reexpansion and reduces the risk of respiratory compromise, particularly in individuals with limited pulmonary reserve.

Management of Unstable Patients

In emergency scenarios, particularly those involving traumatic or tension pneumothorax, immediate decompression is critical. For patients with tension pneumothorax, needle thoracostomy should be performed without delay, followed by chest tube placement once the patient is stabilized [42]. In trauma settings, the choice of intervention may depend on available resources, injury mechanism, and concurrent injuries. Large or combined pneumothorax-hemothorax often necessitates large-bore chest tube insertion. While small-bore catheters inserted via the Seldinger technique are effective for most cases, some situations demand a traditional large-bore thoracostomy tube, especially when dealing with hemothorax, extensive air leakage, or ongoing bleeding [43]. Evidence indicates that aspiration techniques have a higher failure rate when used as initial therapy in complete primary spontaneous pneumothorax, suggesting that more definitive measures, like tube thoracostomy, are preferable in such scenarios [44].

Air Drainage Techniques

Air evacuation is central to pneumothorax treatment. The choice of technique is influenced by the patient's stability, pneumothorax size, and the presence of underlying disease. Needle aspiration involves inserting a large-bore (14-gauge) needle into the pleural cavity to relieve pressure and allow air to escape. Common sites include the second intercostal space in the midclavicular line or the fifth intercostal space in the anterior axillary line. Placement should be just above the superior border of the rib to avoid injury to the neurovascular bundle [45]. In more significant or persistent pneumothorax, an 8.3-French pigtail catheter may be inserted. This small-bore catheter is often placed using ultrasound guidance to improve accuracy and minimize complications. The same anatomical locations apply as in needle aspiration, and the catheter may remain in place for several days depending on air leak duration and lung reexpansion [46].

Special Considerations in Pneumothorax Management

Management of pneumothorax in specific populations requires tailored approaches. In pregnant women, conservative observation is often effective, with nearly 50% of cases resolving without invasive intervention. Fetal complications are rare, occurring in fewer than 5% of cases [47]. However, close monitoring is essential to ensure maternal respiratory stability. Patients with lymphangioleiomyomatosis, a rare lung disease associated with pneumothorax, are particularly vulnerable during pregnancy. Even in asymptomatic cases, these individuals should be counseled on pneumothorax risks and seek immediate evaluation if respiratory symptoms develop. Ideally, care during pregnancy should be coordinated between a pulmonologist and a high-risk obstetrician [48]. For patients at high risk of recurrence, such as those with repeated episodes of primary spontaneous pneumothorax, surgical management may be indicated. Two widely used procedures are thoracic pleurodesis using pleural abrasion and minocycline pleurodesis, or apical pleurectomy. Both have demonstrated comparable efficacy in reducing recurrence and are considered standard treatment options for preventing future episodes [49].

Pharmacological Management and Pain Control

Pain management is an important component of pneumothorax treatment. Discomfort arises not only from the pneumothorax itself but also from procedures such as chest tube insertion and thoracic surgery. Effective pain control improves patient compliance, facilitates deep breathing, and prevents complications such as atelectasis. Local anesthesia is commonly used during thoracostomy or aspiration procedures. Additional pain relief may be provided using oral or intravenous medications. In postoperative settings, regional anesthesia techniques—especially intercostal nerve blocks—offer targeted pain relief with fewer systemic effects. For patients undergoing video-assisted thoracoscopic surgery (VATS), intercostal blocks are as effective as thoracic epidural anesthesia but with improved mobility and fewer adverse outcomes like hypotension or urinary retention [50]. Infection control is another important consideration. Prophylactic antibiotics may be administered during chest tube insertion, particularly in patients expected to require prolonged drainage. This strategy helps prevent site infections and more serious complications such as empyema. Antibiotics may also be considered when there is clinical evidence of infection or in immunocompromised patients at higher risk.

