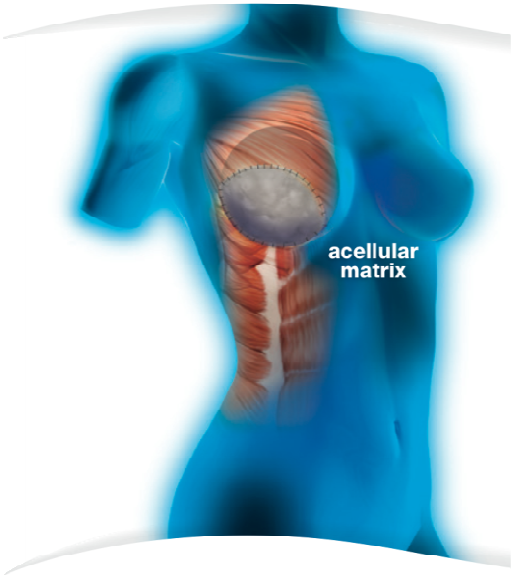


Contemporary Oncology - 2019

Non-palpable lesions in breast cancer – new methods of visualization in breast conserving surgery

PhD Dawid Murawa, Assoc. Prof.

Chair and Department of Surgery and Oncology, The Faculty of Medicine and Health Sciences, University of Zielona Góra

The purpose of examination: ”screening mammography”

Detection of breast cancer at an early stage before it becomes clinically symptomatic so as to avoid morbidity and mortality resulting from local advancement or dissemination of the cancer process.

Mammography

8 large controlled clinical trials prove "indisputably" the value of screening mammography in reducing mortality from breast cancer

- by 20% at the age of 40-49
- from 20 to 35% at the age of 50-69
- up to 55% at the age of > 65

Preventive Services Task Force. Screening for breast cancer: recommendations and rationale. Ann Intern Med 2002; 137: 344-346.

Fletcher SW et al. Report of the international workshop on screening for breast cancer. J Natl Cancer Inst 1993; 85: 1644-1656.

Ultrasonography

Particularly useful in women with so called dense breast tissue (younger women, long-term hormonal therapy)

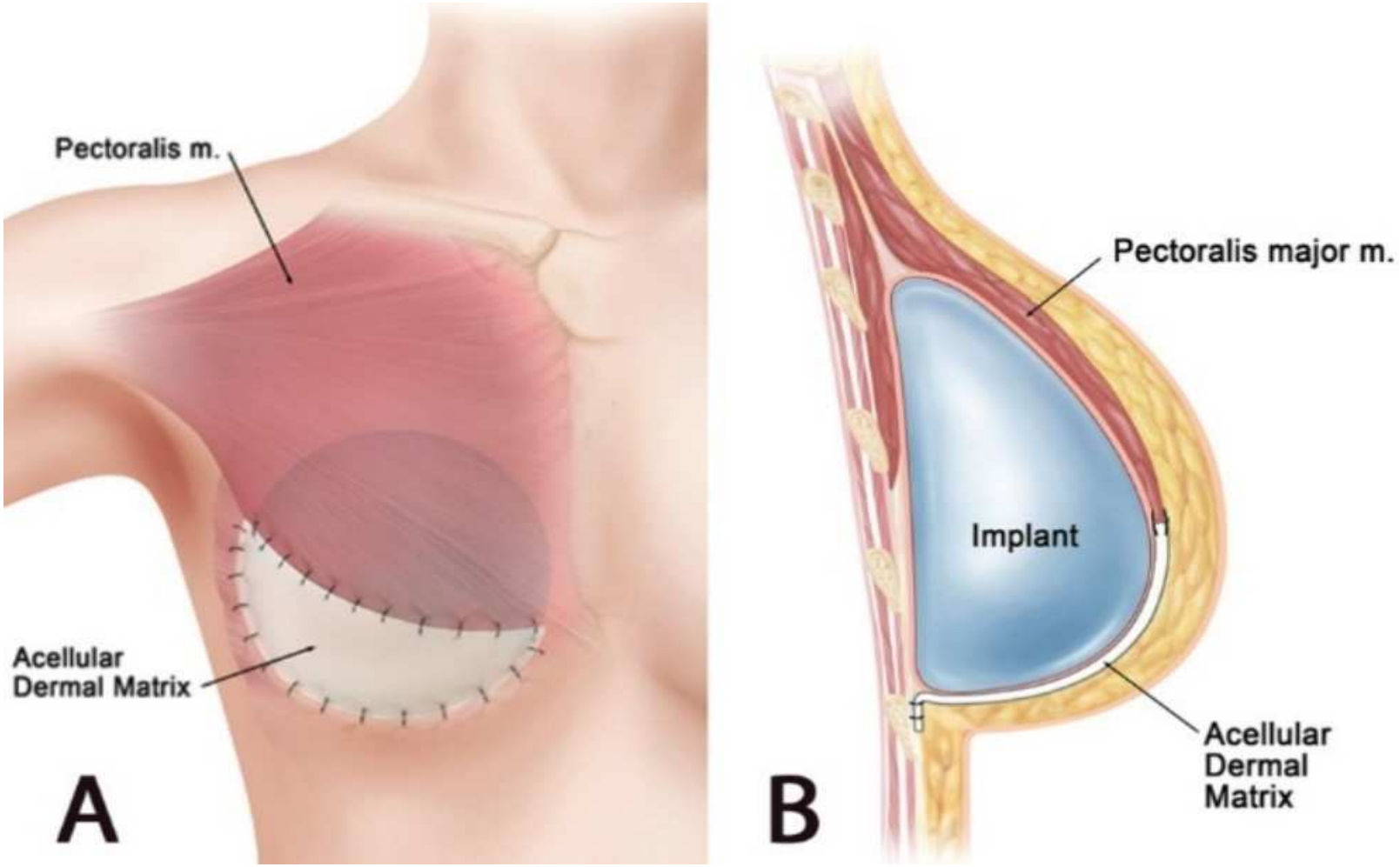
Increasingly better supplement to mammography, however not as an independent screening method

- small number of cancers detected in the ultrasound
- lack of detection of most microcalcifications typical of early forms of cancer (reportedly, failure to detect up to 75% of DCIS - ductal carcinoma in situ)

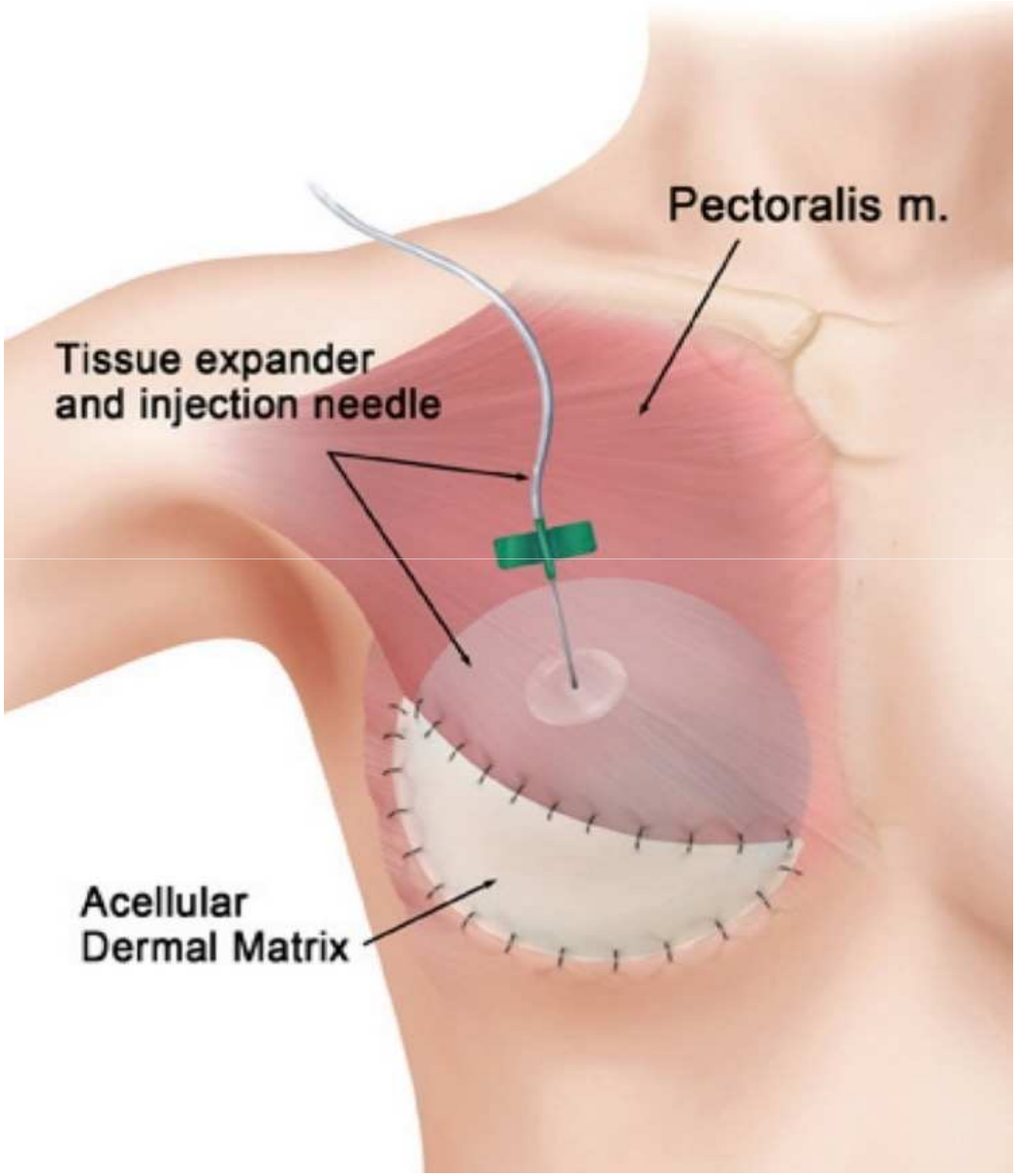
Mammotome biopsy

- Vacuum assisted core needle biopsy – Mammotome
- In the past, suspicious lesions - excisional biopsy
- Approximately **80%** of these cases turned out to be benign

