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Radio-Histopathological Aspects of Breast Nodules in a Sub-Saharan African City (Ouagadougou, Burkina Faso)

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Abstract

Objective: To determine the diagnostic contribution of breast microbiopsy percutaneously under ultrasound guidance. **Methodology:** Retrospective descriptive study conducted from January 2014 to October 2017. The included patients had an ultrasound-guided breast microbiopsy after a mammographic and ultrasound scan. The variables collected were gender, age, nodule size, ACR classification and anatomopathologic diagnosis. **Results:** 347 nodules were explored in 313 patients. There were 300 women (95.85%) and 13 men (4.15%), a gender ratio of 23.07. The average age was 44.64 ± 14.18 years. The average size of the nodules was 30.33 ± 19.58 mm. There were 53.89% ACR4 grade nodules, 48% ACR5 nodules and 32.28% ACR3 nodules. 86.49% of ACR3 nodules were benign and 97.92% of ACR5 nodules were actually malignant. Malignant tumors accounted for 50.29% of the nodules and were dominated by invasive breast carcinomas in 98.26%. The average age of patients with malignant tumors was 49.15 ± 11.55 years. 16% of patients with malignancy were aged under 40 years old. **Conclusion:** The diagnostic yield was satisfactory and there was a good correlation between the rate of malignant and benign lesions and the positive predictive values of malignancy in the literature.

Keywords

Breast Microbiopsy, Ultrasound Guidance, Mammary Nodule, Breast Cancer

1. Introduction

Breast cancer is growing in sub-Saharan Africa. In Burkina Faso, it accounted for 23.81% of all cancers and 49.36% of female cancers in 1998 [1] [2]. These figures are increasing, with an incidence of 1144 new cases per year according to the World Health Organization in 2014.

This affection poses many difficulties in our country for its care. Thus, in routine practice, lumpectomy or mastectomy can be performed without prior histological diagnosis. However, recommendations stipulate that more than 70% of cancers must be diagnosed prior to surgery in order to adapt the therapeutic procedure [3].

Breast biopsies can prevent surgical biopsies. The indications for these samples are based on the ACR BI-RADS classification and essentially interest to ACR5, ACR4 lesions, and in some cases, ACR3 lesions.

Several studies have analyzed the positive predictive value (PPV) of categories 3, 4 and 5 of BIRADS [4]. In a literature review conducted by Kastelman *et al.* [5], this PPV was 0 to 8% for category 3, 4 to 69% for category 4 and 5 to 100% for category 5. In Burkina Faso, existing studies have mainly focused on fine needle aspiration biopsy [6].

There is not, to our knowledge, studies to date on the histopathological and radiological correlations mammary tumors performed in our context. However, since the advent of breast microbiopsy, the fine needle aspiration biopsies have decreased in breast pathology.

The aim of this work was to show the diagnostic contribution of percutaneous breast microbiopsy under ultrasound guidance in our context.

2. Methodology

This was a descriptive and retrospective study, conducted from January 2014 to October 2017. The included patients had nodules classified ACR3, 4 or 5 after a mammographic and ultrasound scan, with a histology result available. The breast microbiopsies were performed under ultrasound guidance. The biopsy punctures were performed by an experienced radiologist. The procedure of the microbiopsy and the risks were explained to the patient before each action. Consent was obtained orally.

We used automatic biopsy needles of 14 gauge (G) and 10 cm in length. Ultrasound location and strict asepsis of the cutaneous levels with povidone-iodine were performed. Local anesthesia was performed at the skin entry point and along the needle path to the edge of the nodule with 10 ml of 2% lidocaine. The needle was introduced to the edge of the target under ultrasound guidance using a linear probe of 12 to 16 Mz. Three to four samples were then taken per nodule (Figure 1).

Samples were placed in formalin flasks and sent to the pathology laboratory for analysis. Microbiopsies were all performed on an outpatient basis.

The variables collected were gender, age, nodule size, ACR classification and pathology diagnosis.

