



Research letter

Performance of ultrasound guidance for vacuum-assisted biopsy of breast microcalcifications without associated mass

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1. Introduction

Percutaneous Vacuum-assisted biopsy for breast microcalcifications (identified in 30%–50% of screen-detected cancers) without associated mass is a technique assessed by large studies, allowing prompt diagnosis through high-quality tissue sample and is usually performed under stereotactic mammography guidance [1–5]. Ultrasound (US) guided percutaneous breast biopsy is an increasingly used technique and seems interesting thanks to US characteristics [6–8].

The aim of this study was to evaluate the relevance of sonographic guided Vacuum-assisted biopsy of suspicious microcalcifications, without mass, mammographically detected.

2. Materials and methods

This retrospective study was Institutional Review Board approved.

All patients with suspicious microcalcifications, without associated mass, who underwent a vacuum-assisted biopsy procedure guided by ultrasonography in our institution (2012 – 2020) were retrospectively included. Ultrasound guidance was preferred to stereotactic guidance as soon as microcalcifications detected on mammogram were identified on B mode ultrasonography (two patients had a marker placed under stereotactic guidance, none had a skin marker).

Microcalcifications were defined by echogenic dots not linked to echogenic anatomical structures, sometimes with hypochoic area, sometimes intraductal with hyperhemia (Figs. 1, 2).

Four to 12 samples (13G (MAMMOTOME® ELITE) and 10G (MAMMOTOME® LEGACY, then REVOLVE®) were taken by a board-certified radiologist (YB), with a continuous ultrasound monitoring and real-time readjusting of the sampling aperture (time of procedure: approximately 20 to 30 minutes). The success of the procedure was based on identifying microcalcifications on the systematic specimen radiograph.

Final diagnosis was defined by BI-RADS (Breast Imaging-Reporting And Data System) classification associated to follow-up (1 to 7 years) or by histopathological results of surgery, and classified into four categories: benign, atypical, ductal carcinoma in situ (DCIS) and invasive.

Results of the biopsies were classified as concordant with the final diagnosis, underestimated (when the histopathology of surgery or the follow-up eventually concluded to a worse diagnosis than the histopathology of biopsy) or overestimated (the opposite). The absence of residual in situ or invasive cancer on surgical specimens was considered as a total removal by biopsy.

Statistical analyses were performed with EXCEL® (Microsoft®, Redmond, WA) and Python.

3. Results

On the 148 US biopsy procedures included 113 final diagnoses (75 by surgery, 38 by follow-up) on 107 patients [mean age 56 years old, range 28 - 89] were finally obtained.

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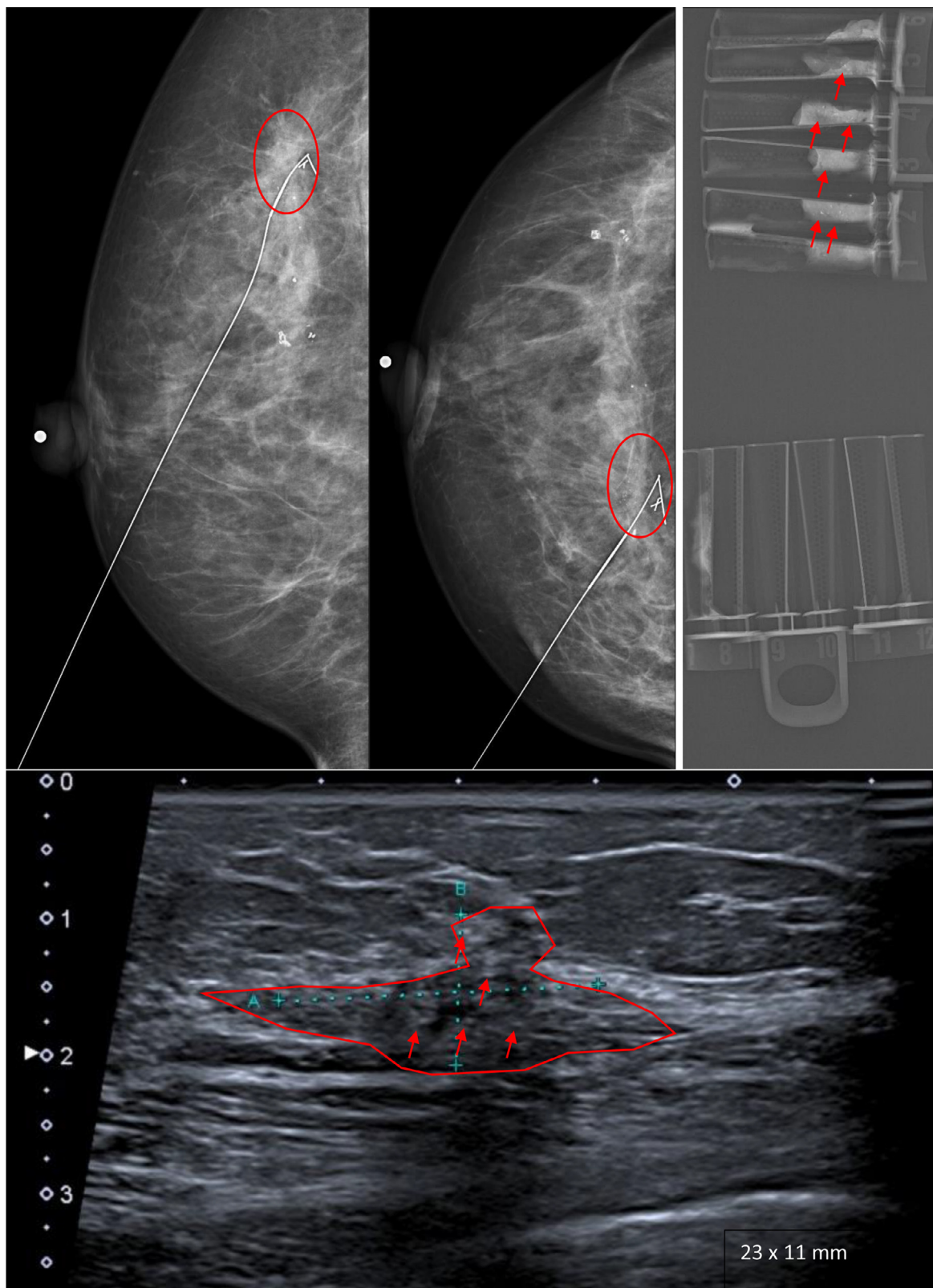


