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CASE REPORT

Clinical and Histopathological Aspects of Primary Intracranial Tumours: Case Series of 178 Patients in Yaounde

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Abstract

Background: Primary intracranial tumours in Africa present a histopathologic and immune-histochemical diagnostic problem with regards to the limited diagnostic resources which still has to be improved. This case series shares the experience of 2 university hospitals in Cameroon including 178 patients sampled on a 6-year period (January 2014 to December 2019), concerning the clinical, histopathologic and immuno-histochemical aspects.

Methods: This was a cross-sectional study based on patient files gathered from the Yaoundé Central Hospital and General University Hospital. We obtained pathology from the Yaoundé and Geneva university hospital laboratories.

Results: The main tumours were meningiomas (40.24%), gliomas (31.1%), pituitary adenomas (12.2%). Glioblastomas was the most frequent glial tumour (59.1%) occurring at a mean age of 38.1 ± 7.9 years. Grade IV glioblastomas expressed GFAP (50%), muted IDH1 (4.51%), MAP-2 (4.54%). We did not observe N4BP1 in any grade of glioblastomas. Protein S100 was expressed by grades I and II gliomas.

Conclusion: This study will serve as baseline for the improvement of nuclear medicine, radiotherapy and immunotherapy in Cameroon and sub-region.

Keywords

Histopathological aspects, Primary intracranial tumors, Clinical aspects, Yaounde

Abbreviation

IDH: Isocitrate Dehydrogenase; MAP: Mitogen Activate Protein; Bis-GMA: Biphenol A-Glycidyl Methacrylate; PHA-P: Phytohaemagglutinin; AML: Acute Myeloid Leukemia; EMA: Epithelial Membrane Antigen; MRI: Magneting Resonance Imaging; CT-Scan: Computed Tomography; GFA: Glial Fibrillary Acid Protein; TSH: Thyroid Stimulating Hormone; GH: Growth Hormone, HUG: Hopitaux Universitaires de Genève, N4BP1: NEDD4-Binding Protein 1

Introduction

Primary intracranial tumours develop from brain tissue, meninges and appendages (either benign or malign). With the advent of new imaging modalities, improvement in neuro-anesthesiology, and surgical techniques, the diagnosis of intra-cranial tumours in Cameroon has increased and particularly in Yaoundé; occurring both in paediatric and adult population (11% and 89% respectively). Pathology and particularly immunohistochemistry and molecular biology techniques are important for the management.

The aim of this study was to report the clinical, histopathological and molecular aspects of primary intracranial tumours in Yaoundé.

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Patients and Methods

This was a cross-sectional study which included all operated patients of primary intracranial tumours either at the Yaoundé Central or General Hospitals from January 1st, 2014 to December 31st, 2019. Local pathology laboratories and the neuropathology laboratory unit of the Geneva University Hospitals (HUG) analyzed the tissue samples.

Results

One hundred and seventy-eight (178) consecutive cases of primary intracranial tumours were operated amongst which 135 at the Yaoundé Central Hospital and the remaining at the Yaoundé General Hospital giving an intrahospital incidence of 34.5 cases/year.

Fourteen cases of brain metastases operated during the same time frame were excluded from this series.

The main clinical features were neurologic deficits (76.21%), intracranial hypertension (46.95%), convulsion (33.5%), isolated headaches (11.6%), and endocrine disorders (9.7%).

The CT-scan was most often used (74%) followed by MRI alone (21%) and finally CT-scan and MRI (5%).

The majority of tumours were supratentorial (74.3%). We observed the same distribution irrespective of age.

All the tissue samples were obtained by either total, subtotal or partial tumour resection only by craniotomies. We did not use stereotaxic nor endoscopic approach. We found meningiomas (40.24%), gliomas (31.1%), pituitary adenomas (12.2%), medulloblastomas (5.5%), craniopharyngiomas (3.6%) ependymomas (1.8%) and haemangioblastomas (1.3%). Dysembryoplastic neuroepithelial tumours, primary lymphomas, haemangiomas, gangliogliomas were rare representing one case each (0.6%). We found 75.76% of grade I meningiomas, 21.21% of grade II and 3.03% of grade III; these occurred principally in women (sex ratio 3:1). The mean age was 44.76 ± 14.3. Post-operative mortality at 1 month was 12%. Meningiomas expressed Epithelial Membrane Antigenes (EMA) in 23.5% of cases, protein S100 in 11.8% of cases, pankeratin, anti-CD34, progesterone receptors, PHA-P, PSA and AML in 5.9% of cases each.

