

Technetium-99m-sestamibi scintimammography of benign and malignant phyllodes tumors

Hitoya OHTA,* Tomoo KOMIBUCHI,* Toshihiro NISHIO,** Toshiyuki KITAI,** Shunji YAMAMOTO,** Minoru UKIKUSA,** Hiroji AWANE,** Kunikatsu IRIE*** and Masayuki SHINTAKU***

*Departments of *Laboratories, **Surgery and ***Pathology, Osaka Red Cross Hospital*

We presented two cases of phyllodes tumor of the breast examined by ^{99m}Tc -sestamibi (MIBI) two-phase scintimammography. In the case with malignant phyllodes tumor, ^{99m}Tc -MIBI accumulation was recognized on both early and delayed images. In the case with benign phyllodes tumor, however, ^{99m}Tc -MIBI accumulation was recognized on only the early image. ^{99m}Tc -MIBI delayed imaging may have the potential to distinguish between benign and malignant phyllodes tumors.

Key words: technetium-99m-sestamibi, scintimammography, phyllodes tumor

INTRODUCTION

PHYLLODES TUMOR ACCOUNTS for less than 1% of breast tumors and have been divided into benign, borderline and malignant groups.^{1,2} It is not easy to distinguish between benign and malignant phyllodes tumors by mammography and sonography, since there is substantial overlap in the imaging characteristic.³ Recently high diagnostic accuracy of ^{99m}Tc -sestamibi (MIBI) scintimammography in detecting breast cancer has been reported.^{4,5} We report two cases of phyllodes tumor examined by ^{99m}Tc -MIBI scintimammography and discuss the potential to distinguish between benign and malignant phyllodes tumors.

CASE REPORT

Scintimammography was performed at 15 minutes (early image) and at 3 hours (delayed image) after intravenous injection of 600 MBq of ^{99m}Tc -MIBI. The anterior planar view including both breasts and axillary regions in the supine position was obtained with a Toshiba GCA 7200-A gamma camera equipped with a low-energy, high resolution parallel hole collimator.

Case 1 A 51-year-old female was admitted because of

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For reprint contact: Hitoya Ohta, M.D., Department of Laboratories, Osaka Red Cross Hospital, 5-53 Fudegasaki-cho, Tennohji-ku, Osaka 543, JAPAN.

a rapidly enlarging breast tumor. She had noticed a firm lump in the right breast three years before her admission. Scintimammography was performed and ^{99m}Tc -MIBI accumulation was recognized on both early and delayed images (Fig. 1 A, B). Simple mastectomy was performed. The tumor measured 20 cm \times 17 cm \times 13 cm and histopathology revealed malignant phyllodes tumor (Fig. 2 A, B).

Case 2 A 29-year-old female was admitted because of an enlarging left breast tumor. She had noticed the tumor nine months before. Scintimammography was performed and ^{99m}Tc -MIBI accumulation was recognized on an early image (Fig. 3A), but was not recognized on a delayed image (Fig. 3B).

The tumor was excised widely. The tumor measured 8 cm \times 6.5 cm \times 5 cm and histopathology revealed benign phyllodes tumor (Fig. 4 A, B).

DISCUSSION

Because of diverse criteria of histopathologic analysis, the percentage of malignant subgroup varies from 23% to 50% of all phyllodes tumors.³ Preoperative diagnosis is difficult,⁶ since with mammography and sonography there is substantial overlap in the imaging characteristics of benign and malignant phyllodes tumors.³

Recently developed ^{99m}Tc -MIBI scintimammography offers new hope in breast imaging.^{4,5} To our knowledge, there is no literature on ^{99m}Tc -MIBI scintimammography of phyllodes tumor. Our case showed that ^{99m}Tc -MIBI

