Surgical Approach and Prognosis of Glioblastoma in the Cerebellum: Case Study of an Older Patient

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Abordagem Cirúrgica e Prognóstico de Glioblastoma em Cerebelo: Estudo de Caso em Paciente Idosa

Enfoque Quirúrgico y Pronóstico del Glioblastoma en el Cerebelo: Estudio de un Caso en una Paciente de Edad Avanzada

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ABSTRACT

Introduction: Glioblastomas are highly aggressive malignant brain tumors and are rarely located in the cerebellum. This case report describes a rare case of cerebellar glioblastoma, contributing to the national literature by addressing the clinical, diagnostic, and therapeutic characteristics of the case. **Case report:** A 75-year-old woman was admitted to the *Hospital Universitário São Francisco de Assis* presenting initial symptoms of dizziness and imbalance, with rapid progression over 20 days. Imaging studies, including computed tomography and magnetic resonance imaging, revealed a large solid-cystic lesion in the right cerebellar hemisphere, with necrotic features and intense post-contrast enhancement. The patient underwent total surgical resection of the lesion, achieving good initial recovery and no residual tumor on immediate postoperative imaging. She was monitored at the intensive care unit and discharged on the eighth postoperative day. The histopathological examination, complemented by immunohistochemistry, confirmed the diagnosis of grade 4 glioblastoma IDH-wildtype. The patient was referred for adjuvant treatment with radiotherapy (28 sessions) and chemotherapy (using temozolomide). The patient passed away 14 months after the surgical procedure. **Conclusion:** This report contributes to the national literature on cerebellar glioblastoma, emphasizing the importance of early diagnosis, total surgical resection, and proper follow-up, while also highlighting the need for regional studies that consider Brazil's clinical and epidemiological specificities.

Key words: Glioblastoma; Brain Neoplasms/surgery; Early Detection of Cancer.

RESUMO

Introdução: Glioblastomas são tumores cerebrais malignos de alta agressividade e são raramente localizados no cerebelo. Este relato descreve um caso raro de glioblastoma cerebelar, contribuindo para a literatura nacional ao abordar as características clínicas, diagnósticas e terapêuticas do caso. **Relato do caso:** Mulher, 75 anos, atendida no Hospital Universitário São Francisco de Assis, apresentando sintomas iniciais de tontura e desequilíbrio, com rápida progressão em 20 dias. Exames de imagem, incluindo tomografia e ressonância magnética, evidenciaram uma grande lesão sólido-cística no hemisfério cerebelar direito, com características de necrose e intenso realce pós-contraste. A paciente foi submetida a uma cirurgia de ressecção total da lesão, com boa recuperação inicial e ausência de tumor residual no pós-operatório imediato. Foi monitorada na unidade de tratamento intensivo e recebeu alta no oitavo dia pós-operatório. O exame anatomopatológico, complementado pela imuno-histoquímica, confirmou o diagnóstico de glioblastoma grau 4 IDH-wildtype. A paciente foi encaminhada para tratamento adjuvante com radioterapia (28 sessões) e quimioterapia (fazendo uso de temozolamida). A paciente evoluiu para óbito 14 meses após o procedimento cirúrgico. **Conclusão:** O presente relato contribui para a literatura nacional sobre glioblastoma de cerebelo, enfatizando a importância do diagnóstico precoce, ressecção cirúrgica total e acompanhamento adequado, além de destacar a necessidade de relatórios regionais que considerem as particularidades clínicas e epidemiológicas do Brasil.

Palavras-chave: Glioblastoma; Neoplasias Encefálicas/cirurgia; Detecção Precoce de Câncer.

RESUMEN

Introducción: Los glioblastomas son tumores cerebrales malignos altamente agresivos y raramente se localizan en el cerebelo. Este informe describe un caso raro de glioblastoma cerebeloso, contribuyendo a la literatura nacional al abordar las características clínicas, diagnósticas y terapéuticas del caso. **Informe del caso:** Mujer, 75 años, atendida en el Hospital Universitario São Francisco de Assis con síntomas iniciales de mareo y desequilibrio, con una rápida progresión en 20 días. Los estudios de imagen, incluyendo tomografía computarizada y resonancia magnética, evidenciaron una gran lesión sólido-quística en el hemisferio cerebeloso derecho, con características de necrosis y un intenso realce post-contraste. La paciente fue sometida a una resección quirúrgica total de la lesión, logrando una buena recuperación inicial y sin tumor residual en las imágenes posoperatorias inmediatas. Fue monitoreada en la unidad de cuidados intensivos y dada de alta al octavo día posoperatorio. El examen anatomopatológico, complementado con inmunohistoquímica, confirmó el diagnóstico de glioblastoma de grado 4 IDH sin mutación. La paciente fue remitida para tratamiento adyuvante con radioterapia (28 sesiones) y quimioterapia (utilizando temozolamida). La paciente falleció 14 meses después del procedimiento quirúrgico. **Conclusión:** Este informe contribuye a la literatura nacional sobre glioblastoma cerebeloso, enfatizando la importancia del diagnóstico temprano, la resección quirúrgica total y un seguimiento adecuado, además de destacar la necesidad de informes regionales que consideren las particularidades clínicas y epidemiológicas del Brasil.

