

## ELASTOFİBROMA DORSİ: MULTİ DEDEKTÖR BİLGİSAYARLI TOMOGRAFİDE PREVELANS VE GÖRÜNTÜLEME ÖZELLİKLERİ

### ELASTOFİBROMA DORSİ: PREVALENCE AND IMAGING FEATURES ON MULTI DETECTOR COMPUTED TOMOGRAPHY

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#### ABSTRACT

**OBJECTIVE:** *The aim of this study was to determine the prevalence and radiological characteristics of elastofibroma dorsi detected incidentally by thoracic multidetector computed tomography (MDCT).*

**MATERIAL AND METHODS:** *1674 thoracic CT examinations were evaluated. CT examinations were performed using 16-slices CT scanner. In patients with detected mass(es) the dimensions and marginal and internal radiological characteristics, whether the mass was unilateral or bilateral and consequently the affected site in unilateral cases were recorded. The enhancement patterns of the lesions were evaluated in the studies with contrast agent administration.*

**RESULTS:** *Elastofibroma dorsi was detected in 88 (5,3%) of 1649 patients. Statistically the detection rate for the entity was significantly higher in female patients ( $p<0.001$ ). The mean age of the patients without elastofibroma dorsi was significantly lower than the mean age of the patients with entity ( $p<0.001$ ). The frequency of bilateral elastofibroma dorsi was found to be significantly higher than that of unilateral disease ( $p=0.002$ ). No significant difference was detected between the frequencies of right- and left-sided elastofibroma dorsi ( $p=0.046$ ). Out of 19 lesions detected, 12 (63,2%) did not show any contrast enhancement, whereas 5 (26,3%) had mild and 2 (10,5%) had moderate degree of contrast enhancement .*

**CONCLUSION:** *The detection rate of incidental lesions has considerably increased in parallel with the improvements in imaging technology. MDCT enables identifying the typical imaging features of elastofibroma dorsi which might preclude the need for the use of advanced imaging tools, tissue sampling and histopathological analysis for making a proper differential diagnosis.*

**Keywords:** *Prevalence, elastofibroma dorsi, multi detector computed tomography.*

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## ÖZ

**AMAÇ:** Bu çalışmanın amacı, toraks multidetektör bilgisayarlı tomografi (MDBT) görüntüleme ile rastlantısal olarak saptanan elastofibroma dorsi'nin prevalansının ve görüntüleme özelliklerinin belirlenmesiydi.

**GEREÇ VE YÖNTEMLER:** 1674 toraks BT incelemesi değerlendirildi. BT incelemeleri 16 kesitli BT tarayıcısı kullanılarak yapıldı. Kitle saptanan hastalarda kitlenin boyutları, kenar ve iç yapıların radyolojik özellikleri, kitlenin tek taraflı veya çift taraflı olma durumu ve tek taraflı kitlelerde tutulum görülen bölge kaydedildi. Kontrast madde uygulaması yapılan tetkiklerde kontrastlanma paterni değerlendirildi. İstatistiksel analiz SPSS 20.0 yazılımı kullanılarak yapıldı.

**BULGULAR:** 1649 hastanın 88'inde (% 5,3) elastofibroma dorsi tespit edildi. Kitle tespit oranı kadın hastalarda istatistiksel olarak belirgin şekilde daha yüksekti ( $p < 0.001$ ). Elastofibroma dorsi bulunmayan hastaların ortalama yaşı, kitle bulunan hastaların ortalama yaşından anlamlı derecede düşüktü ( $p < 0.001$ ). İki taraflı elastofibroma dorsi görülme sıklığı tek taraflı hastalığa göre anlamlı derecede yüksek bulundu ( $p = 0.002$ ). Sağ ve sol taraflı elastofibroma dorsi sıklığı arasında anlamlı fark tespit edilmedi ( $p = 0.046$ ). Genel olarak, 12 kitle (% 63,2) kontrast tutulumu göstermezken, 5 (% 26,3) lezyonda hafif ve 2 (% 10,5) lezyonda orta derecede kontrast tutulumu saptandı.