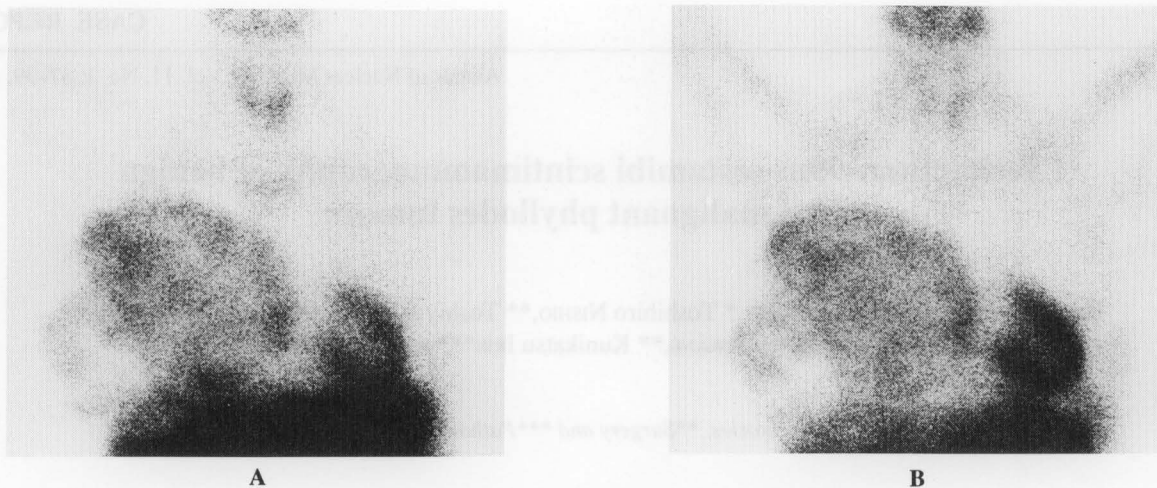


Fig. 1 (Case 1) ^{99m}Tc -MIBI accumulation in the lesion was recognized on both early and delayed images (A: early, B: delayed).

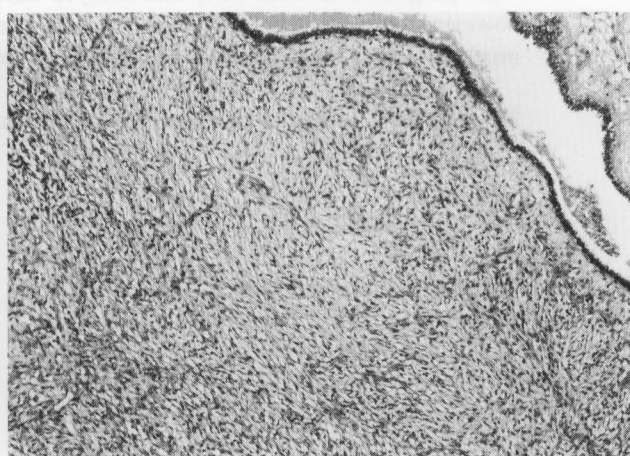
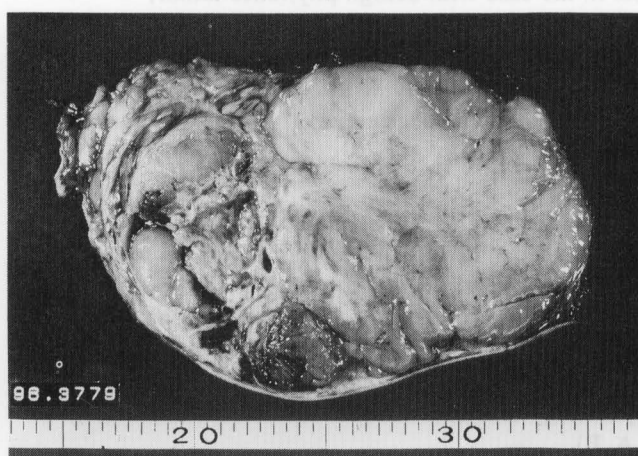


Fig. 2 (Case 1) Surgery revealed malignant phyllodes tumor (A: Gross appearance of the tumor, B: H & E stain).

