Ultrasound guided biopsy using magnetic resonance volume navigation for the histological approach of additional breast lesions: a new technique

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Purpose

To evaluate a new approach to obtain lesion correlation and histology using ultrasound guidance with magnetic resonance volume navigation (V NAV).

Images for this section:

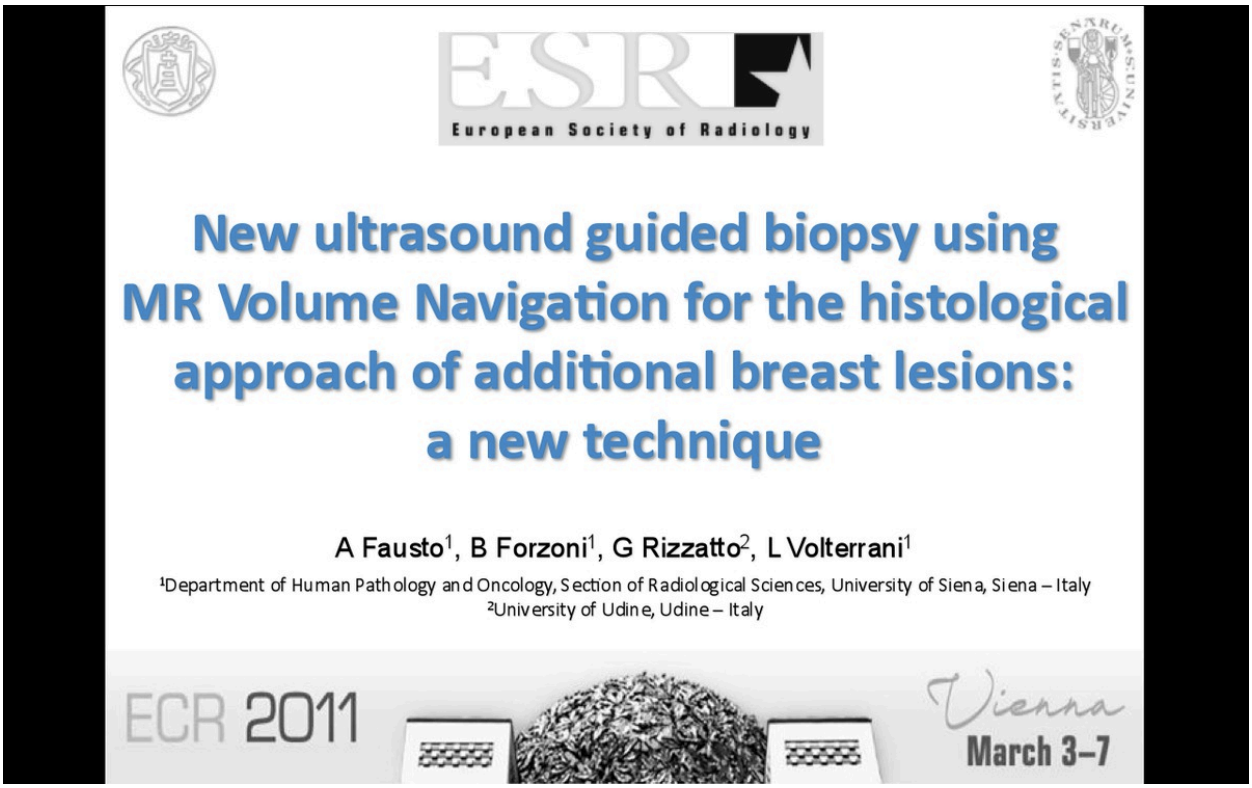

Fig. 1: Title page and Affiliation

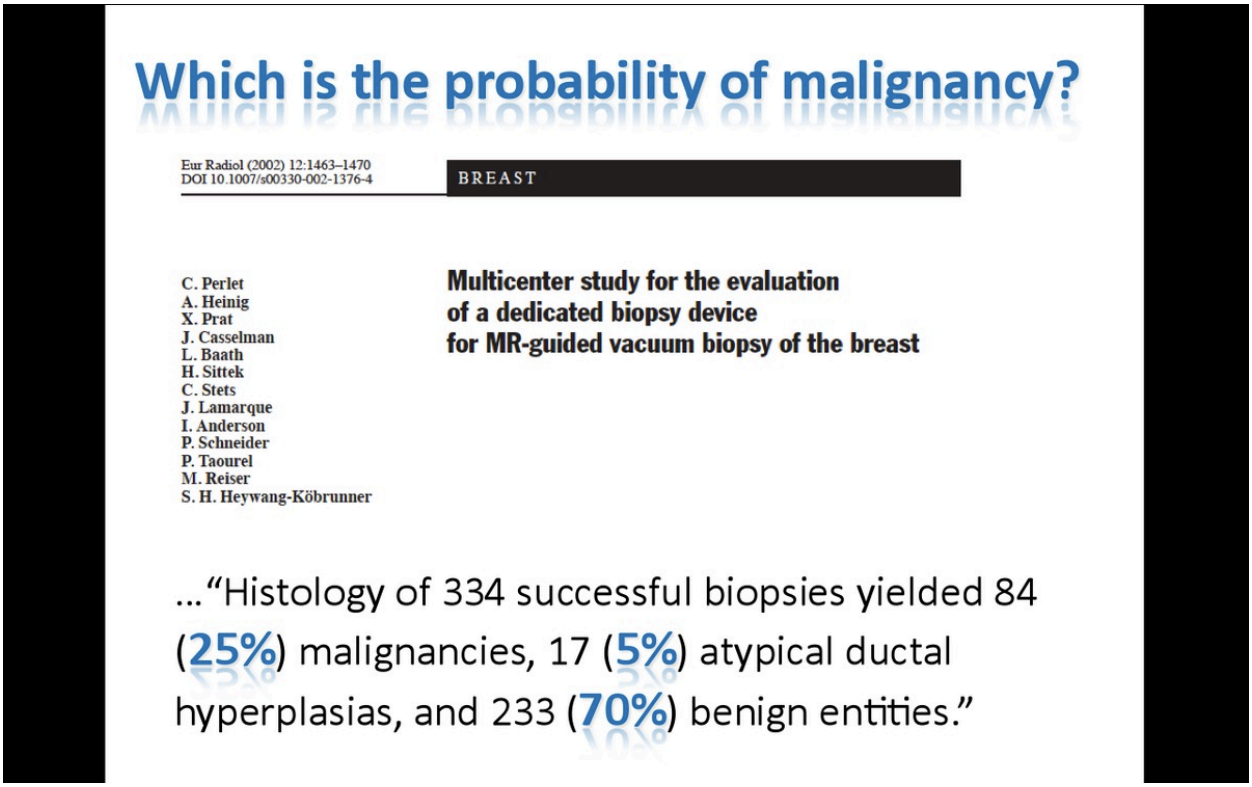

Fig. 2: This first page summarize the results of this multicentric study. A huge effort, considering MR equipment time, radiologist' time and the cost of the biopsy resulted in an high percentage of benign lesions with a low cost-effectiveness. Two answers are possible: who read MR images had a low PPV; the radiologist during the 'second look' US was not so confident to correlate US appearance to MR detected lesion.

Methods and Materials

Fifteen consecutive patients (53±14 years, range 35-75) with additional only MR detected lesions underwent bilateral contrast-enhanced breast MR in supine position using flexible surface body coil. Three vitamin E pills and the corresponding drawing pen signs were used as skin reference for final alignment. Breast US and MR co-registration was manually obtained and maintained by means of a dual electromagnetic systems consisting of a magnetic transmitter positioned close to the patient and two small magnetic receivers positioned on a linear probe's bracket. Large core US guided biopsy with V Nav was used for lesion sampling and carbon clip positioning. Clip-to-lesion distance at surgical pathologic examination was used as standard of reference.

Images for this section:

Fig. 1: US equipment with Volume Navigation (V Nav) and fiducial markers.

Results

All twenty-two additional lesions had a correlation during US with V Nav. No additional MR guided biopsy was needed. At pathologic examination clip position distance from the lesion was reported 0.7±0.4 cm (mean±SD). Seventy-three percent of lesions (16/22) were malignant and 26% (6/22) were benign. Three out of 6 benign lesions were classified as high-risk lesions.

Images for this section:

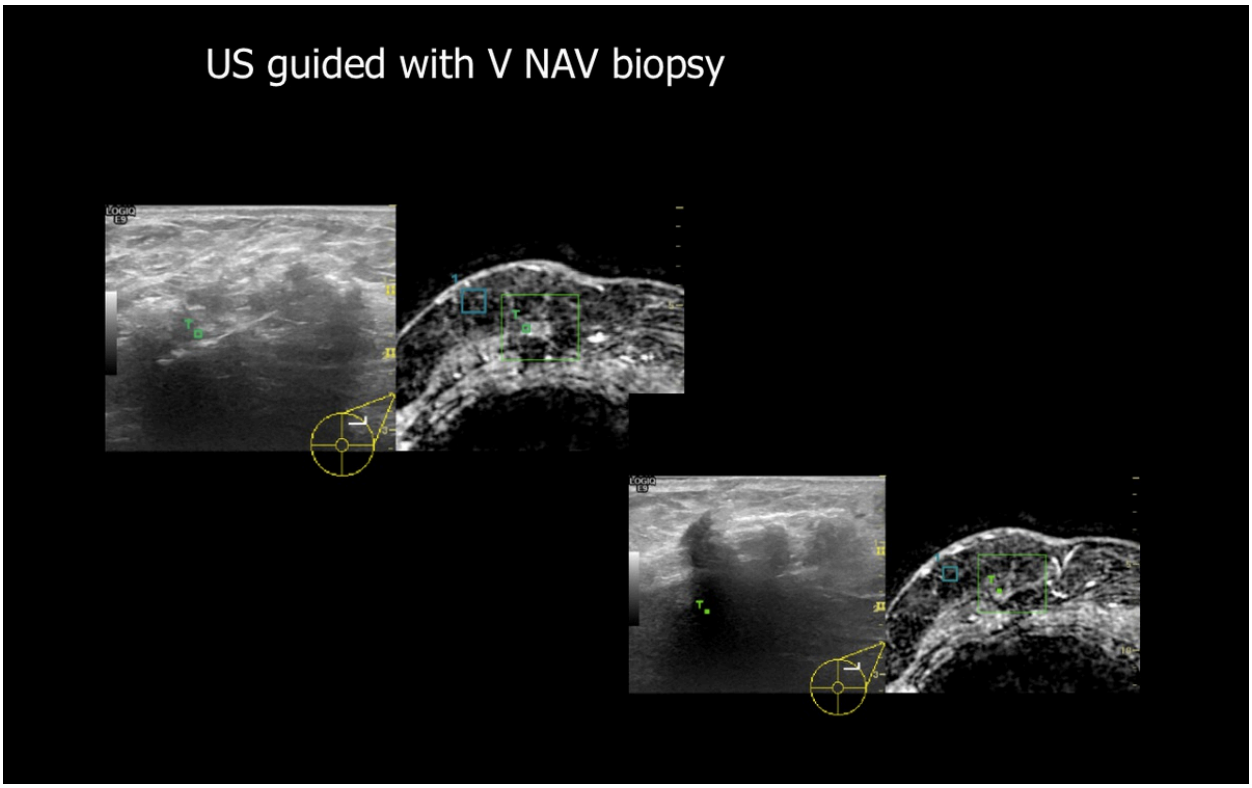

Fig. 1: Two example of US guided biopsy using V Nav in which lesion is well-depicted in MR images ma a GPS marker (green dot) shows where the lesion in on the US corresponding image.

