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Mode B Ultrasound in the Study of the Posterior Segment in the Medical Clinic "Marie Curie" in Bamako

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Abstract

Introduction: The study of the posterior segment of the eye has nowadays become one of the most frequent indications for diagnostic ultrasound in the ophthalmological field. The objective of this work is to contribute to the improvement of the diagnostic management of pathologies of the posterior segment of the eye in the radiology department of the medical clinic "Marie Curie" in Bamako. **Material and Methods:** This was a cross-sectional study carried out in the medical imaging department from January 2020 to January 2022. It concerned all patients who presented for the study of the ocular posterior segment on ultrasound. **Results:** Fifty-two (52) patients out of a total of 109 were included in the study, *i.e.* a frequency of 47.70%. The average age was 33.90 with the extremes ranging from 05 years to 75 years. The male sex dominated with a frequency of 69.23%. Ocular ultrasound was prescribed mainly by ophthalmologists (100%). In the study of the posterior segment, preoperative assessment represented the most frequent indications with respectively 55.76% and 23.10%. Retinal detachment and vitreous hemorrhage were the most found lesions on ultrasound with 50% and 34.61% respectively. **Conclusion:** Ocular ultrasound is accessible in Bamako and has allowed the study of the posterior segment of the eye. It occupies an important place in the study and management of ocular pathologies of the posterior segment.

Keywords

Ultrasound, Posterior Segment of the Eye, Medical Clinic "Marie Curie"

Bamako

1. Introduction

Ocular pathology is a real public health problem on a global scale. In fact, there are at least 2.2 billion people in the world who are visually impaired or blind [1] [2]. Medical imaging has become essential in the management of ocular pathologies, in particular the posterior segment [3]. The study of the posterior segment is one of the most frequent indications for diagnostic ultrasound. The ultrasound examination must be systematic and exhaustive. He must successively analyze the vitreous, the vitreoretinal interface, the retina, the choroid, the sclera, the papilla and the macula, using the benefits of high-frequency probes [4]. The indications for ocular ultrasound are multiple, in particular the search for various tumoral, traumatic, infectious, and degenerative pathologies [3] [4] [5]. Ocular ultrasound makes it possible to establish a precise map of ocular lesions, contribute to the clinical evaluation and ensure follow-up and prognosis. CT and oculo-orbital MRI are commonly practiced, but although the oldest of the techniques (the eye has been one of the first applications of ultrasound in medicine), ultrasound is only practiced by very few sonographers and a few ophthalmologists [3]. Ultrasound is one of the means of ocular radiological exploration little used in Bamako. To our knowledge, no study on all ocular pathologies (posterior segment) observed on ultrasound has been carried out in Mali to date, which justifies our study. The objective of this work is to contribute to the improvement of the diagnostic management of pathologies of the posterior segment of the eye in the radiology department of the medical clinic "Marie Curie" in Bamako. By describing the socio-epidemiological aspects of patients with ocular ultrasound indications; and determining the main ocular pathologies of the posterior segment revealed by ultrasound.

2. Materials and Methods

This was a cross-sectional study carried out in the medical imaging department of the "Marie Curie" medical clinic from January 2020 to January 2022, *i.e.* a duration of 02 years. It involved all patients who presented for the study of the posterior ocular segment on ultrasound, regardless of age and gender. All patients with complete files including (surname, first name, age, sex and origin). So the sample consisted of 52 patients. Ocular ultrasounds were performed by radiologists and sonographers (with more than 10 years of experience) of the service with a General Electric (GE) brand ultrasound device put into circulation in 2010. It was equipped with three probes including a probe linear multifrequency of 5 - 12 MHZ which had been used to make the ocular ultrasounds. The examination was performed with a patient in the supine position, eyes closed, and the coupling gel applied to the eyelids. The left eye and the right eye were syste-

matically examined and compared regardless of the indications. The examination began with the measurement of the ocular biometrics in B mode and in the longitudinal section. The posterior segment was examined, looking for vitreous abnormalities (floaters, membranes, an expansive process, and foreign bodies) and retinal abnormalities (V-shaped and umbrella detachment). An information collection sheet was drawn up, based on the radiological examination report. It included the following parameters: age, sex, prescriber (ophthalmologist or other), indication and results of the examination.

The information obtained was treated in strict anonymity.

3. Results

Sociodemographic data

At the end of the study, 52 patients were included. The average age was 33.90 years with extremes ranging from 05 years to 75 years. The male gender predominated with 69.23%. The distribution of patients by age group revealed that the age group from 41 to 50 years was the most affected with 32.69% (Figure 1).

