

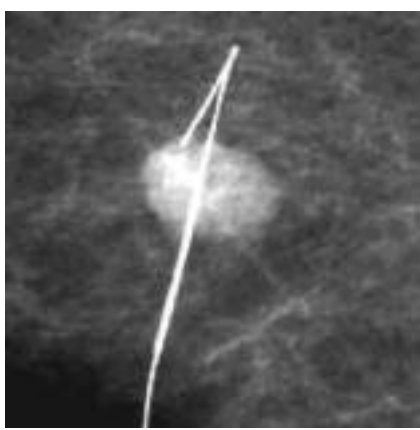
Comparison of ultrasound localisation techniques for impalpable breast cancer

Johnston D, Juetta A, Shaw M, Pain S, Malcolm P.
Norfolk and Norwich University Hospital, Norwich, United Kingdom

Localisation techniques for impalpable lesions

- Guidewire
- Skin marker
- Carbon
- Radio-guided Occult Lesion Localisation (ROLL)

Guidewire localisation is the ultrasound localisation technique used in the majority of UK breast centres.



ROLL, first described in 1995, was adopted by our centre at the beginning of 2008 for ultrasound localisation of impalpable lesions. Previously, we had also performed guidewire localisation.

Guidewire localisation versus roll

Guidewire insertion is the standard localisation technique but has a reported miss rate ranging from 1-10% and a re-excision rate ranging between 18 and 59%. Potential technical problems include: wire migration, wire displacement and even complete wire transaction, all of which can prevent successful excision of the lesion.

ROLL potentially offers some technical advantages – it allows for the best surgical access route to be selected as the gamma-probe can be used to locate and mark the lesion just prior to the excision with potentially greater precision as the gamma probe constantly guides the surgeon.

The injection of the radio-colloid is as easy or easier to perform than guidewire insertion. Also, no check mammograms are required. Some anecdotal evidence also suggests that the ROLL technique is better tolerated by patients. A miss rate of 0- 4.5% and re-excision rate of 9.5-17% has been described.

Roll procedure

Ultrasound ROLL Injection

- 10 MBq Tc99m Nanocoll with 0.1mls air behind it.
- 1 ml syringe; 21G (green) needle.

Sentinel node injection

- 10 MBq Tc99m Nanocoll with 0.15mls air.
- 1 ml syringe; 25G (orange) needle.

NANOCOLL

Radiocolloid: 99m Tc labelled human colloidal serum albumin

At least 95 % of human albumin colloidal particles have a diameter \leq 80 nm.

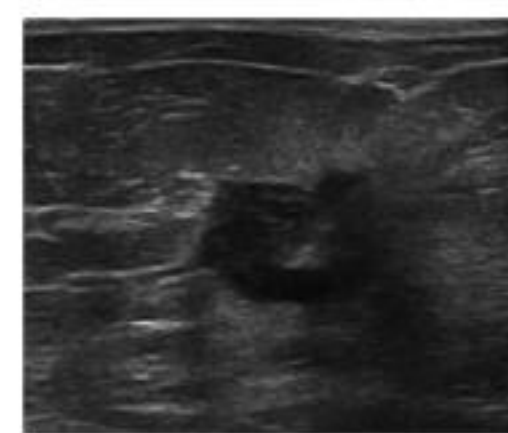


ROLL and Sentinel Node syringes containing Nanocoll in lead transfer box.

