

## Profile of Meningioma at the Pathology Laboratory of the Hospital Center of Soavinandriana Antananarivo

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### ABSTRACT

**Introduction:** Meningiomas are the most common primary tumors of the central nervous system, accounting for approximately one-third of all intracranial neoplasms. The aim of this study was to describe the epidemiological and histopathological characteristics of meningiomas diagnosed at the Pathology Department of the Soavinandriana Hospital Center (CENHOSOA), Antananarivo Madagascar.

**Patients and Methods:** A retrospective, descriptive, and analytical single-center study was conducted in the Pathology Department of CENHOSOA, Antananarivo, Madagascar, over a 10-year period from January 2013 to December 2022. All histologically confirmed cases of meningioma were included.

**Results:** During the study period, 38 cases were collected. The mean age of patients was  $48.9 \pm 14.6$  years, with a female predominance (sex ratio: 2.1). Signs of intracranial hypertension were the most common presenting symptoms, occurring in 28.4% of cases. The convexity was the most frequent tumor location (65.8%). According to the WHO classification, grade I meningiomas represented 81.8% of cases, with the meningothelial subtype being the most prevalent histological variant (52.6%). Surgical specimens accounted for 94.7% of the analyzed samples.

**Conclusion:** Meningiomas predominantly affected middle-aged adults and were mainly represented by WHO grade I tumors. A multicenter study would provide a more comprehensive overview of the epidemiological, clinical, and histopathological profile of meningiomas in Madagascar.

### Keywords

Brain neoplasm, Epidemiology, Histology, Madagascar, Meningioma, Tumor.

### Introduction

Meningiomas are primary extra-parenchymal tumors, generally benign, that develop at the expense of the meninges. They constitute the most common benign tumor of the central nervous

system, with respective proportions of 47.9% in the United States [1] and 36.6% in Madagascar [2]. Histologically, meningiomas present a wide morphological variability. According to the World Health Organization [3], meningiomas include fifteen histological subtypes, divided into three grades. Thus, through this study and the review of the literature, we aim to describe the histopathological aspects of meningiomas.

## Patients and Method

We carried out a retrospective study of meningiomas, collected at the Pathology Laboratory of the Hospital Center of Soavinandriana (CENHOSOA), over ten-year-period from 2013 to 2022. We focused on clinical information and the anatomopathology examination. The diagnosis was obtained after microscopic examination of slides stained with Hematoxylin-Eosin from biopsy or operative specimens.

## Results

During the study period, 38 cases were collected. The mean age was  $48.99 \pm 14.64$  years, with a peak frequency in the age groups between 40 and 50 years and between 60 and 70 years at 24% each (Figure 1). Two cases of pediatric meningioma were observed in this study, representing 5.3% of the study population. A female predominance was noted, with a sex ratio of 2.1 (Figure 2). According to clinical information, the presence of intracranial hypertension was the most frequent clinical manifestation (28.4%). By location, the meningioma was intracranial in 37 cases (97.4%) and spinal in 2.6% (T8). The convexity was the preferred site for intracranial meningioma in 65.8%. Computed tomography (CT) was performed in 35 patients (92.1%), of whom two patients (5.3%) had magnetic resonance imaging in addition to the CT. In 94.7% of cases, the specimen was a surgical piece. According to the histological results, three types of meningiomas were observed: benign meningioma in 81%, atypical meningioma in 14%, and anaplastic meningioma in 5%. For benign meningiomas, the meningothelial subtype was observed in 52.6% of cases (Figure 3).

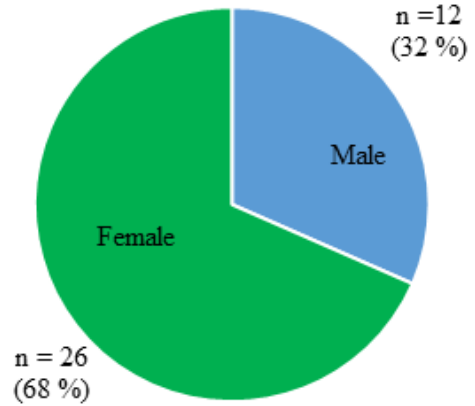


Figure 2: Distribution of patients by gender.

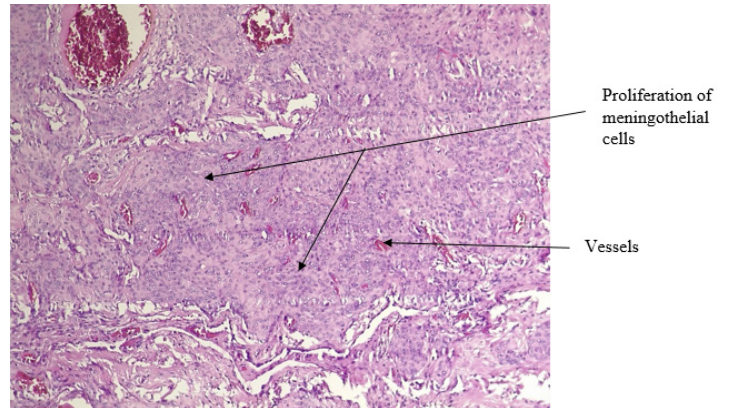


Figure 3: Brain surgical specimen. Meningothelial meningioma. Hematoxylin eosin x 100.