Prescribers

The distribution of patients according to prescribers had shown that all prescribers were ophthalmologists, *i.e.*, 100% of cases

Indications for ultrasound

The indications for ultrasound were varied. The study of the posterior segment was the most frequent, represented by 55.76%, followed by the preoperative assessment (23.10%), trauma 9.61% of cases and controls 9.61% (Table 1).

Ocular biometry and the affected eye

Almost all of the eyeballs had normal biometry (96.16%). However, one case of hypotrophy and one case of staphyloma had been observed. The right eye (OD) was affected in 20 patients, *i.e.*, 38.46% of cases, the left eye (OG) was affected in 15 patients, *i.e.*, 28.84%, and bilateral involvement in 17 patients, *i.e.* 32.69%.

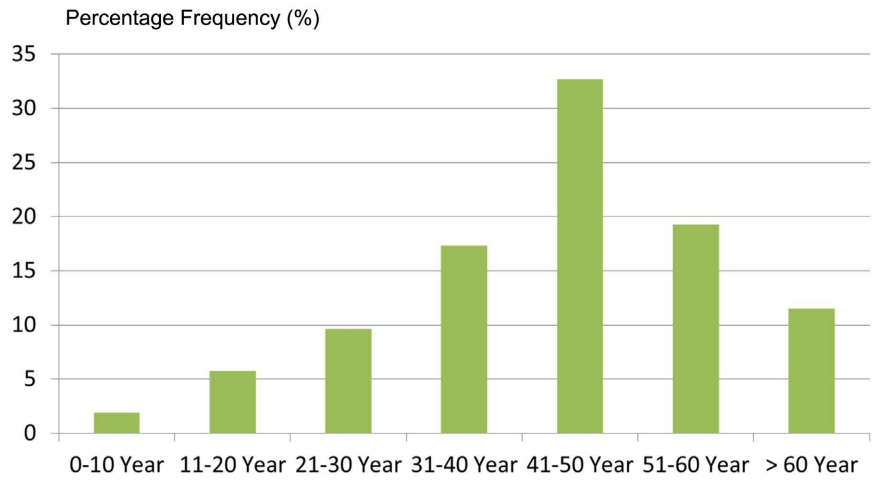

Figure 1. Distribution of patients by age group.

Lesions of the posterior segment observed on ultrasound

Several pathologies of the posterior segment have been revealed by ocular ultrasound. They were dominated by retinal detachments which represent half of the pathologies (50% of cases) followed by hemorrhages of the vitreous (34.61%) and dislocation of the lens (7.69%). A case of ocular hypotrophy and one case of staphyloma were observed (Table 2).

Figures 2-4 describe certain pathologies of the posterior segment found on ultrasound. Among the 20 patients who presented lesions of the posterior segment of the eye, some of its pathologies were associated with each other, in particular retinal detachment with vitreous hemorrhage (in 9 cases, *i.e.* 34.61% of cases). Retinal detachment and calcifications of the lens (in 17 cases or 65.38% of cases). The retinal detachment was much more total in our study, which we will show you in Figure 2 and Figure 3 below. These retinal detachments are associated with floating mobile membranes in the vitreous and also with intra-vitreal hemorrhage observed in the same figures. We have also shown in Figure 3, the dislocation of the posterior lens which reaches the cataract in Figure 4.

