

Tc-99m Tetrofosmin Scintimammography for the Detection of Recurrent Breast Cancer in a Patient with Equivocal Mammography Study

*Samir Hussein,¹ Sukhpal Sawhney,¹ Adil Al-Jarrah²

تصوير الثدي الوُمضائي بالتيتروفوسمين لاكتشاف سرطان الثدي الراجع عند المريضات في حالة وجود تصوير الثدي الشعاعي المتببس

سامر حسين، سكبال سوني، عادل الجراح

المخلص: هذا تقرير وصفي من مستشفى جامعة السلطان قابوس حالة مريضة تعاني من سرطان الثدي الراجع والمنتقل إلى الغدد الليمفاوية الابطية . اكتشف السرطان بتصوير الثدي الوُمضائي بعد الحصول على تصوير شعاعي ملتبس للثدي .
مفتاح الكلمات: تصوير الثدي الوُمضائي . تيتروفوسمين . تصوير الثدي الشعاعي . سرطان الثدي . تقرير حالة . عمان .

ABSTRACT This is a case report describing a patient at Sultan Qaboos University Hospital, Oman, with recurrent local breast cancer and axillary lymph node metastasis. The cancer was detected with ⁹⁹Tc-^m tetrofosmin scintimammography after an equivocal mammography study.

Keywords: Breast Scintigraphy, Tc-99m Tetrofosmin; Mammography; Breast Cancer; Case report; Oman.

BREAST CANCER IS BECOMING A GLOBAL challenge.¹ There is evidence that the incidence of breast cancer is rising in developing countries² where diagnostic facilities have been reported to be rudimentary.³ Recent affluence in Oman has led to the development of a modern health care infrastructure including radiological facilities for the diagnosis of breast cancer. There are no reports to our knowledge from Oman that document the progress of the use of modern radiological techniques. The present discourse is to highlight this in a patient, whose recurrent cancer was detected with Tc-99m tetrofosmin scintimammography.

CASE

A 42 years old female underwent right breast lumpectomy for breast cancer at a hospital in Oman. Six months

later, she presented to the surgical outpatient department at Sultan Qaboos University Hospital for follow up. Her clinical examination, which is not the focus of this report, did not reveal any abnormality except a surgical scar in the right breast. A mammography was performed, which showed an equivocal residual tumour at the lumpectomy site with pathologic right axillary lymph nodes and underlying seroma [Fig 1].

A scintimammography was performed using 740 MBq of Tc-99m tetrofosmin which was injected in the arm contra-lateral to the mammary lesion. Ten minutes later, planar imaging was performed using a rectangular, large field of view, dual-head gamma camera equipped with low-energy, high-resolution, parallel-hole collimators. A 10% window and a 140-keV photo peak were selected. Planar images were acquired in

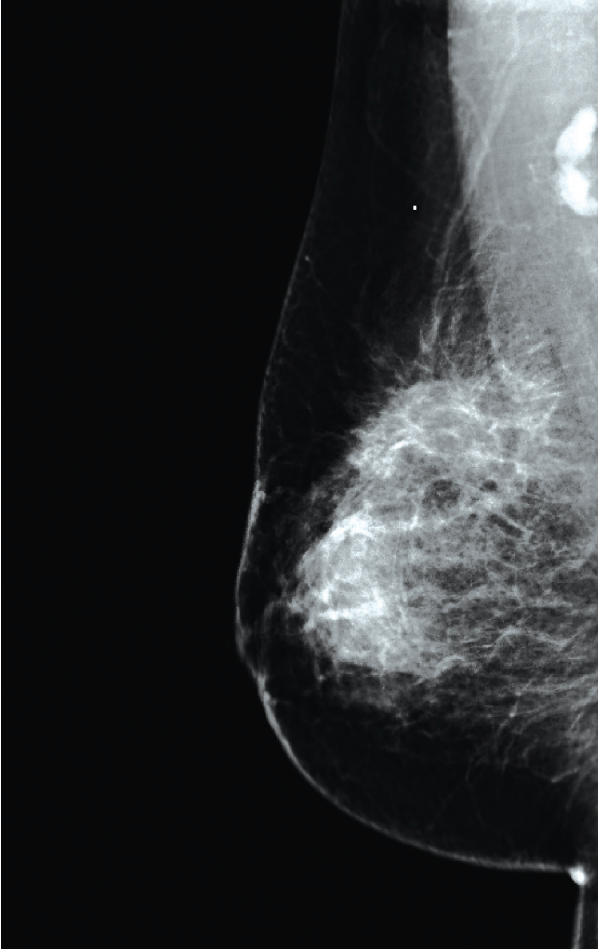


Figure 1: Right breast mammography showing heterogeneity of parenchyma with spiculations extending towards pectoralis muscle, seen under surgical scar site in supero-lateral quadrant

both anterior and lateral views, with a 256 x 256 matrix size, an acquisition time of 600 s per view. First, the anterior planar view was acquired in the supine position; both breasts and the axillae were included in the field of view. The procedure is well described in the European Association for Nuclear Medicine's guidelines for breast scintigraphy.⁴

The scintimammography showed abnormal uptake in the right breast indicating recurrence of breast cancer, and abnormal uptake in the right axilla indicating lymph node metastasis [Fig 2].

The patient subsequently underwent right modified radical mastectomy with right axillary lymph node dissection. The histopathological findings were fibrocystic changes and duct ectasia. There were foci of residual high grade ductal carcinoma in situ and axillary lymph nodes positive for tumour metastasis.

