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Radio-guided localization of clinically occult breast lesions (ROLL): a DGH experience

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AIM: Wire-guided localization (WGL) of clinically occult breast lesions is a well established technique. The aim of this study was to evaluate radio-guided localization (ROLL) within the breast screening service of a district general hospital.

METHOD: The study group comprised 70 women who underwent ROLL under US and stereotaxis. This required an injection of Technetium-labelled colloidal albumen into the impalpable breast lesion. The women then proceeded to theatre, where localization was achieved with the use of a gamma probe. The lesion was identified by the presence of a high signal, caused by the injected isotope. The results of 70 consecutive cases in which a breast lesion was localized using ROLL were compared with the results of the latest 70 WGLs.

RESULTS: All 140 lesions were successfully localized. However, the change in technique from WGL to ROLL offered significant benefits to patients.

CONCLUSION: Our study demonstrated that ROLL is a practical and reliable localization technique. It can be implemented in hospital units without using valuable gamma camera time. The cost compares well with WGL. There is an improved cosmetic outcome for patients, and the very small quantity of radioactivity used is safe for both patients and staff.

Introduction

Clinically occult breast lesions are found with increasing frequency, both within the breast screening service and following the use of mammography in symptomatic and high-risk patients. Several techniques have been described for preoperative localization of non-palpable lesions.[1–4] The most frequently used method is wire-guided localization (WGL) under US or stereotactic control.[1–4]

Radio-guided localization (ROLL) by means of 99mTc has been described in the literature.[5–7] Gennari and colleagues reported the injection of 3.7 megaBecquerels of Technetium-labelled colloid into the lesion within 24 h preoperatively (usually the day before surgery). Front and lateral view planar scintigraphy images of the breast, exposure time 3 min, were obtained with a gamma camera immediately and 5 h after administration of the Technetium-labelled colloid particles. The scintigraphic image was superimposed on the mammogram and the hot spot was shown to correspond to the lesion site.

Here we present a modified version of the radio-guided technique, as used for occult lesion localization within a district general hospital. The radioisotope was injected on the day of surgery, which allowed a reduction in dose to 1 MBq, or 0.02 mSv, which is no more than the dose for a chest radiograph.

The value of performing a scintigraphic image was questioned. As the site of injection was

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confirmed by imaging the needle tip position under either plain radiographic or US control, the scintigraphic image was deemed unnecessary. The modified version was judged to be useful in any screening unit, without the need for a gamma camera or overnight admission before surgery.

Materials and methods

In the first instance, an ARSAC holder had to apply for a certificate to allow the technique to be performed within the unit. An application for the addition to the certificate for administration of diagnostic radioactive medicinal products was sent to ARSAC's support unit with details of the procedure, activity per test in megaBequerels and the effective dose test. Within our department there is a Nuclear Medicine Department and therefore ARSAC licence holders. It is, however, not required that the individual who performs the examination should be an ARSAC licence holder, but that she or he should be authorized by an ARSAC licence holder to perform the procedure to protocol. Approval was received from the Chairman of the Ethical Committee.

The dose required was calculated with the help of a physicist. Previous studies[5-7] used higher doses, as the injection was received the night before operation. As the injection was to be performed on the day of surgery, a lower dose was calculated. It was agreed that 1 megaBequerel would be sufficient. Technetium 99^{m}-labelled colloidal albumen was used (macro-aggregate 10–150 μm).The time between the injection and surgery ranged from 1 to 4 h in this study. The dose could be altered if the delay was likely to be more than 4 h.

Local rules were developed to comply with Radiation Protection Regulations. During the initial stages, we undertook dose measurements to the surgeon's hands during the procedure and the radiographer's hands during radiography of the specimens.

When obtaining consent for surgery, the surgeon discussed with the participant the localization technique to be used.

The first 20 participants underwent localization with a guide-wire as well as injection of the radioactive dose. With a guide-wire, a lateral and a cranio-caudal view are performed after insertion. Once the surgical team became more confident with ROLL, the use of the guide-wire was discontinued; 2 more participants also accepted an injection of contrast medium at the site of the isotope injection. This agent dispersed and partially obscured the lesion. It did not add any benefit to the management of the case, other than to indicate the site of the injection.

The next 70 participants underwent localization without the use of a guide-wire or any contrast media. No post-localization films were performed. The needle was inserted under US or stereotactic control, and the needle tip position was documented by means of a US or stereotactic image (Figs. 1–3).

A Neoprobe (GSET 1 NEO2000, Ethicon Endo-Surgery, Johnson and Johnson Medical Ltd, Edinburgh) was used during surgery, to identify the site of the lesion. The probe was already being used at our hospital for sentinel node mapping in cases of malignant melanoma. There was, therefore, no capital cost; in other circumstances the capital cost of a probe would range from £10,000 to £15,000.

The core of the lesion was identified by the presence of a high signal. The incision was determined on a cosmetic basis, without the need to follow a wire through the breast parenchyma. After excision of the lesion, the probe was used to examine the resection bed to ensure that there were no residual areas of high activity. Further surgical exploration was performed if the count in the resection bed remained high. The excised specimen was returned to the radiology department for radiographic confirmation of the presence of the lesion. Once the operator was satisfied that there was no residual activity and that the entire lesion was within the specimen, the wound was closed.

For this paper, the first 22 subjects were excluded from the results as they constituted a pilot group. We then compared the group of women who underwent the latest 70 WGLs with the group of women who underwent the first consecutive 70 ROLLs. Clinical data were collected in relation to age, radiological abnormality, preoperative core biopsy, technique of localization and time taken to perform this, type of primary procedure, size of

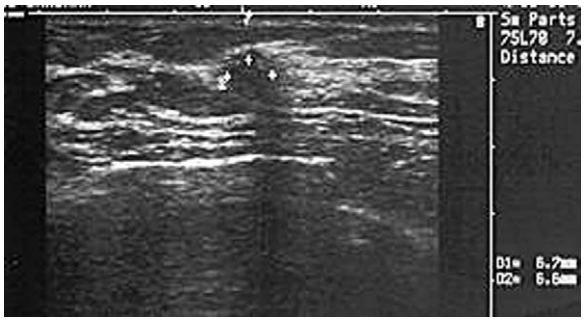

Figure 1 Breast US shows hypoechoic lesion with acoustic shadow, confirmed as malignant at core biopsy.