Key Management Points

- Asymptomatic and stable patients may be managed conservatively, especially if pneumothorax is small and incidentally discovered.
- Symptomatic patients with stable vitals can be treated with needle aspiration or small-bore catheter placement; hospitalization and observation may be required.
- Secondary pneumothorax typically requires chest tube placement and inpatient monitoring due to lower pulmonary reserve.
- Unstable patients or those with tension pneumothorax need immediate needle decompression followed by tube thoracostomy.
- Surgical management, including pleurodesis or pleurectomy, is considered for patients with recurrent pneumothorax or persistent air leaks.
- Pain management should include local anesthetics, systemic analgesics, or nerve blocks depending on the intervention.
- Prophylactic antibiotics should be considered during invasive procedures to reduce infection risk.

The optimal treatment plan requires individualized assessment. The clinician must balance the risks and benefits of invasive versus conservative approaches, while considering the patient's baseline lung function, recurrence risk, and overall health status. Effective coordination between emergency, pulmonary, surgical, and, when needed, obstetric services is critical for achieving the best outcomes in patients with pneumothorax.

Differential Diagnosis

Spontaneous nontraumatic pneumothorax, especially in its early stages, often presents nonspecific clinical features that mimic a range of other acute chest conditions. The most common presenting symptoms include sudden-onset chest pain and dyspnea, which are also common to various pulmonary, cardiac, gastrointestinal, musculoskeletal, and psychiatric disorders. Because of this overlap, clinicians must systematically consider and exclude a broad differential diagnosis to avoid misdiagnosis or delayed treatment.

In pulmonary conditions, pneumonia remains one of the most frequently confusing diagnoses. Both pneumothorax and pneumonia can present pleuritic chest pain, shortness of breath, and cough. However, pneumonia usually involves fever, productive cough, and radiographic findings of consolidation rather than the absence of lung markings associated with pneumothorax. Acute asthma exacerbations and bronchitis can also present respiratory distress, wheezing, and chest discomfort. However, they typically have a preceding history of chronic respiratory illness, bilateral involvement, and wheezing on auscultation. Pulmonary embolism, another critical differential, shares the acute onset of chest pain and dyspnea. In embolism, pleuritic pain and hypoxia are common, but imaging will show vascular occlusions rather than air in the pleural space. Tuberculosis may mimic chronic or recurrent pneumothorax, especially in regions where the disease is prevalent. Pulmonary empyema and lung abscesses may also cause pleuritic chest pain but are distinguished by systemic signs of infection and localized consolidation on imaging. From a cardiovascular perspective, several life-threatening conditions must be ruled out. Aortic dissection, for example, may present sudden, tearing chest pain and signs of hemodynamic instability. Unlike pneumothorax, dissection often radiates to the back and is accompanied by blood pressure discrepancies between limbs. Acute coronary syndrome presents chest tightness or pressure, often radiating to the jaw or arm and associated with electrocardiographic changes and elevated cardiac enzymes. Myocarditis and pericarditis can also present with chest discomfort and dyspnea. Pericarditis, in particular, may mimic the pleuritic pain of pneumothorax, but it usually worsens when lying down and improves when sitting up. Pleurodynia, typically caused by viral infections, causes localized pain that may resemble that of pneumothorax but lacks radiologic confirmation.

Gastrointestinal and musculoskeletal conditions further complicate the diagnostic picture. Costochondritis, or inflammation of the costal cartilage, can cause localized chest pain, often reproducible on palpation. This feature distinguishes it from pneumothorax, where physical examination is typically unremarkable unless the collapse is significant. Diaphragmatic injuries may mimic chest pain and impaired ventilation but are usually associated with trauma and abdominal signs. Gastroesophageal reflux disease and esophageal spasm can cause retrosternal burning or pressure that resembles pleuritic pain. However, these symptoms are typically associated with meals and are not relieved by changes in position or respiration. Mallory-Weiss tear and Boerhaave syndrome involve esophageal injury and may present with chest pain and subcutaneous emphysema, making them challenging to distinguish from pneumothorax. However, Boerhaave syndrome often follows forceful vomiting and can lead to mediastinitis, which produces systemic signs of infection and requires prompt imaging. Psychiatric conditions such as panic attacks or anxiety disorders can present sudden-onset dyspnea, chest tightness, and a sense of impending doom. These symptoms can easily be misinterpreted as pneumothorax, especially in younger individuals with no significant past medical history. A thorough history focusing on triggering events, lack of physical findings, and the presence of hyperventilation or tingling in extremities can help differentiate panic-related symptoms from true pleural or cardiopulmonary pathology.

