Contribution of the Imagery by Magnetic Resonance (IRM) in the diagnosis of encephalic pathologies in Cameroun: case of Medical Jordan Service of Yaounde, General Hospital and of Daniel Muna Memorial Clinic of Douala

Authors : Mbo Amvene J¹, Ngassa Ekani Murielle Grâce², Mballa³, Ngaroua⁴, Nko'o Amvene S.⁵, Hamadou Ba⁶.

^{1,2,4}. Department of biomedical sciences, of the Faculty of sciences of the university of Ngaoundéré

^{3.5}. The university teaching centre of Yaoundé

⁶. Faculty of medecine and biomedical sciences of Garoua, university of Ngaoundéré

ABSTRACT

Background : encephalic pathologies are a real public health problem. Their support in imaging is important for clear characterization of lesions and therapeutic decision making. The aim of our study was to determine the benefits of Magnetic Resonance Imaging (MRI) in the diagnosis of encephalic pathologies.

Materials and methods: This was a cross-sectional descriptive study conducted in medical imaging and radiology services of Jordan Medical Services (JMS), the Danile Muna Memorial Clinic (DMMC) and the General Hospital of Douala (GHD) over a period from 9 May to 9 september 2016. All patients admitted for suspicion of brain pathology for MRI were eligible in the study. The dta were entered and analysed using software Microsoft Offcie 2013, Epi info7, Sphinx V5 Plus.

Results : A total of 123 patients were selected. Of the patients selected, 32 had a normal result. However, 91 MRI revealed 112 encephalic pathologies, the protocols used were in accordance whit the data of the literature either in sequences or in pondérations for etiologies encountered. MRI requests were made up in 41.5% of cases by neurologists and in 91.1% of cases the requests were justified coming mainly from hospitals of first category. More over, 45.5% of patients had a duration of symptoms that were more than two years old. In 74% of the cases MRI was only requested in the second intention and for symptomatology using MRI in the first intention according to the guide of good use of the medical imaging exams.

Conclusion : The diagnosis of encephalic pathologies is not early in the study area. MRI thus proves to be an undeniable contribution to the diagnosis which should be precocious in the encephalic pathologies. Hence, our invitation to access to the greatest number and for adequate indications and in conformity whit the recommendations of guides and good use of the medical imaging exams.

Keywords : Encephalic pathologies, MRI, early diagnosis

1- INTRODUCTION

The nervous system represents the whole of the nerve centres and nerves making it possible to coordinate and order the various apparatuses of the organization. The brain is part of the central nervous system consisted of the brain, cerebellum and cerebral trunk. The affections of brain are varied and can be subdivided in two great groups with knowing traumatic pathologies and nontraumatic pathologies [1].

Traumatic pathologies of the brain are variable; they are divided into primary lesions will intra or extra-axial, hemorrhagic or parenchymatous and in lesions known as secondary [2]. As for the nontraumatic cerebral lesions they are variable and can be subdivided in lesions tumoral, vascular, infectious and degenerative.

The diagnosis of these pathologies calls upon the private clinic but also with the medical imagery for an effective treatment

In optics to reduce the exposure of the patients to the irradiations by the suppression of the not justified examinations of imagery, a guide of good practices of the examinations of medical imagery was developed. This handbook presents 5 types of mentions for the indications of the examinations of imagery (examination indicated; indicated only in particular cases; specialized examination; not indicated initially; not indicated and contra-indicated).

The imaging by magnetic resonance (IRM) which was the subject of our study east defines by the French company of radiology as being a specialized examination and is regarded as the method of choice for the early diagnosis of encephalic pathologies in France.Not being irradiant, the IRM should be required in first intention in front of an irradiant technique such as tomodensitometry (TDM), standard radiography and the tomography by emission of positrons (Mtoe) for equivalent results [3].

Being installed only in two cities in Cameroon, the populations of the peripheral zones do not have an easy access to the examination of IRM.In addition to geographical accessibility, it poses a problem of financial accessibility because the IRM is an expensive examination.In the same way, the therapeutic decision is complicated and sometimes ineffective at advanced stages of pathologies.However, the early diagnosis of encephalic pathologies has the advantage of reducing the evolution of pathology, to allow a fast and effective assumption of responsibility which supports a good cure.

