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## Case Report

# A Rare Case of Bilateral Pectoralis Major Muscle Defect and Abnormal Muscle

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## Keywords

Pectoralis major muscle defect · Abnormal muscle · Reconstruction

## Abstract

A 56-year-old female patient with left breast cancer presented at our hospital. Preoperative CT scan showed an isolated bilateral pectoralis major muscle defect and abnormal muscle originating from the entire sternum and inserting in the lower ribs and rectus sheath. Total mastectomy and axillary lymph node dissection were performed. We believe that this case is unique and that others like it have never been reported. If there is a defect in the pectoralis major muscle, reconstructive surgery with a tissue expander is contraindicated. Therefore, preoperative evaluation of the chest wall musculature on imaging is recommended.

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## Introduction

Surgeons prefer to discover anatomic anomalies before surgery to avoid having to modify the surgical plan intraoperatively. The number of breast cancer surgeries using implants is increasing, and the discovery of a chest wall anomaly is needed before surgery because it is difficult to use a tissue expander if there is a partial defect in the pectoralis major muscle.

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A number of case reports discuss partial defects of the pectoralis major muscle [1–4]. Partial defect of the pectoralis major muscle is often associated with Poland syndrome (PS) [5]. PS is characterized by a unilateral partial defect of the pectoralis major muscle and syndactyly of the hand [6]. If there is only a partial defect of the pectoralis major muscle and no other malformations, it is reported as a variation of the pectoralis major muscle [7]. The most common muscle abnormality in the precordial area is the presence of a sternalis muscle. The incidence is 1–23% and is common among Asians [8]. The authors present a patient with bilateral partial defect of pectoralis major muscle and abnormal precordial muscle confirmed by CT before breast cancer surgery. We believe that our case is unique and that other cases with this combination of anomalies have not been reported. The authors documented this pectoralis major abnormality and its impact on breast reconstruction in the preoperative history and physical examination report.

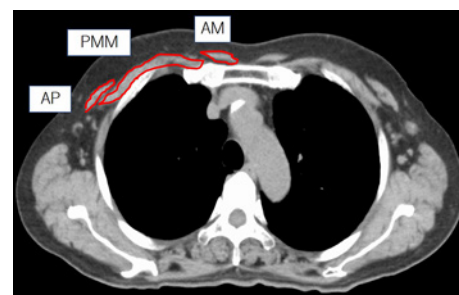
### Case Report/Case Presentation

The patient is a 56-year-old Korean woman. She presented at our hospital with a 30-mm tumor in her left breast. She was diagnosed with invasive lobular carcinoma on core needle biopsy. Cancer was clinical stage II, cT2N1M0. Preoperative CT scan showed the absence of the bilateral sternocostal portion of the pectoralis major muscle and the clavicular portion (CP) was observed as rod shaped (Fig. 1). The patient did not want reconstruction. Total mastectomy and axillary lymph node dissection were performed. Mastectomy was performed with a transverse incision extending from the nipple to the axilla (Stewart's incision). The mastectomy exposed the pectoralis major muscle to 10 cm below the collarbone. The lower part of the CP and the abdominal portion (AP) of the pectoralis major muscle were observed (Fig. 2). There was no normal sternocostal portion located from the sternum to the humerus (Fig. 3). There was abnormal muscle (AM) originating from the sternum and inserting into the lower ribs and rectus sheath. The muscle was present anterior to the AP. The pectoralis minor muscle was exposed through the inverted triangle defect formed by the CP, AP, and AM.

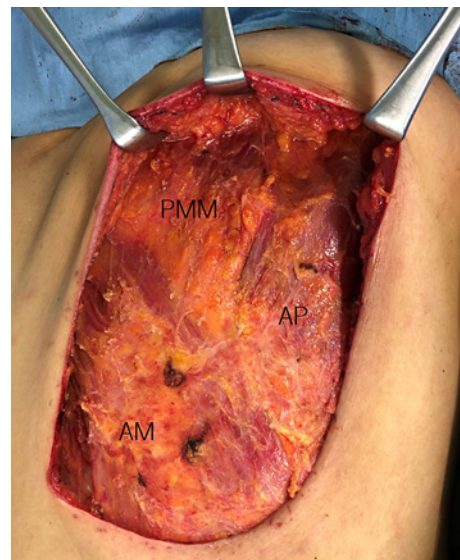
### Discussion/Conclusion

Pectoralis major anomalies include total defects, partial defects, and accessory muscles. In our case, there were partial defects of the pectoralis major muscles on both sides. No deformities were observed in other muscles, the chest wall, breast, or upper limbs. Therefore, it is considered that this is not a case of PS but an isolated pectoralis major anomaly.