In cases of traumatic pneumothorax, the diagnostic approach must also account for potential complications such as tension pneumothorax and hemothorax. Tension pneumothorax presents with severe respiratory distress and hemodynamic instability and requires immediate decompression. Hemothorax, characterized by blood in the pleural cavity, may present with similar signs and is often associated with blunt or penetrating chest trauma. In trauma patients, the presence of pneumothorax often coexists with other thoracic and abdominal injuries, such as rib fractures, pulmonary contusions, diaphragmatic rupture, or solid organ lacerations. Therefore, a full trauma evaluation, including focused assessment with sonography for trauma (FAST) and contrast-enhanced imaging, is essential. Given the extensive range of possible conditions with overlapping presentations, the initial assessment must include a detailed history, physical examination, and targeted imaging. Clinicians should inquire about recent trauma, infection, cardiovascular symptoms, gastrointestinal complaints, and psychiatric history to narrow the differential. Appropriate use of diagnostic tools, including chest radiographs, point-of-care ultrasound, CT imaging, and laboratory testing, ensures accurate diagnosis and avoids unnecessary interventions or missed life-threatening conditions.

Prognosis

The clinical outcome of spontaneous pneumothorax is closely linked to its classification, the extent of lung collapse, and the patient's baseline pulmonary function. Primary spontaneous pneumothorax, which occurs in patients without known lung disease, typically has a favorable prognosis. In many of these cases, especially when the pneumothorax is small and the patient remains asymptomatic, conservative observation may be sufficient, and full reexpansion of the lung can occur without invasive treatment. However, despite the generally benign short-term outcome, the long-term risk of recurrence remains a significant concern. Recurrence rates after an initial primary spontaneous pneumothorax episode are reported to be between 20% and 60% within three years, with the highest likelihood of recurrence in the first 6 to 12 months following the initial event [51]. In contrast, secondary spontaneous pneumothorax, which arises in the context of preexisting pulmonary pathology such as chronic obstructive pulmonary disease, cystic fibrosis, or pulmonary fibrosis, carries a less favorable prognosis. These patients often present with more pronounced symptoms and reduced respiratory reserve, making the pneumothorax more clinically significant. In such cases, complications like persistent air leaks, incomplete lung reexpansion, or respiratory failure are more common. Secondary pneumothorax usually requires hospital admission, chest tube placement, and sometimes surgical intervention, particularly in recurrent cases. Prognosis also depends on the promptness of diagnosis and the appropriateness of the chosen treatment strategy. Early identification and management of pneumothorax, especially in vulnerable populations such as the elderly or those with significant comorbidities, are essential to minimize morbidity and prevent potentially fatal complications like tension pneumothorax.

Complications

Pneumothorax, while often manageable with timely intervention, carries the risk of several complications that can significantly worsen clinical outcomes if not promptly identified and treated. One of the most significant and preventable complications is misdiagnosis. Failure to recognize pneumothorax can delay essential treatment and result in rapid clinical deterioration. This may occur due to incomplete history-taking, insufficient physical examination, low clinical suspicion, or failure to obtain or correctly interpret chest radiographs. Small pneumothoraces, in particular, can be difficult to detect on standard imaging, especially in supine films or in patients with underlying pulmonary abnormalities [36][52][53].