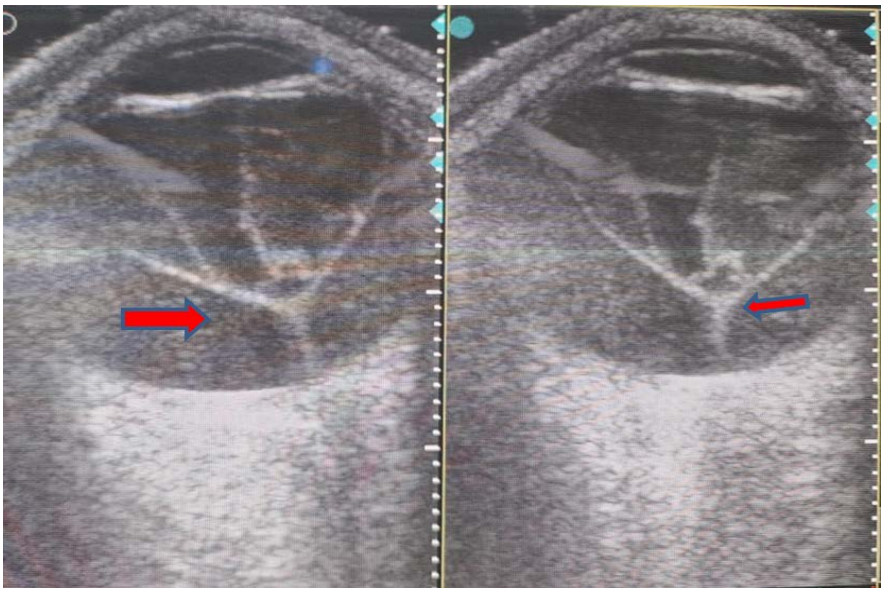

Figure 2. V-shaped retinal detachment (red arrow) with intravitreal membranes.

Table 1. Distribution of patients by clinical information.

Clinical information	Number of patients	Percentage (%)
Posterior segment states	29	55.76
Preoperative assessment	12	23.10
Trauma	5	9.61
Controls	5	9.61
Stained glass stain	1	1.92
Total	52	100%

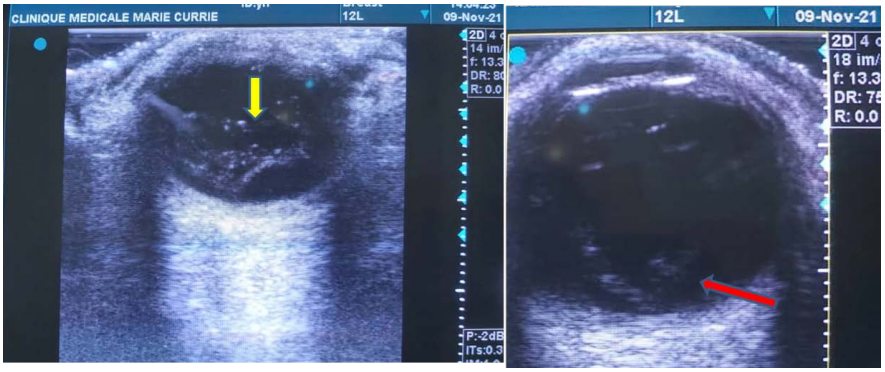

Figure 3. Intravitreal hemorrhage (yellow arrow) with V-shaped retinal detachment (red arrow).

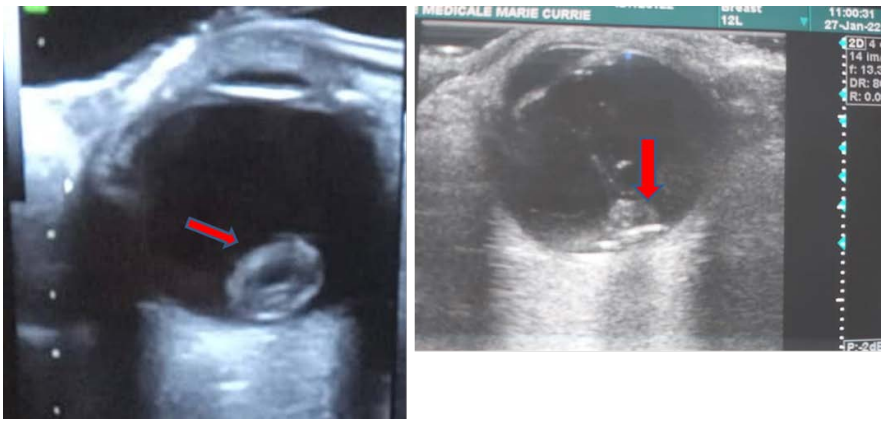

Figure 4. B mode ultrasound: posterior dislocation of the lens (red arrow).

Table 2. Breakdown of patients by pathologies found on ultrasound.

Pathologies found on ultrasound	Patients	Percentage (%)
Rétinal detachment	12	50
Vitreous hemorrhage	10	34.61
Posterior lens dislocation	2	7.69
Ocular hypotrophy	1	3.85
Staphyloma	1	3.85
Total	26	100

4. Discussion

***Sociodemographic data*:** We had collected 52 patients over a period of 2 years looking for pathologies of the posterior segment of the eye. This number is lower than that of Konan AN *et al* [1], who collected 112 cases in Abidjan on the Ivory Coast over a period of 24 months. This difference could be explained by the less strong demand for ocular ultrasound by ophthalmologists on the one hand and the lack of experience of Malian radiologists in ultrasound management in eye pathologies, in particular the study of the posterior segment, this

study which was exclusively interested in the pathologies of the segment. We had found that ocular pathologies can occur at any age. The same findings were reported by Nzeh *et al.* [5]. However, some of these pathologies vary according to age groups [1] [5]. The male predominance of ocular pathologies, in particular the study of the posterior segment, has also been reported in the literature [6] [7] [8].