Palabras clave: Glioblastoma; Neoplasias Encefálicas/cirugía; Detección Precoz del Cáncer.

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INTRODUCTION

Glioblastoma is the most common and aggressive malignant brain tumor, accounting for approximately 15% of all central nervous system cancers (CNS). In Brazil, 11,000 new cases of CNS cancer are estimated annually. However, cerebellar glioblastoma is an extremely rare presentation, representing less than 1% of intracranial cases.

It grows fast locally, spreading frequently to the brain stem and proximal leptomeninges, being associated with poor prognosis[1-3]. Until 1987, only 13 cases of cerebellar glioblastoma in adults have been documented. The 14th case was reported by Levine et al.[4] of an 80-year old patient, different from the mean reported so far (53 years).

The study of Oliveira et al.[5] affirmed that, in Brazil, malignant CNS tumors are predominant in the brain (91.5%), affecting adults between 40 and 64 years of age, mainly, being more common in men, except meningeal tumors that are more frequent in women. The highest incidence occurs at the Southeast regions with relatively stable rates from 2000 to 2015. Regional differences reflect variations of diagnosis and sub-notification, indicating the necessity of strategies to improve management and prognosis.

Despite the incidence, cerebellar glioblastoma in Brazilians are barely reported in the literature. Lobão et al.[6] described a clinical case of a 65-year old Brazilian male diagnosed with cerebellar glioblastoma. The patient presented symptoms as headache, mental confusion, left hemiparesis, ataxia of gait and trunk, in addition to dysmetria that developed along five months. His medical history revealed earlier ischemic cerebral event without permanent sequelae, emergency laparotomy due to hemorrhagic gastric ulcer and aortic ectasia.

The present report describes a case of cerebellar glioblastoma in an older Brazilian woman, the first reported in the country, standing out for its rarity and distinct clinical context. The detailed presentation of clinical and radiologic findings aims to contribute to understand this rare tumor, emphasizing its relevance for the differential diagnosis of cerebellar lesions in older adults.

The Ethics Committee approved the study, report number 7047626 (CAAE (submission for ethical review): 81757024.0.0000.5514) at the meeting held on August 29, 2024 in compliance with Directive 466/2012[7] of the National Health Council.

CASE REPORT

Woman, 75 years of age, admitted to *Hospital Universitário São Francisco de Assis* on July 22, 2023 complaining of dizziness and imbalance initiated 20 days earlier. At physical examination, ataxia of gait, dysmetria, diadochokinetic and horizontal nystagmus were observed. Infectious metabolic screening did not reveal any alteration of lab tests; a brain computed tomography without contrast was performed, showing area of hypodensity at the right cerebellar hemisphere with effect of mass over the IV ventricle and cerebellar folia deletion. Oncological screening was negative for other neoplasms and to rule out metastasis.

Brain magnetic resonance revealed large cystic-solid lesion at the right cerebellar medullar body with significant expansive effect (Figure 1).

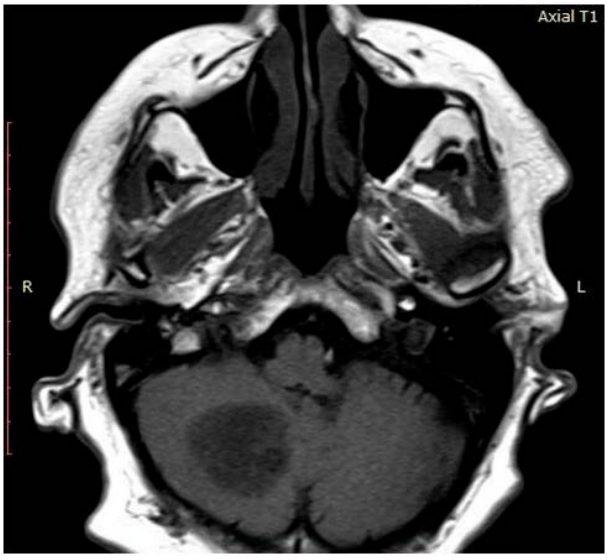

Figure 1. Axial brain magnetic resonance T1

The 30.9x32.0x36.4 lesion presented hypersignal in T2 (Figure 2) and fluid attenuated inversion recovery (FLAIR) (Figure 3), hyposignal in T2, hemosiderin deposition at the borders, restriction area to diffusion and intense post-contrast enhancement of the solid portion. Cystic areas suggest high grade of necrosis.

