

## *Imaging assessment of the scapular girdle elastofibromas*

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### ABSTRACT

Elastofibroma dorsi, a slow-growing, soft-tissue pseudotumor has been more and more remembered in the differential diagnosis of chronic scapular pain. It has also been incidentally diagnosed in routine diagnostic imaging tests. Our approach here is the imaging diagnosis, which can start with the conventional X-ray, but is better characterized by the ultrasound and the magnetic resonance, the latter being the modality of choice.

**Keywords:** shoulder, scapula, elastofibroma, magnetic resonance, tumor.

Shoulder pain is a frequent complaint in offices and clinics. Among the various causes related to it, elastofibroma can appear as an increase in the sub- or infra-scapular volume, accompanied by a feeling of discomfort and mild pain, a snapping or grating scapula, or even a scapular blockage.<sup>1,2</sup> Occasionally, these symptoms can be mistaken for bursitis or rotator cuff tendinopathy.<sup>3</sup> Palpation revealed a firm mass that does not adhere to the skin, but that may be attached to the periosteum of the ribs. There is a volume increase in the subscapular region, which is marked by a 90° shoulder adduction and elevation.<sup>1,2,4,5</sup> Half of the diagnosed patients are asymptomatic.

Elastofibroma has been most frequently found in women – 93% of the cases were identified in females.<sup>4,5</sup> However, a study carried out at an orthopedic oncologic center with a series of 15 confirmed cases, in a 20-year period, showed a prevalence of 80% in male.<sup>1</sup> The common age for its onset ranges from 55 to 70, but it can also affect children.<sup>4</sup>

Found to be rare at first, this lesion has currently been described in literature much more frequently, especially among the elderly population.<sup>5</sup> Autopsy studies reveal its presence in 24% of women and 11% of asymptomatic men; bilateral in 46% of the cases.<sup>8</sup> Brandser *et al.* have found that the prevalence of elastofibromas is 2% in chest computerized tomography (CT) performed in patients over 60 years old<sup>9</sup> to assess their

pulmonary parenchyma. The prevalence of elastofibroma dorsi at autopsy is higher than in CT due to the reduced dimensions of most lesions detected in the autopsy series, lower than the contrast resolution of CT.<sup>5</sup>

First described by Jarvi and Saxen in 1961, elastofibroma is a slow-growing, benign, soft-tissue tumor,<sup>9</sup> also considered by some authors as a pseudotumor.<sup>1</sup>

Of unknown etiology, it is assumed to be a reaction to some little chronic traumas caused by repetitive movements of the scapular girdle. During this movement there is a friction of the scapula against the posterior costal arches – common in golf players. That could explain the higher prevalence in the predominant limb (the right one) although more than 60% of the cases are bilateral.<sup>4,5,6,9</sup> However, one third of the cases presents a family history of this type of lesion, also suggesting genetic etiology.<sup>5</sup>

Usually, it is located at the lower pole of the scapula, deep to the muscles serratus anterior and latissimus dorsi, with the possibility of attaching to the periosteum of the posterior costal arches. Less than 1% of the cases occur in other sites such as: the deltoid muscle, ischial tuberosity, olecranon, foot, among others.<sup>1,2,4,5,10</sup> They measure over 5 cm, and they are deep to the deep fascia of the dorsal region, which may mislead to the diagnosis of malignant lesions.<sup>1</sup>

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Microscopy characterizes the elastofibroma as an indistinct mass with a fibrous tissue with internal fat streaks. The histopathologic study describes it as nonencapsulated hypocellular formation, composed of benign fibroblasts, strands of eosinophilic collagen, and elastic fibers with a degenerated or fragmented aspect with groups of interposed mature adipocytes. It does not reach the skin.<sup>1,5,6,10,14</sup>

Diagnosis can be made by imaging methods. Conventional radiology is usually normal, but height scapular asymmetry has been described in some cases.<sup>5</sup> In the ultrasound, the patient is assessed in the ventral decubitus position with an abducted arm for a better view of the mass. An arm elevation and adduction will allow a larger protrusion. It has a characteristic appearance of an indistinct, streaky, heterogeneous soft-tissue mass, with hyperechogenic layers (fibrous tissue) interspersed with hypoechogenic (fat) stripes or lines.<sup>6,5,11,12</sup> It can also be completely isoechoic to the muscle planes, and hence difficult to be detected.<sup>13</sup>

In the computerized tomography, elastofibroma has been often diagnosed incidentally through chest tomography studies for different reasons.<sup>5,6</sup>

CT can be diagnostic when the lesion has the appearance of a heterogeneous, indistinct and nonencapsulated, infra- or subscapular soft-tissue mass, isoattenuating to muscle (fibrous tissue) with streaks of fat attenuation, and which can be homogeneous when small (Figure 1). It presents a slightly heterogeneous enhancement.<sup>5,6,10,14,15</sup>