Fig. 1. Example of microcalcifications classified ACR4c, on a patient with a final diagnosis of DCIS, on the oblique external and front mammographies after biopsy with guidewire placement on the marker; mammography of the samples; ultrasonography of the lesion before biopsy (hypochoic area with microcalcifications)

Overall concordance of US guided biopsies was 104/113=92%. Underestimation of the final diagnosis by US guided biopsies occurred in 9/113 = 8% and there was no overestimation (Table 1).

The US-guided biopsies allowed to remove the totality of the lesion in 8/113 (7%) and the infiltrative part associated with DCIS lesion on 10/113 (9%) of cases.

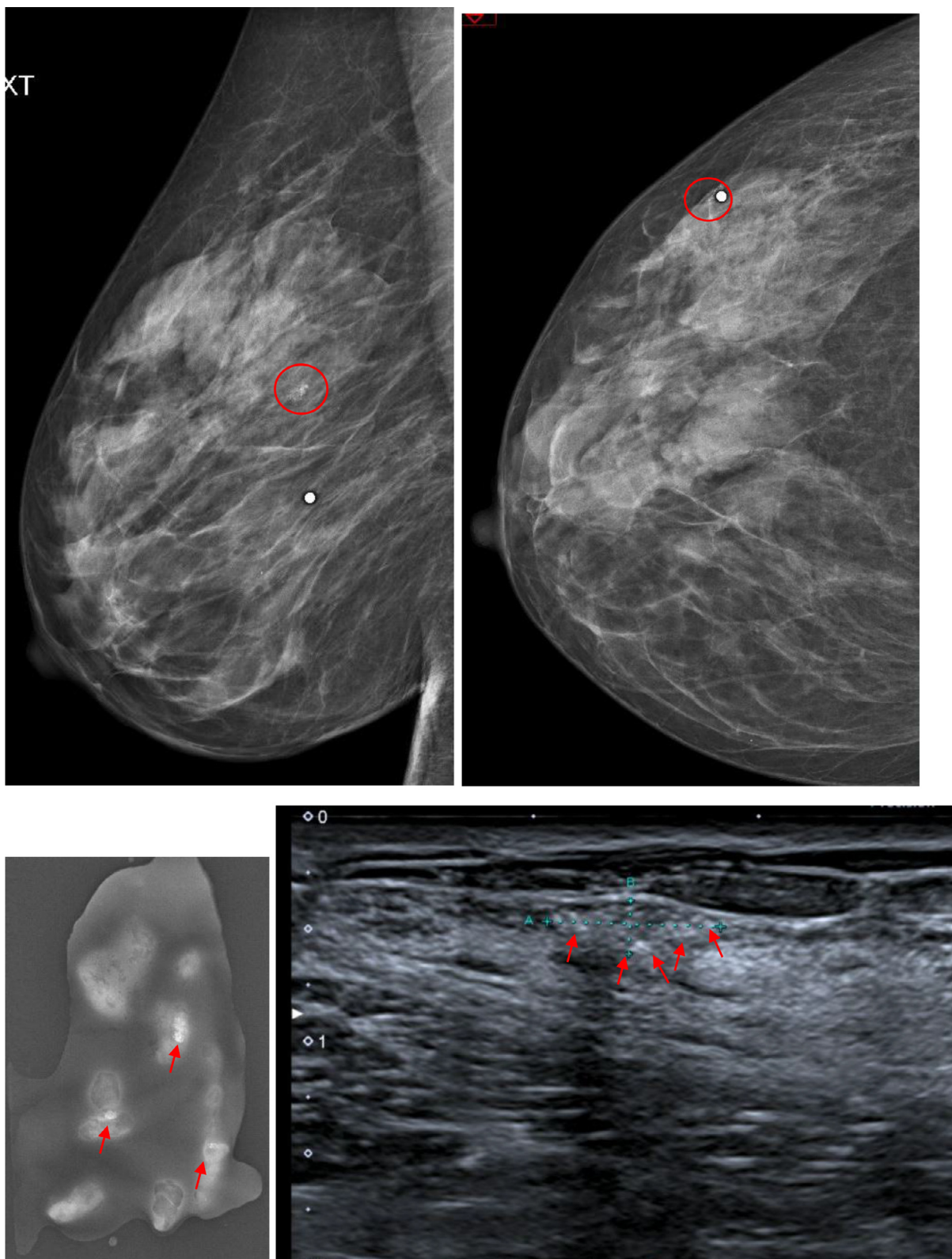


Fig. 2. Example of microcalcifications classified ACR4b, on a patient with fibrocystic changes on final diagnosis, on the oblique external and front mammographies before the biopsy; on mammography of the sample; on ultrasonography (isoechoic area with microcalcifications).

Among the invasive diagnoses, invasive ductal carcinoma was found in 21/27 (78%), invasive lobular carcinoma in 5/27 (19%), tubular carcinoma in 1/27 (3%) of cases.

Among the 75/113 (66%) diagnoses obtained by surgery, the main diagnosis was DCIS (31/75, 41%). Among the 38/113 (34%) diagnoses

obtained through follow-up, the main diagnosis was fibrocystic changes in 24/38 (63%).

No procedure was interrupted, and no adverse event was reported after the biopsy guided by US. All patients could return home immediately after the procedure.

Table 1
Correlation for the 113 cases between results of biopsies and the final diagnoses.

Biopsy findings	Final diagnosis									
	Invasive		DCIS		Atypia + CLIS		Benign		Overall Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Invasive	20	17,7%	0	0%	0	0%	0	0%	20	17,7%
DCIS	4 ^a	3,5%	30	26,5%	0	0%	0	0%	34	30,1%
Atypia + CLIS	2 ^b	1,8%	0	0%	14	12,4%	0	0%	16	14,2%
Benign	1 ^c	0,9%	1	0,9%	1	0,9%	40	35,4%	43	38,1%
Total	27	23,9%	31	27,4%	15	13,3%	40	35,4%	113	100%

Diagonal: exact diagnosis; red: underestimation; blue; overestimation.

^a 2 DCI and 2 CLI on surgery.

^b 1 biopsy findings of CLIS eventually classified as CLI on histology of surgery and 1 apocrine metaplasia eventually classified as DCI on histology of surgery.

^c Tubular carcinoma on surgery.

4. Discussion

