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Ultrasound-Guided Core Needle Biopsy of Breast Lesions: Results and Usefulness in a Low Income Country

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Abstract

Background: Core needle biopsy (CNB) under ultrasound guidance is an accepted standard of care for the diagnosis of breast lesions. It is safe, cost-effective and minimally invasive compared with surgical excision. **Objective**: The aim of this study was to evaluate the CNB's results regarding the procedure, complications, histopathological findings and their correlation with the imaging data and surgical histopathological findings. **Method**: A cross-sectional prospective and descriptive study of a consecutive series of ultrasound-guided CNB of breast lesions in women conduced from January 2015 to December 2016 at the Sylvanus Olympio university hospital of Lomé, in Togo. **Results**: There were 72 CNB performed under ultrasound guidance in women; from which 54 were retained for the study. The mean age was 44.9 years ± 9.8. 11.1% had a family history of breast cancer. Lesions were most often palpable (90.7%). They were located in the left breast in 54.7%. Lesions were categorized probably malignant or malignant (Birads 4 and 5) in 70.4% and probably benign (Birads 3) in 29.6%. Their mean size was 24.8 mm ± 7.6 at ultrasound. There were no major complications during the procedure. One CNB (1.9%) considered inconclusive was repeated. Histologically, invasive ductal carcinoma (61.1%) was the most common lesion. Fifty-three women underwent surgical procedure and histopathological confirmation. Ultrasound-guided CNB had a sensitivity of 97.5%, specificity of 100%, positive predictive value of 100%, negative predictive value of 92.8%, and an overall diagnostic accuracy of 98.1%. Breast Imaging Reporting and Data System (Birads) categorization had a sensitivity of 94.8%, specificity of 100%, positive predictive value of 100%, negative predictive value of 87.4%, and diagnostic accuracy of 96.2%. **Conclusion**: Ultrasound guided CNB represent accurate methods for the

characterization of breast lesions, with high values of diagnostic accuracy, sensitivity, specificity and negative predictive value. It does not involve a major complication, even in tropical environments.

Keywords

Ultrasound, Core Needle Biopsy, Breast, Cancer, Histology

1. Introduction

Breast cancer is the first cancer in women in the world; accounting for about 25% of female cancers with higher prevalence in developed countries and an average age of 50 - 70 years [1] [2]. In Togo, it is the most common type of cancer in females with 27.1% of female cancers and even if in the two sexes [3] [4]. Core Needle Biopsy (CNB) under imaging guidance is an accepted standard of care for the diagnosis of breast lesions, particularly those that are non-palpable [2]-[8]. This procedure is safe, cost-effective and minimally invasive compared with surgical excision [5].

CNB has replaced the Fine needle aspiration cytology (FNAC) in most of the countries [9]. Practitioners switch to CNB since it advent, because it provides a sufficient amount of tissue for pathologists to make an accurate histological diagnosis [10], out of having benefits of FNAC such as its accuracy, cost effectiveness, and ease of use [11] [12] [13] [14]. CNB is better than FNAC and should be performed for uncertain diagnostic cases and when the evaluation of the invasiveness or histological type of breast lesion is mandatory [15].

In Togo, before to the introduction of tru-cut biopsy or core needle biopsy (CNB), ultrasound-guided, breast suspected malignant lesions or probably benign lesions that were difficult to monitor were subjected to surgical procedures like mastectomy, excision biopsy, quadrantectomy, or wide local excision. This is in order to have tissue or a specimen for the histopathological exam. The FNAC was not also widely used.

The aim of this study was to evaluate the CNB's results regarding the procedure, complications, histopathological findings and their correlation with the imaging data and surgical histopathological findings.

2. Method

A cross-sectional prospective and descriptive study of a consecutive series of ultrasound-guided CNB of breast lesions in women conduced from January 2015 to December 2016 at the Sylvanus Olympio university hospital of Lomé, in Togo. The ultrasound machine used for CNB guidance was the Logic P5, GE, with a linear probe of variable frequency from 7.5 to 12 MHz. All biopsies were performed by one and the same radiologist.

