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Original Research Article

Retrospective Study on the Place of 1.5 Tesla MRI in the Management of Breast Pathology in Douala

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Abstract: ***Aim***: Magnetic resonance imaging is the most sensitive imaging technique for the detection of breast cancer, although it is rarely requested as a first-line procedure. The aim of our study was to determine the indications and results of breast examinations using 1.5 Tesla MRI in a referral imaging centre in Douala. ***Methodology*:** We conducted a retrospective descriptive cross-sectional study between 01 March 2021 and 31 December 2022. The examinations were performed with a dedicated breast scanner, using axial and sagittal T1 SE and T2 FSE sequences, as well as dynamic T1 sequences with gadolinium injection, and interpreted by two experienced radiologists. According to the BIRADS classification of the American College of Radiology (ACR), examinations graded 4 to 5 were considered positive. ***Results*:** Thirty-five patients underwent breast MRI, with a median age of 47, ranging from 29 to 65 years. The vast majority of prescribers were gynaecologists (88.6%). The most common indication for MRI was for additional assessment of a lesion (34.2%), followed by assessment of locoregional extension (17.1%), particularly for multiple extensions. All investigations requested solely for mastodynia (14.3%) were unremarkable. The two cases of investigation of breast discharge were mainly associated with enhancement without mass (5.7%). At the end of the study, 28.5% of MRI scans were pathological according to BIRADS. ***Conclusion*:** The gradual introduction of 1.5 T MRI scanners in our environment means that we can now carry out breast MRI scans that are much more sensitive than ultrasound mammography. However, prescriptions are still highly specialised, and indications need to be verified, given their relative specificity and the socio-economic context in which our countries are evolving.

Keywords: 1.5 Tesla MRI; Breast; BIRADS.

1. INTRODUCTION

Breast pathology mainly encompasses tumour lesions, dystrophic lesions and inflammatory lesions [1], requiring early diagnosis in order to eliminate breast cancer, which is the most common malignant tumour in the world and the leading cause of cancer deaths [2]. According to an American study, black women have a higher mortality rate from breast cancer than other ethnic or racial groups [3]. Furthermore, in developing countries, breast cancer is diagnosed late, particularly in Cameroon, where over 70% of patients present with stage III or IV disease [4].

In addition to the standard breast diagnostic procedures of clinical examination, mammography and ultrasound [5], magnetic resonance imaging (MRI) has emerged as the most sensitive test for detecting breast cancer [6, 7], with a sensitivity approaching 100% for visualising invasive cancer [8], although it has a high false positive rate [9]. Overall, an analysis of diagnostic imaging for cancer in Africa, based on 107 studies conducted in 19 countries, revealed that ultrasound was the most frequently used imaging modality, and MRI the least frequently used [10]. While in sub-Saharan Africa, the low use of MRI is thought to be linked to its excessive cost and rare availability [11], some authors in the United

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States advocate designating black women as high-risk, in order to improve access to early screening and complementary imaging, including breast MRI [3].

To the best of our knowledge, 39% of MRI machines used in Africa are low-field systems [12]. However, some recent studies have been published on the diagnostic and therapeutic contribution of breast MRI using 1.5 Tesla (T) equipment. A better understanding of the benefits of these technological advances could enable these new tools to be better integrated into the contextual diagnostic approach. The aim of this study was therefore to describe the indications and results of breast MRI, in order to assess its contribution.

2. METHODOLOGY

This was a cross-sectional, descriptive and retrospective study conducted at the Centre d'Imagerie Médicale de Douala, a private medical facility equipped with a recent MRI, a HITACHI Echelon Smart 1.5 Tesla, commissioned in March 2021. We included all the reports of patients undergoing breast MRI during the period from 01 March 2021 to 31 December 2022. Sampling was systematic and consecutive. Incomplete reports were excluded from the study. Data were recorded using a data collection form.

All examinations were performed in dorsal procubitus, using a dedicated breast coil, using axial diffusion sequences with ADC mapping, T1- and T2-weighted axial and sagittal sequences, and dynamic T1 sequences with gadolinium with or without fat saturation (not systematic).