(a)

(b)
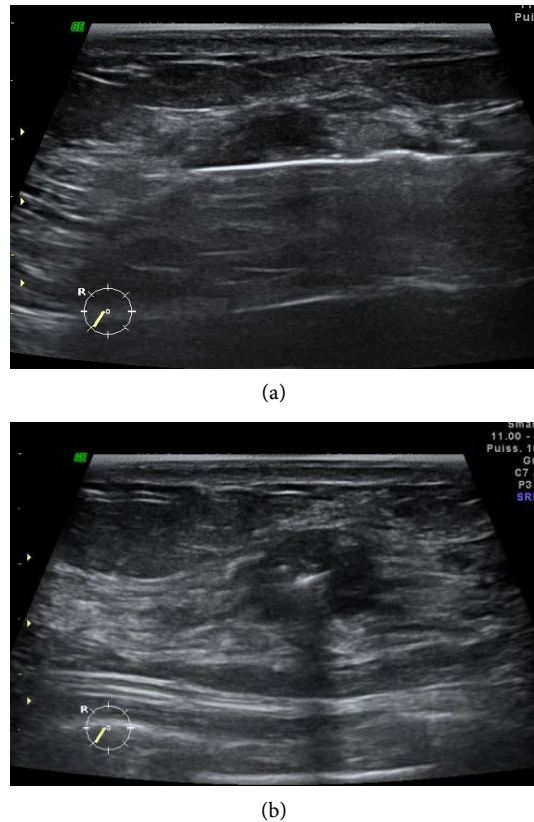
Figure 1. Ultrasound sections with biopsy needle within the nodule ((a) longitudinal view; (b) transverse view).

Data analysis was performed using the Epi Info 7.3 software.

3. Results

Our sample consisted of 347 nodules from 313 subjects. There were 300 women (95.85%) and 13 men (4.15%). The average age was 44.64 ± 14.18 years. The average size of the nodules was 30.33 ± 19.58 mm. The average age of patients with malignant tumors was 49.15 ± 11.55 years. 16% of patients with malignancy were aged under 40 years old.

The distribution of our sample according to the ACR BIRADS classification noted 112 ACR3 nodules (Figure 2) or 32.28%, 187 ACR4 nodules (Figure 3) or 53.89% and 48 ACR5 nodules (Figure 4) or 13.83%.

Biopsies were contributive in 344 cases (99.13%). The nodules sat on the left in 54.65% of cases and on the right in 45.35%.