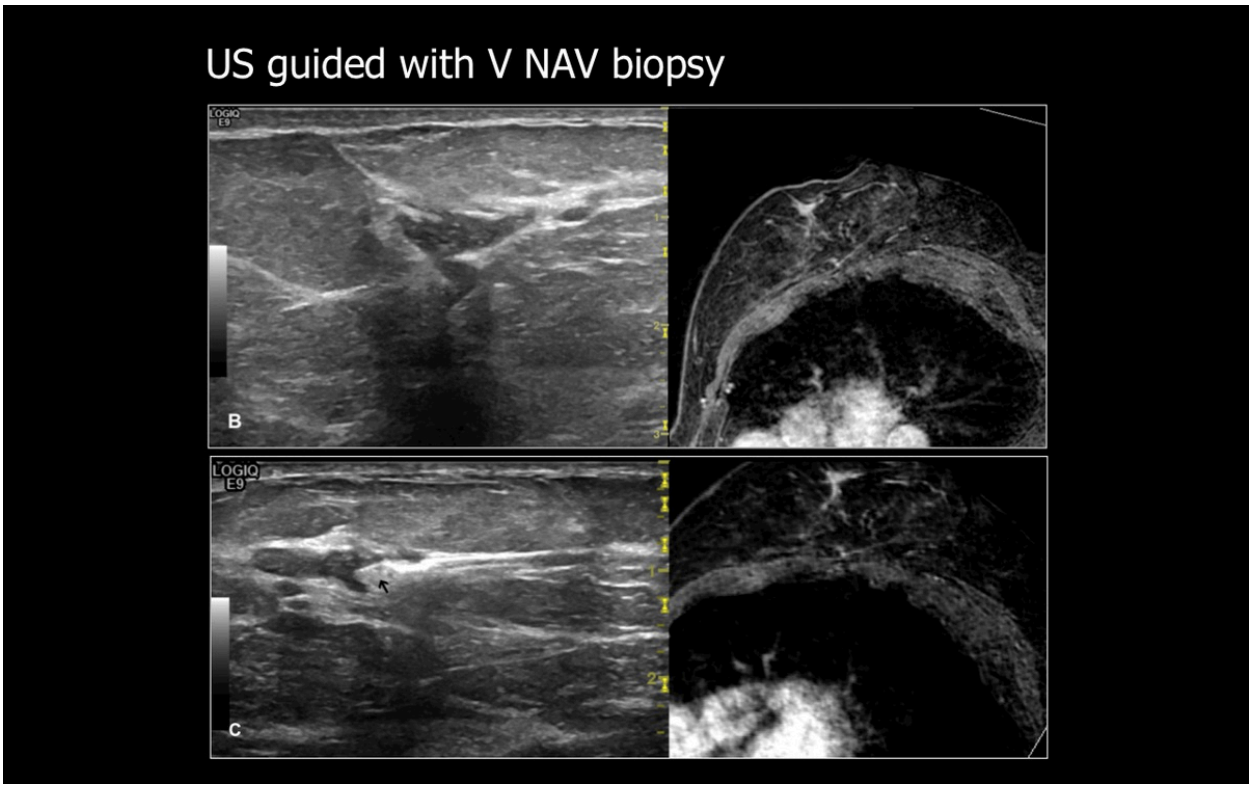

Fig. 2: Intraductal enhancement branching seen with both images. Histological result was DCIS.

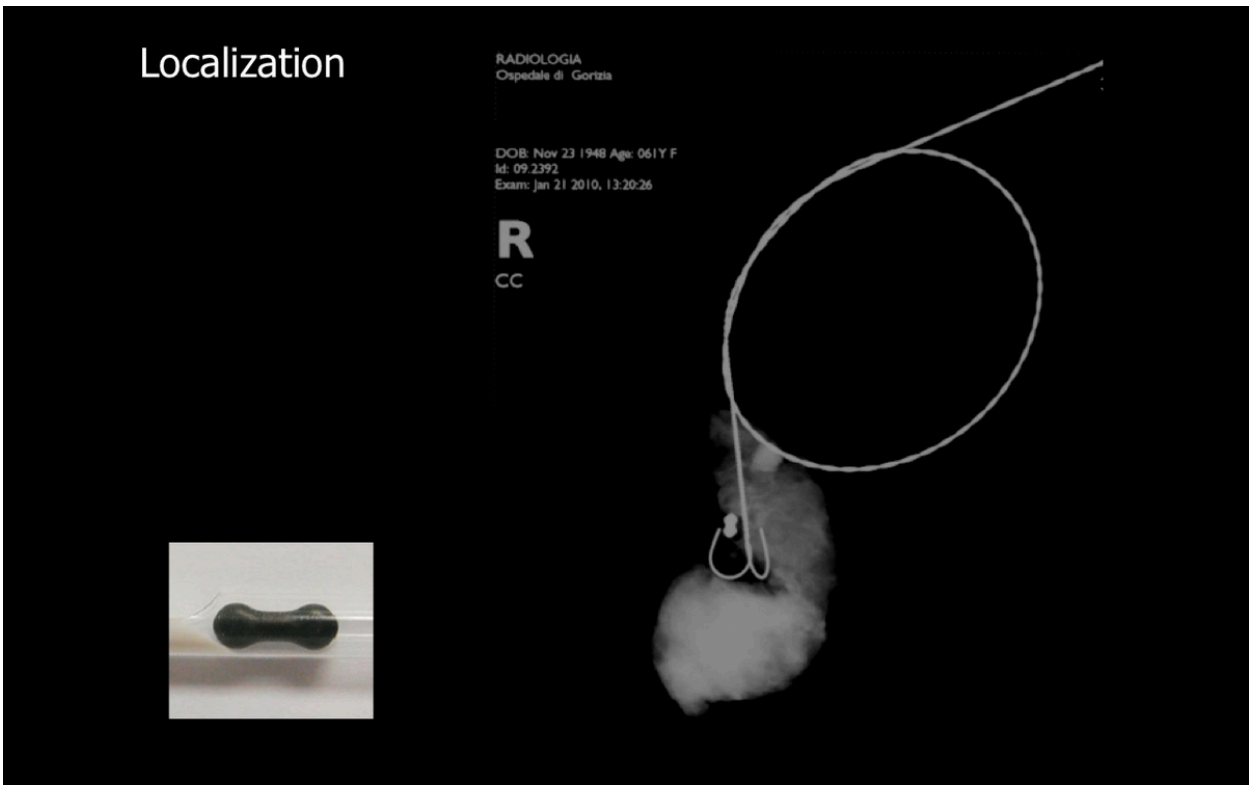

Fig. 3: After each biopsy a marker (BiomarC Tissue Marker TM) was delivered to guide surgical resection and measure the in vivo distance from image appearance to pathologic result. In the image is shown an example.

Conclusion

Breast US guided biopsy with V Nav for only MR-detected lesions is feasible and seems to allow an accurate tool for sampling breast lesions with a strong reduction of MR guided procedures. US with MR volume navigation and fusion imaging could increase US-guided biopsy or follow-up accuracy of

MR-detected lesions.

Images for this section:

Fig. 1: A sky view of Piazza del Campo, Siena.

References

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2. Rizzatto G, Fausto A (2009) Breast Imaging and volume navigation: MR imaging and Ultrasound Co-registration. Ultrasound Clinics 4:261-271

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