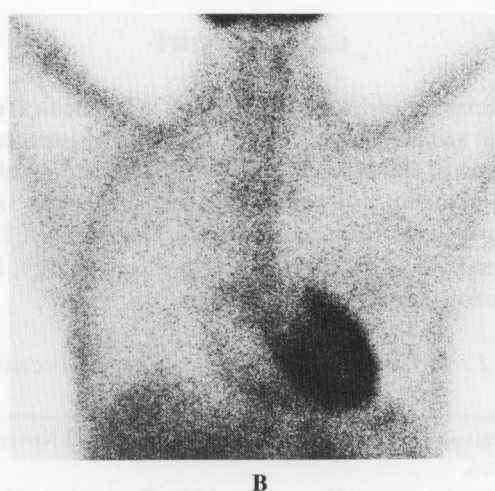
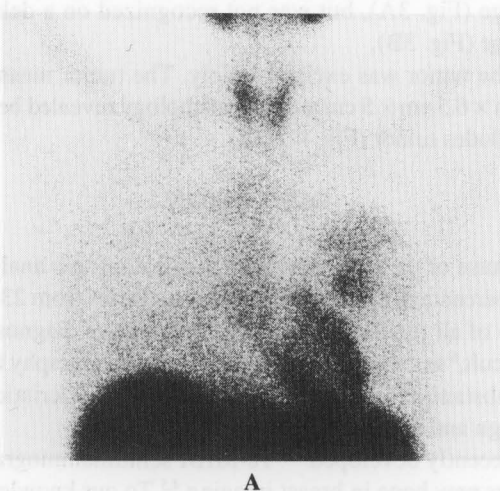


Fig. 3 (Case 2) ^{99m}Tc -MIBI accumulation was recognized on early image (A), but ^{99m}Tc -MIBI accumulation was cleared on delayed image (B).

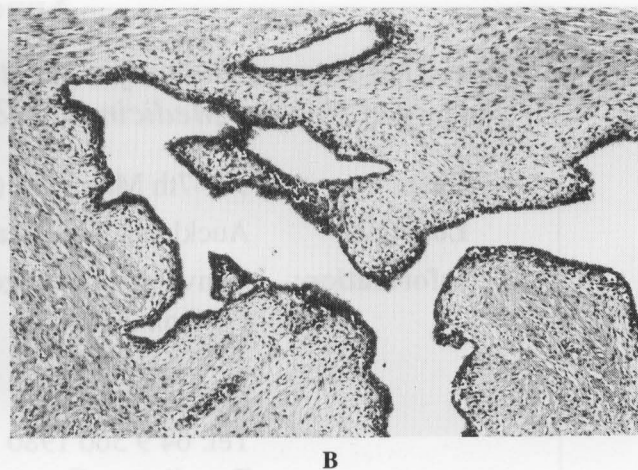
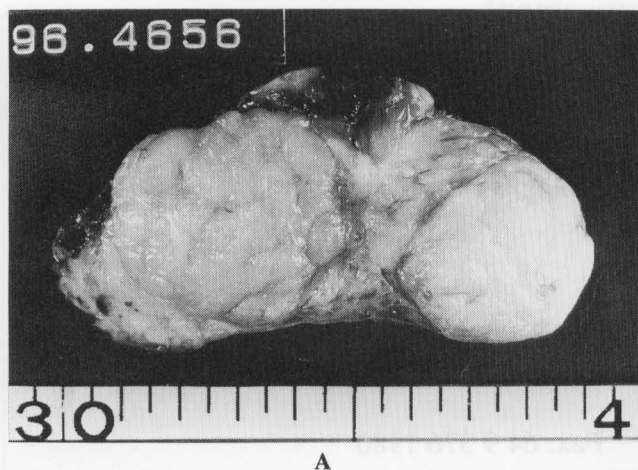


Fig. 4 (Case 2) Surgery revealed benign phyllodes tumor (A: Gross appearance of the tumor, B: H & E stain).

delayed imaging may have the potential to distinguish between benign and malignant phyllodes tumors. Concerning the uptake mechanism, it has been reported that ^{99m}Tc -MIBI accumulates within mitochondria on the basis of electrical potentials generated across the membranes. And since malignant tumors maintain a more negative transmembrane potential, ^{99m}Tc -MIBI accumulation increases,⁷⁻⁹ but ^{99m}Tc -MIBI accumulation also relates with tumor vascularity or high cellularity.^{10,11} We considered that the ^{99m}Tc -MIBI accumulation on the early image in case 2 was due to a reflection of blood flow or the high cellularity of the tumor. It has recently been found that the presence of multidrug resistance-mediated P glycoprotein excludes ^{99m}Tc -MIBI accumulation.^{8,9} Unfortunately we could not examine the expression of P glycoprotein in case 2.