The histopathological findings showed 50.29% malignant nodules, 46.22% benign nodules and 3.49% borderlines nodules. Malignant tumors were dominated by invasive breast carcinomas in 98.26%. Benign tumors were mainly represented by dystrophic and inflammatory lesions in 32.08% and 27.04%. Borderlines lesions consisted mainly of atypical ductal hyperplasias. Invasive ductal carcinomas were the most common lesions among malignant lesions. The histological types of nodules are reported in Table 1.
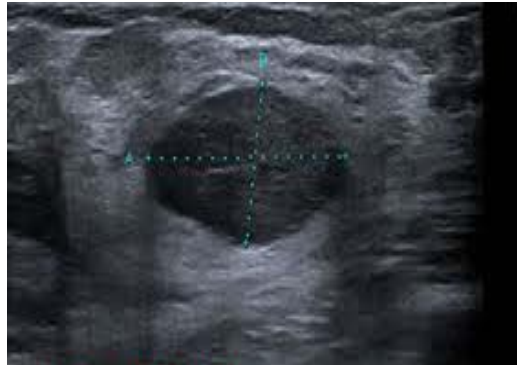
Figure 2. Ultrasound appearance of an ACR3 grade nodule. The contours are circumscribed. The major axis is parallel to the cutaneous levels.
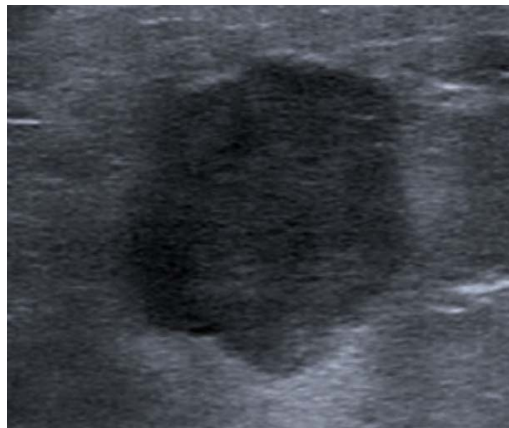
Figure 3. Ultrasound appearance of an ACR4 grade nodule. Contours are partially hidden (arrow).
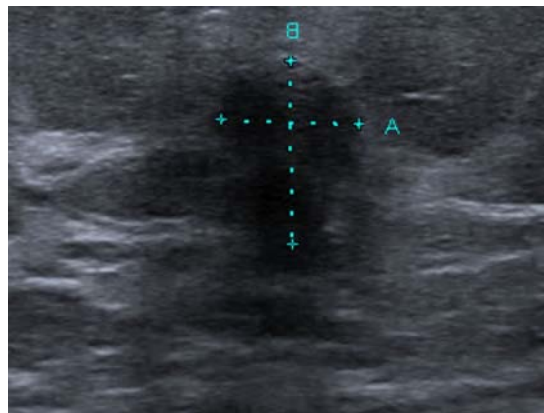
Figure 4. Ultrasound appearance of an ACR5 grade nodule. The contours are irregular, the major axis of the nodule is perpendicular to the cutaneous levels and there is a posterior attenuation of the echoes.

There were 97.92% (n = 47) of malignant lesions in ACR5, 64.32% (n = 119) in ACR4 and 6.31% (n = 7) in ACR3. The histological aspects of the nodules according to the ACR classification are noted in Table 2.

Table 1. Histopathological aspect of breast nodules explored through microbiopsy.

Histological type	Frequency	Percentage
Malignant tumor		
Grade 1 CCI	23	13.29
Grade 2 CCI	125	72.25
Grade 3 CCI	21	12.14
Mucineous carcinoma	1	0.58
Liposarcoma	2	1.16
Metastasis	1	0.58
	173	**100**
Benign tumor		
Dystrophic lesions	51	32.08
Inflammatory lesions	43	27.04
Fibroadenomas	35	22.01
Adenosis	17	10.69
Lactating adenoma	4	2.52
Intraductal papilloma	4	2.52
Phyllodes tumor	3	1.89
Hemangioma	2	1.26
	159	**100**
Border tumor		
HCA	**12**	**100**

Table 2. Histological findings according to the ACR classification.

	Malignant nodules		Benign nodules		Border nodules	
	Frequency	%	Frequency	%	Frequency	%
ACR3	7	6.31	96	86.48	8	7.21
ACR4	119	64.32	62	33.51	4	2.17
ACR5	47	97.92	1	2.08	0	

4. Discussion

Our study highlighted the fact that the microbiopsy of breast nodules had an excellent yield and that malignant nodules predominated in our sample.

The average age of the patients in our series (44.64 years) was younger than that found by Moifo *et al.* [7] in Cameroon (49 years), but higher than that of Tsonga *et al.* [8] in Gabon, who had found an average age of 41 years.

The average size of analyzed nodules was higher than that found by Tsonga *et al.* [8] which was 15 mm. This difference may be related to the modalities of discovery of the nodules. Indeed, in their sample, the authors were interested in the nodules discovered during a systematic screening, therefore of smaller size, contrary to our study where the patients were referred after clinical discovery of nodules.

The BIRADS classification of the ACR permits to classify the nodules explored through imaging according to the predictive value of their malignancy potential, notably on the ultrasound contour criterion, and also makes it possible to pro-

pose a course of action.

ACR5 nodules typically have a positive predictive value of malignancy (PPV) greater than 70% [9]. In our sample, this PPV was excellent, as 97.92% of ACR5 nodules were actually malignant in histology. Among these nodules, we found a predominance of invasive breast carcinomas in agreement with several studies [8] [10].

