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Radiologic Multimodality Approach in a Case of Pancoast Tumor with Bone Lytic Lesions

Novia Andansari Putri[1*], Prima Belia Fathana[2], Triana Dyah Cahyawati[1]

[1] Department of Radiology, Faculty of Medicine, Mataram University/Nusa Tenggara Barat General Hospital, Mataram, Indonesia
[2] Department of Pulmonology, Faculty of Medicine, Mataram University/Nusa Tenggara Barat General Hospital, Mataram, Indonesia

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Abstract: Lung cancer was the second most common malignancy and the leading cause of cancer-related mortality worldwide in 2020, accounting for 1.8 million deaths. Delayed diagnosis often leads to advanced-stage presentation and poor long-term survival. Pancoast tumors, a rare subset of superior sulcus lung cancers, may present with atypical neurologic signs. We report a 55-year-old man with a 6-month history of right chest pain and progressive dyspnea. Physical examination was unremarkable apart from mild right eyelid ptosis without a full Horner's syndrome. Chest X-ray and contrast-enhanced CT demonstrated an apical mass in the right upper lobe with lytic lesions of the first and second ribs. Bronchoscopic biopsy confirmed non–small cell lung carcinoma consistent with a Pancoast tumor. The patient underwent surgical resection of the apical mass with regional lymphadenectomy, followed by platinum-based chemotherapy. Postoperative imaging revealed residual disease, prompting additional chemotherapy cycles. At six-month follow-up, the patient experienced marked pain relief and partial resolution of ptosis, with no new metastatic foci on imaging. High clinical suspicion and a multidisciplinary radiologic and histopathologic approach are essential for early diagnosis and optimal management of Pancoast tumors.

Keywords: Lung cancer, Pancoast, Lung adenocarcinoma

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Introduction

Lung cancer has shown a rising incidence globally and remains a major public health concern, including in Indonesia. Each year, approximately six million deaths are attributed to cancer, with around one million of these caused by lung cancer. In Indonesia, lung carcinoma ranks fourth among the most frequently diagnosed cancers in hospitals. According to data from the Indonesian Ministry of Health, cancer affects approximately 6% of the national population. A World Health Organization (WHO) survey conducted in 2002 estimated the number of lung cancer cases in developing countries at 191,000 (Gondhowiardjo et al., 2021; Li et al., 2023; Santoso et al., 2021).

In 1924, Henry Pancoast, a radiologist from the University of Pennsylvania, published a paper describing tumors located at the lung apex. In a subsequent 1932 report, he provided a detailed account of the syndrome that would later bear his name. Pancoast was the first to characterize the clinical features of apical lung tumors—now known as Pancoast tumors—including an apical lung mass associated with rib destruction, pain involving the eighth cervical nerve

Email: novia.putri5@gmail.com

or the first and second ribs, Horner's syndrome, atrophy of the upper limb muscles, shoulder pain, and pain along the distribution of the ulnar nerve in the arm and hand (Rea, 2024; Munir et al., 2021; Francis et al., 2024; Nugroho & Sensusiati, 2023).

Benign tumors of the lung are rare, and most Pancoast tumors are malignant. The majority are squamous cell carcinomas, although adenocarcinomas and large cell carcinomas—classified as non-small cell lung cancer (NSCLC)—also frequently occur. Only 3–5% of cases are classified as small cell lung carcinoma (SCLC). Pancoast tumors represent a subset of lung cancers that specifically invade the apical chest wall (Detterbeck, 2010; Tohme et al., 2024; Tsitsias et al., 2023; Kratz et al., 2017; Elsaka et al., 2022).

Case(s) and Operation Technique

A 55-year-old male presented to the Thoracic and Mediastinal Oncology Clinic at RSUD Provinsi NTB with complaints of chest pain that began in late 2023. The pain was localized to the right shoulder and radiated posteriorly. It was described as a tingling sensation. The patient did not report accompanying symptoms such as cough, dyspnea, fever, night sweats, or weight loss. The pain was not influenced by physical activity or specific positions.

The patient initially sought treatment at a primary healthcare center but reported that the right shoulder pain persisted without improvement. He was subsequently referred to RSUD Provinsi NTB, where a diagnosis of adenocarcinoma was confirmed, with ALK positivity on molecular testing. The patient underwent radiotherapy in July 2024.

In September 2024, the patient was hospitalized at RSUD Provinsi NTB with complaints of generalized weakness and recurrent right-sided chest pain radiating to the back and right arm, again described as tingling in nature. These symptoms were accompanied by swelling in the fingers of the right hand, nausea, and decreased appetite. On physical examination, vital signs were largely within normal limits: blood pressure, heart rate, and body temperature were unremarkable. However, a mild increase in respiratory rate to 25 breaths per minute was noted.