**Origin:** Pathology Laboratory of the Hospital Center of Soavinandriana (CENHOSOA)

## Discussion

Meningiomas are tumor proliferations originating from the meningeal layers of the brain or spinal cord [4]. They account for 35% of brain tumors in adults and are the most common primary tumors of the central nervous system [5]. Meningiomas are benign in more than 90% of cases and correspond to a WHO grade I. Meningioma is the generally benign tumor, the most frequent of the central nervous system. It has been the subject of several studies, and currently, research is more focused on the fields of microbiology and oncogenesis of this pathology [6]. The confirmed prevalence of the pathology is estimated at 97.5/100,000 in the United States, with more than 170,000 diagnosed patients living with this condition. In this study, 38 cases were recruited over 10 years, representing 0.99% of all samples. The age at diagnosis differs between developed and developing countries.

In the present study, the average age was  $48.99 \pm 14.64$  years. A Malagasy study found a younger average age than in the present study. Ratovondrainy W et al [7] reported an average age of 39.7 years.

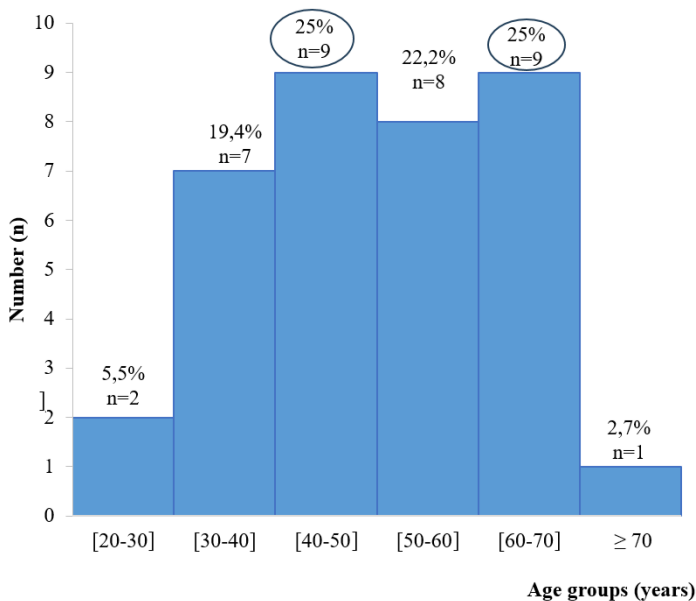


Figure 1: Distribution of patients according to age groups.

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Results from African studies suggest that meningiomas were mostly observed at an earlier age compared to other western countries, particularly in black populations. The most likely reason lies in the shorter life expectancy of the African population. In Europe, 76% of meningioma cases are observed after 50 years, with a median age of 61 and 52 years for some forms in adults and in children [8,9]. In France, Zouaoui S et al found an average age of 58 years [10].

Meningioma is exceptional in children, which is consistent with the results of the study by Thuijs NB et al. on intracranial meningioma in the pediatric setting, concerning 72 cases over a period of 36 years regarding the rarity of meningioma in this age group and its much more aggressive nature than that in adults [11]. Female predominance is classic and clear. It is typical of meningiomas, according to different authors. The data from this study are consistent with the literature since 68.2% of patients were women. In the United States, Ostrom QT et al. found that meningiomas are 2.3 times more common in women than in men, and 3.29 times even more in women aged 35 to 54 years [4].

Although the precise reasons for this trend are not yet fully understood, several hypotheses have been put forward to explain this predominance: hormonal influences: sex hormones, particularly estrogens, could play a role in the development of meningiomas. Regarding the clinical presentation, intracranial hypertension was the most observed in the present study at 28.4%. This aligns with the study by Cherif M et al. [12], in Guinea, in 43% of cases. It differs markedly between African and European countries. In Africa, patients often consult at an advanced stage with signs of intracranial hypertension, significant neurological deficits, and large tumors.

On the other hand, Hima-Maiga A et al. found headaches as a clinical sign in 72.2% of cases [13]. In Europe, earlier diagnosis allows for management before the onset of severe neurological complications. Regarding the type of sampling, in the literature, according to Chun JY et al. [14], total tumor resection is the standard rule in the treatment of meningioma. Therefore, complete excision should be performed whenever possible without major life-threatening or functional risk. From a histological point of view, grade I meningioma was the most observed in this study, in 81.6% of cases.

This aligns with the literature data such as Oumarou HN [15] in Cameroon, Yguel C et al. [16] in France, and Zhang Q et al. [17] in China, with 75.8%, 75.8%, and 98%, respectively. Regarding the meningioma subtype, the present study showed that the meningothelial subtype was observed in 52.6% of cases. This is similar to the study by Kouadio T et al. [18] in Côte d'Ivoire, which revealed a predominance of the meningothelial subtype in 55.8% of cases. In developed countries, Dupont P et al. [19] in France showed that grade I meningiomas, according to the 2016 WHO meningioma classification, were dominated by the meningothelial subtype in 65.7% of cases. Johnson DR et al. [20], in the United

States, although few recent studies have specifically addressed this subtype, generally recognize it as the most common.

## Conclusion

Meningiomas are common primary tumors in neurosurgery. The retrospective analysis of 38 cases of meningioma provided the opportunity to explore in detail the epidemiological and histopathological characteristics inherent to this pathology.

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