Of gliomas, 25.5% were grade I, 13.7% grade II, 11.7 grade III and 49.1% grade IV. The mean age was 38.10 ± 7.95 years. In the glioma population, the vast majority were astrocytomas (89.1%) followed by oligodendrogliomas (3.7%), and ependymomas (5.5%).

Patients with pituitary adenomas presented most often with headaches (95%), intracranial hypertension (75%) and visual disorders (70%). The mean age was 49.6 ± 9 years.

Post-op complications were wound infections (7.3%), CSF leakage (4.26%), intracranial suppurations (1.21%) and meningitis (3.05%).

We used dental Bis-GMA composite for bone reconstruction [1].

Gliomas expressed GFAP: grade IV Glioblastomas (50%), grade II gliomas (18.18%), and grade I gliomas (4.54%); mutated IDH-1 was expressed by grade IV gliomas (4.54%), grade II gliomas (9.1%), MAP-2 was expressed by grade IV gliomas (4.54%), grade II gliomas (4.54%). Grade II gliomas expressed MIB, 2%. N4BP1 was not expressed by any grade of gliomas. We found protein S100 in grade I and II gliomas (respectively 4.54%). Grade IV gliomas secreted antibody anti-vimentin, anti-CD34 and membrane epithelial antigen. Grade II gliomas also secreted anti-CD56.

Pituitary adenomas represented 18.2% of our series amongst which 9.1% were secreting adenomas expressing TSHα, TSHβ and GH.

Craniopharyngiomas represented 18.2% of our series of which, adamantinoma was the most common histological type. Antibody anti-KALL was secreted by one tumour.

Discussion

With the advent of new imaging modalities like computed tomography and more recently, magnetic resonance imaging, the constant development of neurosurgical practice in Africa and Yaoundé in particular, and with better surgical and anesthesiological conditions, more intracranial space occupying lesion are diagnosed and treated.

The epidemiology of intracranial tumours and gliomas in particular is often biased in African series because of the limited histological, immunohistochemical and molecular diagnostic techniques. As a result in certain series, it is difficult to identify grade II and III gliomas or others where modern pathologic techniques are indispensable [2]. The advantage of our series is the contribution of the neuropathologic laboratory of the Geneva University Hospitals which systematically analyzed all pathologic samples with modern techniques. This was possible thanks to the convention between Cameroon and Switzerland [3]. This study shows the gradual increase in cases as years go by; adults and children at variable proportions. With the use of histochemistry, the grading of gliomas is more precise. The different histologic types are identified in Yaoundé [4-7]. In the majority of African series, meningiomas are the most frequent tumours and range between 35-40% [6-9], other rare series find fewer proportions (in Kinshasa and Enugu 31-32%) [10-12] or more in Saudi arabia, 42% [13].

Women are one or two times more concerned. This is a condition of the aged. The mean age in african series ranges between 35-40 years [6-9,11,14]. Meningiomas

can be observed at all ages; the paediatric forms are often malignant. We didn't find children with meningiomas. We observed the same grade distribution as in literature with less than 25% of grade II (atypical meningiomas) and less than 5% were grade III (anaplastic).

Glioblastomas and metastases are the most frequent tumours in western series whereas meningiomas represent less than 25% of all intracranial tumours [4]. With respect to the rapid evolution of metastases and glioblastomas and the late diagnostic in Africa, many patients probably die before the diagnosis is made. In western series, pituitary adenomas represent 10% of intracranial tumours compared to our series where we find the double.

Conclusion

This study brings preliminary information which will support further discussions regarding the equipment of our hospitals with modern pathologic laboratories, radiotherapy treatment options, and providing baseline information for immunologic therapy in Cameroon and Africa at large. The question therefore is to know what is the immunohistochemical profile of primary intracranial tumours in Cameroon and the sub-region. This work serves as an advocacy for neurosurgery-related specialties like neuropathology, radiotherapy and neuro-oncology, considered a luxury in sub-saharan Africa.

Declarations of Interest

None.

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Authors Contribution

All authors equally contributed to the study conception and design.

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