The variables studied were clinico-epidemiological data (age, prescribers, indications), MRI data (abnormalities found), and the American College of Radiology (ACR) BIRADS classification, ranging from 0 to 6. The ACR Bi-Rads classification is based on morphological and dynamic analysis of contrast [13]. Examinations classified as BIRADS 1 were considered normal. Examinations classified as BIRADS 2 and 3 were considered benign. Examinations classified as 4 to 6 were considered positive. Statistical analyses were performed using Epi info software.

3. RESULTS

In the course of our study, we identified 37 breast MRI examinations, out of a total of 1,690 MRI scans performed at the centre, representing a frequency of 2% for breast MRI. A total of 35 examinations were definitively included, mainly in female subjects.

The median age was 47, with extremes ranging from 29 to 65. The most common age group was between 40 and 50 (45.7%), as shown in Figure 1.

Figure 2 shows the distribution of different prescribers, which were mainly dominated by gynaecologists (88.6%, n=31), followed distantly by oncologists (5.7%, n=2).

The indications for the 35 examinations are shown in Table I. The main indication was for further investigation of a lesion (12 patients out of 35, i.e. 34.2%). This work-up enabled us to better characterise 6 cases of cystic mastopathy (classified as BIRADS 3), mostly presenting as rounded sub-centimetric lesions, with fairly well-defined contours, hypo-T1, hypo-T2, without enhancement. There were also 3 normal examinations (BIRADS 1). In addition, in a 45-year-old patient being followed for cystic mastopathy, this work-up revealed the presence of an irregular mass, in T2-hyposignal- Diffusion, with low ADC, associated with architectural disorganisation, infiltration of the pectoral muscle, skin thickening and axillary adenomegalia (BIRADS 5).

As for the assessment of locoregional extension (6 patients out of 35, i.e. 17.1%), this confirmed 5 cases of tumour involvement, with the appearance of an oval mass, irregular contours, intermediate T1 and T2 signal, and low enhancement. Involvement of the pectoral muscle was noted in two patients and multiple involvement in three others. In a 56-year-old patient referred by an internist, MRI revealed a rounded nodule with low T1 and T2 signal, regular contours and moderate enhancement after contrast injection, classifying it as a suspicious lesion (BIRADS 4).

All examinations requested solely for mastodynia (5 patients out of 35, i.e. 14.3%) were unremarkable.

Two of the three patients (8.5%) who came for their MRI scan without a report presented with fibrocystic mastopathy associated with known adenofibromas, in the form of a well-demarcated mass with T1 and T2 hyposignal, non-enhanced after injection (BIRADS 2). The third examination was normal.

Two patients (5.7%) underwent breast flow assessment, which revealed irregular segmental enhancement, without a mass syndrome (BIRADS 4).

Among the two patients with radio-clinical discrepancies (5.7%), there was one case of cystic mastopathy, and the other examination was normal.

MRI of one of the two patients referred for post-chemotherapy surveillance (5.7%) showed a nodular lesion with skin infiltration, associated with pectoral involvement and axillary adenomegaly (BIRADS 6). Examination of the second patient showed an oval cyst with T1 hyposignal and T2 frank hypersignal, without enhancement, as well as post-therapeutic changes with the appearance of diffuse post-radiation fibrosis (BIRADS 3).

The only case of clinical suspicion of tumour recurrence (2.8%), presented a spiculated mass in hyposignal T1 and T2, in diffusion hypersignal, with lowered ADC, enhancing, with infiltration of the pectoral muscle (BIRADS 6), in a 48-year-old woman.

Only one patient presented with a discrepancy between mammography and ultrasonography (2.8%), concerning a nodule classified as a suspicious lesion on MRI (BIRADS 4).

The MRI performed on the only patient presenting with induration of the breast implants (2.8%) revealed an atypical, reshuffled appearance of the contents of the prostheses, with irregular thickening of the internal walls, in favour of bilateral extra-capsular rupture (BIRADS 3).

At the end of this study, eight examinations, or 28.5% of MRIs, were pathological according to BIRADS.