Prescribers: All our patients were referred by ophthalmologists from our clinic and other ophthalmological centers in Bamako, as well as ophthalmologists from the large CHU IOTA (African Tropical Ophthalmology Institute) based in Bamako, Mali. This shows that the management of eye pathologies in Mali and Africa seems to be appropriate and logical given the sensitivity of the organ which is the eye.

Indications: The indications for an ocular ultrasound during our study were dominated by the study of the posterior segment of the eye and the preoperative assessment; ocular trauma came in 3rd place. These results cannot be superimposed on those of the literature [1] [9] because most of our patients presented cataracts, which is a much more common pathology in the elderly, during the assessment. But ocular trauma can occur at any age [3] [10] [11] [12].

Ocular involvement: The right eye was much more affected than the left eye and bilateral involvement of the ocular posterior segment was not negligible in (32.69% of cases). These results are identical to those of the literature who's right or left predominance or even bilaterally would be due to chance [1] [9] [13] [14] [15].

Pathologies of the posterior segment of the eye found on ultrasound: Of the 52 patients included in the study of the posterior segment, the 20 cases of ocular pathologies of the posterior segment mainly concerned retinal detachments (50%), vitreous hemorrhages (34.61%), and posterior dislocation of the lens (7.69%), ocular hypotrophy (3.85%) and staphyloma (3.85%). These findings are very similar to those of the literature [1] [11] [16] found in order of the most frequent pathologies in ocular ultrasound (retinal detachments and vitreous hemorrhages). Some authors have the same thing but in the order differ [1] [5]. The lesions can be presented alone or in association, especially in the case of retinal detachment with vitreous hemorrhage (34.61% of cases in our series) and retinal detachment with vitreous and lens calcifications in cases of cataract (65.38% of cases) which has also been reported by some authors [1] [3] [16] [17] [18]. Retinal detachment often causes differential diagnosis with vitreous hemorrhages [1] [19]. Retinal detachments appear on ultrasound as a typical image in the form of a more or less thick hyper echogenic line, connecting gently to the wall of the eyeball, which can be partial or total, giving the appearance of an umbrella image or in V. They are mobile during the movements of the eyeball [1] [19]. Intra-vitreal hemorrhages are easy to diagnose, they are characterized by echogenicity in clusters of the vitreous or sometimes are organized in thick membranes with slow and flexible movements [1] [8]. There may be interpretation problems in the diagnosis of retinal detachment, especially in

the case of intra-vitreal hemorrhage or mobile vitreous membranes whose multiple echoes interfere with the detection of retinal detachment and vice versa [1] [20]. Other means of imaging such as MRI (Magnetic Reason Imaging) and computed tomography (CT) in the study of the posterior segment of the eye in particular and the pathology of the eyeball in general are important in order to finer and more precise semiology, thus explaining the limits of ultrasound and the complementarity between ultrasound and cross-sectional imaging (MRI and CT) [1].

***Limit of the study*:** The parameters of the sampling are the limit of our study given the findings of the large number of parameters studied in certain studies in the literature [1] [11] [16] [20] and especially the absence of a study original on the matter, but also the difficulty of following the evolution of our patients after therapy.

5. Conclusion

Ocular ultrasound is a sensitive examination that is less expensive and accessible in Bamako and has allowed the study of the posterior segment of the eye by finding most of its pathologies described in the literature such as retinal detachment, intra-vitreal hemorrhage, lens dislocation, hypotrophy and staphyloma. It occupies an important place in the study and management of ocular pathologies of the posterior segment of the eye. It should be more and more in demand given its place in the management of ocular pathologies.

Conflicts of Interest

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

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Annex

Mode B ultrasound in the study of the posterior segment in the medical clinic "Marie Curie" in Bamako

Sheet No.: ……..

I. Identification: ……

Last name: .....

First Name: ....

Age.....in years Residence.....

Gender: ……

II. Medical history:

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III. Surgical history:

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IV. Clinical information:

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V. Ultrasoundresults:

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