Extrathoracic Musculature Mimicking Pleural Lesions[1]

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The thoracic cage musculature can project over the lung fields in such a way as to mimic pleural-based densities on the posteroanterior chest radiograph. The characteristics of these muscular shadows and their differentiation from actual pleural lesions are described. This differentiation is of utmost importance in patients with suspected primary or metastatic malignancy.

INDEX TERMS: Muscles • Pleura • (Pleura, hydrothorax or pleural thickening, 6[6].760) • (Rib cage, normal variant, 4[7].130) • Thorax

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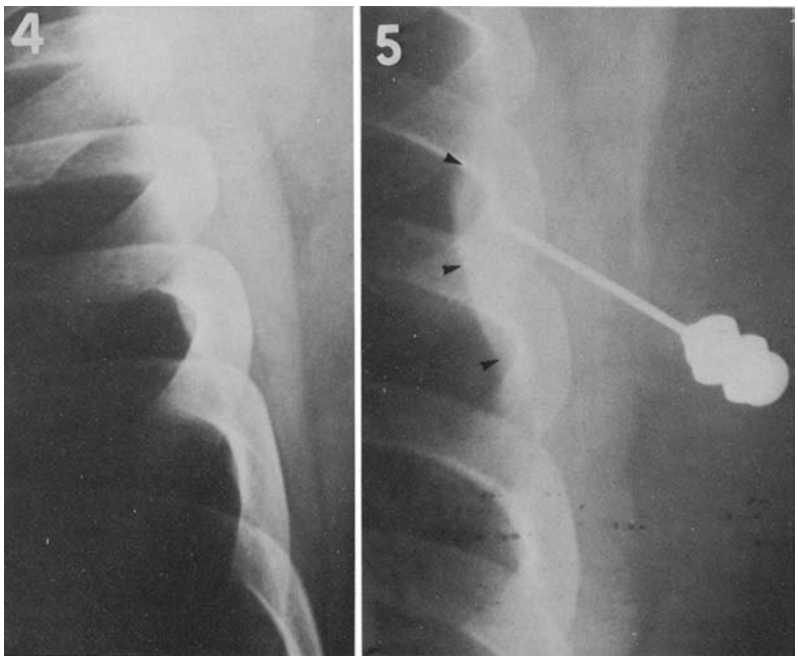

Fig. 1. Normal costal slips of origin of serratus anterior and external oblique abdominal muscles with sharp medial border fading inferiorly (arrowheads). Muscle bellies of the serratus anterior are seen in the extrathoracic soft tissue (arrows).

Fig. 2. PA chest radiograph demonstrating presumed left pleural-based mass abutting the 5th through 7th ribs laterally (arrowheads).

Fig. 3. Fluoroscopic spot film revealing several presumed pleural-based "masses" abutting the lateral thoracic wall (large arrowheads). Prominent serratus anterior muscles overlie the lateral aspect of the ribs (small arrowheads).

Fig. 4. Fluoroscopic spot film in an oblique projection showing presumed pleural-based "masses" rotated off of the lung field.

Fig. 5. Vim-Silverman needle tip in costal slip of serratus anterior muscle.

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THE COSTAL SLIPS of origin of the serratus anterior and external oblique abdominal muscles can project over the periphery of the lung fields on the frontal chest radiograph and simulate pleural-based densities (1). Sargent *et al.* (2) described these shadows as triangular in shape, with sharp or ill-defined borders, and originating variably from the fifth to the ninth ribs (Fig. 1). It is our experience that these muscles may present as localized, smoothly marginated densities abutting against and forming obtuse angles with the inner thoracic wall and thus resemble actual pleural-based lesions. We feel it is imperative to distinguish them, if possible, to avoid needless invasive diagnostic examinations. This is of particular importance in patients with known or suspected malignancies. The purpose of this paper is to describe the differentiation of such simulating radiographic shadows, using fluoroscopic technique and standard frontal chest radiographs.

CASE REPORTS

CASE I: An asymptomatic 58-year-old man was referred for evaluation of a presumed pleural-based mass detected on a posteroanterior (PA) chest radiograph (Fig. 2). The patient was examined fluoroscopically prior to a planned percutaneous needle biopsy. The "mass" was localized laterally over the thoracic wall (Fig. 3) but on obliquing the patient, it was projected off of the lung field (Fig. 4). A Vim-Silverman biopsy needle was then percutaneously placed in the presumed "mass" and manipulated under fluoroscopic control. The position of the "mass" corresponded to a costal slip of the serratus anterior muscle (Fig. 5). The patient was therefore spared further morbid diagnostic examinations for a benign condition. He was followed and found to be healthy seven years later without change in his chest radiograph.

