

## Mammographic normal variant: the sternalis muscle

**Debra Meerkotter, MB BCh, FCRad (D) SA**  
*Regional Imaging, St Vincents Hospital, Launceston, Tasmania, Australia*

### Introduction

Mammography is an established screening tool for breast cancer.<sup>1</sup> Early detection of breast cancer has a significant impact on morbidity and mortality.<sup>1</sup> Correct interpretation of mammograms can avoid false negatives and unnecessary biopsies in respect of benign changes. However, interpretation of mammograms can be challenging.<sup>2</sup> The medial aspect of the breast is a 'blind spot' on the medio-lateral oblique view. As mammographic techniques improve, more attention is being given to imaging the medial breast, and the sternalis muscle will be revealed with increasing frequency.<sup>2</sup>

A case of the mammographic findings of the sternalis muscle is presented. Features of this normal mammogram variant are described. In addition, the computed tomography findings are described and presented.

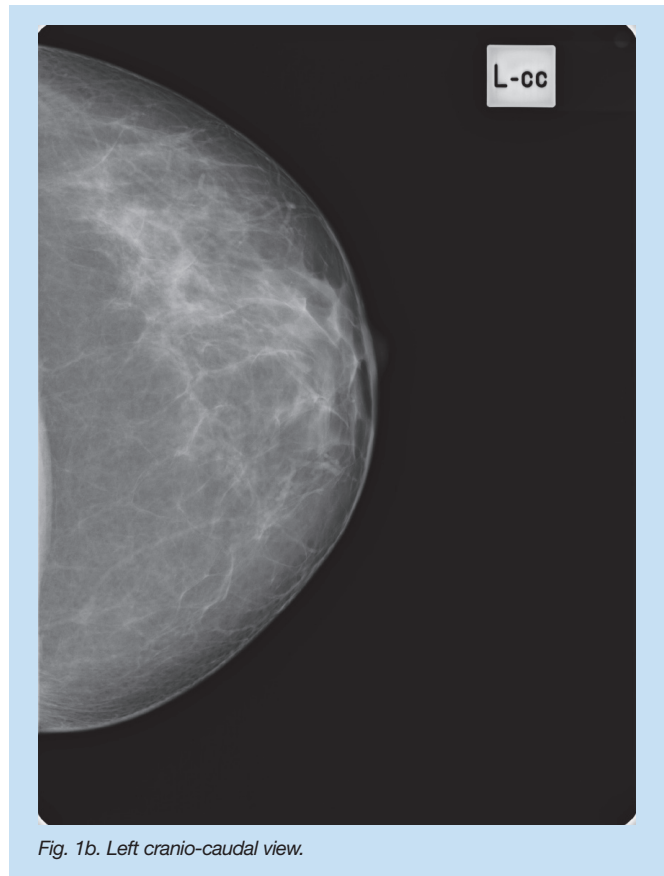


Fig. 1b. Left cranio-caudal view.

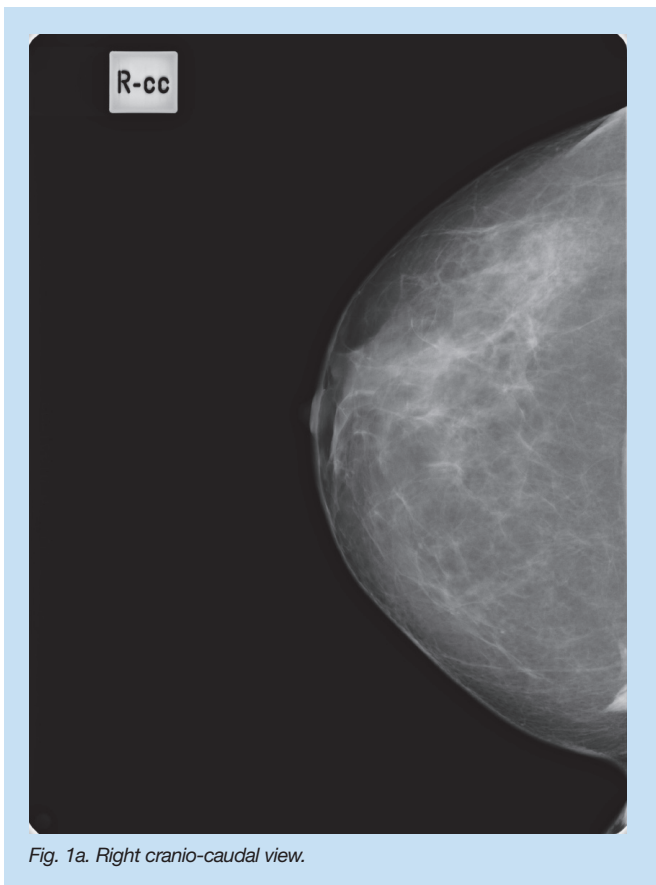


Fig. 1a. Right cranio-caudal view.