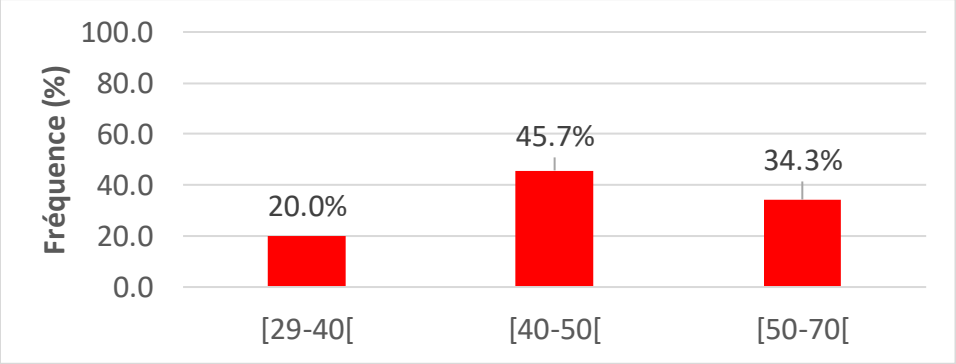

Figure 1: Breakdown of participants by age group

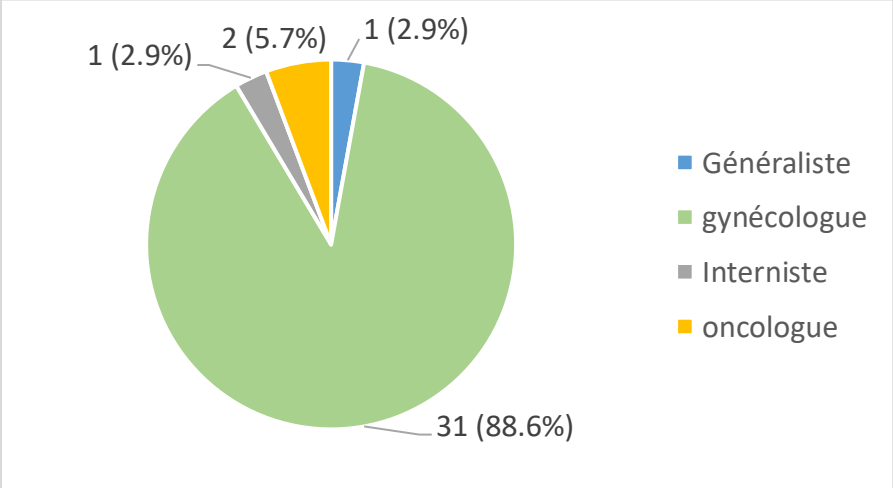

Figure 2: Breakdown of participants by test prescriber

Table I: Distribution of patients according to history

Indications	**Number (n)**	**Percentage (%)**
Additional assessment of an injury	10	28.8
Loco-regional extension	6	17.1
Mastodynia	5	14.3
Not documented	3	8.6
Radiation-clinical discrepancy	2	5.7
Breast discharge	2	5.7
Suspicion of tumour recurrence	2	5.7
Chemotherapy monitoring	2	5.7
Mammo-ultrasound discrepancy	1	2.9
Exploring breast implants	1	2.9
Total	**35**	**100.0**