**SONUÇ:** Görüntüleme teknolojisindeki gelişmelere paralel olarak rastlantısal lezyonların saptanma oranı belirgin şekilde artmıştır. MDBT elastofibroma dorsi'nin tipik görüntüleme özelliklerinin belirlenmesini sağlayarak ayırıcı tanının doğru şekilde yapılması amacıyla ileri görüntüleme araçlarının, doku örneklemesinin ve histopatolojik analizin kullanılmasına yönelik ihtiyacı ortadan kaldırmaktadır.

**Anahtar Kelimeler:** Prevalans, elastofibroma dorsi, multi dedektör bilgisayarlı tomografi.

## INTRODUCTION

Elastofibroma dorsi is a rare, benign soft tissue tumor that was first described in 1961 (1). It is 5 to 13-fold more common in females than males (2, 3, 4). Its prevalence increases by advanced age (2, 5). It may be encountered bilaterally with a reported incidence of 10-60% (4, 5, 6). However, its most common presentation is unilateral soft-tissue swelling in females over 50 years of age (5).

From clinical point of view, it is usually asymptomatic (7). Nevertheless, it may cause complaints such as pain, palpable mass and snapping sound in scapular region (7). It may be observed in other parts of the human body though periscapular region is noted to be the most common site effected (4). It can be diagnosed by computed tomography (CT) evaluation based on its typical localization site and radiological features (2, 4).

The aim of this study was to determine the prevalence and radiological characteristics of elastofibroma dorsi inciden-

tally detected by thoracic multidetector computed tomography (MDCT) imaging.

## MATERIAL AND METHODS

The thoracic CT examinations of the patients referred to Radiology Department of 25 December State Hospital which were performed between January 1, 2016 and April 1, 2016 were evaluated retrospectively. The inclusion criterion for the study was to have a CT examination performed due to indications such as lung parenchymal diseases, mediastinal mass and acute trauma whereas the CT studies of the patients with medical history of previous thoracic surgery and the presence of clinical findings symptoms such as pain or mass which may imply elastofibroma were excluded. A total of 1674 thoracic CT examinations in the study group were evaluated. On the other hand, a total of 25 patients were excluded from the study including the cases whose thoracic walls could not be displayed completely within the imaging field because of inability to position the patient appropriately, the cases whose examinations

present beam hardening artefacts in the prescapular field because of positioning or foreign substances and the cases who could not be evaluated because of motion artefacts. The radiological evaluation was performed by a single senior radiologist.

With regard to CT examinations, contrast agent containing 300mg/l iodine concentration was used in 190 (11,5%) of the patients. The contrast agent was administered using an automatic injector through antecubital vein at a flow rate of 4ml/sec. All of the CT examinations were performed using 16-slices CT scanner (Toshiba, Activion 16, Toshiba Medical Systems, Otowara, Japan). No preparation was made prior to the examination. All examinations were performed during a breath hold in the supine position with the arms of the patients above their heads. Mediastinal and parenchymal windows of each patient were taken. Mediastinal window is used for evaluation of elastofibroma dorsi. The imaging parameters were tube voltage of 120 kV, tube flow of 100 mA while mediastinal width and level were 400 HU and 40 HU, respectively.

Posterolateral thoracic wall masses which are located deep to scapular end and latissimus dorsi, serratus anterior and levator scapula muscles and having soft tissue density interspersed with infrascapular linear hypodense areas were regarded to be consistent with elastofibroma dorsi. For each patient; age, gender and the status regarding whether a contrast agent was used or not noted. In patients with detected mass(es), the dimensions and marginal and internal radiological characteristics, whether the mass was unilateral or bilateral and consequently the affected site in unilateral cases were recorded. Finally, the enhancement patterns of the lesions were evaluated in the studies with contrast agent administration.