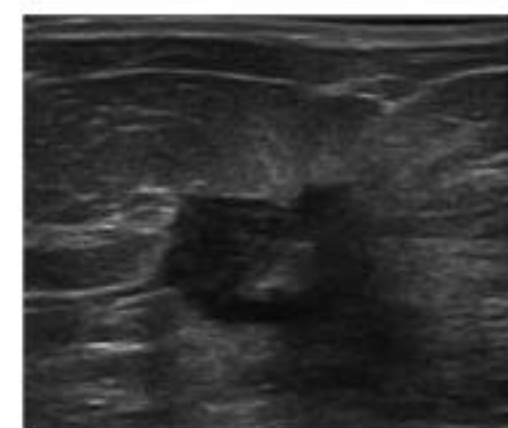
Roll procedure

1. The Tc99m Nanocoll delivered by nuclear medicine on a trolley together with a spill pack.
2. Lesion identified on ultrasound. Syringe inspection to insure Nanocoll is injected first followed by air to push all of radionuclide into tissue.
3. Injection for ROLL performed into centre of lesion under ultrasound guidance. Burst of air bubbles confirms correct delivery site visually.
4. Skin marked to identify lesion location deep to skin for additional visual guidance to surgeon. Lesion depth noted and communicated to surgeon.
5. If ROLL and sentinel node injections are to be undertaken, the sentinel node injection should be made in the areola on the opposite side of the nipple to the breast lesion to avoid confusion.
6. When procedure complete, syringes are returned to Nuclear Medicine, where the syringe is measured for residue and the adjusted activity administered noted.

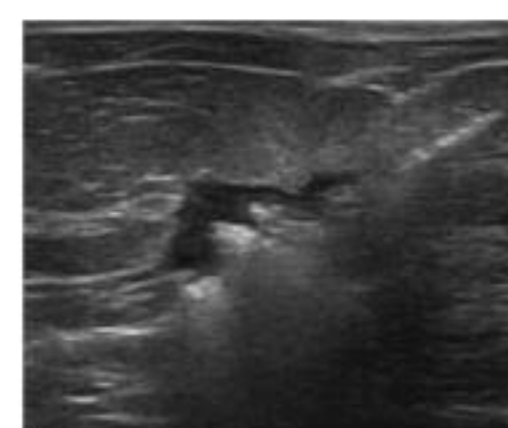
ROLL PROCEDURE- CAPTURED IMAGES



NEEDLE TIP IN 8MM IMPALPABLE LESION



RADIO-ISOTOPE INJECTED



BURST OF AIR BEHIND ISOTOPE INJECTED (a small quantity of air is seen tracking up along the needle)

Operative technique

Gamma-probe is used to define the hottest point corresponding to the centre of the lesion. The gamma-probe can be used during the whole procedure to control the excision.

Incision is made directly over the lesion with or without excising the overlying skin.

The volume of breast tissue to remove is calculated from the size of the lesion and the free margin desired which depends on the nature of the lesion.

After completion of the excision, the specimen and the cavity are checked with the gamma-probe. The specimen is marked according to the established institutional protocol and sent for specimen radiography.

Simultaneous Sentinel Lymph Node Biopsy can be performed if indicated. It is possible to reverse the order of the two procedures.

Study methods

- All ultrasound guided localisations for two surgeons from January 2006 to December 2008 were reviewed.
- Wire localisation had been used between January 2006 and December 2007.
- ROLL localisation used from January to December 2008.
- For all wire and ROLL localisations, the following measurements were recorded using data obtained from PACS and our institutional pathology system.
 - lesion size on ultrasound
 - radiological margin on specimen radiography
 - histological margin
 - pathology lesion size
 - pathology specimen volume
 - pathology specimen weight
- Benign lesions, skin marking only, and patients with incomplete data were excluded.

Results

69 ROLL procedures between January and December 2008. Exclusions -30 (13 benign lesions, 13 skin marking only, 4 patients with no data available on PACS)

56 Wire localizations between January 2006 and December 2007. Exclusions -23 (9 benign lesions, 8 skin marking only, 3 patients with no data available on PACS, 2 patients with no specimen x-rays and 1 patient with 2 separate tumour foci seen on localization scan).

Statistical analysis performed with an unpaired t-test.

	ROLL mean	Wire mean	P
Ultrasound lesion size (mm)	9.4	9.0	0.58
Radiology margin (mm)	12.3	10.6	0.29
Histological margin (mm)	5.4	5.4	0.99
Pathology lesion size (mm)	12.5	12.5	0.99
Pathology specimen weight (g)	47.7	51.4	0.56
Pathology specimen volume (cm ³)	89.3	81.5	0.53

Conclusion

Despite ROLL being a new technique, it achieved marginally superior results in terms of specimen weight. However, no significant differences were demonstrated in the measured indices to the established technique of wire localisation.

Overall, the team at our institution as a whole (radiologists, surgeons, pathologists) are happy with the switch from wire to ROLL. It appears better tolerated by patients, is accurate at localising occult lesions and surgically less restrictive with potential for a better cosmetic result.

Future analysis will also look at how well ROLL competes in terms of re-excision rates.