To treat vasogenic edema, dexamethasone 4 mg each 6 hours was initiated, evolving to symptomatic improvement; surgery was performed 72 hours after admission, under general anesthesia, positioned in lateral decubitus (¾ prone), partial left lateralization and head 90º lateralized at right to facilitate the access to the posterior fossa. The procedure initiated with paramedian incision to expose the posterior fossa with limits over the line of inion and the arc of C1.

Craniotomy with the right transverse and sigmoid sinuses as superior and lateral limits was performed to access the cerebellum. Dura-mater was opened in Y and folded over the superior transverse sinus and lower lateral sigmoid. Surgical microscopy was utilized to resect

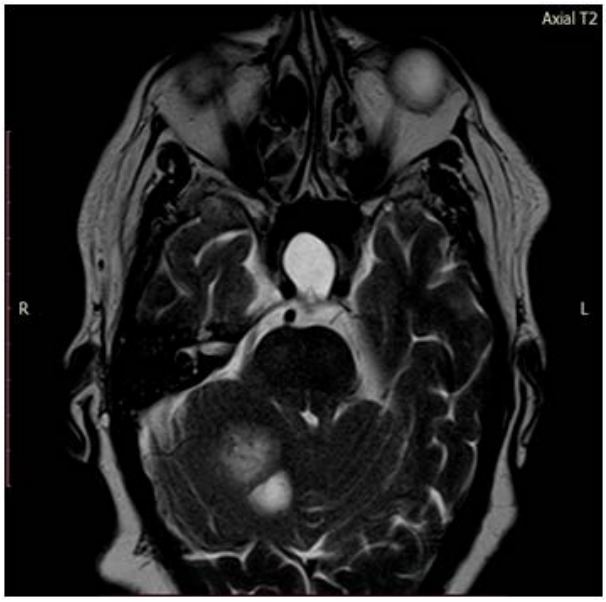

Figure 2. Axial brain magnetic resonance T2

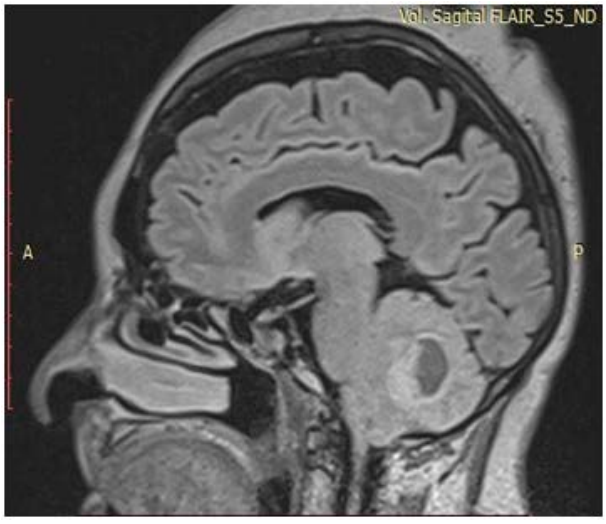

Figure 3. Sagital FLAIR

intracranial expansive lesion. Initially, corticectomy was performed on the right cerebellar hemisphere, being observed a grayish lesion with citric cystic content. Next, progressive dissection of the expansive lesion was performed with ill-defined limits of the brain tissue, presenting a friable, grayish area and thrombosed vessels. The lesion was fully removed, microscopy did not reveal abnormal tissue at the surgical bed, with preservation of adjacent cerebellar structures and neurologic function.

The material removed was sent for anatomopathology since intraoperative frozen section and immunohistochemistry were unavailable. The surgery lasted up to five hours and 30 minutes, without complications and significant blood loss, not being necessary blood transfusion.

Post-operation, the patient was transferred to the Intensive Care Unit (ICU) for neurologic surveillance in stable conditions. Vital signs were within normal parameters in the first 24 hours without new neurologic deficits. Corticosteroids were administered (dexamethasone 4 mg, each 12 hours to control cerebral edema), prophylactic antibiotic therapy (cefuroxime – 3 doses) and analgesics. Postoperative computed tomography with contrast in the first 24 hours confirmed the absence of macroscopic residual tumor.

The patient continued under observation at the neurologic ICU and transferred after 48 hours to the ward and discharged eight days post-operation with mild dizziness and absence of motor complications. The anatomopathology and immuno-histochemistry (Figure 4) revealed hypercellular neoplasm formed by rounded to polygonal and atypical fusiform cells with figures of mitosis and necrosis. In addition to microvascular proliferation, presents expression of Olig2 and glial fibrillary acidic protein (GFAP), which indicates the glial histogenesis of the neoplasm with immunophenotype IDH-1 negative, compatible with grade 4 IDH-wildtype glioblastoma according to the 5th edition of WHO Classification of Tumors of the Central Nervous System[8].