A chest radiograph revealed a soft tissue bulging mass at the right lung apex with associated destruction of the first, second, and third right ribs, raising suspicion for a Pancoast tumor.

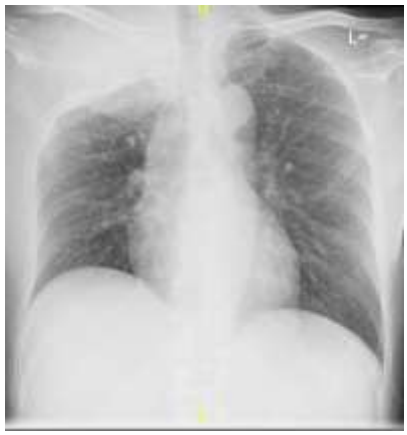

Figure 1. X-ray show soft tissue bulging mass at the right lung apex with associated destruction of the first, second, and third right ribs

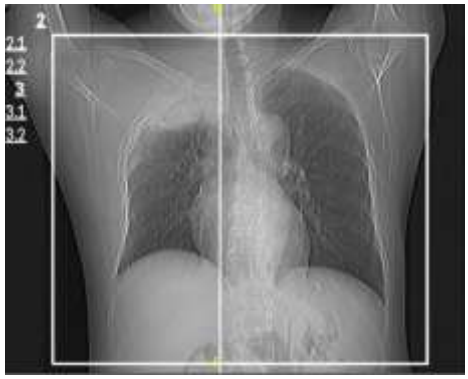

Figure 2. CT scan showed a right apical mass consistent with a Pancoast tumor, along with destruction and blastic lesions of the right first and second ribs

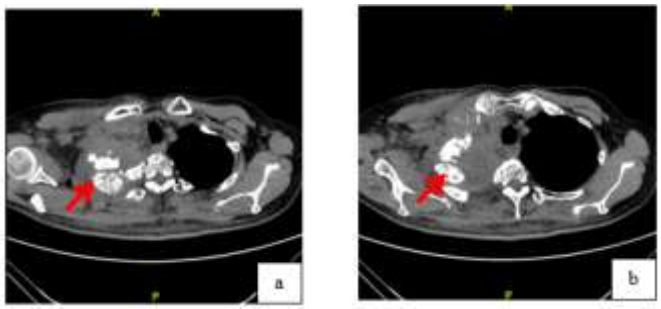

Figure 3. a) and b) Appearance of mass on the hemitorax

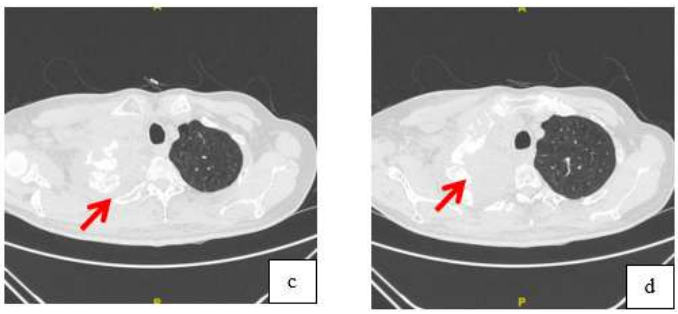

Figure 4. c) and d) Lung view on axial slice CT scan

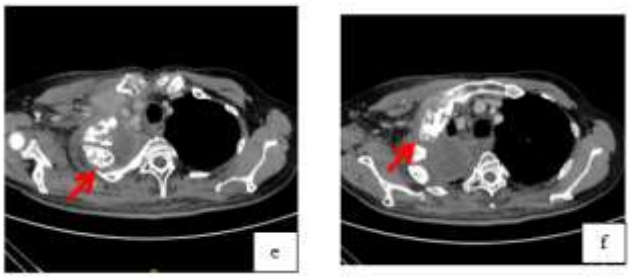

Figure 5. e) and f) Mediastinal view on axial section CT scan

Further imaging with contrast-enhanced thoracic CT scan showed a right apical mass consistent with a Pancoast tumor, along with destruction and blastic lesions of the right first and second ribs. Additionally, multiple lymphadenopathies were identified in the pretracheal and right peribronchial regions. Based on these findings, the Thoracic and Mediastinal Oncology Subspecialist recommended continuation of radiotherapy.