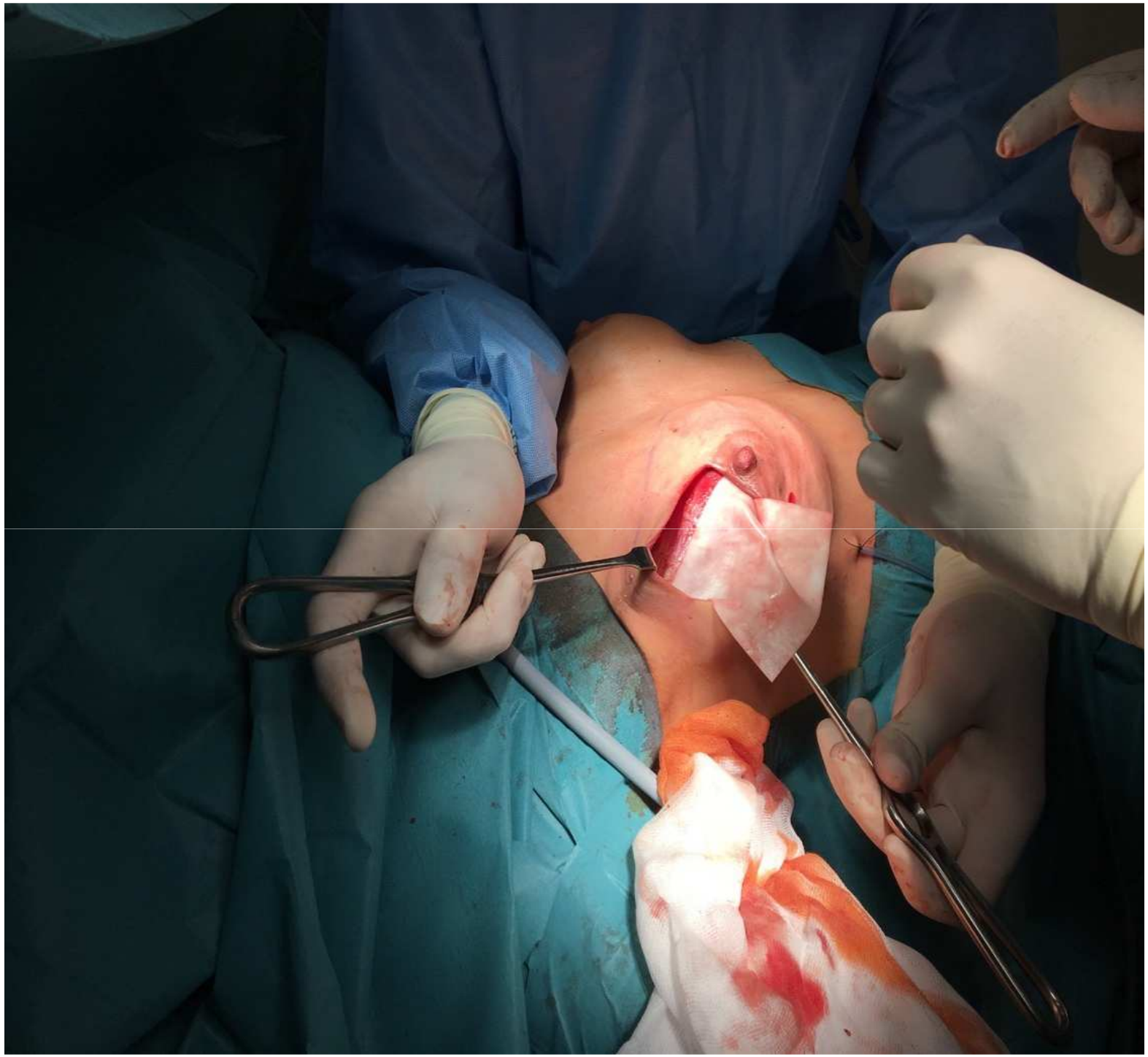
Excisional biopsy vs. core needle biopsy

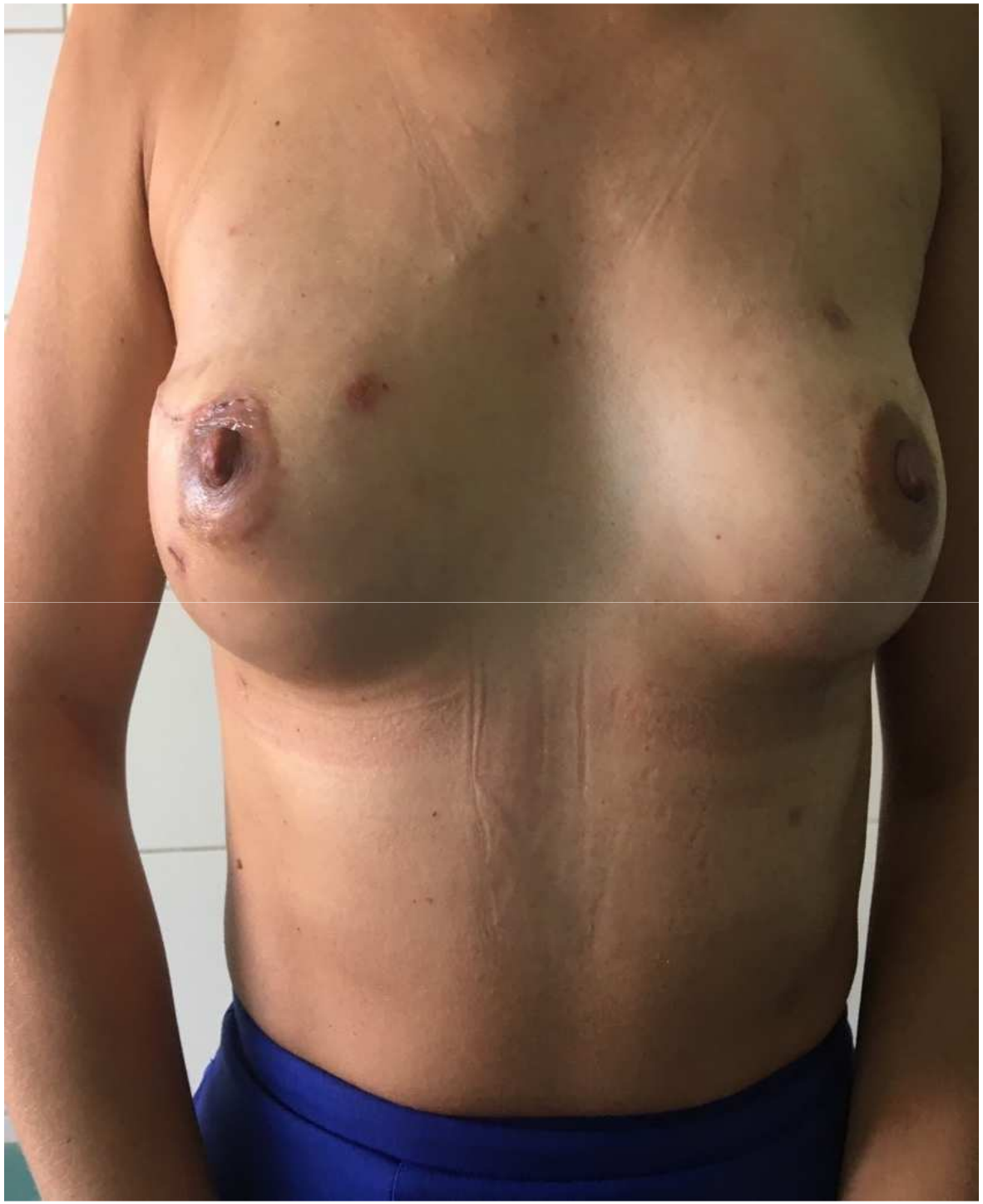


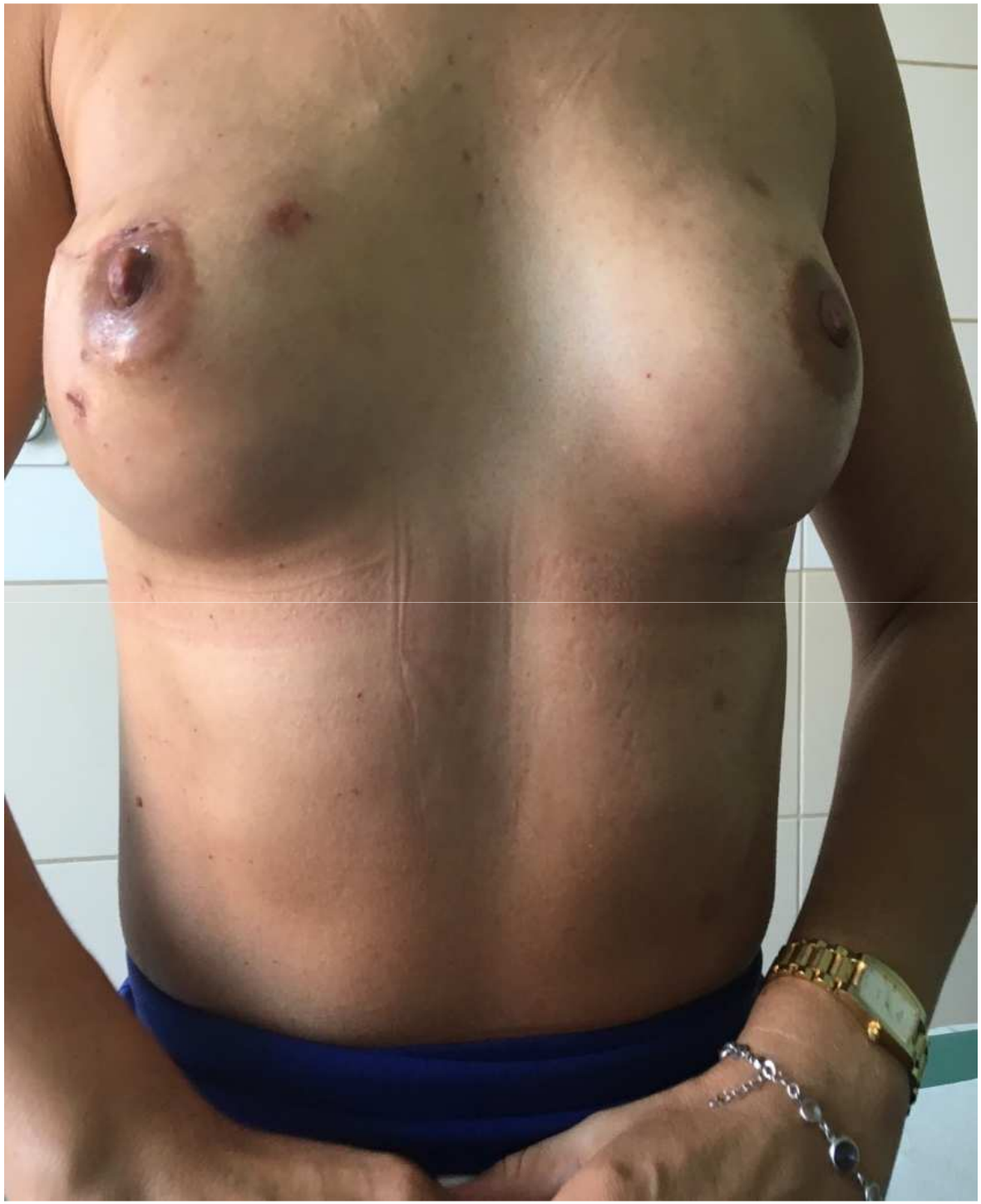
- Coverage with ADM implant – front and side view