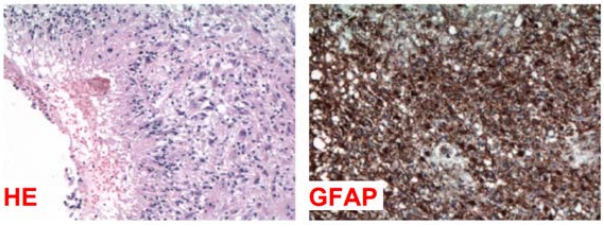

Figure 4. Histological blade of the tumor, hematoxylin-eosin staining for GFAP

The patient was followed-up for adjuvant treatment and submitted to radiotherapy (30 sessions 2 Gy/day, total 60 Gy) between August 15 and September 12, 2023 concomitant with chemotherapy with temozolomide 75 mg/m². After concluding radiotherapy, 5/28 days regimen cycles of chemotherapy with temozolomide (five days followed by 23 days of rest), totaling eight cycles have been administered. Three cycles were not completed, one due to significant leukopenia (leukocytes: 376) and two due to thrombocytopenia (<50,000 platelets).

She died due to complications of the disease, with progressive loss of performance status and respiratory infection evolving to pulmonary sepsis 14 months after the surgery.

DISCUSSION

This case report highlights the importance of early diagnosis and aggressive surgical approach to treat cerebellar lesions such as cerebellar glioblastomas with full resection and positive results.

It is important to compare the results herein with another case occurred in Brazil because the epidemiologic, clinical and therapeutic characteristics can vary significantly among different populations and national studies provide accurate understanding of the specificities of management and outcome of cerebellar glioblastoma in the Brazilian context. The present case of a 78-year old woman with cerebellar glioblastoma presents clinical, radiological and therapeutic differences in relation to the case reported by Lobão et al.[6] involving a 65-year old man.

Clinically, the patient presented initial symptoms of dizziness and imbalance with fast progression in 20 days while the case of 2008 presented headache, mental confusion and complex neurologic symptoms that developed in five months. Radiologically, the current report revealed a cystic-solid lesion at the right cerebellar hemisphere, while Lobão et al.[6] described a heterogeneous and infiltrative mass at the cerebellar vermis involving critical structures as the brain stem.

Therapeutic approaches differ significantly. Total resection was possible in the present case with good initial recovery and absence of postoperative residual tumor. For the 2008 case, infiltration in critical structures limited surgery to subtotal resection, resulting in residual tumor and local relapse after six months. These differences emphasize the importance of early diagnosis and thorough anatomic evaluation to optimize the treatment.

Survival of cerebellar glioblastoma is low with elevated recurrence rates according to Lobão et al.[6] for a patient who presented early tumoral progression. Initial total resection in this case can be a favorable prognostic factor, possibly contributing for better local control of the disease. Nevertheless, the absence of adjuvant treatment may compromise this benefit as demonstrated in previous studies that associate radiotherapy and chemotherapy for improved survival.

Both cases show how challenging the diagnosis is and high recurrence rate of cerebellar glioblastoma as in the report by Lobão et al.[6], who underpins the importance of complementary radiotherapy and the present case suggesting the potential benefit of a total resection for best local tumor control.

The present case contributes to understand cerebellar glioblastoma in a sub-represented population, providing regional data and highlighting the importance of patient-centered management. The differences observed between the cases emphasize the necessity of expanding the current literature with reports that explore prognostic factors, complementary therapies and impact of tumor location on clinical outcomes.

CONCLUSION

This case report highlights the relevance of early diagnosis and full surgical resection to manage malignant cerebellar lesions especially in older patients. The intervention was successful with initial satisfactory recovery and no evidence of residual tumor. It favored the understanding of the specificities of the treatment of these lesions in patients at advanced ages and strengthen the importance of proper and patient-centered therapeutic approaches to optimize the results and the quality of life. Continuous follow up and definition of complementary therapies as radiotherapy and chemotherapy are essential for long-term monitoring.

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CONTRIBUTIONS

Caio Marcelo Spadafora contributed to the study design, acquisition, analysis and interpretation of the data, writing and critical review. Karen Christine da Silva contributed to the acquisition, analysis and interpretation of the data and writing of the manuscript. Cássio Neves da Silva Sousa, Nathalia Bacci Castilho, Wilkie Azevêdo Machado and Felipe Miguel de Almeida contributed to the acquisition, analysis and interpretation of the data. Carlos Tadeu Parisi de Oliveira contributed to the study design, acquisition, analysis and interpretation of the data and critical review. All the authors approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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None.

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