Discussion

Tumors in the superior sulcus were first described by Pancoast in 1932, characterized by a constellation of signs and symptoms that later became known as Pancoast syndrome (Marulli et al., 2016). The classical clinical manifestations include shoulder pain radiating to the arm, weakness, and atrophy of muscles innervated by the C8–T1 nerve roots on the ipsilateral side (Das et al., 2014). Histologically, most Pancoast tumors consist of squamous cell carcinoma (35–40%) and adenocarcinoma (~60%), while small cell carcinoma is rare (<5%). (Detterbeck, 2010; Tohme et al., 2024)

In this case report, a 55-year-old male presented to the Thoracic and Mediastinal Oncology Clinic at RSUD Provinsi NTB in late 2023 with right-sided chest pain radiating posteriorly, which was eventually confirmed as a Pancoast tumor. Diagnosis is often delayed—on average more than three months—due to nonspecific symptoms that mimic infections or other forms of pulmonary metastasis (Moita et al., 2024). In this case, targeted CT-guided biopsy confirmed adenocarcinoma with a histologic accuracy exceeding 90% and minimal complication rate (Kang et al., 2023), emphasizing the importance of CT imaging and a multimodal diagnostic approach to exclude differential diagnoses such as metastases or infections (Foroulis et al., 2013).

The differential diagnosis of Pancoast tumors includes primary tumors of the thyroid, larynx, and pleura, as well as non-neoplastic etiologies such as pulmonary infections (Villgran et al., 2023), subclavian artery aneurysms (D'Silva, 2025), pleural amyloidosis (Radu Şerban et al., 2023), and multiple myeloma (Xu et al., 2021).

Once the diagnosis is confirmed, surgical management may be performed via an anterior or posterior incision. The posterior approach follows the scapular contour and enters the pleural cavity through the third or fourth intercostal space, with inferior dissection to avoid injury to the subclavian artery and brachial plexus (Foroulis et al., 2013; Xu et al., 2021). Prior to resection, comprehensive imaging with CT and MRI is essential to assess tumor invasion into the parietal pleura, ribs, and neurovascular structures (Hao et al., 2020)

En bloc resection involves removing the apical chest wall, including the posterior segments of the first three ribs, the upper thoracic vertebral segments, stellate ganglion, and the involved lung parenchyma, to achieve an R0 surgical margin (Lemmon et al., 2022). The feasibility of resection is determined by the absence of extensive invasion into the subclavian artery, vertebral body with or without spinal cord compression, or unresectable brachial plexus involvement. (Detterbeck, 2010; Tohme et al., 2024)

Although resection removes most of the tumor mass, postoperative thoracic CT imaging in this case revealed residual tumor at the margin, indicating the need for adjuvant therapy (Moita et al., 2024). Adjuvant chemotherapy with a regimen of cisplatin, etoposide, and bleomycin over three cycles effectively reduced the residual mass, with follow-up CT thorax showing no detectable tumor after completion of therapy (Foroulis et al., 2013; Sandrucci, 2024; Conci et al., 2022).

Although this case report provides valuable information on diagnosing and treating a Pancoast tumor, several areas could be improved to strengthen its scientific and educational value. The discussion section would benefit from a more thorough explanation of other possible diagnoses and how conditions such as infections, lymphoma, or other apical lung masses were ruled out in this patient. Additionally, the report offers limited details on the patient's long-term outcome, such as survival, recurrence, or quality of life after treatment, which are important for understanding the effectiveness of the therapy. The report could also highlight more clearly what makes this case unique, for example, the presence of ALK-positive adenocarcinoma, to distinguish it from other similar cases. While different imaging studies are mentioned, including clear, labeled images would help readers better understand the radiologic findings described. Finally, improving some of the language and writing style would make the report easier to read and more precise.

This research hope a message could emphasize the importance of considering Pancoast tumors in

patients with ongoing shoulder pain and masses at the lung apex and highlight the crucial role of various imaging methods and tissue diagnosis in confirming the disease and planning treatment. Additionally, pointing out the relevance of molecular findings like ALK positivity and the need for a team-based approach in managing these patients would make the article more useful for clinical practice. Including these improvements would make the case report clearer, more informative, and more valuable to readers in the medical community.

Conclusion

One subtype of lung cancer is the Pancoast tumor, which involves the apical region of the chest wall. Most true Pancoast tumors are extrathoracic in nature, with their primary focus on chest wall structures rather than the pulmonary parenchyma. These tumors frequently invade the lymphatic system, brachial plexus, intercostal nerves, stellate ganglion, sympathetic nervous system, adjacent ribs, and vertebrae. Due to their location in the lung apex, Pancoast tumors often spread rapidly to surrounding tissues. However, this cancer is potentially curable if detected before metastasis and regional nodal enlargement occurs.

Pancoast tumors are exceedingly rare, primarily because they arise in the lung apex, whereas most lung cancers originate in the lower lobes. Fewer than 5% of lung cancer cases involve Pancoast tumors. Notably, these tumors tend to have a better prognosis than centrally located lung tumors and exhibit higher survival rates when compared to other cancers at a similar stage.

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