- ADM – its use in two-stage reconstruction







Tumor, extent of resection

Non-palpable breast cancers

About 30% in Western European countries

(33% UK, 44% Netherlands)

Treatment of choice – BCT

Concept –Radical oncological treatment without removing too much healthy tissue (Margins: **No Ink Tumor)**

NABON Breast Cancer Audit (NBCA). Jaarraportage NBCA 2014

Non-palpable lesions

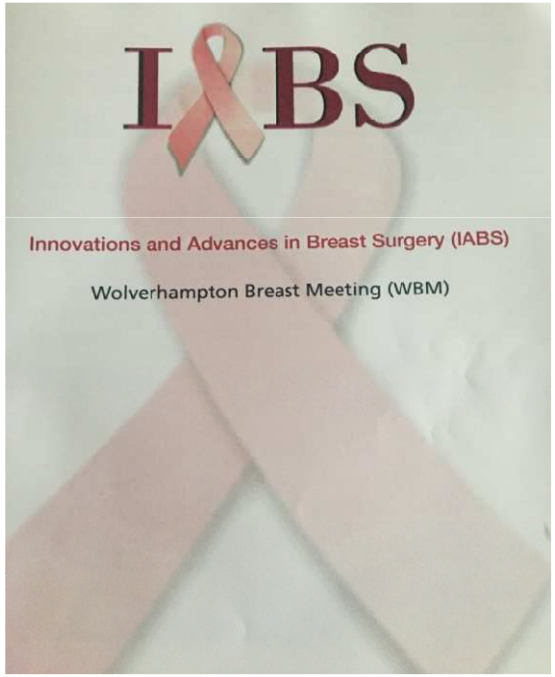
BCT – according to the literature, the reoperation rate due to positive margins varies from 15% to even 40%

Holland R, Hendriks JH. Microcalcifications associated with ductal carcinoma in situ: mammographic-pathologic correlation. Semin Diagn Pathol. 1994;11:181-192.
Faverly DRG, Burgers L, Bult P, Holland R. Three-dimensional imaging of mammary ductal carcinoma in situ: clinical implications. Semin Diagn Pathol. 1994;11:193-198.
Silverstein MJ, Silberman H. The breast biopsy paradigm shifts once again (editorial). Ann Surg Oncol. 1999;6:323-324.
Liberman L, LaTrenta LR, Dershaw DD. Impact of core biopsy on the surgical management of impalpable breast cancer: another look at margins (letter). AJR. 1997;169:1464-1465.

Surgery - margins

- Dutch study by Jobsen JJ et al. ”The value of a positive margin for invasive carcinoma in breast conservative treatment in relation to local recurrence is limited to young women only” Int J Radiat Oncol Biol Phys 2003, 57: 724-731
  - 2000 patients - BCT
  - observation period of 78 months
- Local recurrence: 58% (pos) vs 15% (neg) ≤40years
  7% (pos) vs 6% (neg) >40years

Wolverhampton 2018 – methods of breast tumor localization



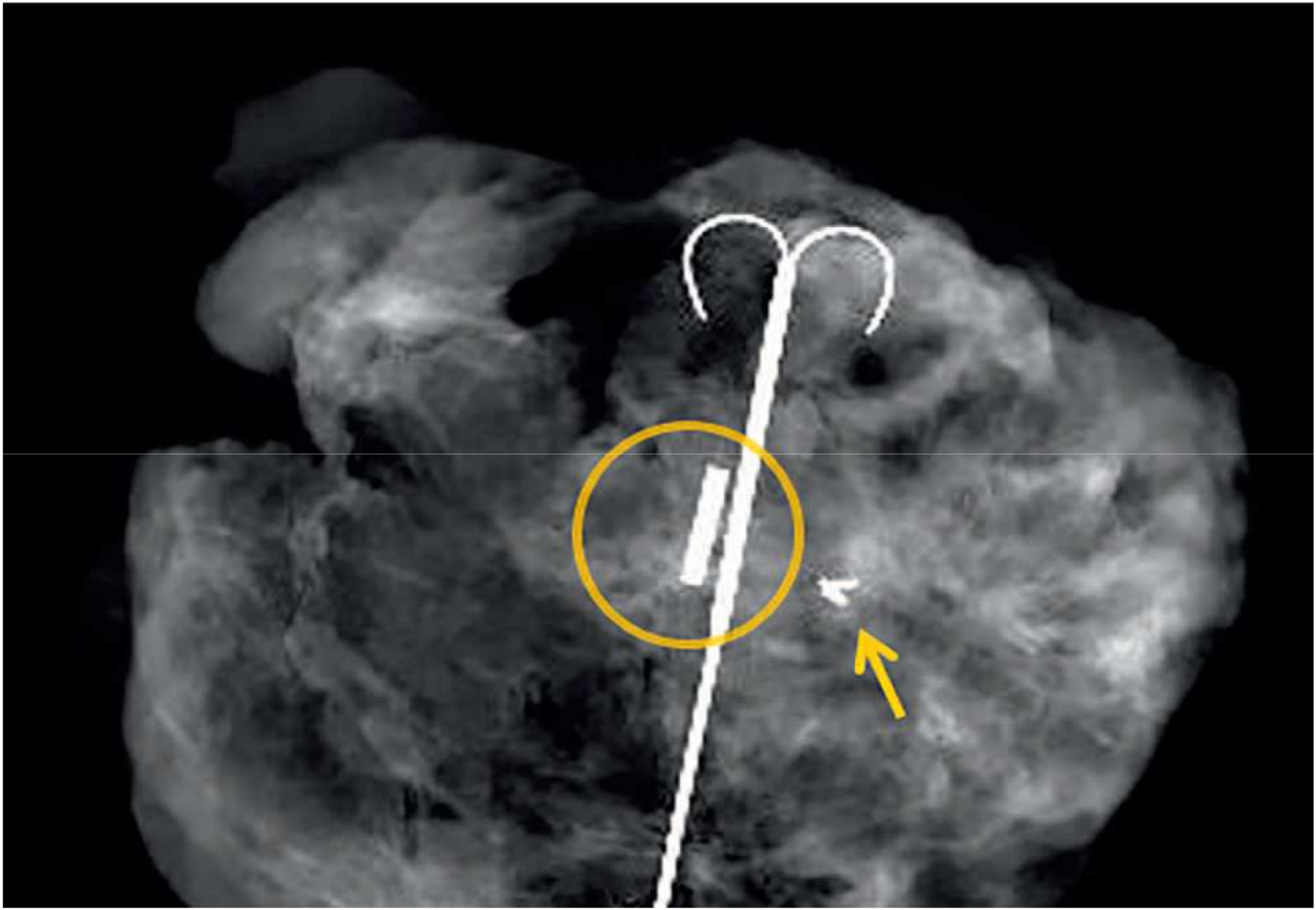
Non-palpable lesions

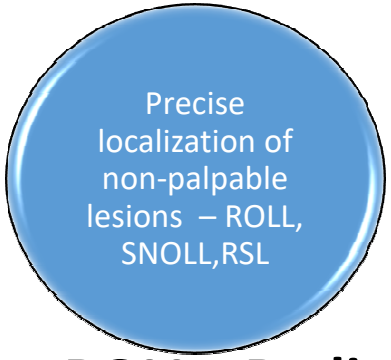
Guide Wire – needle method for locating lesions in the breast

- used since the early 1970s
- still the primary technique
- visualization and determination of the tactic for the surgeon

Needle good yesterday, bad today!!!

- displacement or damage to the needle
- placing the needle on the day of surgery: operating room depends on marking!!! (costs, effectiveness)
- unfriendly technique for the patient!!!





Non-palpable lesions

- **ROLL - Radio-Guided Occult Lesion Localization - radioisotope technique of localization of non-palpable lesions in the breast**
- **SNOLL - Sentinel Node and Occult Lesion Localization**
- **RSL – solid iodine 125 seed**

Precise localization of non-palpable lesions – ROLL, SNOLL

Markers – MAASOL

SNB - NANOCOLL

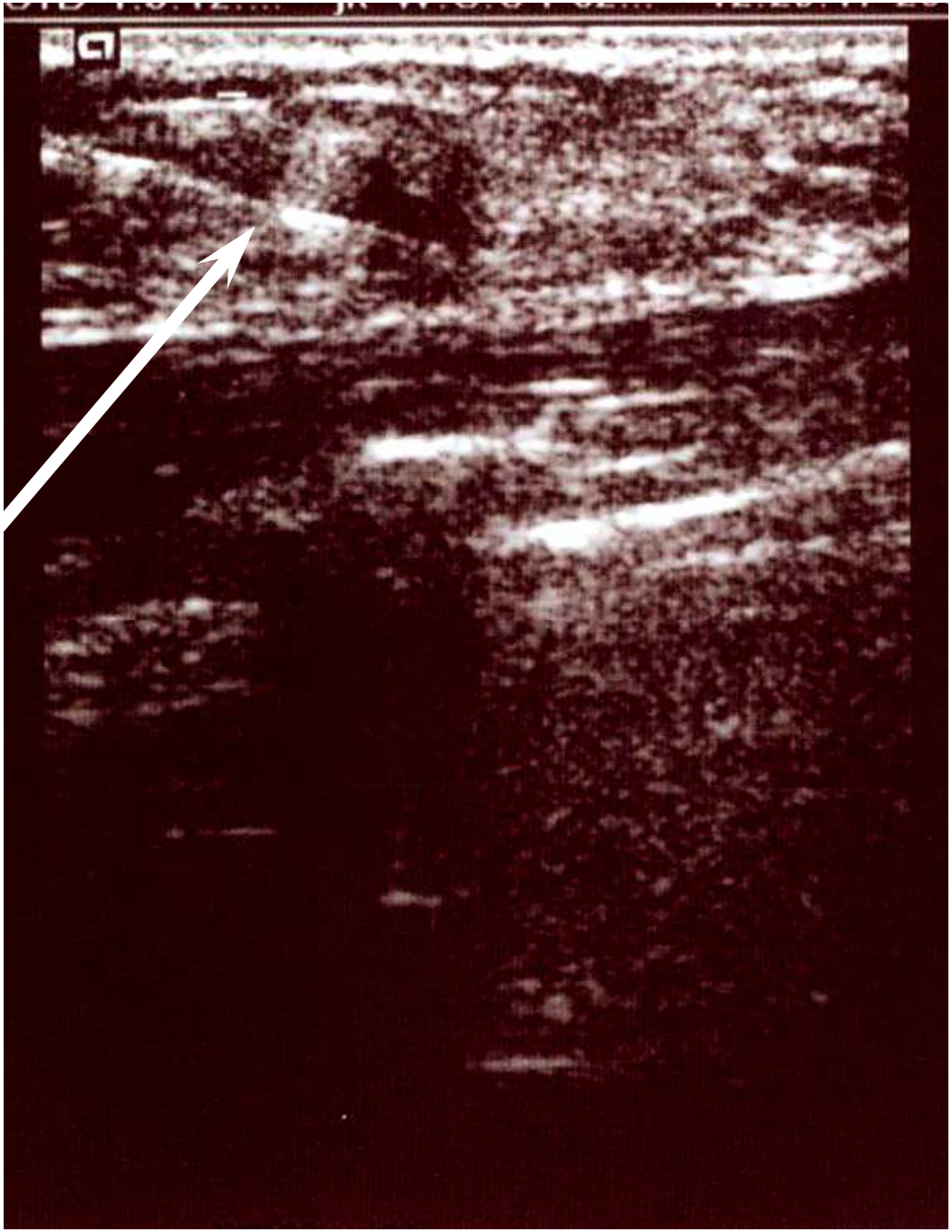
Mobile marker, passes through lymphatic pathways from the injection site to the sentinel node where it accumulates