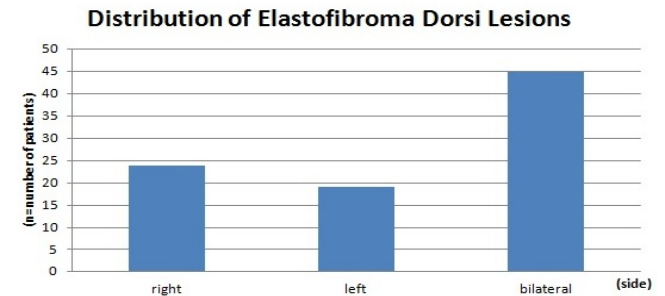
Statistical analysis was performed using SPSS 20.0 (Chicago, IL) software.  $P < 0.05$  value was accepted as significant. T-test was used to compare the mean age of patients with and without elastofibroma dorsi. Chi-square test was used to analyse whether there is a significant relationship between the detection rates for unilateral and bilateral masses and between the detection rates for right and left sided unilateral masses.

## RESULTS

The age of the patients included in the study ranged be-

tween 5 and 103. The study group included 957 (58,1%) male patients and 692 (41,9%) female patients. Elastofibroma dorsi was detected in 88 (5,3%) of 1649 patients, with 71 (80,6%) female and 17 (19,4%) male. Statistically the detection rate for the entity was significantly higher in female patients ( $p < 0.001$ ). The youngest and the oldest patients with elastofibroma dorsi were 35 and 94 years old respectively (mean age:  $68,6 \pm 13,8$ ). Using T-test, the mean age of the patients without elastofibroma dorsi was  $51,3 \pm 19,1$ , which was significantly lower than the mean age of the patients with the entity ( $p < 0.001$ ). The number of the patients with right-sided, left-sided and bilateral masses were 24 (27,3%), 19 (21,6%) and 45 (51,1%), respectively (Figure 1). Using Chi-Square Test, the frequency of bilateral elastofibroma dorsi (Figure 2) was found to be significantly higher than that of unilateral disease ( $p = 0.002$ ), whereas no significant difference was detected between the frequencies of right- and left-sided elastofibroma dorsi ( $p = 0.046$ ). (Figures 3, 4).

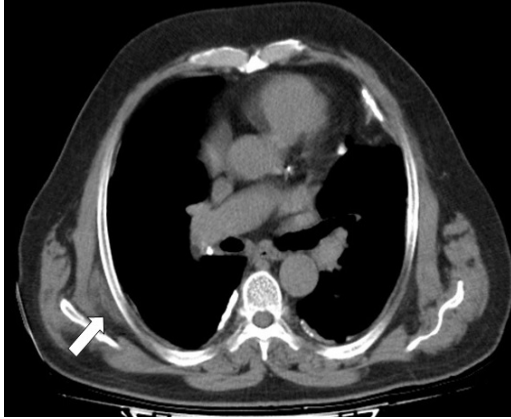
**Figure 1:** The frequency of mass localization in elastofibroma dorsi



**Figure 2:** Bilateral elastofibroma dorsi in a 79 year old female patient. CT shows poorly defined mass (thick arrow) being isodense with the adjacent skeletal muscle and containing linear hypodense regions (thin arrow) of fat.



**Figure 3:** CT shows a right sided soft tissue mass (thick arrow) with streaky fatty content in a 72 year old male patient.



**Figure 4:** Left sided elastofibroma in a 38 year old female patient. CT depicts a solid mass (thick arrow) located inferior to the right scapula tip (thin arrow) which is isodense with muscles and interspersed with fat strands.



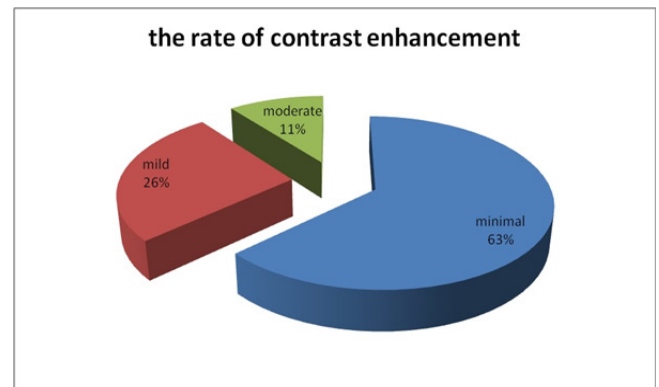
The dimensions of the largest right-sided and left sided tumors were 90x22 mm and 82x33 mm, respectively. The dimensions of the smallest right-sided and left-sided tumor were 20x7 mm and 18x6 mm, respectively. The mean tumor dimensions on the right and left sides were 48,7x16,5 mm and 44,7x15,3 mm, respectively.