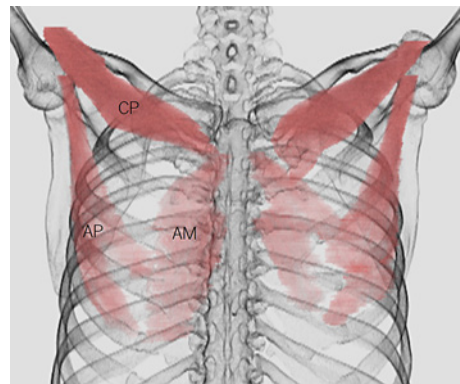
We reviewed the literature to classify these extremely rare bilateral pectoralis major muscle defects and accessory muscles. One case report discussed a split between the CP



**Fig. 1.** Axial image of the CT scan. There is a gap between the AM and the AP, exposing the PMM. PMM: pectoralis minor muscle.



**Fig. 2.** After left breast mastectomy. The sternocostal portion is absent, and the PMM is exposed. There was the wide AM anterior the AP. PMM: pectoralis minor muscle.



**Fig. 3.** Preoperative volume rendering CT scan image. Bilateral sternocostal portion of the pectoralis major muscle was absent, and the AM was present anterior the AP. CP: clavicular portion, AP: abdominal portion, AM: abnormal muscle.

and the sternocostal portion, and not a partial pectoralis major defect [7]. However, another case report discussed a partial pectoralis major deficiency, with the sternocostal portion being the most frequently deficient, and the belief was that the CP is enlarged when the sternocostal portion is deficient [2]. Sometimes, it is bilateral with no other abnormalities.

In our patient, the sternocostal portion of the pectoralis major muscle was missing on both sides. No deformities were observed in other muscles, the chest wall, breast, or upper limbs. Therefore, it was considered an isolated pectoralis major anomaly. The most common accessory muscle in the precordial area is the sternalis muscle, which is located anterior to a pectoralis major muscle and runs cranial to caudal. The origin is the upper sternum and the clavicle, and the insertion varies with the ribs, costal cartilage, rectus sheath, and aponeurosis of the external abdominal oblique muscle. In our case, the AM originated from the entire sternum and inserted in the lower ribs and rectus sheath, and the attachment site was similar to the sternalis muscle. The origin was about 15 cm, and the muscle and its insertion were also wide. It was not considered to be a sternalis muscle [8].

Two reports discuss cases of partial pectoralis major defect and sternalis muscle anomalies [1, 4]. Those two reports are similar to our case because the sternalis muscle becomes large when the pectoralis major muscle is defective. However, one report notes the oblique pectoralis

anterior muscle as an accessory muscle of the precordial region without partial loss of the pectoralis major muscle, which most closely describes our case [9]. In this report, there is no pectoralis major defect, and an accessory muscle is present anteriorly to the normal pectoralis major muscle. In our case as well, the AM was anterior to the AP of the pectoralis major muscle, and the origin, insertion, and shape were similar to those of the accessory muscle described above. Therefore, in our case, it is considered most likely that the sternocostal portion defect of the pectoralis major muscle on both sides was associated with an accessory oblique pectoralis anterior muscle.

Breast reconstruction is often done at the same time as breast cancer surgery. If there is a defect in the pectoralis major muscle, the tissue expander is exposed and insertion is therefore contraindicated. Many reports discuss breast reconstruction in cases with pectoralis major deficiency including PS, but most cases involve autologous breast reconstruction or fat injection. There are no reports with tissue expander insertions.

We detected a pectoralis major muscle defect by CT scan preoperatively and believe that surgeons should be able to easily identify these defects on the preoperative CT. In our case, we told the patient that reconstruction with a tissue expander was not possible. She did not wish to undergo reconstructive surgery and chose total mastectomy. When a patient desires reconstructive surgery with a tissue expander, it is important to check preoperatively for a pectoralis major muscle defect.

## Acknowledgment

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## Statement of Ethics

Ethical approval is not required for this study in accordance with local or national guidelines. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images.

## Conflict of Interest Statement

The authors have no competing interests.

## Funding Sources

Not applicable.

## Author Contributions

Mayuko Yamamoto, Tomonari Kuniyoshi, Sachiko Inubushi, and Hirokazu Tanino wrote the manuscript. Motoi Baba, Sachiko Mizumoto, Yuji Yamashita, Mayuko Miki, and Aoi Okamoto performed the treatment of patient. Ryuhei Fujimoto performed the image construction.

## Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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