The consequences of misdiagnosis can be severe. One critical progression is the conversion of a simple pneumothorax into a tension pneumothorax. This life-threatening state arises when air continues to accumulate in the pleural space without a route of escape, creating positive pressure that compresses the lungs and mediastinal structures. This leads to hypoxemic respiratory failure, obstructive shock, and can result in respiratory or cardiac arrest if decompression is not performed immediately. Tension pneumothorax requires rapid clinical diagnosis and emergency needle decompression followed by definitive chest tube placement to avoid fatal outcomes. Another potential complication is the development of empyema, especially in patients with prolonged chest tube drainage or if aseptic technique is not maintained during thoracostomy. Infection of the pleural space may require antibiotic therapy and sometimes surgical drainage. Similarly, site infections at the catheter insertion point are not uncommon, particularly in immunocompromised individuals or those with prolonged hospitalization [54].

Reexpansion of pulmonary edema is another serious but rare complication. It may occur when a lung that has collapsed for several days is rapidly reexpanded following drainage. This process increases capillary permeability and can result in unilateral or bilateral pulmonary edema, often within hours of reexpansion. The condition is more likely when large pneumothoraces are evacuated quickly, particularly in young patients or those with large-volume drainage. Supportive care with oxygen and, in severe cases, mechanical ventilation may be required. Procedural complications are also a concern. Needle decompression and chest tube thoracostomy, while often lifesaving, carry procedural risks. These include lung laceration, which can cause further air leakage or bleeding; pleural space infection; and hemothorax from injury to the intercostal vessels or internal mammary artery. Incorrect technique or improper tube placement can result in persistent air leak, inadequate lung reexpansion, or the creation of additional injuries. Damage to the intercostal neurovascular bundle can cause pain, bleeding, or long-term neurological symptoms. In rare cases, chest tube placement can induce arrhythmias. This is more likely when the tube irritates the pericardium or adjacent structures during insertion or manipulation. These arrhythmias can range from benign ectopic beats to more serious disturbances that require cardiac monitoring or intervention.

Pneumomediastinum is another recognized complication. It occurs when air from the pleural space dissects into the mediastinum. On imaging, this presents as radiolucency outlining the mediastinal structures. Clinically, it may be accompanied by Hamman's crunch, a crackling or crunching sound heard during the cardiac cycle, best appreciated in the left lateral decubitus position. While often self-limited, pneumomediastinum may be associated with esophageal or tracheal injuries in trauma cases and should prompt further investigation if clinical suspicion exists [54]. To minimize complications, clinicians must maintain a high index of suspicion, especially in high-risk or atypical cases. Meticulous attention to procedural technique, strict infection control measures, and early recognition of warning signs for deterioration are essential. Routine post-procedure monitoring, including follow-up imaging and respiratory assessments, is critical to ensuring patient safety and timely identification of any adverse outcomes. Proper training, adherence to evidence-based protocols, and interprofessional coordination among emergency, respiratory, and surgical teams enhance the overall safety and effectiveness of pneumothorax management.

Consultations

Effective management of pneumothorax frequently involves a multidisciplinary approach, with the need for specialist consultations determined by the type, severity, and etiology of the pneumothorax. For cases of uncomplicated primary spontaneous pneumothorax, particularly when the pneumothorax is small and the patient is hemodynamically stable, treatment may be managed solely by emergency physicians or general practitioners. These cases often respond well to conservative approaches such as observation, supplemental oxygen, or needle aspiration. However, when the pneumothorax is large, symptomatic, or recurrent, referral to a pulmonologist becomes necessary. Pulmonologists can guide both the acute management and the long-term follow-up, especially in assessing the risk of recurrence and determining the need for preventive interventions [54].