ROLL - MAASOL

Immobile marker, remains at the injection site

ROLL/RSL :

Ultrasound-guided intra-tumor injection of MAASOL



Precise localization of non-palpable lesions – ROLL, SNOLL

SNOLL TECHNIQUE

On the day prior to surgery – administration of radiopharmaceuticals followed by lymphoscintigraphy

SURGICeye

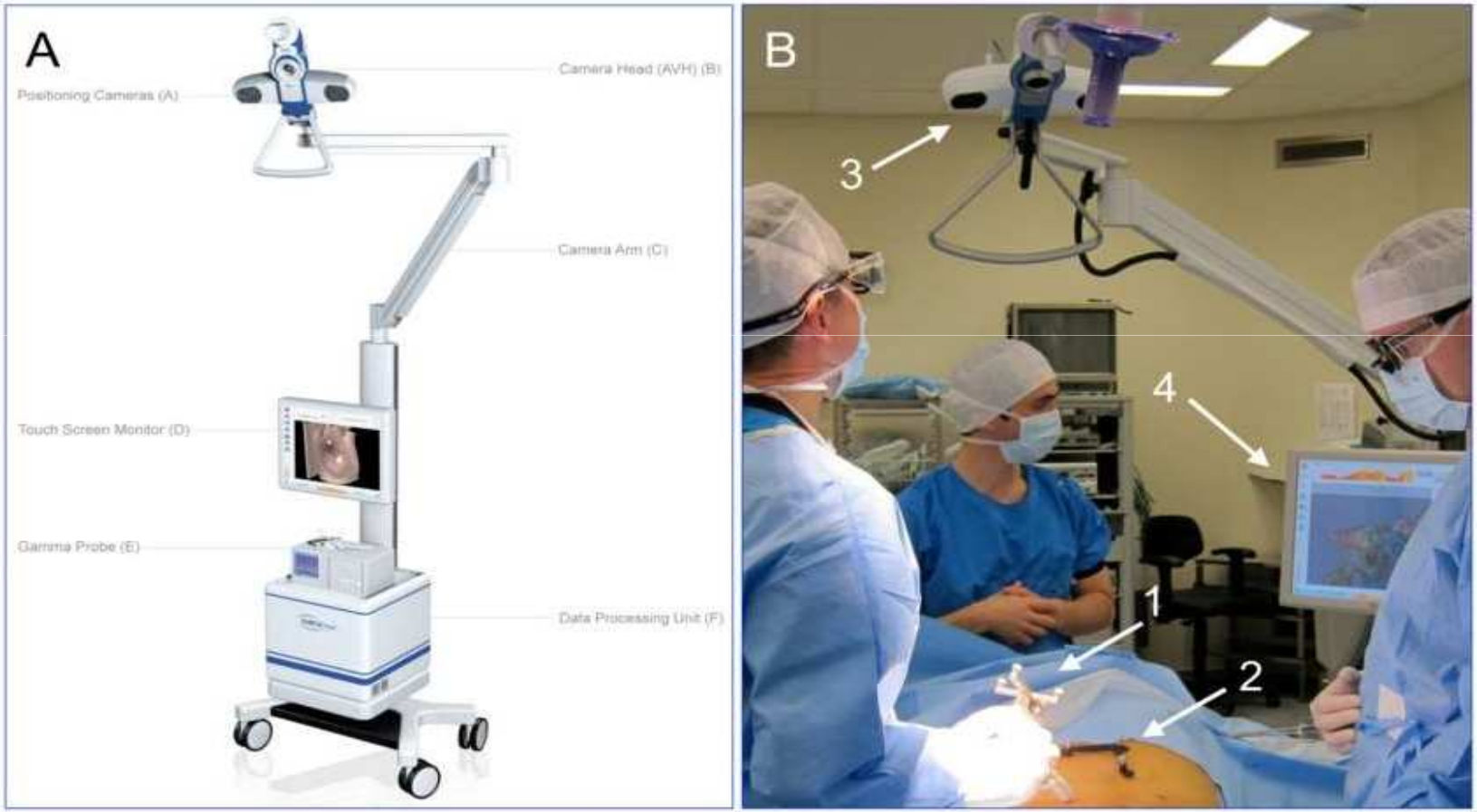
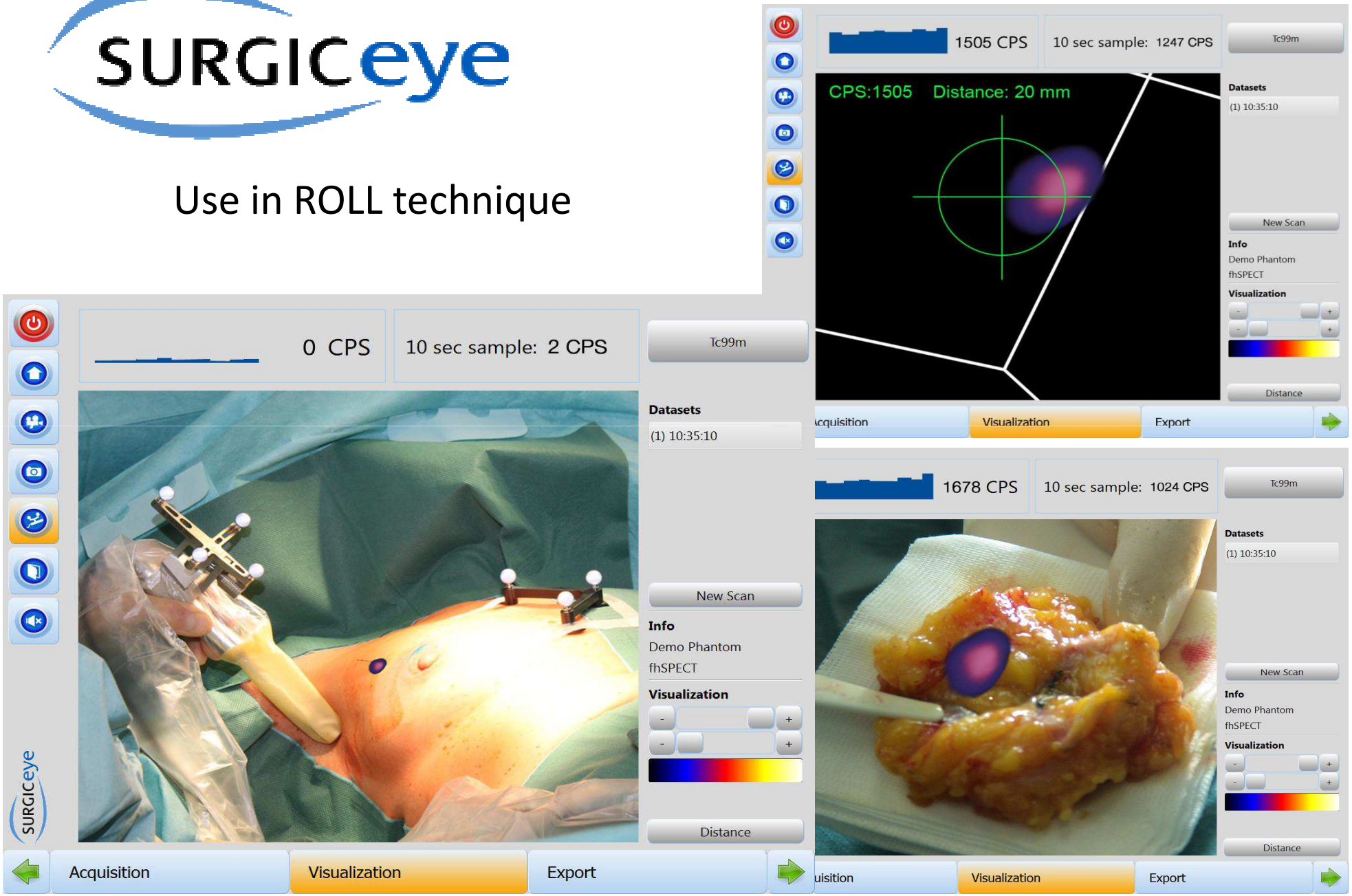


Figure 1: (A) Freehand SPECT system (SurgicEye, Munich, Germany) (B) Intraoperative setup and data acquisition using the freehand SPECT system with tracking targets on the gamma probe (1) and on the patient (2), which are monitored by the optical detection system (3), after which a reconstruction image can be displayed on screen (4).