Our concordance rate for US guided vacuum-assisted biopsies of suspicious microcalcifications without mass (92%) was comparable to the literature for US-guided biopsies (mean 95% [93 – 96]), but better than those for stereotactic-guided biopsies (84%, [70 – 99]) [6–10]. Therefore, when the microcalcifications are visible on ultrasound, there might be no loss of chance in performing the biopsy under ultrasound guidance, which simplifies the procedure, particularly in patients with reduced mobility [6–10].

Better results (8/113, 7%) than the literature (mean of 3 [0 – 11], 5% for stereotactic guidance and mean of 1 {[0 – 1], 1% for US guidance) are found considering the removing of the most pejorative part of the breast lesion.

Underestimation rates of our study are similar to those in the literature. Presence of atypical ductal hyperplasia in the periphery of DCIS lesions can explain some of the underestimation [6–10].

Limits of this study are: the retrospective aspect (percentage of cases without foci of microcalcifications visible on ultrasound is not evaluated); the single operator; the assessment of diagnosis by follow-up for benign lesions (some low-grade malignant lesions may have not been identified, leading to a slight overestimation, however this bias is also present in studies on stereotactic guided biopsy).

5. Conclusion

When microcalcifications are identified on ultrasonography exam (hyperechoic dots frequently with hypoechoic area surrounding them), ultrasound-guided vacuum-assisted biopsy are reliable and could be considered as a first-line examination. Moreover, US guidance allows access to areas difficult for stereotactic, and increases the comfort of the patient, by avoiding compression.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest concerning this article.

CRediT authorship contribution statement

S. Le Cam: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project

administration, Resources, Software, Visualization, Writing – original draft, Writing – review & editing. **Y. Badachi:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **S. Ayadi:** Conceptualization, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **O. Lucidarme:** Conceptualization, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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