The PPV of malignancy in our sample for ACR4 lesions (64.32%) was in accordance with that found in the literature. This class includes a wide range of benign, borderline or malignant lesions. It is therefore necessary for this group to carry out a diagnostic microbiopsy.

ACR3 nodules are nodules with a PPV of malignancy < 3%. These nodules do not immediately require microbiopsy but short-term monitoring. There was a good PPV of benignity in this class with 86.49% of actually benign nodules. The proportion of benign nodules in this class corroborated those in the literature [11]. These nodules were mainly represented by dystrophic and inflammatory lesions.

However, we noted a high rate of malignant nodules in the ACR3 class, higher than international recommendations. Other authors in sub-Saharan Africa had also noted rates of malignant lesions higher than international recommendations: Kamga *et al.* [12], Moifo *et al.* [7] and Mayi Tsonga *et al.* [8] who had respectively demonstrated rates of malignancy of 13.3%, 3.5% and 11%.

It is important to note that some malignant lesions may look falsely reassuring on ultrasound, in connection with a rapid growth of tumor cells, giving the tumor a rounded or oval appearance, of benign appearance. Thus, Lamb PM [13] found in his study 10% - 20% of malignant lesions with regular contours. It is important to monitor ACR 3 nodules on ultrasound in the short term; they are not biopsied, so as not to ignore a malignant lesion of benign presentation. As soon as there is an increase in size or a morphological change of the nodule, a histological examination would be necessary [9].

Among the benign tumors, there was a predominance of dystrophic and inflammatory lesions, followed by fibroadenomas. However, most studies show a predominance of fibroadenomas in benign breast tumors [8] [10]. It is a tumor of the young, hormone-dependent woman whose appearance may vary with time [14].

The borderlignes lesions consisted exclusively of atypical ductal hyperplasia. It should be noted that these nodules were classified ACR3 or ACR4 on ultrasound. These are lesions similar to carcinomas *in situ*, with a relative risk of cancer multiplied by 4 to 5 [15].

Our study presents limitations related to sampling that has been done out only in urban areas, which can generate biases due to the different way of life, education and medical equipment of the health facilities in the country.

5. Conclusions

Our study showed that ultrasound-guided breast microbiopsy performed well in

our context. It allowed to describe the histological types of mammary nodules explored by ultrasound-guided microbiopsy and showed that the malignancy rates of the ACR4 and ACR5 classes were in accordance with the data in the literature. However, the rate of malignant lesions in the ACR3 class was higher than international recommendations.

Multicentric studies including the rural areas, would permit to investigate possible features of breast nodules in sub-Saharan Africa and also optimize the characterization performance of these nodules.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Goumbri, O.M., Domagni, O.E., Sanou, A.M., Konsegre, V., Soudre, R.B., *et al.* (2009) Aspects épidémiologiques et histopathologiques des cancers au Burkina Faso. *Journal africain du cancer/ African Journal of Cancer*, **1**, 207-211. https://doi.org/10.1007/s12558-009-0052-x

[2] Sano, D.I., Cisse, R., Dao, B., Lankoande, J., Traore, S.S.L., Soudre, R.B., *et al.* (1998) Le cancer du sein: Problèmes diagnostiques et thérapêutiques au CHU de Ouagadougou. *Médecine d'Afrique Noire*, **45**, 297-301.

[3] O'Higgins, N., Linos, D.A., Blichert-Toft, M., Cataliotti, L., de Wolf, C., Rochard, F., *et al.* (1997) European Guidelines for Quality Assurance in the Surgical Management of Mammographically Detected Lesions. European Breast Cancer Working Group. *Annales Chirurgiae et Gynaecologiae*, **87**, 110-112. http://europepmc.org/abstract/med/9598249

[4] D'orsi, C.J., Bassett, L.W., Berg, W.A., Feig, S.A., Jackson, V.P. and Kopans, D.B. (2003) Breast Imaging Reporting and Data System: ACR BI-RADS-Mammography. *Journal of the American College of Radiology*, **4**.