Extremely of all these reports, which IRM for which early diagnosis of encephalic pathologies in Cameroon?

Thus, let us be us fixed as objective to determine the benefit of the IRM in the early diagnosis of encephalic pathologies in the three medical structures which are Jordan Medical Center (JMS), Daniel Muna Memorial Clinic (DMMC) and the General Hospital of Douala (HGD), all this with an aim of improving the assumption of responsibility of these pathologies in imagery.

2- MATERIAL AND METHODS

The study was transverse descriptive extending over four months active from May to September 2016 in the services from radiology and medical imagery from three hospitals to knowing medical Jordan services of Yaounde, the General Hospital of Douala and Daniel Muna Memorial Clinic) of Douala.

Was included study, any patient addressed for an exploration IRM of brain having given its enlightened assent.

The examinations were carried out with apparatuses with low magnetic field of 0,3 T and 0,4 T the injection of product of Gadolinium contrast were done manually.

The analysis of the collected data was carried out using the software Epi information version 7 and Sphinx version 5 more. The test of association used was X2 with a risk of error of 5% (P = 0.05).

3- RESULTS

During the period of study, 123 patients carried out a cerebral IRM. 32 examinations were normal and 91 raised 112 encephalic pathologies. The patients consisted of 63 (51,2%) male kind and of 60 (48,8%) of the female kind with to a sex ratio H/F of 1,05. The examination of IRM was justified in 91,1% of case, but was asked in first intention only in 26% of case. The period separating the beginning from the symptoms and the examination of the most representative IRM was that?2 years (45,5%). Listed pathologies were dominated by degenerative pathology 29(25,9%).



Figure 1 : Pattern of the settlement according to the age brackets

The age of the patients varied from 1 to 84 years. The average age was 41 years. The age bracket the most touched was that 60 years and more (40,7%).



$\underline{Figure \ 2}: Distribution \ of \ the \ justification \ of \ the \ request$



The examinations of IRM were justified in 91,1% of case.

Figure 3 : distribution of the IRM like examination of second intention

In 74% of the cases, the IRM was required in second intention for symptomatologies making him call in first intention.

Listed pathologies

32 examinations were normal (26%), 91 examinations were pathological for 112 diagnosed pathologies

Table I: distribution of diagnosed pathologies

Groups of pathologies	Manpower	Fréquences (%)		
Degenerative Pathologies	29	25,9		
infectious Pathologies	24	21,4		
tumoral Pathologies	23	20,6		
Leucopathies	17	15,1		
vascular Pathologies	9	8		

921

Pathologies traumatiques	4	3,6
Syndrome épileptique	3	2,7
Pathologies malformatives	3	2,7
Total	112	100

Degenerative pathologies were accounted for either the 25,9%.

Protocole d'examen

pathologies/	FSE	SE	IR	DWI	EG	BASG	TOF	Dynamique	FS	Total
Séquences								U I		
tumoral	20,7%	22,8%	21,7%	13,8%	15,8%	0%	2,1%	3.1%	0%	100%
Pathologies										
degenerative	18,3%	22,1%	23,7%	15,3%	16,8%	0%	3,8%	0%	0%	100%
Pathologies										
infectious	15,7%	22,6%	24,5%	18,6%	12,8%	2%	3,8%	0%	0%	100%
Pathologies										
nervous	13,9%	21,5%	21,5%	20,3%	15,2%	0%	7,6%	0%	0%	100%
Leucopathies										
vascular	9,3%	20,9%	20,9%	18,6%	16,3%	0%	14%	0%	0%	100%
Pathologies								_		
traumatic	11,8%	23,5%	23,5%	17,6%	11,8%	0%	11,8%	0%	0%	100%
Pathologies										
epileptic	8,3%	16,7%	33,3%	16,7%	25%	0%	0%	0%	0%	100%
syndrom							-			
malformative	23,1%	23,1%	15,4%	7,7%	15,3%	0%	7,7%	0%	7,7%	100%
Pathologies										
Total	16,4%	22%	22,9%	16,6%	15,4%	0,6%	5,2%	0,6%	0,3%	100%

Table II : distribution of pathologies according to the sequences

Inversion-recovery is represented by group of pathologies with 22,9%. The dependence is significant with P = 0.04.

