

## Four cases of mimic breast cancer as the location of a penetrating artery

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### Abstract

“Mimic breast cancer” involves irregularly shaped hypoechoic areas with Doppler flow signals suggesting invasive cancer on breast ultrasonography in one section view that are non-reproducible in others. The ultrasonographic features in four cases of mimic breast cancer are discussed. These findings may represent areas where a penetrating breast artery emerges through the mammary zone. The cancer-like appearance may be due to irregular mammary zone disconnection by the penetrating artery and perivascular fat tissue, and shadowing from arteries adjacent to the anterior mammary fascia. Such lesions may be interpreted as breast cancer by inexperienced examiners, and are associated with risk of vessel injury as a result of needle biopsy.

### Keywords

mimic breast cancer, penetrating breast artery, non-reproducible in any other section views, inexperienced examiner

## 1. Introduction

Although there have been a number of reports regarding “mimic breast cancer” associated with various pathologies—e.g., fat necrosis, diabetic mastopathy, fibrocystic changes, sclerosing adenosis, ruptured inflammatory cysts, inflammation with abscesses, granulomatous mastitis, apocrine metaplasia<sup>1</sup>, nodular fasciitis<sup>2</sup>, hematoma<sup>3</sup>, cholesterol granuloma<sup>4</sup>, foreign bodies<sup>5</sup>, radial scars, surgical scars, desmoid tumors, and granular cell tumors<sup>6</sup>—there has been a little discussion regarding mimic breast cancer caused by a normal structure. Here, we present sonograms of four cases of pseudo-breast cancer lesions related to a penetrating breast artery, and discuss the mechanisms and remedies.

## 2. Case Report

### 2.1 Case 1

A 46-year-old woman was referred to our hospital because of an abnormal irregular hypoechoic lesion at the 11 o'clock position of the right breast detected by screening breast ultrasonography as part of a medical check-up provided by her company. The attending breast surgeon in our hospital could not palpate a mass where the abnormality was located.

Diagnostic breast ultrasonography was performed by an experienced radiologist, which showed a low-echoic structure located in the mammary zone at the 11 o'clock position in the right breast (**Fig. 1 a, b**).

A color Doppler flow signal was observed along the structure from the retromammary zone through the mammary zone to the superficial subcutaneous layer (**Fig. 1 c, d**). In addition, a similar structure was also detected at the 1 o'clock position in the left breast (**Fig. 1 e-h**). Similar structures on the bilateral breasts were observed symmetrically. These were considered to be normal structures around the location of a penetrating breast artery, and we concluded that the screening examiner interpreted the appearance as a lesion.

As a precaution, the surgeon ordered a follow-up ultrasonography examination after 6 months. However, no remarkable changes were observed on the ultrasonogram (**Fig. 1 i-l**), and these findings were concluded to represent normal structures.

### 2.2 Case 2

A 55-year-old woman had been followed-up by a breast surgeon in our hospital since she underwent left mastectomy due to breast cancer 5 years ago. A mass-like appearance at the 6 o'clock position in the right breast was detected in a horizontal view on ultrasonographic examination at annual work-up (**Fig. 2 a**). However, no lesion was observed on a sonogram in the orthogonal plane (**Fig. 2 b**).

A perforating breast artery from the retromammary zone through the mammary zone to the superficial subcutaneous layer was seen at the location of the mass-like lesion (**Fig. 2 c, d**). Similar findings

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