

Tc-99m Sestamibi SPECT/CT as a New Tool for Monitoring Perfusion and Viability of Buried Perforator Based Free Flaps in Breast Reconstruction After Breast Cancer

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Abstract: We report a case of a 53-year-old woman with ductal carcinoma in situ of the right breast. Skin-sparing mastectomy and single-stage reconstruction of the right breast with a “buried” free deep inferior epigastric perforator flap was performed. Classic clinical monitoring was not possible due to the buried situation of the free flap. To assess the perfusion and viability of the perforator based free flap we performed a Tc-99m-sestamibi-SPECT/CT. The results confirmed the intraoperative clinical findings. Tc-99m-sestamibi-SPECT/CT may be a new tool for the postoperative evaluation of regional perfusion and viability of buried perforator based free flaps.

Key Words: autologous breast reconstruction, postoperative monitoring, perforator based free flap, Tc-99m-sestamibi-SPECT/CT, subcutaneous fat

(*Clin Nucl Med* 2010;35: 36–37)

Received for publication April 14, 2009; revision accepted September 4, 2009. From the *Department of Plastic and Hand Surgery, University of Erlangen-Nürnberg, University Hospital, Erlangen, Germany; †Clinic of Nuclear Medicine, University of Erlangen-Nürnberg, University Hospital, Erlangen, Germany; and ‡Division of Molecular and Experimental Surgery, Department of Surgery, University of Erlangen-Nürnberg, University Hospital, Erlangen, Germany.

Supported by an ELAN grant of the University Erlangen-Nürnberg (No. 08.01.07.1).

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ISSN: 0363-9762/10/3501-0036

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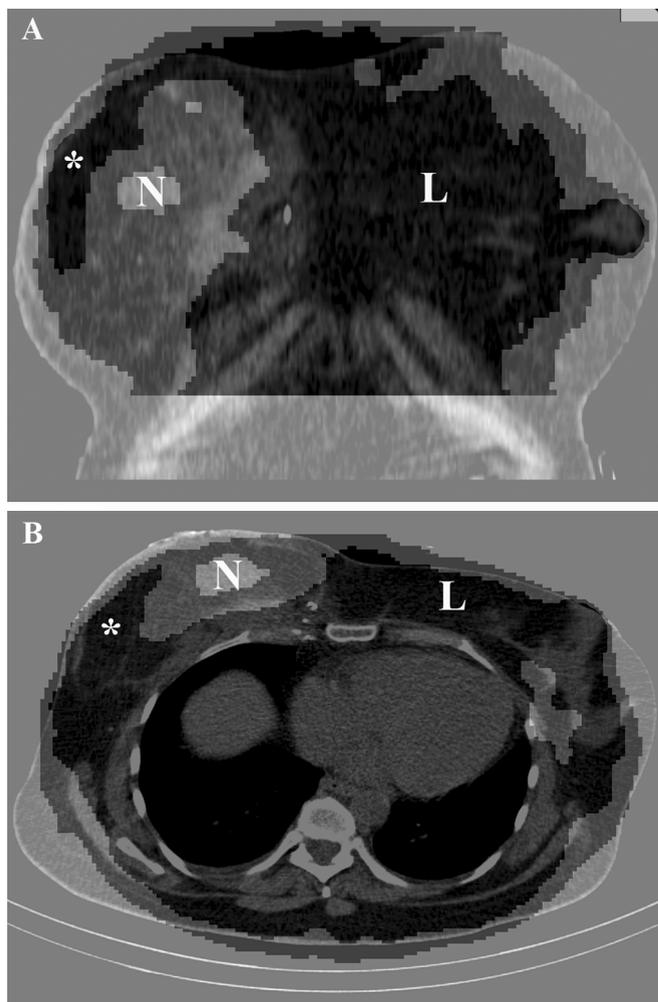


FIGURE 1. A, B, A 53-year-old woman with ductal carcinoma in situ of the right breast was admitted for skin-sparing mastectomy and single-stage reconstruction of the right breast with a free deep inferior epigastric perforator flap.¹⁻⁵ The perforator based free flap was “buried,” which means that more than 90% of the flap was deepithelized and covered by original breast skin. Classic clinical monitoring was not possible due to the buried situation of the free flap.⁶⁻⁸ To assess the perfusion and viability of the whole perforator flap we performed a SPECT/CT analysis with intravenous administration of 730 MBq/19.7 mCi Tc-99m-sestamibi.⁹⁻¹¹ Using a SPECT/CT hybrid camera (Symbia T6, Siemens Medical Solution, Hofman Estate, IL), scans were performed immediately, 30 minutes, and 2 hours after injection. A, B, show 30 minutes scans. For image interpretation the perfusion and viability were considered to be normal in the left healthy breast (L) and thus the uptake of Tc-99m-sestamibi was also considered as normal. The reconstructed right breast showed significantly less uptake of Tc-99m-sestamibi compared with the left breast (L), which was considered as an intraindividual control. These findings can be seen in the coronal images of both breasts (A) as well as in the transverse image (B). It was also possible to determine the regions of normal (*), lower and no (N) perfusion of flap tissue, which consisted of more than 99% of subcutaneous fat. The SPECT/CT showed medially within the free flap no

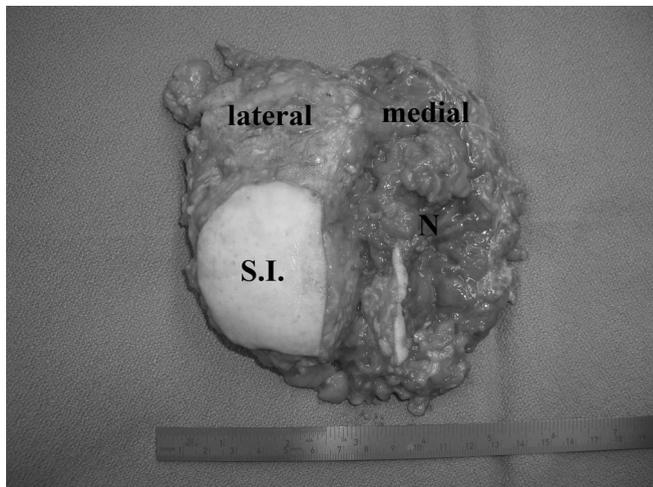


FIGURE 2. On the basis of this diagnostic tool we performed a revision operation. The clinical findings confirmed the Tc-99m sestamibi SPECT/CT results. The medial parts of the flap including the vascular pedicle of the flap were necrotic (N), whereas the lateral part of the flap showed normal perfusion (S.I. indicates “Skin Island” of the flap). As the esthetic outcome with only half of the flap was considered as poor, the whole flap was surgically removed and the right breast was successfully reconstructed in a second operation 2 weeks later with a pedicled latissimus dorsi flap and silicon prosthesis (225 ccm Mentor CPG).

uptake (N) of Tc-99m-sestamibi in a region of 3 × 5 × 4 cm. The lateral parts (*) of the perforator based free flap showed more uptake of Tc-99m-sestamibi and thus more viability and perfusion of the free flap.