4- DISCUSSION

We obtained 123 patients whose age lay between 1 and 84 year (S), the age bracket most represented was that super 60 years with 41 years an average age.Our sample included/understood more patients of the male kind (51,2%) that female with a sex-ratio of 1,049.This, without reference to kind, seems to suggest that the probability of developing a encephalic pathology believes with the age.Indeed, a study on the affections cérébroméningées with the CHU of Fann in Dakar found a sex-ratio of 1,83 and one 33 years average age [4], thus reinforcing this idea as for the increase in which has occurred of the degenerative disease with the age.

Being the justification of the requests for examination, our results are similar to those of the study carried out by Moifo et al. [5], in Yaounde on the relevance of the bulletins of examinations. The neurologists are specialists in neurological pathologies, the request for examination of encephalic IRM which represents a great entity of neurology is made by their care. Indeed, the Guide

of Good Use of the Examinations of Medical imagery (GBUEI) defines the IRM as belonging to the specialized examinations which are "*complex examinations and expensive which is practised only on the request of doctors having necessary experience and the clinical expertise to integrate the results of the imagery for a suitable assumption of responsibility of the patient*" [3]. What justifies the fact that the neurologists have the most indications justified in note study.

The hospitals of first category were those which had the most justified requests, this would be explained by the fact why, these hospital structures have the role of delivering services of care of high level health specialized. They have the most specialists and are used as reference for the hospitals in 2nd category [6].

Concerning the protocols of examination, they were overall in conformity with the data of the literature with some nuances function of the type of required pathology:

- for the degenerative affections, most frequent here is the disease of Alzheimer, if we had worked like Barres (2012) [7] and not like Bertrand *and Al*, (2015) [8], it was much more in optics to determine if there is a rupture of the hematoencephalic barrier. Moreover, sequence TOF was used here to seek a vascular attack. Indeed, the High authority of health proposes a protocol similar to our but without injection of product of contrast [9].

- For infectious pathologies, most frequent in our study was the progressive multiple leucoencephalopathy (LEMP). If we worked as Havez and Al, (2010) [10] with the CHU of Bordeaux with old patients of 19 to 83 years and not like Luaba, (2015) [11] with the CHU of Liege, or as the French Company of radiology [12] suggests it; it is much more due to the fact that we work with an apparatus with low magnetic field what led to the addition of the sequences TOF, BASG and echo of gradient for a better appreciation of the vascular attack in infectious pathology.

- For tumoral pathologies, most frequent here was the macroadenomist of the pituitary gland, our results are similar to those obtained in Dakar [13] and Nouakchott [14] and nonin conformity as the French Company of Radiology [12] suggests it.Indeed, the sequences in echo of T2 gradient *, Dynamics and BASG were used to determine the signs of bleeding of the tumour in order to differentiate the malignant tumours from the benign ones.

- The leucoaraïose represented the most frequent leucopathy of our study, and the ischaemic AVC, the vascular affection most frequent. Our results are similar with those of Longstreth *et al.*.(1996) [15] and with the same protocols as those of Sede and Labauge (2010)[16] or of those of Boukobza *et al.*.(2000) [17] in the diagnosis of the syndrome of Sturge Weber for the leucopathies. In the same way, our results are similar to those of Cowppli-bony *et al.*, (2007)[18] which worked in Bouaké and of those of Kouakou [19] in Abidjan (2015) or of those of Lescot *et al.*.(2010)[20].Of the protocols as for them, were in conformity with the recommendations of the French company of radiology [12] (SFR, 2013).