### Case report

A 37-year-old woman presented with bilateral 'lumpy' breast parenchyma on palpation. There was no family history of breast cancer and she had not undergone any previous breast surgery. All of her three children had been breastfed. She was not taking any form of hormonal manipulation.

A mammogram and ultrasound were performed to further assess the palpable changes. The mammogram revealed bilateral, moderately dense breast parenchyma. Normal skin and nipple contours were present. No clustered microcalcifications or architectural distortion were noted. However, in the cranio-caudal view of the right breast, a triangular opacity was noted in the postero-medial aspect of the breast. The medio-lateral oblique view did not contribute to the assessment of this density.

Ultrasound did not conclusively identify the density seen on mammogram in this patient. A limited computed tomography (CT) scan of the chest wall was performed to gain clarity of the mammographic findings (Figs 1a, 1b and 2). The CT scan demonstrated a flattened band of muscle density lying anterior to the medial margin of the pectoralis muscle. This structure was separated from the underlying pectoralis muscle by a thin band of fat (Fig. 3). The finding on mammography, which was further elucidated by CT scanning, was the sternalis muscle (Fig.4).

## CASE REPORT

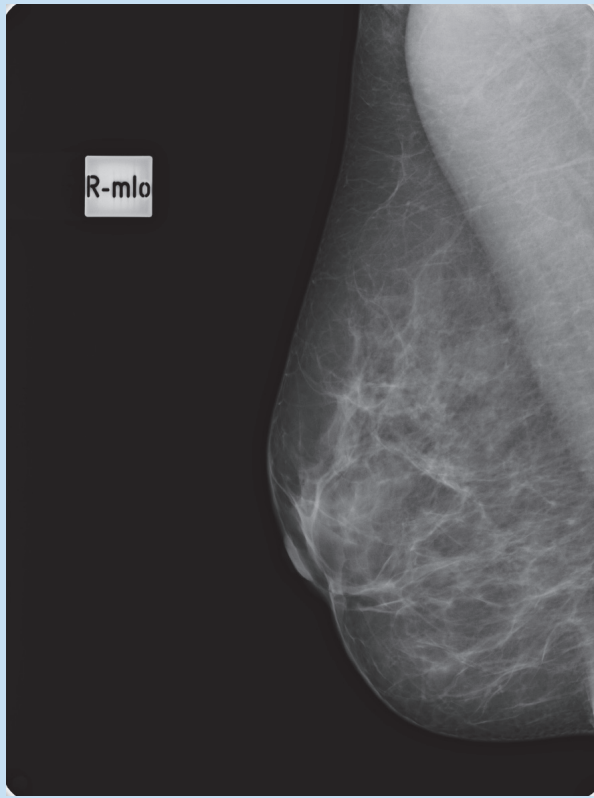


Fig. 2. Right medio-lateral oblique view.

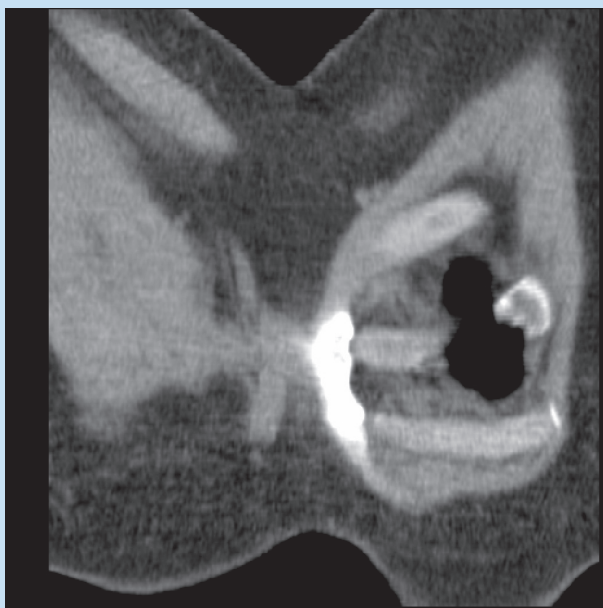


Fig. 3. Sternalis muscle coronal CT image.