For the practical achievement of the biopsy, a single protocol had been

adopted. After ultrasound scanning, disinfection of the skin, and compliance with asepsis measures, local anesthesia by infiltration of 4 to 6 ml of Lidocaine 1% was done. Three to four successive specimens were obtained by introducing the needle into the lesion. The target achievement was checked by two transversal and longitudinal ultrasound sections (**Figure 1**).

The specimens thus obtained were immediately fixed in formaldehyde and sent to the laboratory of pathology of the hospital.

The average cost of the procedure in radiology is 50 US$. The standard cost of analyzing laboratory samples (standard histology without histo-immunochemical analyze) is € 25 US$.

The studied variables were clinical data (age, palpable or non-palpable mass, mass location, personal or family history of cancer); imaging data (type of imaging performed, lesion size, Birads classification); biopsy data (coagulation test, needle gauge, type of device used, duration, immediate and late complications) and histological data of the CNB and surgical specimens.

On imaging, lesions were described and categorized using the relevant Breast Imaging Reporting and Data System (Birads) criteria of the American College of Radiology [16] based on the combination of mammography and/or ultrasound findings.

The diagnostic characteristics of the Birads categorization and the ultrasound-guided CNB were studied by considering as benign lesions classified Birads 3 and malignant lesions Birads 4 and 5. They were compared with the histopathological reports of follow-up surgical procedures including procedures like mastectomy, quandrantectomy, excision biopsy, or wide local excision. Following values were calculated: true positive (TP), false positive (FP), sensitivity (SE), specificity (SP), positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy (DA).

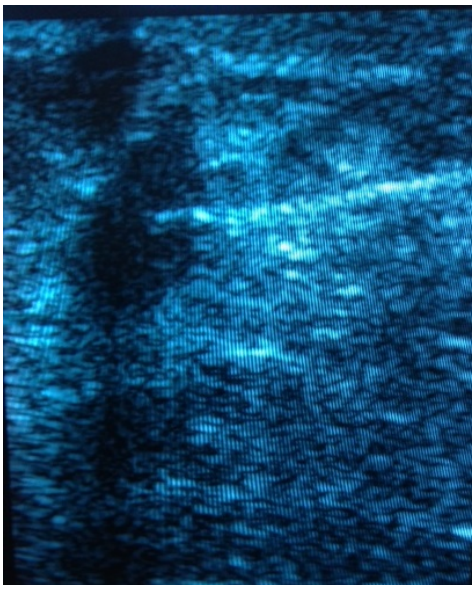

Figure 1. Ultrasound guided core needle biopsy image showing the needle inside the lesion.

The data were analyzed using the Epi info version 7.1.5.0 software. They were presented as a mean, with standard deviation and percentage. Values (TP, FP, SE, SP, PPV, NPV and DA) were calculated manually.

3. Results

During the one year period, 72 breast biopsies were performed under ultrasound guidance in women. 54 were retained for the study; 18 patients had not been seen again after the biopsy and their histological findings were not available. The mean age of the 54 patients retained was 44.9 years ± 9.8, (range: 23 to 67 years). The age groups 35 - 45 and 45 - 55 years were the most represented (Table 1). Only 11.1% had a family history of breast cancer, none had a personal history of breast cancer. Clinically, lesions were most often palpable (90.7%). They were located in the left breast in 54.7% (Table 1).

In terms of radiology, the diagnostic examination performed for diagnosis was

Table 1. Summary of general, clinical and imaging data for women who underwent ultrasound-guided core needle biopsy.

Specifications	Number	Percentage
Age rang		
<35 ans	8	14.8
35 - 45 years	19	35.2
45 - 55 years	19	35.2
55 - 65 years	7	12.9
>65 ans	1	1.9
Family history of breast cancer		
Yes	6	11.1
No	48	88.9
Clinical presentation		
Palpable mass	49	90.7
Non-palpable	5	9.3
Location of the lesion		
Right breast	23	42.6
Left breast	31	57.4
Imaging		
Ultrasound	8	14.8
Combination ultrasound and mammography	46	85.2
Birads classification before biopsy		
Birads 3	16	29.6
Birads 4	27	50.0
Birads 5	11	20.4

the combination of ultrasound and mammography in 85.2%. Lesions found were categorized probably malignant or malignant (Birads 4 and 5) in 70.4% and probably benign (Birads 3) in 29.6% (Table 1). Their mean size was 24.8 mm ± 7.6 at ultrasound.