In more severe or persistent cases, thoracic surgery consultation is often required. Thoracic surgeons manage procedures such as chest tube insertion, video-assisted thoracoscopic surgery (VATS), pleurectomy, or pleurodesis. These procedures are particularly relevant for patients who experience repeated episodes of pneumothorax or for those in whom less invasive measures fail to achieve lung reexpansion. For secondary spontaneous pneumothorax, consultation with a pulmonologist is essential due to the complexity added by underlying pulmonary disease, such as COPD or interstitial lung disease. In these patients, optimizing chronic disease management is critical to reducing recurrence risk and improving outcomes. In patients requiring mechanical ventilation or intensive monitoring due to respiratory compromise or tension pneumothorax, critical care specialists and anesthesiologists are often involved in patient stabilization and ventilator management. In cases of iatrogenic pneumothorax resulting from procedures such as central line insertion, lung biopsy, or mechanical ventilation, collaboration with the proceduralist—such as an interventional radiologist or anesthesiologist—is important to ensure coordinated management. Their input can help identify the source of injury and guide future procedural precautions to prevent recurrence. Coordinated interdisciplinary care remains essential in complex or high-risk cases to ensure timely diagnosis, effective intervention, and prevention of complications [54].

Patient Education

Patient education plays a critical role in reducing the recurrence and complications of spontaneous pneumothorax. Understanding the underlying risk factors and necessary lifestyle changes is essential for patients, particularly those with a history of pneumothorax or chronic lung disease. One of the most important aspects of patient counseling is smoking cessation. Smoking, including tobacco and cannabis use, significantly increases the risk of both primary and secondary spontaneous pneumothorax recurrence. Patients should be provided with resources and support programs to assist with quitting and preventing relapse. Patients must also be informed about the risks associated with activities that involve rapid or extreme changes in atmospheric pressure. These include scuba diving, high-altitude hiking, and flying in unpressurized aircraft. Such activities can precipitate a pneumothorax, especially in individuals with residual pulmonary blebs or bullae. In many cases, patients with a history of pneumothorax may be advised to permanently avoid these activities unless cleared by a pulmonologist following thorough evaluation, including imaging and pulmonary function tests [55].

Education should also focus on early symptom recognition. Patients need to understand that sudden onset of pleuritic chest pain, breathlessness, or unexplained fatigue should prompt immediate medical evaluation. Timely intervention can prevent progression to tension pneumothorax or other complications. For those who have undergone surgical interventions such as pleurodesis or video-assisted thoracoscopic surgery, education should include postoperative care instructions, expected recovery timelines, and the importance of adhering to follow-up appointments. Long-term follow-up with a pulmonologist is often recommended for individuals with recurrent pneumothorax or chronic lung conditions. These visits allow for monitoring of lung function, evaluation of any new symptoms, and reinforcement of preventive strategies. Effective communication and consistent education empower patients to take an active role in managing their condition, ultimately improving clinical outcomes and quality of life [55].

Other Issues

Acute pneumothorax remains a significant clinical condition that requires prompt recognition, accurate diagnosis, and timely management to prevent complications. At its core, pneumothorax is defined by the presence of air in the pleural space, which disrupts the negative pressure that keeps the lungs inflated. This leads to partial or complete lung collapse and can result in respiratory compromise. The condition typically presents with sudden-onset pleuritic chest pain and shortness of breath. These symptoms may range from mild discomfort to severe respiratory distress, depending on the size of the pneumothorax and the patient's underlying lung function [55]. Tension pneumothorax represents a life-threatening variant that requires immediate attention. It occurs when air enters the pleural cavity and cannot escape, leading to increasing pressure on thoracic organs. Clinically, tension pneumothorax is characterized by hypotension, tachycardia, jugular venous distention, and tracheal deviation away from the affected side. The rapid progression of respiratory distress in these patients demands immediate needle decompression, typically performed at the second intercostal space in the midclavicular line, followed by definitive chest tube placement. On physical examination, clinicians may note decreased or absent breath sounds on the affected side, hyperresonance on percussion, reduced tactile fremitus, and, in severe cases, distended neck veins and hypotension. A chest x-ray remains the most accessible and widely used imaging modality. It often reveals a visible visceral pleural line with absent lung markings peripheral to it. In cases where the pneumothorax is small—defined as less than 2 cm from the lung margin to the chest wall—and the patient is stable with minimal symptoms, observation and supplemental oxygen may suffice. Oxygen accelerates pleural air resorption and can be administered while monitoring the patient.