CASE II: A 63-year-old man was referred for staging of Hodgkin's disease thought to be limited to disease below the diaphragm. Bilateral, presumed pleural-based densities were evident on the PA chest radiograph (Fig. 6) and chest exploration was considered because of their interpretation as extensions of his disease. Comparison of old and new chest radiographs revealed no new abnormalities and we, therefore, examined the patient under fluoroscopy. The densities were then demonstrated to be extrinsic to the chest and corresponded to hypertrophied serratus anterior muscles, and the patient's surgery was thus averted. Further clinical examination of the patient showed bilateral concavities of the bony thorax as well as prominent chest wall musculature (Fig. 7).

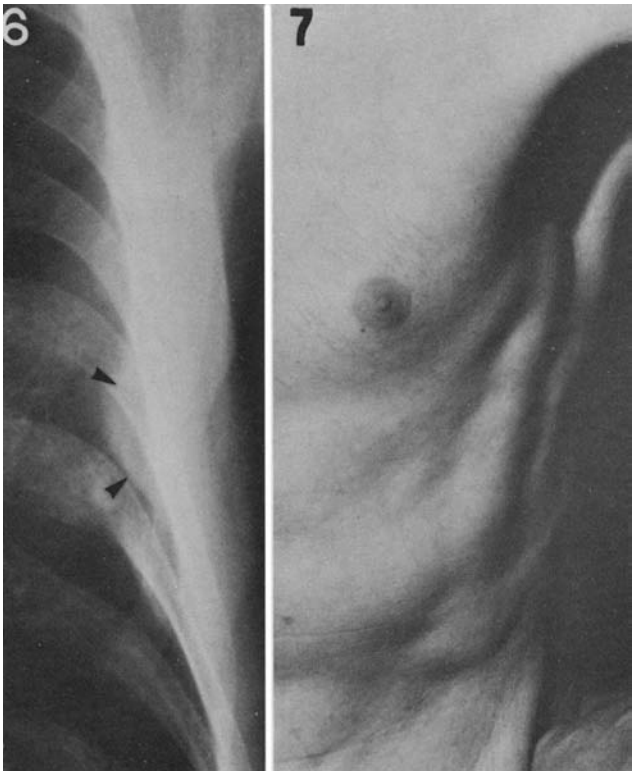

Fig. 6. Fluoroscopic spot film showing presumed pleural-based densities (arrowheads). The costal slips of the serratus anterior muscles can be seen in the soft tissues lateral to the bony thoracic wall.

Fig. 7. Close-up photograph of patient's left chest wall showing markedly hypertrophied serratus anterior muscles.

DISCUSSION

Unusually prominent musculature of the chest presenting as solitary masses abutting the pleura and projecting over the lung fields is most frequent in the adult patient with inwardly concave lateral chest walls. Such appearances are most common over the lateral aspect of the chest from the fifth to the ninth ribs and may be bilateral or multiple. A helpful observation is their continuation into and relation with the adjacent soft tissues lateral to the bony thoracic wall. If the chest wall is examined fluoroscopically in varying degrees of obliquity, the hypertrophied thoracic cage musculature can be rotated off the lung fields. Moreover, clinical examination of the patient will often reveal associated concavities of the thorax with muscular prominence.

Shadows from thoracic musculature may mimic a variety of pleural-based lesions (3), but the most crucial diagnostic concern is differentiation from either primary or metastatic disease. Several patients, primarily with oncological problems, have been spared needless invasive procedures with careful fluoroscopic study and an awareness of such simulating effects. It is important that clinicians and radiologists recognize this normal variant.

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REFERENCES

1. Felson B: Chest Roentgenology. Philadelphia, Saunders, 1973 page 463.
2. Sargent, EN, Jacobson G, Gordonson JS: Pleural plaques: a signpost of asbestos dust inhalation. Semin Roentgenol **12**:287–297, Oct 1977
3. Ochs CW, Smith JP: Chronic pleural thickening: some observations on cause and pathogenesis. Milit Med **141**:77–81, Feb 1976