- Traumatic pathologies were dominated by the hématome under-dural with a male prevalence. Although our results are similar to those found by Sanoussi *et al.*, (2009) [21] with the service of neurosurgery of Niamey, the protocols were not the same ones as those proposed the French Company of Radiology [12]. Indeed, because of an apparatus of IRM with low magnetic field, we added the sequences in echo of T2 gradient * to determine the signs of bleedings, the TOF in the exploration of the vessels there to determine a possible lesion and the injection of PDC to study a rupture of the hemato-encephalic barrier.

- For malformatives pathologies with knowing Pachygyrie, hypertrophies cerebral, Platybasie, our protocols were not similar with those of Mnif *et al.*.(2003) [22].Indeed, we worked on the great group of malformatives pathologies.This is why we added in addition to these sequences, the FATSAT, the echo of gradient and sequence TOF in optics studied the vessels, to determine if there is a vascular attack and to differentiate the malformative attack from a lubricating component, contrary to work of Mnif *et al.* whose study was centered only on one particular type of cerebral malformations.

- For the syndrome epileptic (2,4%), our apparatus with low magnetic field did not enable us to study the functional aspect recommended by the French Company of Radiology [12], however, the diffusion with an apparent coefficient of diffusion (ADC) reduced as well as the sequences of echo of gradient enabled us to determine the zones of hypoactivity as well as signs of bleeding.



The IRM was required in second intention in the majority of the cases (74%). So the nonobservance of the recommendations with regard to the choice of the examination of imagery of first intention for the diagnosis of the lesions of brain represents a barrier to obtaining an early diagnosis for an effective treatment. It is to say that the diagnosis of encephalic pathologies was not early in our zone of study. In addition, the reduced number of apparatuses of IRM in the country represents a handicap with regard to the financial and geographical accessibility of the populations to this method of medical imagery. The high number of pathologies listed thanks to this method of imagery enables us to conclude that the IRM is of an undeniable contribution to the diagnosis which should be early for an effective treatment of encephalic pathologies. More specific studies on attacks isolated from brain or for a precise type from sequences from IRM could be very beneficial with regard to the projections of the neuro-imagery in Cameroon.

REFERENCES

- 1. Devedeix N., 2014. Le système nerveux, anatomie physiologie ; U.E.2.2. Pp. 2-5
- 2. Dosch J-C., Dupuis M., Douzal V., 1994. Traumatismes crâniens fermés et imageries des lésions intracrâniennes récentes, Éditions Scientifiques et Médicales *Elsevier SAS*. P. 10

3. Guide de Bonnes Usage des examens d'imagerie médicale (GBUEI), 2013. SFR, SFBMN; 2^{ème} Edition. Pp.16-22

4. Soumaré M., Seydi M., Ndour C. T., Fall N., Dieng Y., Sow A. I., Diop B., 2005. Profil épidémiologique clinique et étiologique des affections cérébroméningées observées à la clinique des maladies infectieuses du CHU de Fann à Dakar. *Médécine et maladies infectieuses*.35(7) :383-389.

5. Moifo B., Kamgnie M. N., Ninying F., Zeh O. F., Tebere H., Mouliom T. J. R., Edzimbi A. L., Nko'o A. S., **2013**. Pertinence des indications d'examens d'imagerie médicale à Yaoundé-Cameroun. *HSD* ; 14 (4) :8

6. Essomba A., 2012. Organisation du système de soins au Cameroun. Pp.4-15

7. Barres P., 2012. Maladie d'Alzheimer et autres maladies d'évolution démentielle. D.I.U Alzheimer. Nice. P.4

8. Bertrand A., Lehericy S., Colliot O., Dormont D., 2015. Troubles cognitifs et imagerie : de l'imagerie morphologique. P. 90.

