Incidental Finding of the Sternalis Muscle on Chest Multidetector-row Computed Tomography (MDCT): The Diagnostic Value of Additional Postprocessed MDCT Images for an Uncommon Muscular Variant

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Abstract

We herein report two cases of incidental finding of the sternalis muscle in the right anterior chest wall on multidetector-row computed tomography (MDCT). We emphasize the diagnostic utility and value of additional postprocessed MDCT images, which can be easily created using volume data sets of MDCT, in establishing an accurate diagnosis of the sternalis muscle, an uncommon muscular variant.

Key words: sternalis muscle, accessory muscle, normal variation, thoracic wall, multidetector-row computed tomography (MDCT), postprocessed image


Introduction

The sternalis muscle is an uncommon anatomic variant of the anterior chest wall muscles. There are more than 20 terms used to describe this anatomic variant, including episternalis, pre sternalis, rectus thoracis, rectus sterni and superficial rectus abdominis (1). The etiology and function of the sternalis muscle have remained unclear until recently. This muscle runs from the infraclavicular region to approximately the caudal aspect of the sternum and is located subcutaneously over the pectoralis major with a course parallel to the sternum (2). With the rapid advancement of imaging technology, the sternalis muscle has recently become detected more regularly on thin-slice multidetector-row computed tomography (MDCT) images (2, 3). However, diagnosing the sternalis muscle remains challenging because this muscle can be easily overlooked or misdiagnosed as a malignant lesion on imaging examinations such as mammography and computed tomography (CT) not only as a result of its low incidence, but also as a result of medical professionals’ unfamiliarity with it (3, 4). In contrast, modern MDCT scanners are able to obtain continuous volume data sets with thin-slice collimation. Therefore, fine postprocessed images such as two-dimensional multiplanar reconstruction (2D-MPR) and three-dimensional volume rendered (3D-VR) reconstruction can be immediately and easily created. An interactive manipulation on a scanner console or workstation can simultaneously facilitate the construction of appropriate images, resulting in additional information that helps to establish an accurate diagnosis of normal variants as well as pathological conditions (3, 5, 6). Accurately interpreting MDCT images obtained from multidirectional views is important for reducing the need to perform additional examinations or biopsies when uncommon normal variants such as the sternalis muscle are encountered incidentally (4). We herein present two cases of the sternalis muscle in the right anterior chest wall detected incidentally on chest MDCT examinations in which additional postprocessed MDCT images combined with routine axial images assisted in establishing an accurate diagnosis of this uncommon muscular variant.

Case Reports

Case 1 (Fig. 1) involved a 74-year-old woman who was prescribed medication for hypertension at our clinic. Although she had no pulmonary symptoms, the patient desired to undergo a screening chest MDCT examination. Case 2
were immediately created from the source CT data sets. On cases, postprocessed 2D-MPR images of the sagittal and thickness and a 5-mm interval on a CT console. For these changes were revealed in S6 of the left lower lobe.

In this case report, we demonstrated the utility and value of additional postprocessed 2D-MPR and 3D-VR images combined with routine axial images in the diagnosis of the sternalis muscle detected incidentally on routine chest MDCT images. To the best of our knowledge, this is the first report to emphasize assessment of the sternalis muscle using multiple postprocessed MDCT images.

The sternalis muscle is an uncommon muscular variant of the chest wall located in the parasternal region. On autopsy, the prevalence of this muscle varies according to ethnicity; for example, 4.1%-15.6% in the Japanese population, 1.0%-23.5% in the Asian population, 4.0%-8.0% in the Indian population, 1.9%-9.9% in the European and American populations and 4.2%-14.3% in the African population (7). On chest MDCT examinations conducted in living patients, the sternalis muscle is revealed in 6.2%-10.5% of cases (2, 3). Both sexes are affected with a slight dominance in women, and the unilateral form is twice as common as the bilateral form (2-4, 7).

Discussion

In this case report, we demonstrated the utility and value of additional postprocessed 2D-MPR and 3D-VR images combined with routine axial images in the diagnosis of the sternalis muscle detected incidentally on routine chest MDCT images. To the best of our knowledge, this is the first report to emphasize assessment of the sternalis muscle using multiple postprocessed MDCT images.