Table 2 summarizes data on CNB's procedure and post-biopsy's histological finding. No coagulation test was required before the procedure. The only available data on blood crass were platelet counts in 6 patients (11.1%), which was all normal. The most material used for biopsy was the BARD magnum gun (Figure 2). The duration of the procedure was evaluated at less than 30 minutes for 94.4%. The number of specimens taken was 3 or 4 (Figure 3). The number

Table 2. Data on CNB's procedure and post-biopsy's histological finding.

Specifications	Nombre	Pourcentage
Coagulation test		
Yes (Platelets)	6	11.1
None	48	88.9
Needle Gauge		
14 G	11	20.4
16 G	24	44.4
18 G	19	35.2
Type of materiel used for biopsy		
BARD automatic gun	44	81.5
Semi-automatic needle	10	18.5
Duration of the biopsy act		
Less than 30 minutes	51	94.4
More than 30 minutes	3	5.6
Complication		
Immediat complications	2	3.7
Late complications	3	5.6
Number of specimens		
3 specimens	23	42.5
4 specimens	30	55.6
6 specimens	1	1.9
Histology on ultrasound-guided biopsy specimens		
Adenofibroma	6	11.1
Fibro-cystic dysplasia	8	14.8
Invasif ductal carcinoma	33	61.1
In situ ductal carcinoma	5	9.3
Others*	2	3.7

*others: 1 case of mastitis, 1 case metastasis of a carcinoma from pulmonary or another site.

Figure 2. Automatic Magnum gun of BARD and 14 G needle.

Figure 3. Four specimens obtained from breast CNB.

was 6 specimens in a single patient who in fact showed a globally inflammatory breast without a true focal lesion.

No major complications such as hemorrhage, infection of the site of puncture had been noted. The complications noted were minor with local unbearable pains experienced by two patients during the biopsy. Two cases of spontaneously resolved hematoma were reported by the patients in the hours following the procedure requiring no intervention and one case of residual pain at the point of puncture few days long after the procedure was reported during the communication of results.

One case (1.9%) was considered inconclusive by the histologist, which resulted in a biopsy repetition one month after the initial CNB. Histologically, invasive ductal carcinoma (61.1%) was the most common lesion (Table 2).

From the 54 patients, 53 underwent invasive or minimally invasive surgical procedures including surgical procedures like mastectomy, quandrantectomy, excision biopsy, or wide local excision. The surgical specimens were sent for histopathological examinations. The untreated case was that of mastitis which was successfully treated with antibiotics.

The diagnostic characteristics of the Birads classification based on the initial

Table 3. Diagnostic characteristics of the Birads classification and of the histology of specimens from ultrasound-guided CNB biopsy compared to histopathological examination of the surgical specimens.

	Birads before biopsy (n = 53)	Histology after CNB (n = 53)
True Positif (TP)	37 (69.8%)	39 (73.6%)
False Positif (FP)	0 (0.0%)	0 (0.0%)
False Negatif (FN)	2 (3.8%)	1 (1.9%)
True Negatif (TN)	14 (26.4%)	13 (24.5%)
Sensibility (SE = TP/TP + FN)	94.8%	97.5%
Specificity (SP = TN/TN + FP)	100%	100%
Positive Predictive Value (PPV = TP/TP + FP)	100%	100%
Negative Predictive Value (NPV = TN/TN + FN)	87.4%	92.8%
Diagnostic Accuracy (DA= (TP + TN)/(FP + FN + TP + TN)	96.2%	98.1%

CNB = Core Needle Biopsy.

imaging and of the histology of specimens from ultrasound-guided CNB biopsy compared to the results of the histopathological examination of the surgical specimens as reference are summarized in Table 3.

4. Discussion

4.1. Complications

In our study, immediate and late complications were rare, only 2 immediate minor complications made of unbearable local pain experienced by the patients. The pain may be related to ineffective local anesthesia. In our case the pain was recorded in patients with inflammatory breasts. No late major complications such as infection were noted. Only 3 cases of spontaneously resolved hematomas were noted. This was the same situation in the study of Brnić *et al.* [17] in Croatia in with no significant complications related to the procedure recorded, all patients in their study tolerated the procedure well, with only one case of psychosomatic reaction and 2 patients experiencing moderate local breast pain.