SURGICeye

Use in ROLL technique



Non-palpable lesions

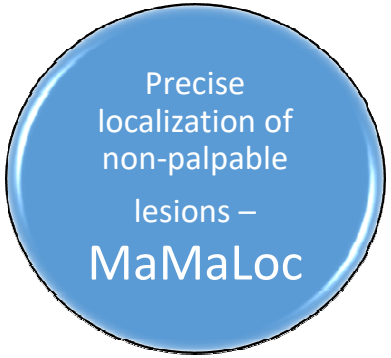
- **Techniques introduced as a new alternative to WGL**

- **ROLL - invisible in MMR (lack of possibility to verify marker position); spillage of fluid in the tissue leads to resection of a larger volume of tissue (especially fatty breasts)**

- **RSL – according to the literature, advantage over WGL and ROLL (point, localized signal; verification of localization)**

Non-palpable lesions

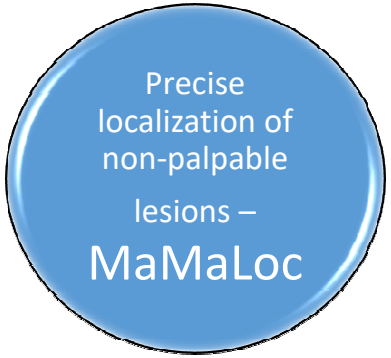
- **If RSL is a perfect technique, where is the problem ???**
- **Legal regulations / Administrative problems (radioactivity)**
- **Department of Nuclear Medicine in communication with Breast Unit**
- **After 15 years since its introduction, only 18% of procedures performed in this technology in the Netherlands**



Non-palpable lesions

- **MaMaLoc technique – Magnetic Marker Localization**

- **Advantages of RSL**
- **No legal or administrative restrictions**
- **Effective surgically and radiologically**
- **"Magnetism" does not change over time**

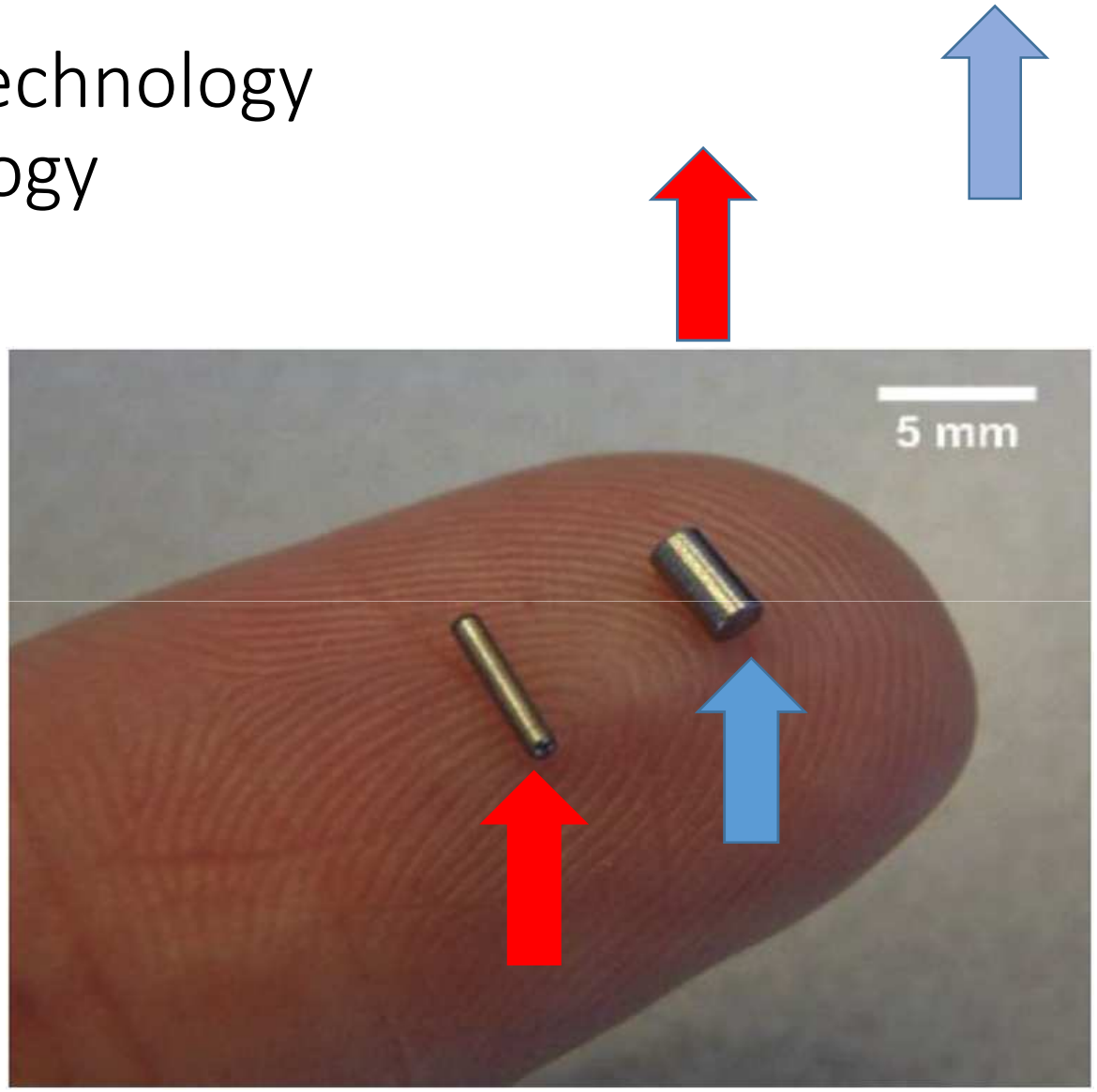


Non-palpable lesions

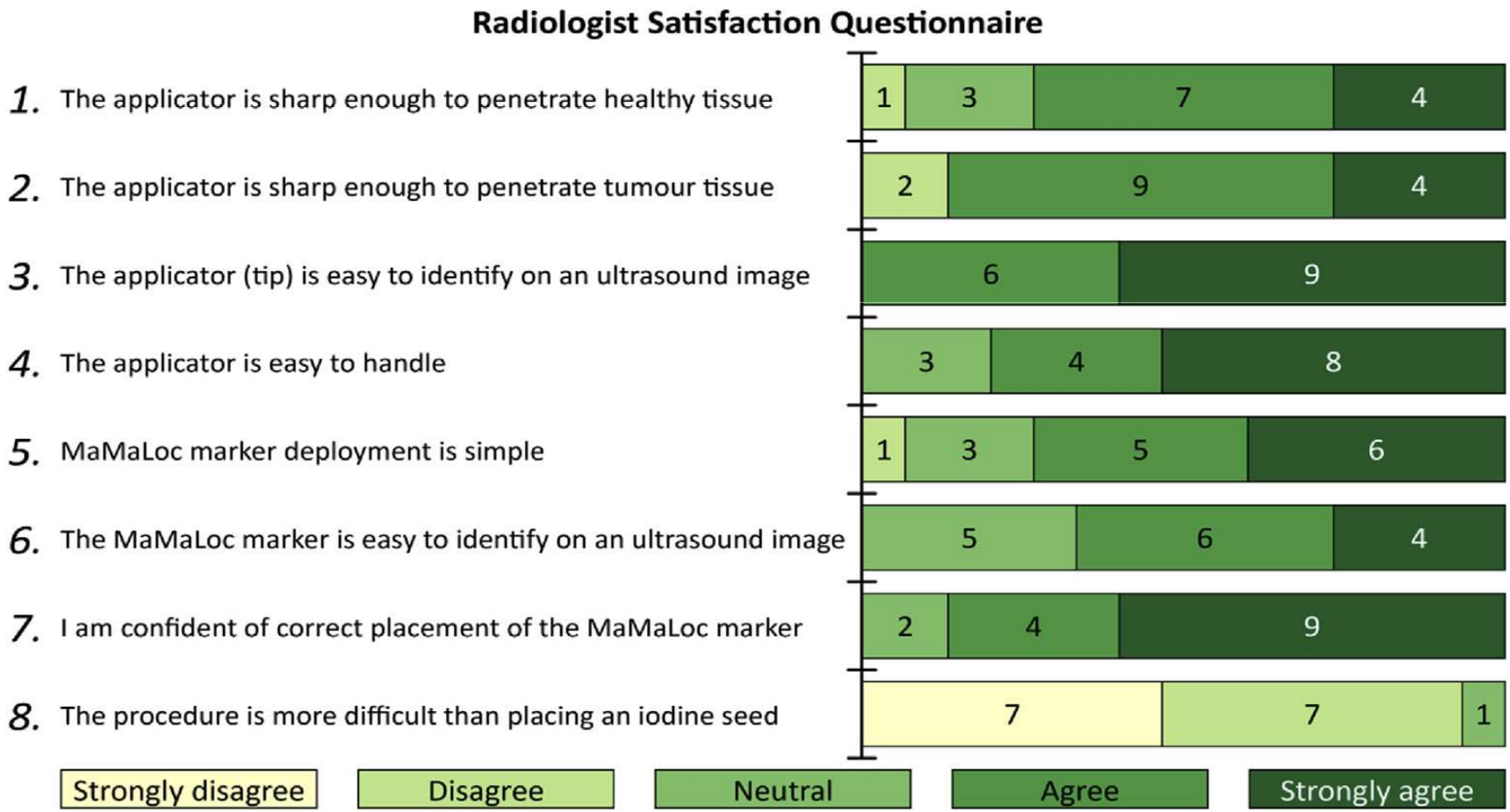
- **MaMaLoc**

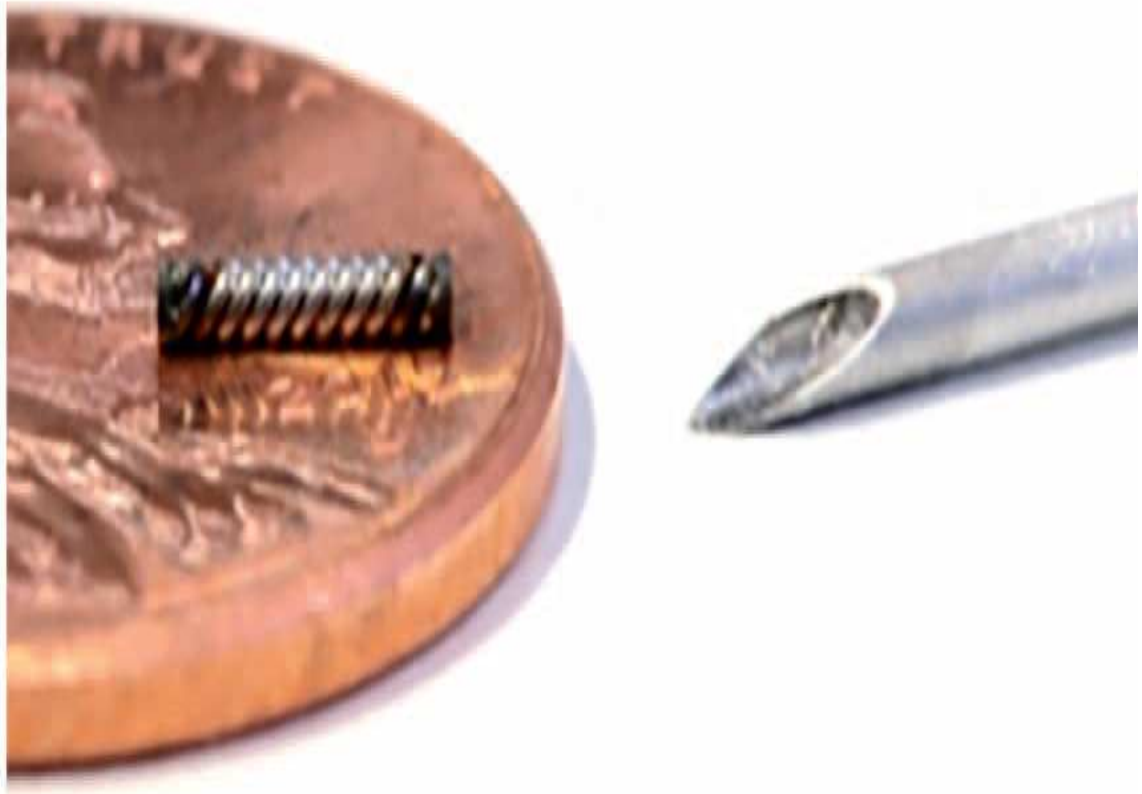
- **Magnetic probe (Sentimag, Endomagnetics, Cambridge UK)**
- **Emission of magnetic field, field strengthening by a ferromagnetic marker and re-detection of the signal by the probe (visual and audible signal)**
- **Optimally, the distance between the probe and the marker in the breast is 35mm**