Magnetic resonance imaging is the method of choice for diagnosis. The mass appears as a solid expansive formation, ill-defined, nonencapsulated, heterogeneous, and localized anterior or caudal to the inferior pole of the scapula, and deep in relation to the muscles latissimus dorsi, rhomboid and serratus anterior. It presents a predominant iso-signal to muscles (fibrous tissue), and, characteristically, alternated stripes or lines of hypersignal on T1 and T2 interspersed (adipose tissue) (Figures 2A, 2B and 2C).<sup>1,6,5,10,14</sup>

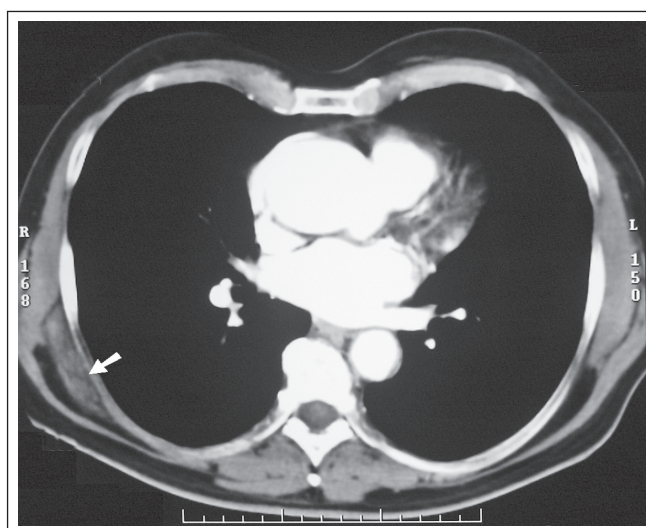
Small lesions may not be detected because their signal is similar to muscles (Figures 3 and 4). Occasionally, they can present a heterogeneous enhancement through paramagnetic contrast (gadolinium), which hinders its distinction from malignant lesions, such as sarcomas (Figures 2D and 2E).<sup>5,6,16,17</sup>

Painless subscapular lesions with atypical characteristics, such as bone destruction and intense enhancement, should signal other diagnoses, such as sarcomas and metastases. Also included in the differential diagnosis are the following: lipoma, extra-abdominal fibromatosis, hemangioma, and granular cell tumors.

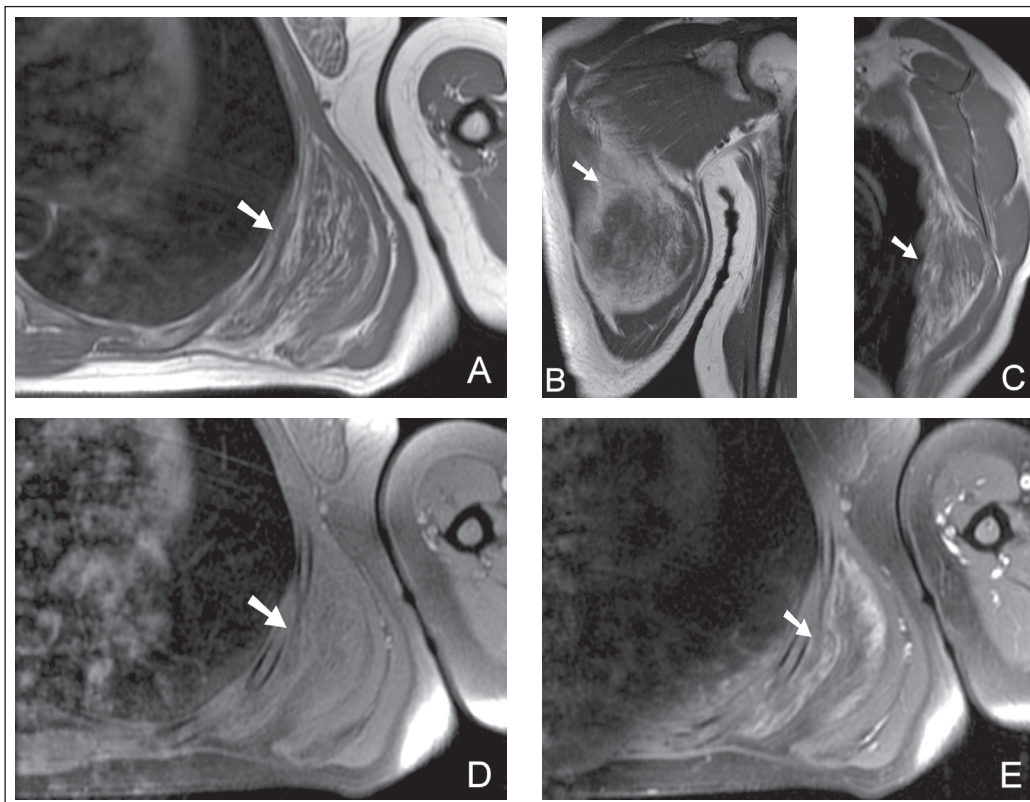
Thick needle biopsy is needed for diagnostic confirmation in case of a symptomatic fast-growing tumor.<sup>1,2,5,10,14</sup> Surgical excision must be large, including the skin, the hypodermic tissue and, when necessary, the deeper tissue. Erasion or puncture biopsy are not sufficient procedures.<sup>5</sup> However, some authors claim that the clinical evaluation together with the imaging studies will ensure the diagnosis without the need of biopsy.<sup>17,18,19</sup>