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Figure 1. A 74-year-old woman with a sternalis muscle in the right anterior chest wall. A: A routine axial MDCT image shows a soft tissue mass (arrow), i.e., the sternalis muscle, which lies superficial to the right edge of the sternum. B: A postprocessed 2D-MPR image in the sagittal section reveals the corresponding soft tissue mass (arrow), which runs longitudinally in a craniocaudal direction. C: A 3D-VR image provides the entire configuration of the sternalis muscle, which has a fusiform shape with fascicle formation (arrow), thus reflecting a muscular architecture similar to that of other musculature in the chest wall.

Figure 2. A 63-year-old woman with a sternalis muscle in the right anterior chest wall. A: A routine axial MDCT image shows a soft tissue mass (arrow), i.e., the sternalis muscle, which lies superficial to the right pectoralis major muscle. B: A postprocessed 2D-MPR image in the sagittal section reveals the corresponding soft tissue mass (arrow), which runs longitudinally in a craniocaudal direction. C: A 3D-VR image provides the entire configuration of the sternalis muscle, which has a fusiform shape with fascicle formation (arrow), thus reflecting a muscular architecture similar to that of other musculature in the chest wall.
muscle are unclear, the sternalis muscle is clinically important in some cases; for example, it may be used in breast reconstruction after mastectomy (8) or adapted as a pedicle flap or flap with microvascular anastomosis during plastic and reconstructive surgery of the head and neck region (9). This muscle can be detected incidentally on routine imaging examinations such as mammography (4), MDCT (2, 3) and magnetic resonance imaging, which can result in diagnostic dilemmas because many anatomical textbooks do not describe this muscle, and most surgeons and radiologists are not familiar with this anatomical variation (10). For example, Bradley et al. (4) reported that the sternalis muscle is depicted as an irregular medial density on mammography mimicking a breast carcinoma, thus resulting in unnecessary surgical exploration. Therefore, obtaining knowledge and a precise assessment of this muscle is important for optimal patient management.

Rapid technological advances and the clinical introduction of MDCT, coupled with consecutive progression of post-processing techniques, have shown MDCT to be a powerful and essential imaging tool in clinical practice. Such developments in MDCT can significantly assist in the diagnosis of and therapeutic planning for a variety of oncologic, vascular and musculoskeletal abnormalities (5, 11). Modern MDCT scanners are capable of obtaining wide coverage in the Z-axis with narrow collimation during short breath-holding, which facilitates construction of fine postprocessed MDCT images such as 2D-MPR and 3D-VR reconstruction with reduction of motion artifacts and respiratory misregistration. Such data acquisitions can demonstrate not only normal anatomical structures, but also pathological conditions from multidimensional views, even though nonenhanced MDCT images are acquired (12).

In both of our patients, additional postprocessed MDCT images combined with routine axial images fully revealed the longitudinal course and configuration of the sternalis muscle between the infraclavicular region to approximately the caudal aspect of the sternum at a glance. This met the following characteristics of this muscle, as described by Jelev et al. (7): (1) a location between the superficial fascia of the anterior thoracic region and the pectoral fascia; (2) an origin from the sternum or infraclavicular region; (3) insertion into the lower ribs, costal cartilages, aponeurosis of the external oblique abdominis muscle or the sheath of the rectus abdominis; and (4) innervation by the anterior thoracic (pectoral) and/or intercostal nerves. According to the classification proposed by Jelev et al. (7), both of our cases were type I1 (simple unilateral belly), which is the most common type. The use of additional postprocessed 2D-MPR and 3D-VR images combined with routine axial MDCT images allows physicians and radiologists to detect and confirm the sternalis muscle easily and quickly with a high confidence level. Therefore, we emphasize the effectiveness of additional postprocessed 2D-MPR and 3D-VR images combined with routine axial MDCT images in resolving the difficulty of diagnosing this uncommon muscular variant, although other complicated and less frequent types of sternalis muscles will be encountered (3). Moreover, if this muscle is occasionally detected on mammography with inconclusive findings, as Bradley et al. (4) reported, then we strongly recommend performing MDCT examinations and constructing postprocessed 2D-MPR and 3D-VR images simultaneously to differentiate other breast conditions, thereby reducing unnecessary interventions and establishing an accurate and timely diagnosis.

In conclusion, the sternalis muscle can be clearly demonstrated on additional postprocessed 2D-MPR and 3D-VR MDCT images, and these images combined with routine axial images strongly assist in diagnosing this uncommon muscular variant which is encountered incidentally on chest MDCT examinations.

The authors state that they have no Conflict of Interest (COI).

References