MaMaLoc technology
RSL technology



MaMaLoc Technology





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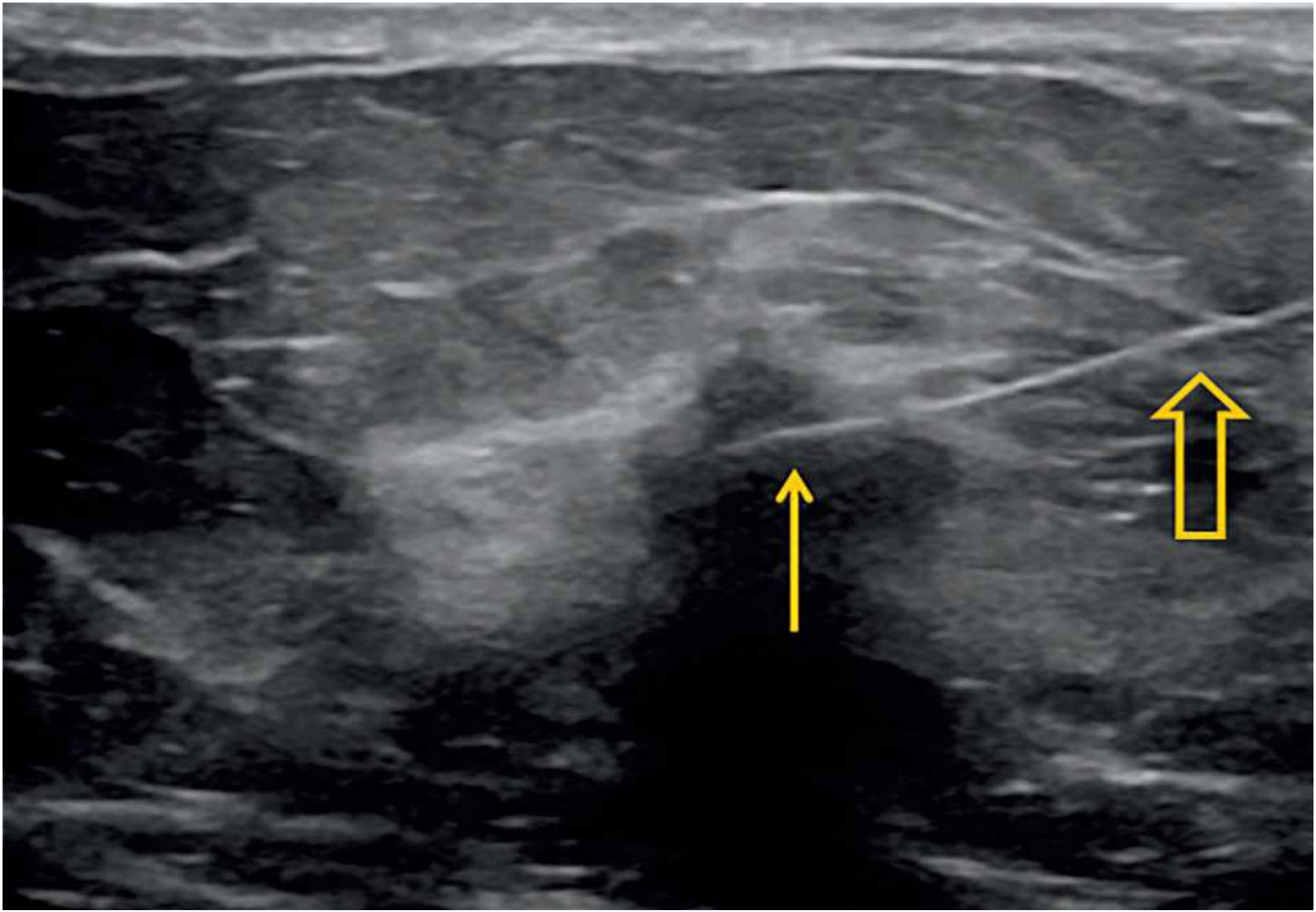


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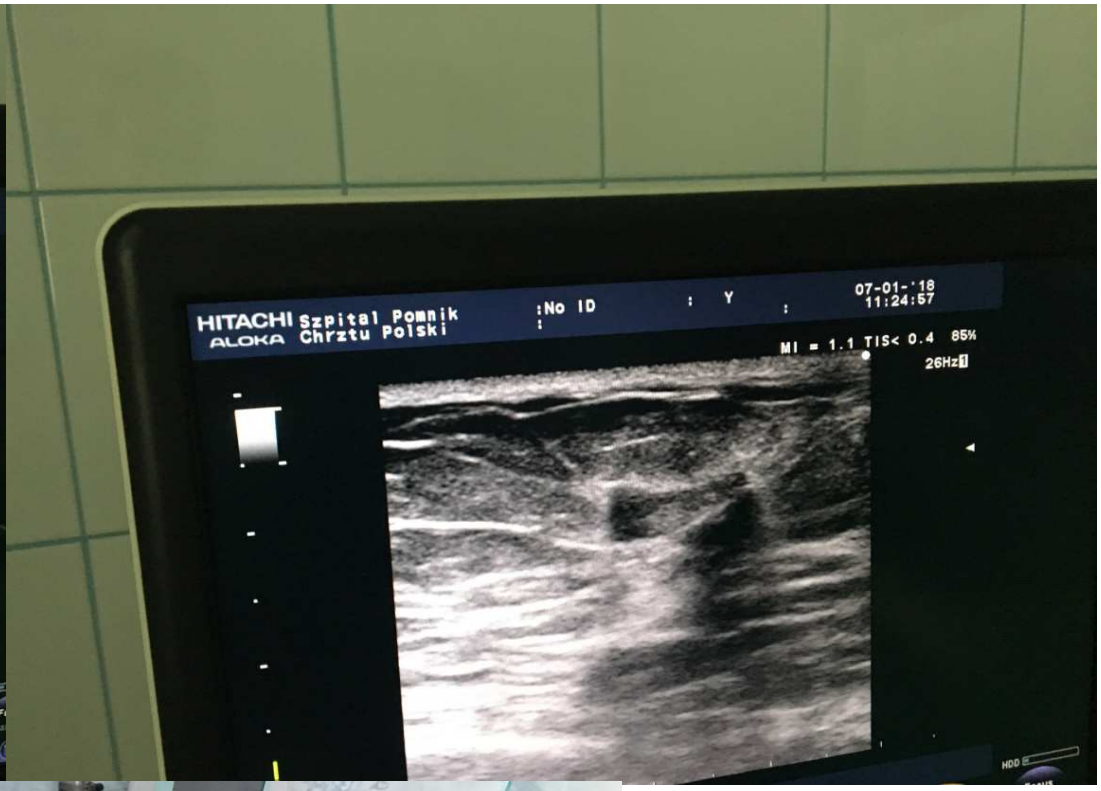
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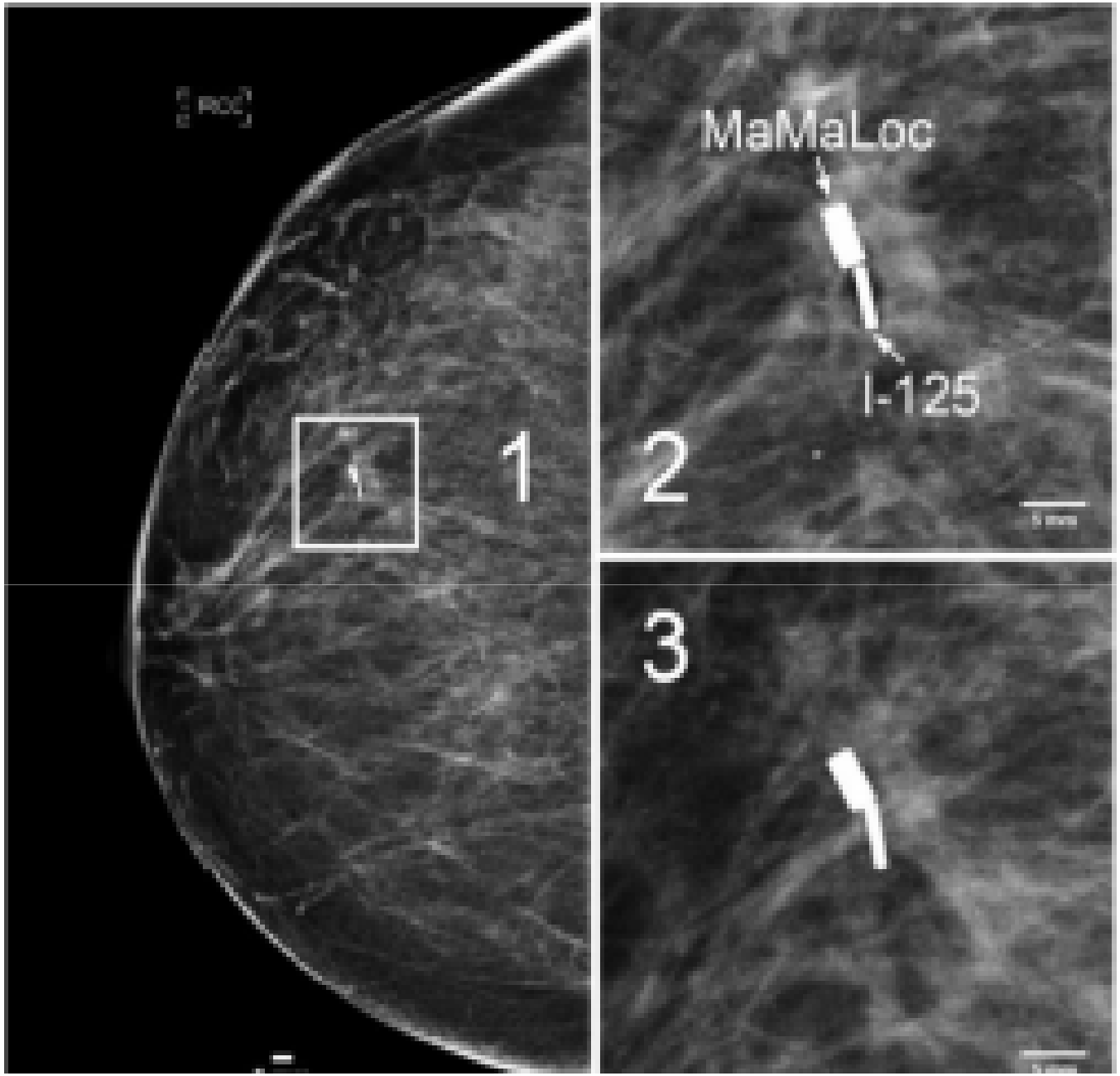
MaMaLoc
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Original article