After the confirmation of the diagnosis, most asymptomatic patients are submitted to the traditional treatment. In case of symptomatic patients, the treatment of choice is the complete excision. If the excision is precise, there will not be a tumor relapse or even the need of a prolonged follow-up.<sup>1,5,10</sup>

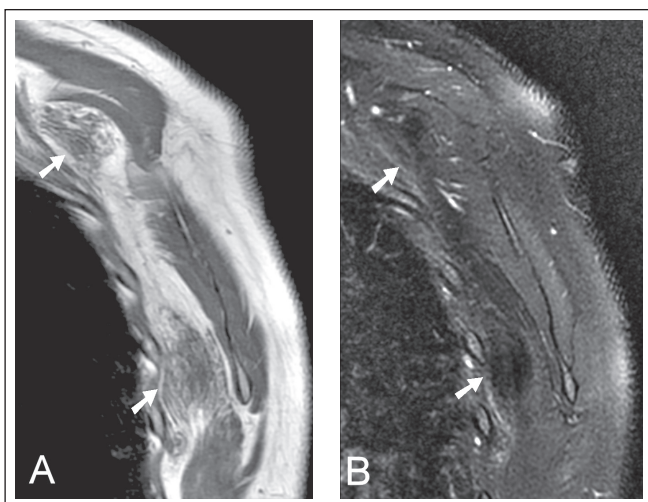
In conclusion, elastofibroma dorsi, a slow-growing pseudotumor of soft tissues has been more and more remembered in the differential diagnosis of chronic scapular pain, being also incidentally diagnosed in routine diagnostic imaging tests. It can mimic other diseases of the scapular girdle that cause pain and limitation of movement, including malignant neoplasm, which must have a differential diagnosis through biopsy. Imaging diagnosis can start with the conventional X-ray, but this condition is better characterized by the ultrasound and the magnetic resonance, the latter being the modality of choice.



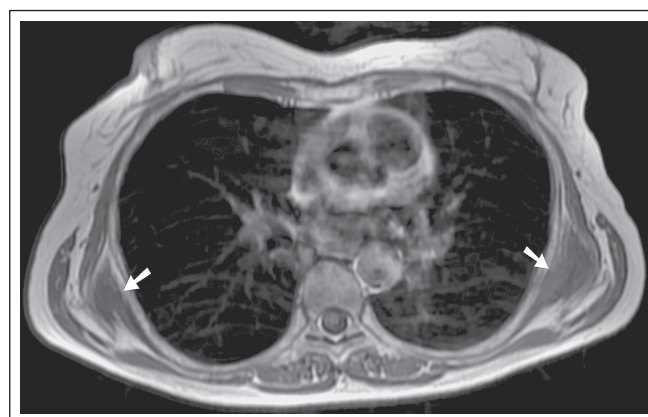
**Figure 1.** A 39-year-old male complaining about a persistent dry cough for 6 months submitted to a chest tomography study for pulmonary parenchyma evaluation. Axial CT image of the chest with soft tissue windows after contrast injection.



**Figure 2.** Female aged 40 complaining about a painful tumor in the left subscapular region for 3 months. Magnetic resonance focused on the left dorsal region, T1 pondered in the transverse (A), coronal (B) and sagittal (C) planes, besides T1 pondered axial sequences with fat suppression before (D) and after (E) intravenous injection of contrast.



**Figure 3.** Female aged 52 complaining about pain and limitation of movement on the left shoulder for 6 months. Magnetic resonance focused on the left dorsal region, T1 pondered (A) and STIR T2 (B) in the sagittal plane. Two elastofibromas dorsi localized in close contact with the posterior costal arch on the left, being one superior, deep to the subscapular muscle, and the other inferior, deep to the lower edge of the scapula.



**Figure 4.** Female aged 60 complaining about painless, bilateral dorsal tumors noticed 2 months earlier. Magnetic resonance of the chest, T1 pondered in the transverse plane. Bilateral, homogeneous elastofibromas in close contact with the posterolateral portion of the costal arches, and deep to the muscle planes.

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