9. HAS, 2011 : indicateur conformité des demandes d'examens d'imagerie campagne **2010**. Analyse descriptive des résultats agrégés 2010 et analyse des facteurs associés à la variabilité des résultats. P.5-10

10. Havez M., Bocquet J., Mouries A., Tourdias T., Moulinier S., Eimer S., Dousset V., 2010 Caractéristiques IRM de la leucoencéphalite multifocale progressive : revue de 11 cas. *SFR*. Pp. 2-8

11. Luaba T. J. F., 2015. Pathologies inflammatoires du système nerveux central. CHU de Liège. Uclimaging. P.16

12. Société Française de Radiologie (SFR), 2013. Neuroradiologie. Pp.241-284

13. Diop A. D., Diop S. B., Dia A. A., Leye M., Mbengue A., Seck M., Baly A., 2014. Aspects épidémiologiques IRM des lésions de la région séllaire et parasellaire à DAKAR (Sénegal). *JAIM*; 6(3) :13-22.

14. Ould B., Boubacar A. M., Soumare O., Dlagana M., Salihy S. M., N'taghry B., Moustapha A. M., 2007. Apport de l'IRM dans le diagnostic des tumeurs cérébrales en milieu tropical : expérience de Nouakchott à propos de 127 cas. *Journal de radiologie*, volume 88, n°10, P. 1444

15. Longstreth W. T., Manolio T., Arnold A., Burke G. L., Bryan N., Jungreis C. A., Enright P. L., Leary O. D., Fried L., 1996. Clinical correlates of white matter findings on cranial magnetic resonance imaging of 3301 elderly people. *The cardiovascular health study. Stroke*. Dec; 27(12): 1269-1273

16. Sedel K., Labauge P., 2010. Etiologies génétiques des leucoencéphalopathies de l'adulte. John Libbey eurotext. (2) :3

17. **Boukobza M., Enjolras O., Cambra M. R., Ducreux D., Merland J. J., 2000**. Syndrome de Sturge Weber. Données actuelles de l'imagerie neuroradiologique. Journal de radiologie, (81)7 : 765-771

18. **Cowppli-bony. P., Sonan D., Yaoua T., Akani F., Ahogo. C., N'guessan. K., Beugre E. K., 2007**. Epidemiologie des AVC au service de neurologie de Bouaké. *Médécine d'Afrique Noire*.;54(4):199-202

19. Kouakou N. Y. N., Traore F., Micesse T., Kouadio E. K., Anzouan J-P., Konin C., Guikahue K., 2015. Aspects épidémiologiques des accidents vasculaires cérébraux (AVC) aux urgences de l'institut de cardiologie d'Abidjan (ICA). *Pan Afr Med J.* 21:160

20. Lesoct T., Galanaud D., Puybasset L., 2010. Imagerie utile en neuroréanimation. Société Française de réanimation. Pp. 5-24

21. Sanoussi S., Addo G., Chaibou M. S., Baoua M., Rabiou M. S., Kelani A., 2009. Hématome sous-dural chronique à Niamey, *African journal of neurological science*. (28):

22. Mnif N., Oueslati S., Hmaied E., Mlika N., Abdallah B., N., Hamza R., 2003. Imagerie par resonance magnétique des dysgénésies corticales. *Journal of neuroradiology*; 30(1):10-17

925

ICONOGRAPHY



Cas No 1 : patient X 56 years old, addressed to the service of radiology for the realization of a cerebral IRM.Collection while growing hyperintense in T2 * (echo of gradient):Hématome under-dural



Case No 2: patient Y 63 years old addressed to the service of radiologies for the realization of a cerebral IRM.Description of hypersignaux T2 périventriculaires translating a phenomenon of demyelinisation of the white substance: Leucoaraïose



Cas No 3: Nourrisson XY 4 months, addressed to the service of radiology for clonic convulsives crises of the hémicorps right.Description of an absence of gyration at the frontal level and of a reduced number of furrow at the pariéto-occipital level:Pachygyrie



Cas No 4:07-year-old YZ patient referred to the radiology department for a brain MRI with gadolinium injection for suspicion of a frontal intracranial process with mass effect. Demonstration of a contrast enhancement with peri-lesional edema visible by the hyposignal surrounding the process in 3DT1 sequence with displacement of the median line: Intracranial occupying process Left posterior frontal responsible for sub-falcorial engagement of 8mm: Abscess at left posterior frontal lobe

C GSJ