4.2. Coagulation Tests and Bleeding

It is demonstrated that there is no relationship between abnormal coagulation profiles and bleeding episodes in patients undergoing image guided breast biopsies [18] [19] [20]. Ashkar *et al.* found a statistical significance between needle gauge and bleeding [20]. Hematomas have been found more frequently with larger gauge needles [20] [21].

The coagulation tests are costly and as the aim of the ultrasound-guided biopsy is to reduce costs, it is possible to do without it because the risks are low. Most encountered bleeding episodes are manageable with good compression [18] [19].

4.3. Effectiveness of Biopsy Specimens

One case (1.9%) was found to be inconclusive for histology and required a repeat biopsy. In the study of Gukas ID *et al.* [22], 3.6% of patients had specimens that were inadequate for histological diagnosis. Rikabi A. and Hussain S. [10] found 6 (2.2%) inconclusive specimens. From the 6 specimens, 5 cases (83.3%) were found to be malignant and 1 (16.7%) was revealed to be a benign lesion on repeat TCB. In the case of an ultrasound-guided biopsy that is inconclusive or does not yield enough tissue for histology, it is indicated to repeat TCBs for confirmation of the diagnosis [10].

4.4. Usefulness of CNB

Several studies have confirmed the usefulness of CNB in the diagnosis of breast lesions with high sensitivity of 88.9% - 98.1% and specificity of 91.3% - 100% [10] [22]-[29]. This report, conducted in a tropical environment, and in a low-income country, finds the same values regarding the usefulness of ultrasound-guided CNB biopsy in the diagnosis of breast lesions. It yielded a high sensitivity of 97.5%, with specificity of 100%, and a PPV, NPV, and DA of 100%, 92.8%, and 98.1%, respectively. As in the study of Rikabi A. and Husain Q. [10], there were no false positive.

The main and important limitation of our study is represented by the small number of enrolled patients. This is linked to the fact that there is no cancer registry and no efficient national strategy to screen and treat cancer in Togo.

5. Conclusion

Ultrasound guided CNB represent accurate methods for the characterization of US-detectable breast lesions, with high values of diagnostic accuracy, sensitivity, specificity and NPV. Birads classifications have also with high values of diagnostic accuracy, sensitivity, specificity and NPV. This suggested that CNB is a technic that can help saving lot of expenses avoiding unnecessary surgical procedures in patients who had benign breast lesions diagnosed accurately by CNB. The use of CNB also lessens the propensity of complicated surgical procedures and minimizes patient stress. In patients with malignant lesions, NCB provides a sufficient tissue for pathologists to make an accurate histological diagnosis. It is also necessary to introduce histo-immunochemistry for more diagnostic accuracy.

References

[1] Pollán, M. (2010) Epidemiology of Breast Cancer in Young Women. *Breast Cancer Research and Treatment*, **123**, 3-6. https://doi.org/10.1007/s10549-010-1098-2

[2] Ferlay, J., Steliarova-Foucher, E., Lortet-Tieulent, J., Rosso, S., Coebergh, J.W.W., Comber, H., Forman, D. and Bray, F. (2013) Cancer Incidence and Mortality Patterns in Europe: Estimates for 40 Countries in 2012. *European Journal of Cancer*, **49**, 1374-1403. https://doi.org/10.1016/j.ejca.2012.12.027

[3] Amégbor, K., Darre, T., Ayéna, K.D., Padaro, E., Tengué, K., Abalo, A. and Napo-Koura, G. (2011) Cancers in Togo from 1984 to 2008: Epidemiological and Pa-

thological Aspects of 5251 Cases. *Journal of Cancer Epidemiology*, **2011**, Article ID: 319872.

[4] Darré, T., Amégbor, K., Sonhaye, L., Kouyate, M., Aboubaraki, A., N'timo, B., Bassowa, A., Fiagnon, K., Adama, R., Klu, S. and Napo-Koura, G. (2013) Histo-Epidemiological Profile of Breast Cancers a Report of 450 Cases Observed in the University Teaching Hospital of Lomé. *Médecine d'Afrique Noire*, **60**, 53-58.