Feasibility of magnetic marker localisation for non-palpable breast cancer

B. Schermers [a, c, *], J.A. van der Hage [a], C.E. Loo [b], M.T.F.D. Vrancken Peeters [a], H.A.O. Winter-Warnars [b], F. van Duijnhoven [a], B. ten Haken [c], S.H. Muller [d], T.J.M. Ruers [a, c]

[a] The Netherlands Cancer Institute, Department of Surgery, The Netherlands
[b] The Netherlands Cancer Institute, Department of Radiology, Division of Diagnostic Oncology, The Netherlands
[c] University of Twente, MIRA Institute, The Netherlands
[d] The Netherlands Cancer Institute, Department of Clinical Physics, The Netherlands

Table 2

Overview of the MaMaLoc compared to the three most common localisation technologies. Based upon post-procedural questionnaires and remarks of radiologists and surgeons. N/A = Not Applicable.

	RSL	ROLL	WGL	MaMaLoc
Radioactive	Yes	Yes	No	No
Radiologic evaluation of correct placement	Yes	No	Yes	Yes
Independent of surgical incision site	Yes	Yes	No	Yes
MRI response evaluation	Yes	No	No	No
Administrative burden	High	High	Low	Low
Planning flexibility	Yes	No	No	Yes
Signal point source	Yes	No	N/A	Yes

MaMaloc Technology

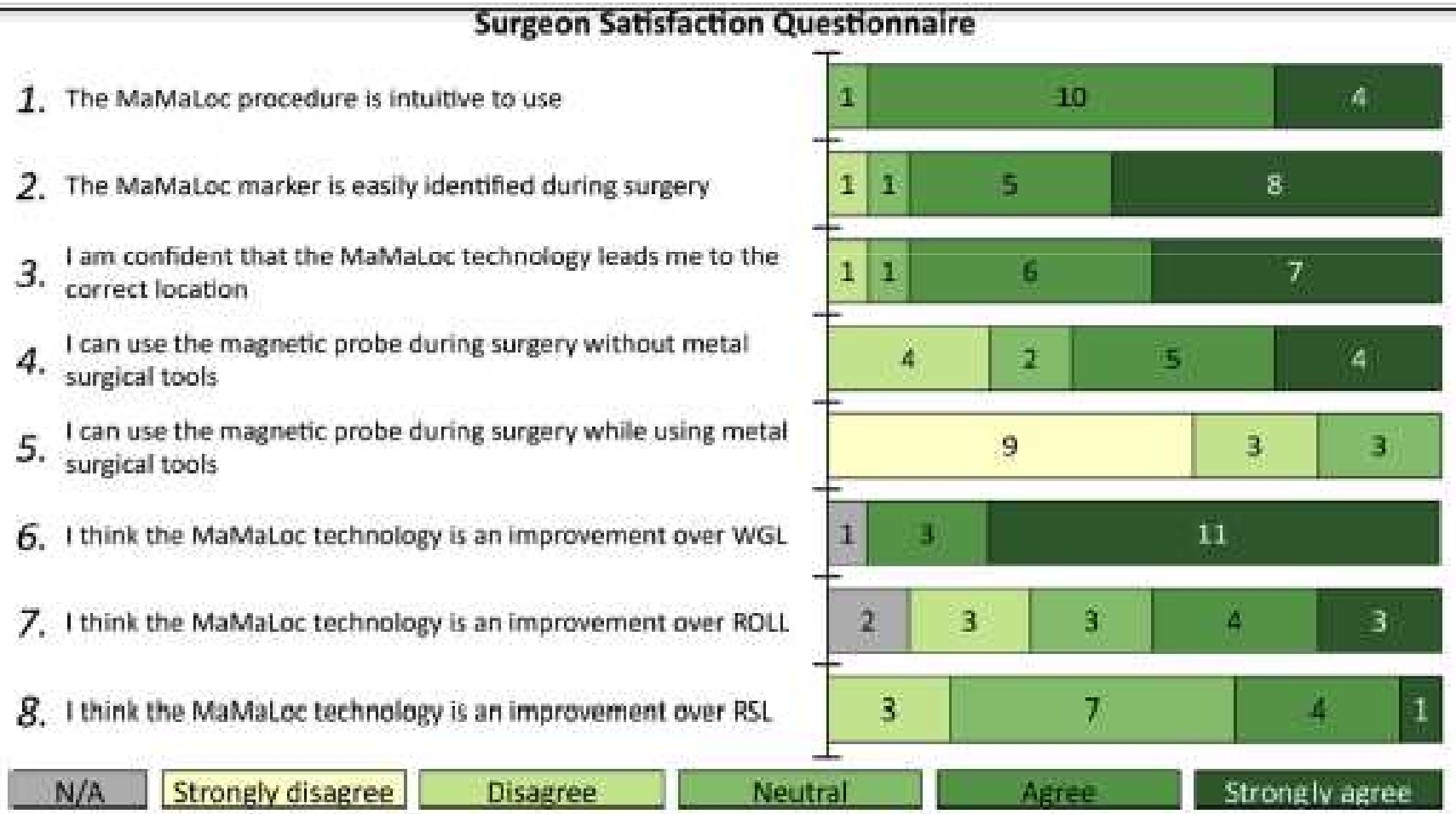
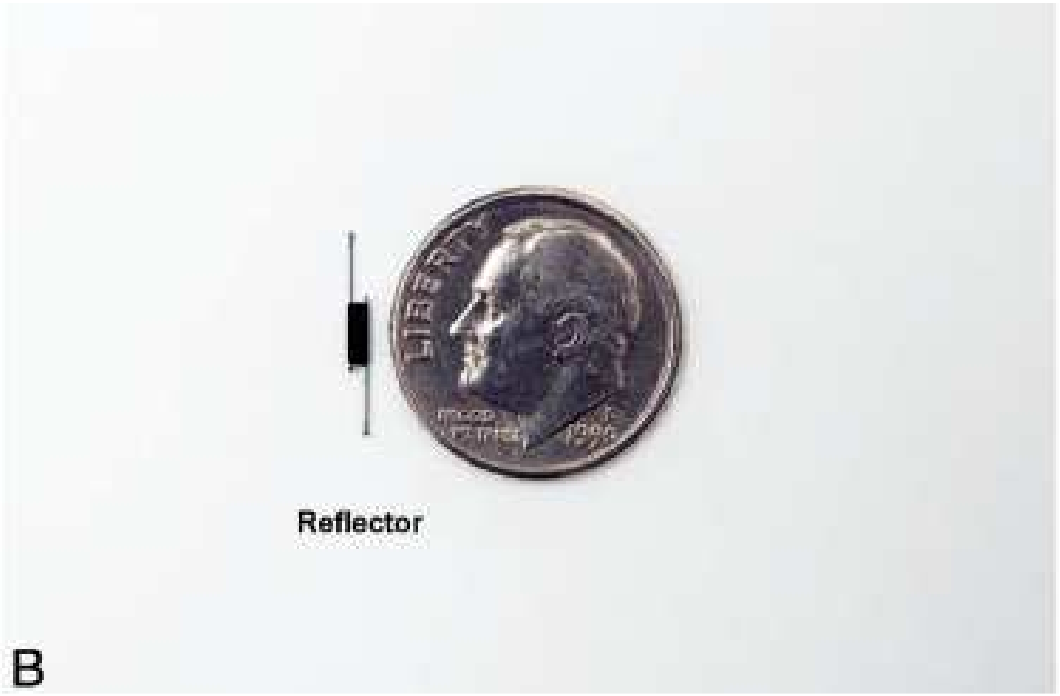


Fig. 5. Surgeon satisfaction questionnaire results. N/A – Not applicable.

