We present a case of phyllodes tumor of the breast in a 78-year-old woman evaluated with Tc-99m (V)DMSA and Tc-99m MIBI scintimammography, acquired in separate sessions (10 and 60 min post-injection). Tc-99m (V)DMSA was accumulated intensely within the mass [tumor to background ratio (T/B) >3], whereas Tc-99m MIBI had significantly lower uptake (T/B 1.9). Histology revealed a phyllodes tumor (maximum diameter 15 cm) and approximately three mitoses over 10 fields of view (FOV) x40, foci of epithelial hyperplasia and apocrine metaplasia. Stromal Ki-67 expression was 7%. The tumor was considered to be benign and the patient underwent mastectomy. One year later the patient presented with local malignant recurrence of the disease with over 15 mitoses per 10 FOV. Tc-99m (V)DMSA seems to have an advantage over Tc-99m MIBI in detecting mesenchymal tumors with unforeseen biological behavior and Ki-67 over-expression, such as phyllodes tumors, even with primary negative histological findings.

Key words: phyllodes tumor – breast cancer – scintimammography – MIBI – pentavalent DMSA

INTRODUCTION

Phyllodes tumors represent 0.5–1.8% of breast tumors and only 2.5% of fibroepithelial tumors. It is constituted from a combination of epithelial and stromal components surrounding the ductal mesenchymal (1).

These kinds of tumors present in women aged 35–55 years. Patients are referred with a palpable and quickly growing mass of size >4 cm. Phyllodes tumors are classified as benign [<3 mitoses per 10 fields of view (FOV)] and malignant low and high grade (>3 mitoses per 10 FOV). The biological behavior of phyllodes tumors is unpredictable and local recurrence and even malignant transformation may occur in high-grade malignant phyllodes tumors. Clinical examination, history and mammography can easily lead to a safe diagnosis, but there is no good predictor for the prognosis and the progression of such a tumor. A high mitotic index, Ki-67, hormonal receptor status, stromal overgrowth, measurement of sarcomatous component and necrosis are considered to be the most significant histological and immunohistochemical parameters to assess the prognostic outcome of the disease (2).

Tc-99m pentavalent DMSA [(V)DMSA] and Tc-99m MIBI scintimammography have been used in detecting breast cancer and its lymph node involvement and even more in precancerous lesions with high risk of progression to malignancies (3–5). Tc-99m (V)DMSA and Tc-99m MIBI appear to have different mechanisms of accumulation in tumors, which have not yet been completely clarified. Tc-99m MIBI is concentrated in cancer cells by an energy-requiring transport mechanism and transmembrane electronegative potential, in addition to nonspecific mechanisms, and is stored within the mitochondria. The mechanism of accumulation of Tc-99m (V)DMSA has been thought to be related to the structural similarity between Tc-99m (V)DMSA core and PO₄³⁻, which is avidly taken up by some cancer cells (6,7). In a poorly differentiated breast cancer model, it is reported that uptake of Tc-99m (V)DMSA was more than twofold greater than that of Tc-99m MIBI (8). It is also reported that Tc-99m (V)DMSA uptake by tumors was related to glucose-mediated acidosis (9). This study was performed to evaluate and compare the abilities of Tc-99m...
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(V)DMSA and Tc-99m MIBI to visualize tumors with unknown biological behavior, such as phyllodes tumors, especially those related to increased cell proliferation activity.

CASE REPORT

A 78-year-old woman with a mammography showing extensive opacity occupying the whole left breast (Fig. 1) underwent scintimammography (before surgery) with Tc-99m (V)DMSA and Tc-99m MIBI with a 48 h time interval between the two tests.

Lateral prone and anterior supine early and late images (at ∼10 and ∼60 min, respectively) were acquired, after intravenous administration of 555–740 MBq of each radiotracer. Acquisitions were obtained using a special positioning pad (PBI-2 Scintimammography Pad Set®, Pinestar Technology, Greenville, PA).

Scintimammography was performed using a single-head γ camera (Sophycamera DS7®, Sopha Medical Vision International, Buc, France), equipped with a high-resolution parallel hole collimator connected to a dedicated computer (Sophy NxT®, Sopha Medical Vision International). The matrix was $256 \times 256$ pixels and the photo peak was focused at 140 keV with a symmetric 10% window.

Tc-99m (V)DMSA scintigraphy showed increased concentration with tumor to background ratio (T/B) >3 in both early and delayed images. Tc-99m MIBI also showed increased concentration but with lower T/B ratio (1.9) (Fig. 2).

The patient underwent mastectomy and the histology revealed a phyllodes tumor (maximum diameter 15 cm) and approximately three mitoses over 10 FOV, foci of epithelial hyperplasia and apocrine metaplasia (Fig. 3).

Ki-67 was found to be over-expressed in the first evaluation. It was 7% in stromal and 5% in epithelial hyperplasia.

One year later, the patient underwent a second surgery due to local recurrence of the disease. Over 15 mitoses per 10 FOV ×40 were observed in surgical specimens.

DISCUSSION

Moffat et al. (10) reported that 17% of benign and 27% of malignant phyllodes tumors in a group of 1600 patients with phyllodes tumors presented with recurrence of the disease. The biological behavior of phyllodes tumors seems unpredictable. Stromal overgrowth, necrosis, type of sarcomatous component, high malignant grade, increased cell proliferation index,
increased cellularity and stromal atypia are the more significant histological parameters of grave prognosis.

Imaging characteristics with mammography and ultrasonography in differentiating between benign and malignant phyllodes tumors have not been described (11). Katayama et al. (12) reported cases evaluated with Tc-99m MIBI and Tc-99m MDP to estimate and distinguish between benign and malignant types of phyllodes tumors. Ohta et al. (13) reported that the early appearance of a phyllodes tumor is related to a benign tumor.

Tc-99m (V)DMSA and to a lesser extent Tc-99m MIBI, as we reported previously, can be effective in visualizing preinvasive lesions such as DCIS/LCIS and epithelial hyperplasia (14,15). Tc-99m (V)DMSA seems to be related to cell proliferative activity in cancers (5,16) and even more in precancerous cell populations such as DCIS/LCIS and epithelial hyperplasia.

The potential reasons for differences between Tc-99m (V)DMSA and Tc-99m MIBI tumor accumulation are probably based on the different mechanisms of tracer concentration in tumors, as mentioned before.

In the present case, Ki-67 was slightly increased in the stromal (7%) and in the epithelial (5%) component of the tumor. In theoretically benign lesions, a slight increase in the cell proliferation index appears to be a significant risk factor in the process of carcinogenesis (17–21). Although increased Ki-67 expression has been reported to be related to a higher uptake of Tc-99m (V)DMSA in epithelial hyperplasia, it is still uncertain whether stromal overgrowth or epithelial hyperplasia is the cause of increased Tc-99m (V)DMSA concentration, although it has no special clinical significance.

Tc-99m (V)DMSA was found to be related to proliferative activity in invasive and preinvasive breast lesions (22,23), which is directly related to tumor grade. Tc-99m MIBI’s lower uptake in the present case.

This case indicates that histologically proven benign phyllodes tumors do not safely exclude a malignant transformant. We consider that Tc-99m (V)DMSA scintimammography could offer useful information regarding the probable outcome of the disease.

References