[5] Jacklin, R.K., Ridgway, P.F., Ziprin, P., Healy, V., Hadjiminas, D. and Darzi, A. (2006) Optimising Preoperative Diagnosis in Phyllodes Tumour of the Breast. *Journal of Clinical Pathology*, **59**, 454-459. https://doi.org/10.1136/jcp.2005.025866

[6] Komenaka, I.K., El-Tamer, M., Pile-Spellman, E. and Hibshoosh, H. (2003) Core Needle Biopsy as a Diagnostic Tool to Differentiate Phyllodes Tumor from Fibroadenoma. *Archives of Surgery*, **138**, 987-990. https://doi.org/10.1001/archsurg.138.9.987

[7] Dillon, M.F., Quinn, C.M., McDermott, E.W., O'Doherty, A., O'Higgins, N. and Hill, A.D. (2006) Needle Core Biopsy in the Diagnosis of Phyllodes Neoplasm. *Surgery*, **140**, 779-784. https://doi.org/10.1016/j.surg.2006.03.022

[8] Lee, A.H.S., Hodi, Z., Ellis, I.O. and Elston, C.W. (2007) Histological Features Useful in the Distinction of Phyllodes Tumour and Fibroadenoma on Needle Core Biopsy of the Breast. *Histopathology*, **51**, 336-344. https://doi.org/10.1111/j.1365-2559.2007.02786.x

[9] Radhakrishna, S., Gayathri, A. and Chegu, D. (2013) Needle Core Biopsy for Breast Lesions: An Audit of 467 Needle Core Biopsies. *Indian Journal of Medical and Paediatric Oncology: Official Journal of Indian Society of Medical & Paediatric Oncology*, **34**, 252-256. https://doi.org/10.4103/0971-5851.125237

[10] Rikabi, A. and Hussain, S. (2013) Diagnostic Usefulness of Tru-Cut Biopsy in the Diagnosis of Breast Lesions. *Oman Medical Journal*, **28**, 125-127. https://doi.org/10.5001/omj.2013.32

[11] Kocaay, A.F., Celik, S.U., Sevim, Y., Ozyazici, S., Cetinkaya, O.A. and Alic, K B. (2016) The Role of Fine Needle Aspiration Cytology and Core Biopsy in the Diagnosis of Palpable Breast Masses. *Nigerian Medical Journal: Journal of the Nigeria Medical Association*, **57**, 77-80. https://doi.org/10.4103/0300-1652.182078

[12] Verenhitach, B.D., Elias, S., Patrocínio, A.C., Nazário, A.C.P. and Waizberg, A. (2011) Evaluation of the clinical Efficacy of Minimally Invasive Procedures for Breast Cancer Screening at a Teaching Hospital. *Journal of Clinical Pathology*, **64**, 858-861. https://doi.org/10.1136/jclinpath-2011-200057

[13] Mendoza, P., Lacambra, M., Tan, P.H. and Tse, G.M. (2011) Fine Needle Aspiration Cytology of the Breast: The Nonmalignant Categories. *Pathology Research International*, **2011**, Article ID: 547580. https://doi.org/10.4061/2011/547580

[14] Berner, A. and Sauer, T. (2011) Fine-Needle Aspiration Cytology of the Breast. *Ultrastructural Pathology*, **35**, 162-167. https://doi.org/10.3109/01913123.2011.576327

[15] Moschetta, M., Telegrafo, M., Carluccio, D.A., Jablonska, J.P., Rella, L., Serio, G., Carrozzo, M., Stabileianora, A.A. and Angelelli, G. (2014) Comparison between Fine Needle Aspiration Cytology (FNAC) and Core Needle Biopsy (CNB) in the Diagnosis of Breast Lesions. *Il Giornale di Chirurgia*, **35**, 171-176. https://doi.org/10.11138/gchir/2014.35.7.171

[16] American College of Radiology (2003) Illustrated Breast Imaging Reporting and Data System (BI-RADS). 4th Edition, American College of Radiology, Reston.