Larger or more symptomatic pneumothoraces, typically greater than 2 cm, require interventional management, including needle aspiration or chest tube thoracostomy. Recurrent or persistent pneumothorax cases may warrant pleurodesis or video-assisted thoracoscopic surgery (VATS) to prevent further episodes. These procedures aim to eliminate the pleural space or reinforce lung adherence, thereby reducing recurrence risk. Preventive strategies should be clearly communicated to all patients following a pneumothorax episode. Smoking cessation is critical, as continued tobacco use significantly increases recurrence risk. Patients should be cautioned against activities that involve significant atmospheric pressure changes, including high-altitude travel, scuba diving, and flying in unpressurized aircraft. Follow-up care is essential. Imaging—often a repeat chest x-ray—is necessary to confirm lung reexpansion and to monitor for delayed complications. In some cases, additional follow-up with pulmonology is warranted, especially if the pneumothorax is secondary or recurrent. Prompt and coordinated care can reduce recurrence, improve lung function outcomes, and minimize the risk of complications [55].

Enhancing Healthcare Team Outcomes

Effective management of pneumothorax demands coordinated efforts from an interprofessional healthcare team. With over 5 million intensive care unit admissions annually in the United States, the burden of conditions like pneumothorax is significant. Optimal outcomes depend not only on rapid diagnosis and intervention but also on seamless collaboration between physicians, nurses, radiologists, and pharmacists. Nursing professionals play a frontline role, especially in post-procedural care following chest tube placement. They are responsible for ongoing patient monitoring, including assessment of respiratory status, breath sounds, vital signs, and signs of infection or tube malfunction. Nurses ensure that the chest drainage system remains functional and the insertion site remains clean and intact. Early identification of complications, such as blocked tubes or signs of reexpansion pulmonary edema, is vital. In cases of tension pneumothorax, nurses are often the first to detect sudden changes in respiratory or cardiovascular function. Their timely recognition and communication with the medical team can initiate life-saving interventions [56].

Radiologists are central to diagnosis and follow-up. Chest x-ray remains the first-line imaging modality, but detecting subtle pneumothoraces or complications requires precision. The integration of advanced radiology software, including computer-assisted detection and high-resolution imaging, has improved accuracy, especially for junior clinicians or in fast-paced emergency settings. Radiologists also guide interventional procedures, such as ultrasound-guided pigtail catheter insertion, enhancing procedural safety and precision. Pharmacists contribute by supporting medication management and ensuring safe use of analgesics and antibiotics. They assist in selecting appropriate pain control strategies during and after thoracostomy or needle aspiration, minimizing adverse effects. When infection risk is present, such as in prolonged chest tube use, pharmacists recommend suitable antimicrobial prophylaxis, adjusting for renal function, allergies, or drug interactions. Clear, timely communication among all members is essential. Emergency physicians, thoracic surgeons, nurses, radiologists, and pharmacists must share clinical updates and respond quickly to changes. Structured team protocols and rapid-response workflows improve decision-making speed and consistency. By fostering interdisciplinary collaboration, the healthcare team enhances safety, shortens hospital stays, and improves patient survival and satisfaction [56].

Conclusion:

Acute pneumothorax is a clinically significant condition requiring prompt recognition and tailored management to prevent complications such as respiratory failure or tension physiology. The condition's heterogeneity—spanning spontaneous, traumatic, and iatrogenic causes—demands an individualized approach. Primary spontaneous pneumothorax, often seen in young, tall males with smoking histories, may resolve with observation, while secondary cases (e.g., in COPD patients) necessitate aggressive treatment due to compromised lung function. Tension pneumothorax, a medical emergency, mandates immediate needle decompression followed by chest tube placement to avert hemodynamic collapse. Diagnostic accuracy hinges on imaging, with chest X-rays as the initial tool, supplemented by CT or ultrasound for complex cases. Point-of-care ultrasound (POCUS) has emerged as a rapid, radiation-free alternative, particularly in emergency settings. Treatment strategies vary: small, asymptomatic pneumothoraces may be monitored, whereas symptomatic or large cases require aspiration or tube thoracostomy. Recurrent episodes often warrant surgical interventions like pleurodesis or VATS to prevent future occurrences. The interdisciplinary team is pivotal in optimizing outcomes. Nurses monitor post-procedural recovery, detect complications (e.g., tube blockage or infection), and provide patient education. Radiologists ensure precise imaging interpretation, guiding interventions such as pigtail catheter placement. Pharmacists contribute by managing analgesia and antibiotic prophylaxis, particularly for prolonged chest tube use. Effective communication among team members enhances decision-making and reduces errors. Patient education is a cornerstone of long-term management. Smoking cessation significantly reduces recurrence risk, while avoidance of high-pressure activities (e.g., scuba diving) is advised for vulnerable individuals. Early symptom recognition—sudden chest pain or dyspnea—can expedite life-saving interventions. Follow-up with pulmonologists ensures monitoring for recurrence, especially in secondary pneumothorax. In summary, pneumothorax management requires a multifaceted approach integrating emergency care, imaging, procedural expertise, and patient-centered counseling. Interprofessional collaboration improves diagnostic efficiency, treatment efficacy, and preventive strategies, ultimately reducing morbidity and mortality. Future advancements in minimally invasive techniques and risk stratification may further refine care paradigms for this condition.

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التقييم والإدارة متعددة التخصصات للاسترواح الصدري الحاد: أدوار الصيادلة، اختصاصي الأشعة، وكوادر التمريض

الملخص:

الخلفية: يُعرّف الاسترواح الصدري بتجمّع الهواء داخل التجويف الجنبي، مما يؤدي إلى انهيار الرئة. تختلف الأعراض من حالات بدون أعراض إلى فشل تنفسي مهدد للحياة. يُصنف الاسترواح إلى تلقائي (أولي أو ثانوي)، رضحي، أو انضغاطي، ولكل نوع خطة علاجية مختلفة.

الهدف: يهدف هذا المقال إلى تقييم الإدارة متعددة التخصصات للاسترواح الصدري الحاد، مع التركيز على أدوار الصيادلة، واختصاصي الأشعة، وكوادر التمريض في التشخيص والعلاج وتثقيف المرضى لتحسين النتائج السريرية.

المنهجية: تم إجراء مراجعة شاملة لمسببات الاسترواح الصدري، والصورة السريرية، وتقنيات التصوير التشخيصي (أشعة الصدر، التصوير المقطعي المحوسب، الموجات فوق الصوتية)، واستراتيجيات العلاج (المراقبة، الشفط بالإبرة، بزل الصدر، الالتصاق الجنبي). كما تم تحليل أدوار مقدمي الرعاية الصحية في رعاية المرضى.

النتائج: الاسترواح الصدري التلقائي الأولي غالباً ما يُعالج بشكل تحفظي، بينما تتطلب الحالات الثانوية تدخلاً مكثفًا بسبب أمراض الرئة المزمنة. الاسترواح الانضغاطي يتطلب تفريغاً طارئاً للهواء. التعاون بين التخصصات يعزز دقة التشخيص وسلامة الإجراءات والوقاية طويلة الأمد، خاصة من خلال التوعية بالإقلاع عن التدخين والرعاية المتابعة.

الاستنتاج: يعتمد النجاح في علاج الاسترواح الصدري على التشخيص الفوري، والتدخل المناسب، وتنسيق الجهود بين الأطباء، والممرضين، واختصاصي الأشعة، والصيادلة. ويُعد تثقيف المرضى حول تقليل عوامل الخطر أساسياً للوقاية من تكرار الحالة.

الكلمات المفتاحية: الاسترواح الصدري، التجويف الجنبي، أنبوب الصدر، الاسترواح الانضغاطي، الرعاية متعددة التخصصات، الإقلاع عن التدخين.