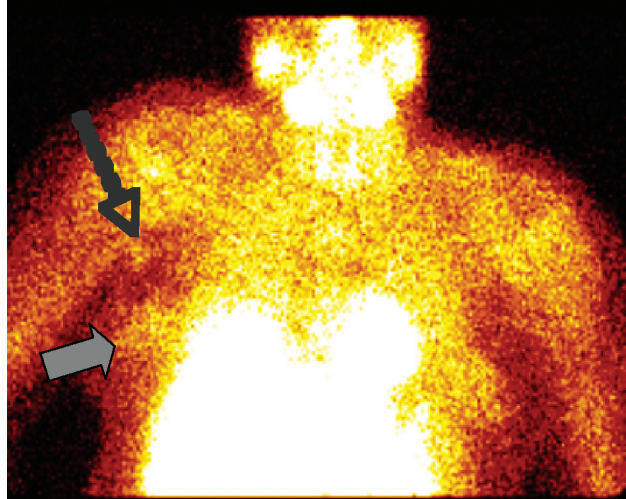


Figure 2: Tc-99m Tetrofosmin showing abnormal uptake in the right breast (grey wide arrow), and abnormal uptake in the right axilla (black dotted arrow)

DISCUSSION

Mammography combined with clinical examination represents the method of choice both in the screening and in the diagnosis of primary and recurrent breast cancer, demonstrating high sensitivity even in the detection of small non-palpable lesions. However, mammography can also yield false-negative results in some cases;⁵ in addition, it is characterized by low specificity and a low positive predictive value.⁶

Scintimammography with the cationic lipophilic oncotropic radiotracers, Tc-99m methoxyisobutylisonitrile (MIBI) and Tc-99m tetrofosmin have proved useful methods for the detection of primary breast cancer and the differentiation of malignant from benign mammary lesions.⁷⁻¹⁰ Two recent meta-analysis studies showed that there is evidence that scintimammography is a robust imaging technique delivering high sensitivities and specificities in patients studied in both single-centre and multi-centre trials and, as such, can be relied on as an adjunctive method for the investigation of primary breast cancer with sensitivity range of 85% - 87.8% and specificity range of 83% - 86.9%.^{11,12} We preferred the use of tetrofosmin to MIBI for scintimammography because of its more favourable pharmacokinetics: its faster and greater clearance from the lungs and liver allow a higher target to background ratio.¹³

The detection of recurrent breast cancer by mammography is a challenging task because architectural changes (mainly fibrosis) and scarring secondary to surgery and radiotherapy, cause difficulties in the in-

terpretation of mammograms. In a prospective trial¹⁴ performed to assess the accuracy of Tc-99m-MIBI scintimammography in women with suspected recurrent breast cancer in the breast and/or locoregional tissues, the sensitivity was 78% in detecting recurrent disease, compared with 55% for mammography.¹⁵ In addition, scintimammography identified 63% of axillary lymph nodes with recurrent tumour.

CONCLUSION

Scintimammography should be performed in patients with recurrent breast cancer and equivocal mammography results.

REFERENCES

1. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, 2002. *CA Cancer J Clin* 2005; 55:74-108.
2. Al-Moundhri M, Al-Bahrani B, Pervez I, Ganguly SS, Nirmala V, Al-Madhani A, et al. The outcome of treatment of breast cancer in a developing country - Oman. *Breast* 2004; 13:139-145.
3. Chopra SA, Chopra FS. Cancer in the Africans and Arabs of Zanzibar. *Int J Cancer* 1977; 19: 298-304.
4. Breast Scintigraphy procedure guidelines for imaging. From http://www.eanm.org/scientific_info/guidelines/gl_onco_breast.php?navId=54. Accessed September 2007.
5. Bird RE, Wallace TW, Yankaskas BC. Analysis of cancers missed at screening mammography. *Radiology* 1992; 184:613-617.
6. Kopans DB. The positive predictive value of mammography. *AJR* 1992; 158:521-526.
7. 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* 1995; 36:1784-1789.
8. Palmedo H, Grünwald F, Bender H, Schomburg A, Mallmann P, Krebs D, et al. Scintimammography with technetium-99m methoxyisobutyle: comparison with mammography and magnetic resonance imaging. *Eur J Nucl Med* 1996; 23:940-946.
9. Mansi L, Rambaldi PF, Procaccini E, Di Gregorio F, Laprovitera A, Pecori B, et al. Scintimammography with technetium-99m tetrofosmin in the diagnosis of breast cancer and lymph node metastases. *Eur J Nucl Med* 1996; 23:932-939.
10. Fenlon HM, Phelan N, Tierney S, Gorey T, Ennis JT. Tc-99m tetrofosmin scintigraphy as an adjunct to plain-film mammography in palpable breast lesions. *Clin Radiol* 1998; 53:17-24.
11. Liberman M, Sampalis F, Mulder DS, Sampalis JS. Breast cancer diagnosis by scintimammography: a meta-analysis and review of the literature. *Breast Cancer Res Treat* 2003; 80:115-126.
12. Hussain R, Buscombe JR. A meta-analysis of scintimammography: an evidence-based approach to its clinical utility. *Nucl Med Commun* 2006; 27:589-594.
13. Higley B, Smith FW, Gemmel HG, Das Gupta P, Gvozdanovic DV, Graham D, et al. Technetium-99m-1,2-bis [bis(2-ethoxyethyl) phosphino] ethane: human biodistribution, dosimetry and safety of a new myocardial perfusion imaging agent. *J Nucl Med* 1993; 34:30-38.
14. Cwikla JB, Kolasinska A, Buscombe JR, Hilson AJ. Tc-99m MIBI in suspected recurrent breast cancer. *Cancer Biother Radiopharm* 2000; 15:367-372.
15. Orel SG, Troupin RH, Patterson EA, Fowble BL. Breast Cancer Recurrence after Lumpectomy and Irradiation: Role of Mammography in Detection. *Radiology* 1992; 183:201-206.