[17] Brnić, Z., Marinkić, M., Schmidt, S., Pedišić, I. and Bolanča-Čulo, K. (2016) Breast Core-Needle Biopsy in a Large Tertiary Oncologic Centre—1-Year Experience after

the Introduction of the Method. *International Journal of Clinical Medicine*, **7**, 690-697. https://doi.org/10.4236/ijcm.2016.710075

[18] Liberman, L. (2002) Percutaneous Image-Guided Core Breast Biopsy. *Radiologic Clinics*, **40**, 483-500. https://doi.org/10.1016/S0033-8389(01)00011-2

[19] Somerville, P., Seifert, P.J., Destounis, S.V., Murphy, P.F. and Young, W. (2008) Anticoagulation and Bleeding Risk after Core Needle Biopsy. *American Journal of Roentgenology*, **191**, 1194-1197. https://doi.org/10.2214/AJR.07.3537

[20] Ashkar, L.K. and Hafiz, R.M. (2016) Costly Coagulation Profile Tests Prior to Performing Breast Biopsies: Do We Really Need It? *Saudi Medical Journal*, **37**, 638-640. https://doi.org/10.15537/smj.2016.6.14135

[21] Chetlen, A.L., Kasales, C., Mack, J., Schetter, S. and Zhu, J. (2013) Hematoma Formation during Breast Core Needle Biopsy in Women Taking Antithrombotic Therapy. *American Journal of Roentgenology*, **201**, 215-222. https://doi.org/10.2214/AJR.12.9930

[22] Gukas, I.D., Nwana, E.J., Ihezue, C.H., Momoh, J.T. and Obekpa, P.O. (2000) Tru-Cut Biopsy of Palpable Breast Lesions: A Practical Option for Pre-Operative Diagnosis in Developing Countries. *The Central African Journal of Medicine*, **46**, 127-130. https://doi.org/10.4314/cajm.v46i5.8536

[23] Lacambra, M.D., Lam, C.C., Mendoza, P., Chan, S.K., Alex, M.Y., Tsang, J.Y., Puay, H.T. and Gary, M.T. (2012) Biopsy Sampling of Breast Lesions: Comparison of Core Needle- and Vacuum-Assisted Breast Biopsies. *Breast Cancer Research and Treatment*, **132**, 917-923. https://doi.org/10.1007/s10549-011-1639-3

[24] Ahmed, M.E., Ahmad, I. and Akhtar, S. (2010) Ultrasound Guided Fine Needle Aspiration Cytology versus Core Biopsy in the Preoperative Assessment of Non-Palpable Breast Lesions. *Journal of Ayub Medical College Abbottabad*, **22**, 138-142.

[25] Bdour, M., Hourani, S., Mefleh, W., Shabatat, A., Karadsheh, S., Nawaiseh, O. and Ebous, A. (2008) Comparison between Fine Needle Aspiration Cytology and Tru-Cut Biopsy in the Diagnosis of Breast Cancer. *Journal of Surgery Pakistan*, **13**, 19-21.

[26] Brunner, A.H., Sagmeister, T., Kremer, J., Riss, P. and Brustmann, H. (2009) The Accuracy of Frozen Section Analysis in Ultrasound-Guided Core Needle Biopsy of Breast Lesions. *BMC Cancer*, **9**, 341. https://doi.org/10.1186/1471-2407-9-341

[27] Kulkarni, D., Irvine, T. and Reyes, R.J. (2009) The Use of Core Biopsy Imprint Cytology in the 'One-Stop' Breast Clinic. *European Journal of Surgical Oncology* (*EJSO*), **35**, 1037-1040. https://doi.org/10.1016/j.ejso.2009.02.009

[28] Homesh, N.A., Issa, M.A. and El-Sofiani, H.A. (2005) The Diagnostic Accuracy of Fine Needle Aspiration Cytology versus Core Needle Biopsy for Palpable Breast Lump (s). *Saudi Medical Journal*, **26**, 42-46.

[29] Samantaray, S., Panda, N., Besra, K., Pattanayak, L., Samantara, S. and Dash, S. (2017) Utility of Tru-Cut Biopsy of Breast Lesions—An Experience in a Regional Cancer Center of a Developing Country. *Journal of Clinical and Diagnostic Research*, **11**, EC36. https://doi.org/10.7860/JCDR/2017/23572.9548