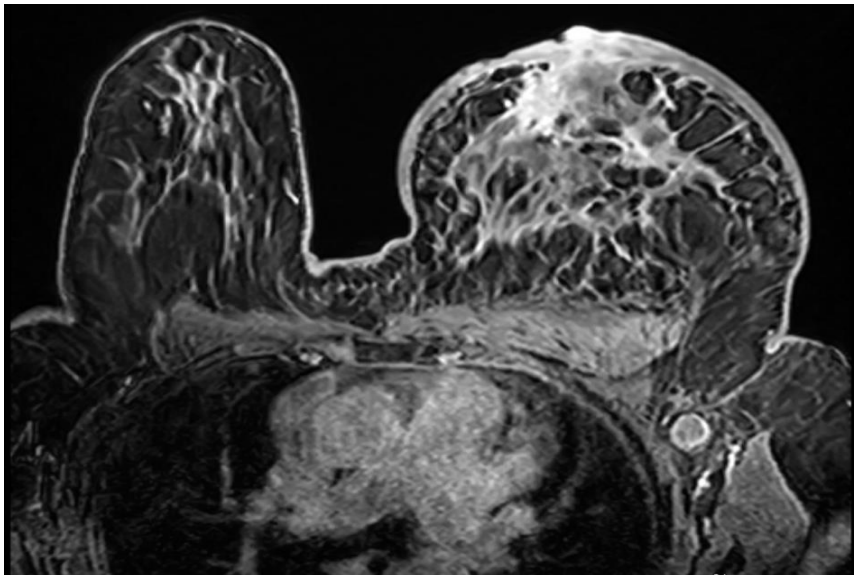

Figure 3: Breast MRI. Dynamic T1 FS-weighted axial sequence after gadolinium IV showing a pseudo-nodular tumour lesion, with skin infiltration, pectoral muscle involvement and axillary adenomegalia (BIRADS 5)

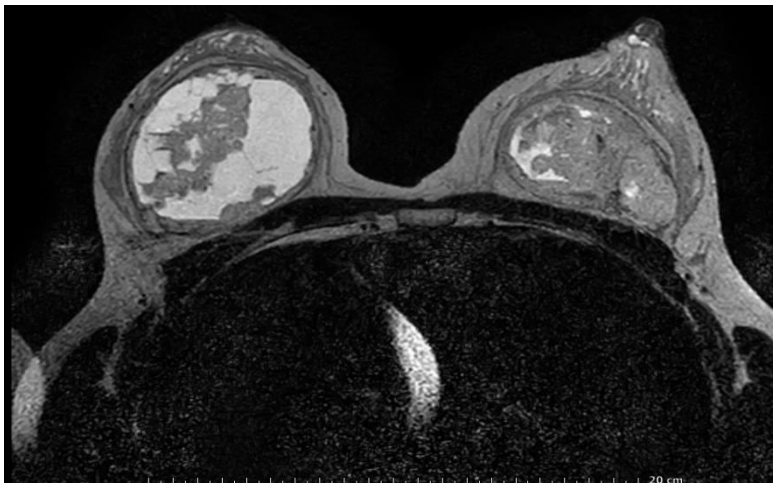

Figure 4: Breast MRI. FSE T2-weighted axial sequence showing an atypical, reshuffled appearance of the contents of the prostheses, with irregular thickening of the internal walls, in favour of bilateral extracapsular rupture (BIRADS 3)

4. DISCUSSION

The originality of this study lies in the fact that it is one of the first studies in the Cameroonian context to evaluate breast MRI activity, in order to contribute to better patient care and ongoing awareness of recent medical imaging techniques available in our environment. At the end of our work, covering a period of 22 months, we found a 2% frequency of breast MRI.

All our examinations were carried out with intravenous injection of gadolinium. Several previous studies have shown that breast MRI without contrast medium has no diagnostic value [5]. In our practice, we did not take into account patients' menstrual cycle. According to several authors, the optimal time to perform breast MRI in pre-menopausal women is between the 5th and 12th day after the start of the menstrual cycle [5].

All our patients were female, which is in line with the results of a French retrospective study on the role of breast MRI in the presence of a normal breast work-up in 51 cases [13]. To the best of our knowledge, there is no indication for MRI in the assessment of breast cancer in men [8]. Similarly, no imaging is recommended for breast cancer screening in asymptomatic men with the BRCA 1 or 2 gene [14].

In our study, 45.7% of the women were aged between 40 and 50. These results are similar to those of the retrospective study by Ouédraogo *et al*., on the practice of breast MRI at the Centre Hospitalier de Chambéry, which found more women aged between 39 and 59 years (45.2%) [15]. The median age of our patients was 47, which is similar to the results of the retrospective study by Brenan *et al*., who found a median age of 48 in patients who had undergone screening MRI

solely on the basis of a personal history of breast cancer [16].

In our series, complementary assessment of a lesion (characterisation) was the main indication (34.2%), which contrasts with the results of a study carried out in France, where the main indication was assessment of locoregional extension. These authors noted that MRI was still very often proposed to explore mammographic images, without ultrasound translation, classified as at least BIRADS 4 [15].