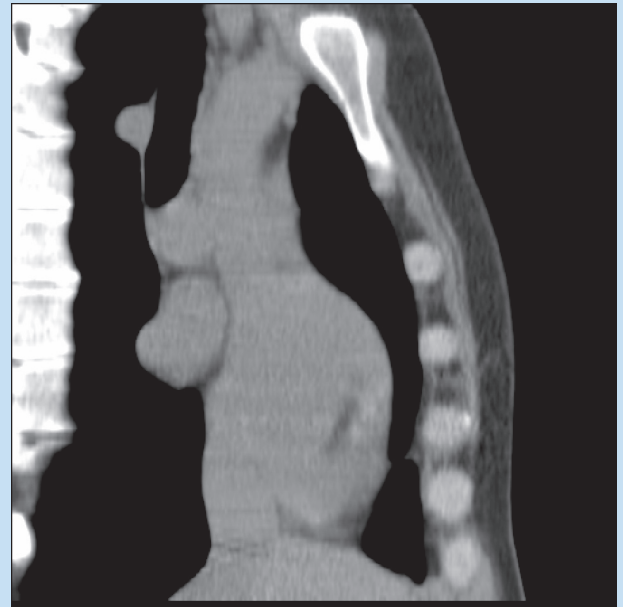


Fig. 4. Sternalis muscle sagittal CT image.

### Discussion

The sternalis muscle is an uncommon normal variant that may present a diagnostic dilemma as it requires differentiation from pathology.<sup>2</sup> The sternalis muscle may be unilateral or bilateral. Cadaveric studies demonstrate its incidence in 8% of the male and female population. It is found in all population groups.<sup>3</sup> It is twice as often unilateral as bilateral.<sup>3</sup> The function of this muscle is uncertain, with various proposed interpretations regarding it. Many surveyed surgeons are unaware of this muscle,<sup>1</sup> and many anatomy textbooks do not include it.<sup>2</sup>

This narrow muscle bundle runs parallel to the sternum, with fibres running at 90 degrees to the pectoralis major muscle. It extends infraclavicularly to the inferior aspect of the sternum. The pectoral nerves provide innervation to the sternalis muscle. It is anatomically distinct from the pectoralis muscle and the abdominal musculature. The origin of this muscle is uncertain, with pectoralis major, rectus abdominus and sternomastoid all being proposed.

Mammographic techniques are continually improving, and for this reason we will encounter this muscle with increasing frequency. When the cranio-caudal view is properly performed, 30 - 40 % of mammograms will reveal the pectoralis muscle.<sup>4</sup> It is seen as a smooth, convex density along the posterior edge of the image; distinct from this, the sternalis muscle may be visualised as a focal density on the medial aspect of the breast.

Mammographically, a single focal soft-tissue density will be seen in the medial aspect of the breast only on the cranio-caudal view. The density may be flame-shaped or triangular, it may have an irregular margin, and it is generally surrounded by fat. The maximum dimension of the density is 1 - 2 cm. The density is not seen on the medio-lateral oblique view as the medial breast is a 'blind spot' on this view.<sup>2</sup>

## CASE REPORT

What are the guidelines in differentiating this feature from pathology? The location on the cranio-caudal view and the normal medio-lateral oblique view are useful guides. In addition, good clinical examination is essential in assessing the breast. The differential diagnosis is that of a mass (benign or malignant) or variable attachment of the pectoralis muscle (this is a slip of pectoralis muscle abutting the sternum and is imaged on both cranio-caudal and medio-lateral oblique views). If doubt still exists, a CT scan or magnetic resonance imaging (MRI) can confirm the presence of the sternalis muscle. Unnecessary biopsy of this normal variant can be avoided if one is aware of the entity.

On CT scanning, the longitudinal course of the muscle can be defined. It lies parallel to the sternum and superficial to, and on the medial aspect of, the pectoralis muscle. Often, the sternalis is separated from the pectoralis muscle by fat. CT scanning in the decubitus position encourages the muscle to bulge forward, providing improved visualisation of the muscle.<sup>2</sup>

MRI scanning will provide superior soft-tissue resolution and will define the muscle clearly. MRI scanning can be optimised by

placing the patient prone, which utilises gravity to pull the muscle away from the chest wall by dependent breast tissue.<sup>1</sup>

### Conclusion

The sternalis muscle is an unusual normal variant which is seen on occasion on the cranio-caudal view of a mammogram. The main differential is that of significant pathology. There are certain features that will guide the radiologist in the interpretation of the mammogram, so avoiding unnecessary biopsy. If there is any doubt in interpreting the mammogram, further correlation with CT or MRI will enable a conclusive diagnosis of this normal variant.

1. Berg WA, Birdwell RL. *Diagnostic Imaging: Breast*, 1st ed. Manitoba, Canada: Amirysis, 2006.
2. Bradley FM, Hoover HC, Hulka CA, et al. The sternalis muscle: an unusual normal finding seen on mammogram. *Am J Roentgenol* 1996; 166: 33-36.
3. Jeng H, Shuen-jing S. The sternalis muscle: an uncommon anatomical variant among Taiwanese. *J Anat* 1998; 193: 287-288.
4. Ramirez-Escobarr MA, Salmeron IR. What is this breast mass? *Br J Radiol* 1998; 71: 573-574.