Radiologically, all masses were isodense to neighboring skeletal muscles. Also, linear hypodense areas corresponding to fatty infiltration were present in all masses. Internal hypodense strandings were more remarkable and lamellar structure could be distinguished more easily. The plane between the masses and the surrounding fat planes were

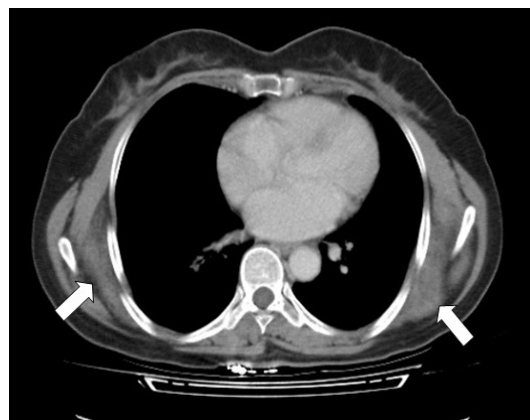
effaced and the masses had irregular margins. However, none of these masses were shown to have invasion to the neighboring muscles and bones. The posterior margins of the masses were convex, being more more remarkable in large-sized lesions.

Contrast agent was administered in 12 (13,6%) out of 88 patients with elastofibroma dorsi (Figure 5), with 7 (58,3%) having bilateral and 5 (41,7%) unilateral lesions. Out of 19 lesions detected in these patients, 12 (63,2%) did not show any contrast enhancement (Figure 6), whereas 5 (26,3%) lesions had mild and 2 (10,5%) lesions had moderate degree of contrast enhancement.

**Figure 5:** The rate of contrast enhancement in elastofibroma dorsi.



**Figure 6:** Contrast-enhanced CT scan demonstrates bilateral soft-tissue mass (thick arrow) with irregular margins. The mass has an attenuation similar to that of the adjacent skeletal muscles with some internal fat attenuation.





## DISCUSSION

Elastofibromas are fibrous, noncapsulated soft tissue masses that contain fatty tissue streaks macroscopically (4). As fibrous tissue is composed of collagen bands and elastic fibers, bulky mature adipocytes are present in the mass (4). The term elastofibroma dorsi refers to the presence of the lesion in the periscapular region comprising approximately 99 % of all cases (2, 4). On the other hand, the entity is entitled as elastofibroma alone in cases with rare detection of the lesion in other body. Though an abnormal degeneration occurring in the elastic fibers due to repetitive minor traumas has been proposed as a possible mechanism, its etiology is not clear yet (3). Familial predisposition, on the other hand, has been shown to have a role for the mechanism (3).

Elastofibroma was first described by Jarvi and Saxen in 1961. Initially, it was accepted to be a rare entity (1). In a study by Brander et al conducted in a population with patient ages exceeding 60 years, its prevalence was reported to be 2% (2). In autopsy series, on the other hand, its prevalence was reported as 24,4 % and 11,2 % in female and male gender, respectively (2, 3). In the latter study, the prevalence of elastofibroma dorsi was found to be 5,3 % in patients with ages ranging from 5 to 103 years, whereas the prevalence was calculated as 0,4 %, 7,4 % and 10,6 % in patient groups with ages below 40 years, above 40 years and above 60 years, respectively.

In our study, the prevalence of elastofibroma dorsi was found to be 5-fold higher than that of the aforementioned study by Brander et al., with a reported prevalence being closest to the autopsy series up to date to the best of our knowledge. The detection of a higher prevalence in our study compared to previous studies may be attributed to the use of spiral CT in the previous ones contrary to the use of MDCT in ours. Technically, the relevant difference may be speculated to result from increased sensitivity for the detection of the smaller lesions which might probably have been missed by older spiral CT technology. In an earlier study conducted in a Taiwanese population, the prevalence of the entity was noted as 0,6 % by Chang et al. (3). Interestingly, a considerably lower prevalence was calculated in the latter study compared to several others, whereas a 8-fold difference was detected in comparison with ours (3). In spite of the fact that, factors related to CT technology

may have caused the difference, patient ethnicity may also be speculated to be a contributing factor. Indeed, future research on patients with different ethnicity may be helpful to reveal whether it might have a role in the etiology.