vi Scout System



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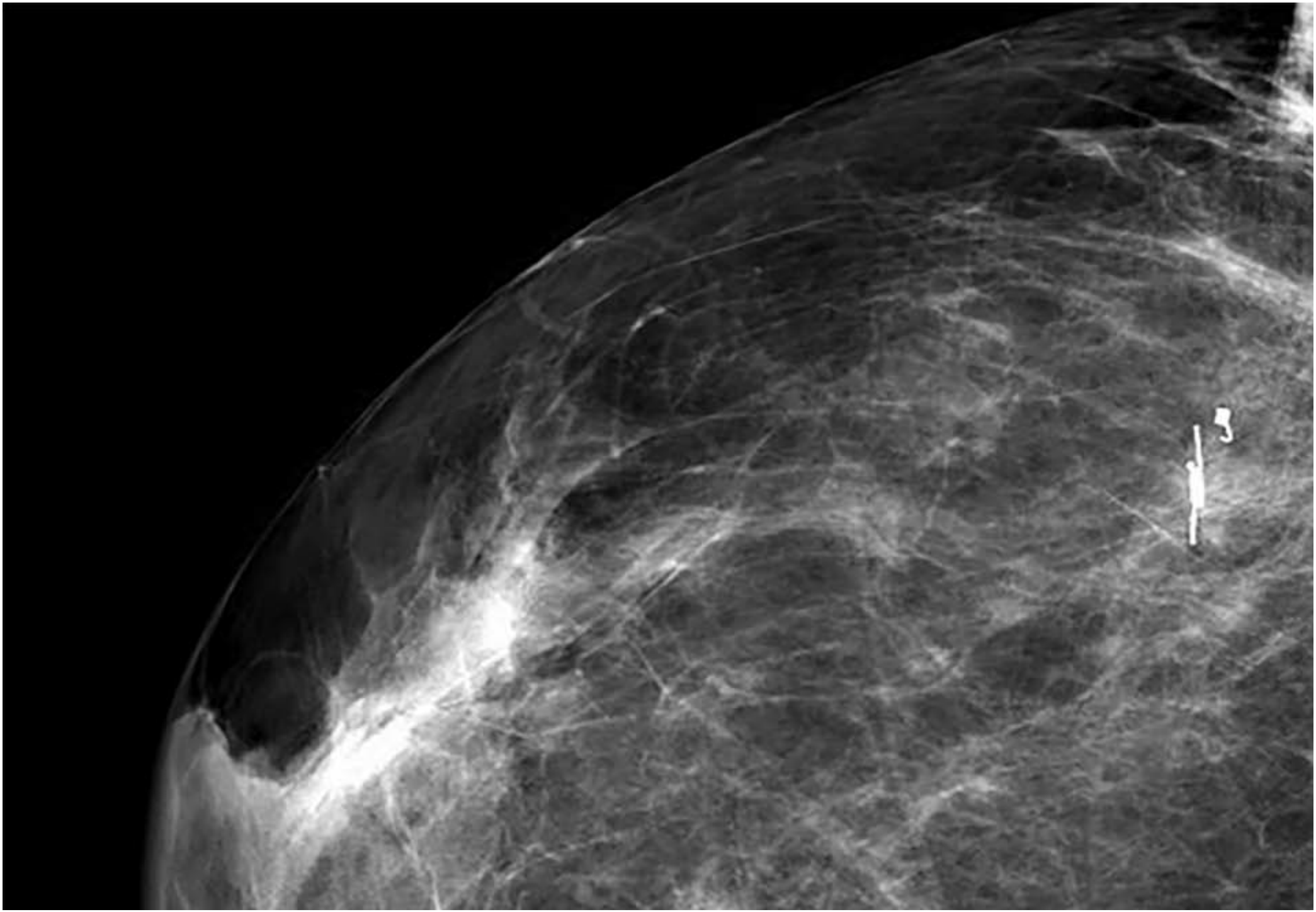
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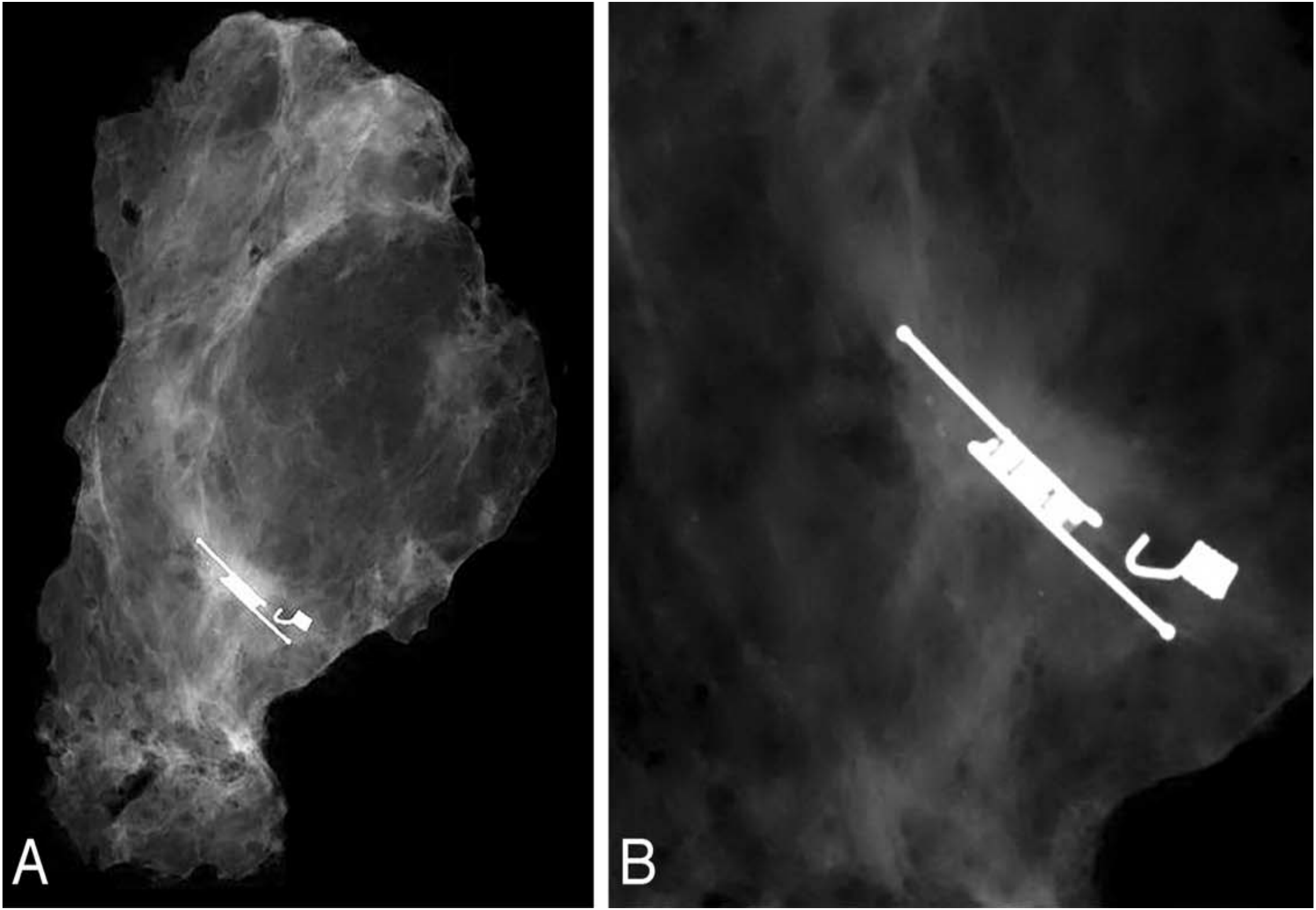
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Received: 13 March 2017 | Revised: 23 April 2017 | Accepted: 3 May 2017
DOI: 10.1111/tbj.12979

ORIGINAL ARTICLE

WILEY The Breast Journal

Utilization of multiple SAVI SCOUT surgical guidance system reflectors in the same breast: A single-institution feasibility study

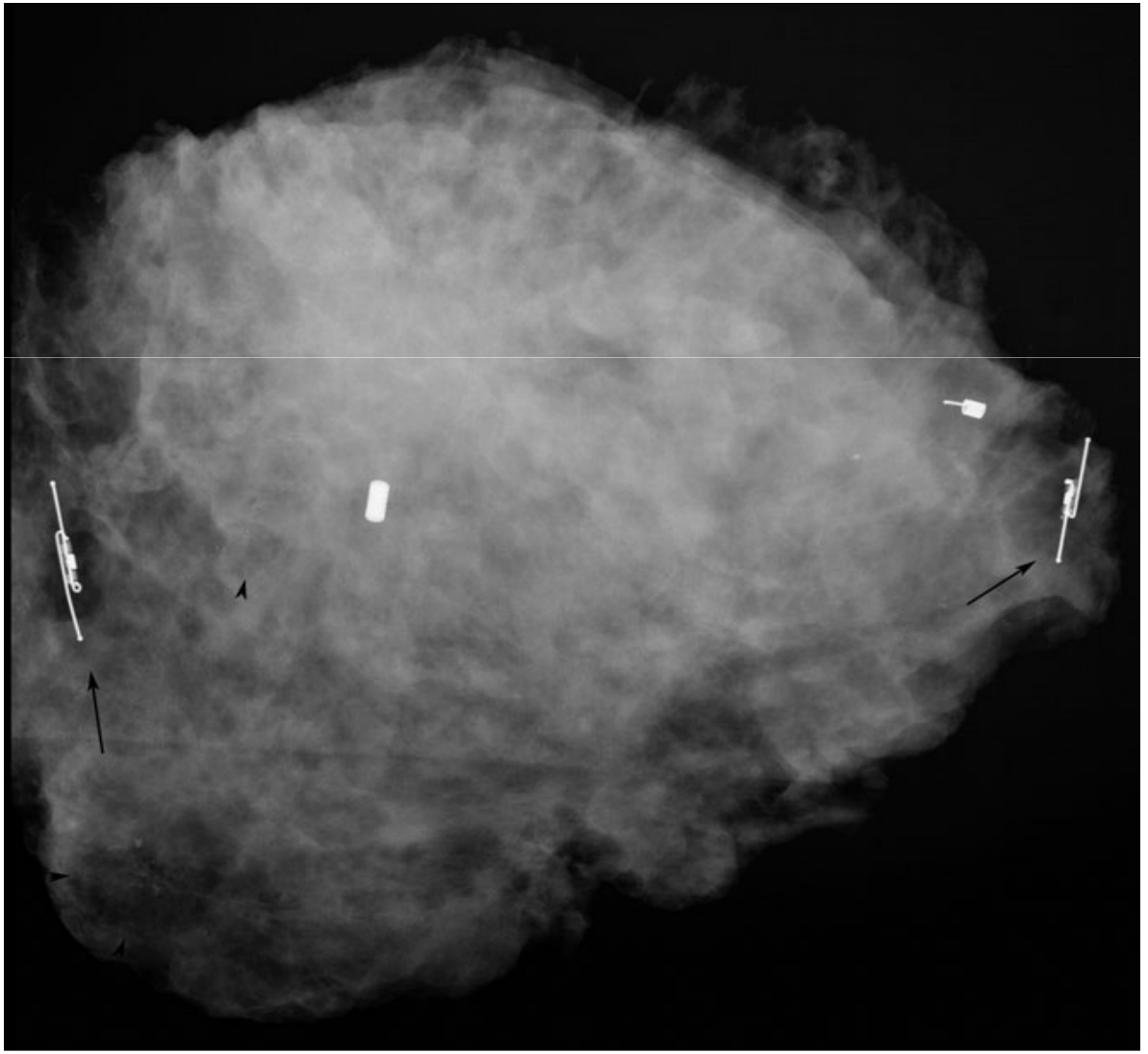
Priya H. Jadeja MD[1] | Victoria Mango MD[2] | Sejal Patel MD[3] | Lauren Friedlander MD[3] | Elise Desperito MD[3] | Everick Ayala-Bustamante MD[3] | Ralph Wynn MD[3] | Margaret Chen-Seetoo MD[1] | Bret Taback MD[1] | Sheldon Feldman MD[4] | Richard Ha MD[3]

TABLE 1 Outcomes of multiple SAVI SCOUT localizers

Outcome	Rate, %, *n* (*n* = 42)
Localization success (bracketing and multiple lesions)	100% (42)
Two reflectors placed	85.7% (36)
Three reflectors placed	14.3% (6)
Bracketing technique	45.2% (19)
Positive margins	10.3% (4)
Close margins (<1 mm)	10.3% (4)

The above reflects the outcomes of 42 patients who underwent excision of 68 lesions.

SAVI Scout System



Conclusions

Non wire location techniques are beneficial, allowing image-guided placement before the day of surgery and resulting in improved workflows. These techniques also eliminate bothersome protruding wires, risk of dislodging and allow the incision site to be independent from the localization site.

Thank you for your attention