As for the locoregional extension work-up requested in our patients (17.1%), it revealed multiple extensions in three patients. According to Taourel *et al*., MRI should be systematically recommended for the assessment of breast cancer extension in selected groups of patients, particularly in the case of neo-adjuvant pre-chemotherapy assessment, and in women under 40 years of age [17]. According to the same authors, in 3% of cases MRI can detect a contralateral synchronous cancer not seen on mammography [17]. Several studies have shown that MRI can change the initial management of patients with breast cancer [9, 15].

Assessment of breast discharge (5.7%) revealed suspicious lesions. This differs from the results of Boisserie-Lacroix *et al*., who, in a study of 50 patients presenting with non-physiological discharge, found a benign aetiology in 92% of cases, atypical in 2%, and malignant in 6% [18]. The same authors emphasised the importance of MRI in the investigation of pathological discharge, avoiding the need for diagnostic surgery. However, in a retrospective study in the United States, MRI was used to diagnose six cancers in 22 patients with breast discharge that were not detected by mammography [13].

Only two cases of post-chemotherapy monitoring (5.7%) were recorded. This contrasts with the results of the study by Ouédraogo *et al*., (22%) [15]. This difference could be attributed to the smaller size of our sample, most of which was referred by gynaecologists.

The only case of clinical suspicion of tumour recurrence was positive. It is important to emphasise that this is the first validated indication for MRI [19].

Similarly, only one MRI scan was performed on a patient with breast implants. This is similar to the results of Lapierre-Combes *et al*., [13] whose study included two patients, but different from those of Ouédraogo *et al*., [15] who included five patients. Most authors agree that MRI is an effective technique for diagnosing possible ruptures of prostheses [13, 20], and remains particularly interesting for detecting possible breast cancers that are difficult to visualise on mammography because of the presence of prostheses [15, 21].

Our study has several limitations, in particular the poor completeness of the MRI reports, and the retrospective nature of the study, which limited the recruitment of a few subjects, thus reducing the size of the study population.

5. CONCLUSION

The gradual introduction of 1.5 T MRI in our environment has enabled us to perform breast MRI that is much more sensitive than the ultrasound-mammography combination, and which is mainly requested by gynaecologists in relatively mature women. The main indication was the additional characterisation of a lesion, which contrasts with the data in the literature. However, these indications need to be discussed with a view to improving patient care, given the socio-economic context in which our countries operate.

Conflicts of Interest: The authors declare no conflicts of interest.

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REFERENCES

1. Komboigo, B. E. (2017). Pathologies mammaires dans le service de gynécologie du Centre Hospitalier Universitaire Yalgado Ouédraogo: épidémiologie, diagnostic et pronostic. *Journal De La Sago (Gynécologie–Obstétrique et Santé de la Reproduction)*, *18*(2).
2. Katsura, C., Ogunmwonyi, I., Kankam, H. K., & Saha, S. (2022). Breast cancer: presentation, investigation and management. *British Journal of Hospital Medicine*, *83*(2), 1-7.
3. Oppong, B. A., Obeng-Gyasi, S., Relation, T., & Adams-Campbell, L. (2021). Call to action: breast cancer screening recommendations for Black women. *Breast Cancer Research and Treatment*, *187*(1), 295-297.
4. Halmata, M., Simo, R. T., Kembaou, G. N., Baiguerel, E. M., Ndopwang, L. C., Kamdje, A. H. N., ... & Nukenine, E. N. (2021). Breast cancer awareness and screening practice amongst health personnel and general population of the littoral region of Cameroon. *Heliyon*, *7*(7).
5. Mann, R. M., Kuhl, C. K., Kinkel, K., & Boetes, C. (2008). Breast MRI: guidelines from the European society of breast imaging. *European radiology*, *18*, 1307-1318.
6. Mann, R. M., Cho, N., & Moy, L. (2019). Breast MRI: state of the art. *Radiology*, *292*(3), 520-536.
7. Berg, W. A., Gutierrez, L., NessAiver, M. S., Carter, W. B., Bhargavan, M., Lewis, R. S., & Ioffe, O. B. (2004). Diagnostic accuracy of mammography, clinical examination, US, and MR imaging in