In conclusion, ^{99m}Tc -MIBI scintimammography was performed in two cases of phyllodes tumor. In the malignant case, ^{99m}Tc -MIBI accumulation was recognized on both early and delayed images. In the benign case, ^{99m}Tc -MIBI accumulation was recognized only on the early image. Further experience is necessary to confirm the possibility to distinguish between benign and malignant phyllodes tumor with ^{99m}Tc -MIBI scintimammography.

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REFERENCES

1. Rosen PP, Oberman HA. Cystosarcoma phyllodes. In Atlas of Tumor Pathology: Tumors of the Mammary Gland, Rosai J, Sobin LH (eds.), Washington DC, Armed Forces Institute of Pathology, pp. 107-114, 1993.
2. Pietruszka M, Barnes L. Cystosarcoma phyllodes: a clinicopathologic analysis of 42 cases. *Cancer* 41: 1974-1983, 1978.
3. Liberman L, Bonaccio E, Hamele-Bena D, Abramson AF, Cohen MA, Dershaw DD. Benign and malignant phyllodes tumors: mammographic and sonographic findings. *Radiology* 198: 121-124, 1996.
4. Taillefer R, Robidoux A, Lambert R, Turpin S, Laperrière J. Technetium-99m-sestamibi prone scintimammography to detect primary breast cancer and axillary lymph node involvement. *J Nucl Med* 36: 1758-1765, 1995.
5. Khalkhali I, Cutrone J, Mena I, Diggles L, Venegas R, Vargas H, et al. Technetium-99m-sestamibi scintimammography of breast lesions: clinical and pathological follow-up. *J Nucl Med* 36: 1784-1789, 1995.
6. Umpleby HC, Moore I, Royle GT, Guyer PB, Taylor I. An evaluation of the preoperative diagnosis and management of cystosarcoma phyllodes. *Ann R Coll Surg Engl* 71: 285-288, 1989.
7. Chiu ML, Kronauge JF, Piwnica-Worms D. Effect of mitochondrial and plasma membrane potentials on accumulation of hexakis (2-methoxyisobutylisonitrile) technetium (I) in cultured mouse fibroblasts. *J Nucl Med* 31: 1646-1653, 1990.
8. Moretti JL, Caglar M, Boaziz C, Calliat-Vigneron N, Morere JF. Sequential functional imaging with technetium-99m hexakis-2-methoxyisobutylisonitrile and indium-111 octreotide: can we predict the response to chemotherapy in small cell lung cancer? *Eur J Nucl Med* 22: 177-180, 1995.
9. Maffioli L, Steens J, Pauwels E, Bombardieri E. Application of ^{99m}Tc -sestamibi in oncology. *Tumori* 82: 12-21, 1996.
10. Rao VV, Chiu ML, Kronauge JF, Piwnica-Worms D. Expression of recombinant human multidrug resistant P-glycoprotein in insect cells confers decreased accumulation of technetium-99m-sestamibi. *J Nucl Med* 35: 510-515, 1994.
11. Komori T, Matsui R, Adachi I, Shimizu T, Sueyoshi K, Narabayashi I. *In vitro* uptake and release of ^{201}Tl and ^{99m}Tc -MIBI in HeLa cell. *KAKU IGAKU (Jpn J Nucl Med)* 32: 651-658, 1995.
12. Lu G, Shin WJ, Huang HY, Long MQ, Sun Q, Liu YH, et al. ^{99m}Tc -MIBI mammoscintigraphy of breast masses: early and delayed imaging. *Nucl Med Commun* 16: 150-156, 1995.