As far as the gender is concerned, elastofibroma dorsi was reported to be 5-13-fold more frequent in females than males in several studies, (2, 3, 4). In contrast, a higher prevalence for the entity was reported in males by Kransdorf et al (8). On the other hand, a 2-2,5-fold higher rate for females was reported in autopsy series (2, 3). In our study, 71 (80,6%) of the cases were female and the detection rate for elastofibroma dorsi was significantly higher in female patients. Also, it has been noted that elastofibroma dorsi may occur bilaterally in 10-60 % of the cases (4). The preponderance of bilateral elastofibroma dorsi was also a common outcome in several other studies (4,9,10). The findings of our study regarding the probability for elastofibroma dorsi were parallel to the previous reports, though no significant difference was encountered for the occurrence of right and left sided lesions. In this regard, ours has been the first of its kind to investigate whether the disease has a propensity to involve either side. In our study, the mean patient age at diagnosis was consistent with the literature data, being 68,6 years in our study and being within 65-70 years range in previous ones (2, 7, 9). Indeed, the aforementioned data also reveals that the prevalence of elastofibroma dorsi increases with advanced age.

Radiologically, elastofibroma dorsi can be diagnosed by CT based on its typical localization and imaging characteristics (2, 4). In earlier studies, it has been reported that smaller sized lesions may be isodense on spiral CT (4). In general, the lesions have been reported to show mild or minimal contrast enhancement (6, 7), whereas a moderate degree of contrast enhancement was noted in one patient with bilateral lesions in our study. On the other hand, several case reports with moderate uptake of fluoro-2-deoxy-D-glucose (FDG) in positron emission tomography (PET-CT) studies have been published recently (11, 12, 13). Taking into account the fact that no literature data is available regarding the enhancement features of elastofibroma dorsi lesions, future research is warranted to reveal the factors which may have an impact on the variability of enhancement patterns.

In all lesions that were detected in our study, a typical appearance was encountered with hypodense regions implying the presence of fatty tissue and slightly denser regions being isodense with neighboring skeletal muscles corresponding to fibrous tissue. Technically, the difficulty in demonstrating hypodense regions by spiral CT may be associated with the inability to detect these regions because of the thick slice intervals in the masses with relatively lesser volume of fatty tissue. Fortunately, the lamellar structure of all the lesions could be displayed in our study, thanks to thinner slice technology of MDCT. Although the lesions were noncapsulated and ill-defined, no radiological finding consistent with invasion to the surrounding tissue was detected. Elastofibroma dorsi can be easily diagnosed by CT in the presence of lesions with typical localization and imaging features (2, 4, 6, 7). No histopathological examination is necessary since the lesion is benign and considerably asymptomatic (3, 6). Overall, the number of the incidentally detected lesions has increased noticeably in parallel with the progressive improvement in imaging technology (14).

Elastofibroma is a commonly encountered tumor in the general population. Especially small lesions may be overlooked since the lesion is isodense, located in the fatty tissue and also contains internal fatty areas. In the symptomatic cases, it can be confused clinically with rotator cuff lesions because of pain and also with other soft tissue tumors based upon the finding of swelling (2, 4). Recognising its typical radiological features and awareness for its common occurrence may be crucial in the differential diagnosis. Despite being rare, elastofibromas may be misinterpreted as malignant tumors because of the hypermetabolic effect encountered with progressively increased use of PET-CT examinations recently. In this regard, the radiologists should be familiar with the typical CT findings to make a proper diagnosis without any need for advanced imaging tools or histopathological examination.

In conclusion, elastofibroma dorsi is a benign soft tissue tumor which is quite common in general population.

The detection rate of incidental lesions has considerably increased in parallel with the improvements in imaging technology. Importantly, identifying the typical imaging features of elastofibroma dorsi will be helpful for making a

proper differential diagnosis, which will preclude the need for the use of advanced imaging tools, tissue sampling and histopathological analysis in turn.

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