preoperative assessment of breast cancer. *radiology*, *233*(3), 830-849.
8. Orel, S. G., & Schnall, M. D. (2001). MR imaging of the breast for the detection, diagnosis, and staging of breast cancer. *Radiology*, *220*(1), 13-30.
9. Demard, N. F., Boulet, P., Prat, X., Charra, L., Lesnik, A., & Taourel, P. (2005). Apport de l'IRM dans le diagnostic et le bilan d'extension des cancers lobulaires infiltrants. *Journal de Radiologie*, *86*(9), 1027-1034.
10. Olawole, T., Oyetunde, T., Uzomah, U., Shanahan, J., Hartmann, K., Rotimi, S., & Dako, F. (2024). Exploring the state of cancer imaging research in Africa. *Journal of the American College of Radiology*, *21*(8), 1216-1221.
11. Patricia, Y. A., Sonia, A. D. J. A. D. O. H. O. U. N., Freddy, G. N. A. N. G. N. O. N., Moïse, S. E. W. A. N. O. U., Yannick, D. O. N. G. M. O., Olivier, B. I. A. O. U., & Vicentia, B. O. C. O. (2022). Accessibilité à l'imagerie dans la prise en charge des cancers du sein en milieu hospitalier au Benin. *Journal Africain d'Imagerie Médicale (J Afr Imag Méd).*, *14*(1).
12. Uduma, F. U., Abaslattai, A., Eduwem, D. U., Ekanem, M., & Okere, P. C. (2017). Utility of first trimester obstetric ultrasonography before 13 weeks of gestation: a retrospective study. *The Pan African Medical Journal*, *26*.
13. Lapierre-Combes, M., Rousset, J., Combes, E., Chinelatto, S., Dupré, P. F., & André, V. (2009). Étude rétrospective dans le Nord-Finistère sur la place de l'IRM mammaire devant un bilan sénologique normal, à propos de 51 cas. *Gynécologie obstétrique & fertilité*, *37*(5), 401-409.
14. Brachot-Simeonova, I., Morin, G., Gillaux, C., Demeer, B., Gondry, J., Mathieu, M., & Fauvet, R. (2012). What management for the asymptomatic men carriers of BRCA1 or 2 mutation? Results of a survey in the French oncogenetic centers. *Bulletin du Cancer*, *99*(4), 417-423.
15. Ouédraogo, P. A., Kouamé, N., Ngoan-Domoua, A. M., Kouamé-Koutouan, A., & Clerc, M. (2013). La pratique de l'IRM mammaire au centre hospitalier de Chambéry. *Médecine Nucléaire*, *37*(10-11), 486-489.
16. Brennan, S., Liberman, L., Dershaw, D. D., & Morris, E. (2010). Breast MRI screening of women with a personal history of breast cancer. *American Journal of Roentgenology*, *195*(2), 510-516.
17. Taourel, P. (2007). IRM dans le bilan d'extension: que nous a appris la litterature: quels referentiels?. *Journal de Radiologie*, *88*(10), 1346.
18. Boisserie-Lacroix, M., Adenet, C., & Trillaud, H. (2011). Apport de l'IRM dans les écoulements mamelonnaires pathologiques: analyse de 50 cas. *Journal de radiologie*, *92*(5), 412-420.
19. Tardivon, A. (2006). Place de l'IRM en sénologie. *Cancer du sein*, 67-82.
20. Herborn, C. U., Marincek, B., Erfmann, D., Meuli-Simmen, C., Wedler, V., Bode-Lesniewska, B., & Kubik-Huch, R. A. (2002). Breast augmentation and reconstructive surgery: MR imaging of implant rupture and malignancy. *European radiology*, *12*(9), 2198-2206.
21. Schnall, M., & Orel, S. (2006). Breast MR imaging in the diagnostic setting. *Magnetic Resonance Imaging Clinics*, *14*(3), 329-337.

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