[5] Kestelman, F.P., de Souza, G.A., Thuler, L.C., Martins, G., de Freitas, V.A.R. and de Oliveira Canella, E. (2007) Breast Imaging Reporting and Data System-BI-RADS®: Positive Predictive Value of Categories 3, 4 and 5. A Systematic Literature Review. *Radiologia Brasileira*, **40**, 173-177. https://doi.org/10.1590/S0100-39842007000300008

[6] Cisse, R., Lougue, C., Sano, D., Bamouni, A.Y., Tapsoba, T.L., Sakande, B., *et al.* (2002) Pathologie tumorale mammaire avant l'âge de 30 ans chez la femme Africaine à Ouagadougou, Burkina Faso. *Imagerie de la Femme*, **12**, 245-251.

[7] Moifo, B., Guegang, G.E., Foumane, P., Sando, Z., Zeh, O.F., WankoWoguep, V.L., *et al.* (2014) Valeur des signes échographiques dans la prédiction du potentiel malin des masses mammaires. *Journal Africain d'Imagerie Médicale*, **5**. http://jaim-online.net/index.php/jaim/article/view/12

[8] Mayi-Tsonga, S., Meye, J.-F., Ngou-Mve-Ngou, J.-P., Mendome, G. and Mounanga, M. (2006) Corrélation radio-histologique des lésions mammaires infracliniques à partir de la classification BI-RADS (étude gabonaise). *Cahiers d'études et de recherches francophones/ Santé*, **16**, 179-183.

[9] Mendelson, E.B., Baum, J.K., Berg, W.A., Merritt, C.R.B. and Rubin, E. (2003) Breast Imaging Reporting and Data System, BI-RADS: Ultrasound. *Journal of the*

American College of Radiology.

[10] Mobima, T., Ouiamon, R., Koandongui, F., Koffi, B., *et al.* (2016) Corrélations histo-échographiques des lésions mammaires à Bangui (RCA). *Journal Africain d'Imagerie Médicale*, **7**. http://jaim-online.net/index.php/jaim/article/view/256

[11] Leblay, F., Anglade, E., Mayras, C. and Dauver, N. (2004) Opacités mammographiques: Utilisation de la classification BI-RADS™ de l'ACR et corrélation avec la biopsie stéréotaxique (14-G) sur table dédiée: A propos de 135 cas: Mammographic opacities: Use of the ACR BI-RADS™ lexicon. *Imagerie de la Femme*, **14**, 229-235. https://doi.org/10.1016/S1776-9817(04)94816-X

[12] Kamga, J.E.G., Moifo, B., Sando, Z., Goudjou, E.G., Amvene, S.N. and Fotsin, J.G. (2013) Fiabilité des utilisateurs de la classification BI-RADS en milieu tropical pour la prédiction de la malignité des lésions mammaires. *Médecine et Santé Tropicales*, **23**, 439-444.

[13] Lamb, P.M., Perry, N.M., Vinnicombe, S.J. and Wells, C.A. (2000) Correlation between Ultrasound Characteristics, Mammographic Findings and Histological Grade in Patients with Invasive Ductal Carcinoma of the Breast. *Clinical Radiology*, **55**, 40-44. https://doi.org/10.1053/crad.1999.0333

[14] Jalaguier-Coudray, A. and Thomassin-Piana, J. (2014) Les Masses Solides: Quelles Lésions Anatomopathologiques Sous-Jacentes? *Journal de Radiologie Diagnostique et Interventionnelle*, **95**, 158-174. https://doi.org/10.1016/j.jradio.2013.12.002

[15] Fitzgibbons, P.L., Henson, D.E. and Hutter, R.V. (1998) Benign Breast Changes and the Risk for Subsequent Breast Cancer: An Update of the 1985 Consensus Statement. *Archives of Pathology & Laboratory Medicine*, **122**, 1053-1055.