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(CASE REPORT)

Challenges in diagnosing diffuse cerebral glioma in a Child: A case report

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Abstract

CONTEXT: Glial Tumors Represent a Significant Proportion of Pediatric Brain Tumors, Among Which Diffuse Gliomas Occupy a Particular Place Due To Their Infiltrative Nature and Their Sometimes-Insidious Evolution. Their Diagnosis Relies Mainly on Imaging, But Their Radiological Manifestations May Be Misleading, Constituting A Real Challenge for the Radiologist.

CASE PRESENTATION: Patient Aged 08 Years, Without Notable Pathological History, Admitted to the Pediatric Emergency Department for the Management of an Afebrile Status Epilepticus. The Patient Underwent an Emergency Brain CT Scan Revealing Multiple Intra- and Extra-Axial Nodular Lesions in Supra- and Infratentorial Locations, Followed by A Brain MRI and A Stereotactic Biopsy That Confirmed the Diagnosis of a Diffuse Midline Cerebral Glioma.

CONCLUSION: Diffuse Cerebral Glioma in Children May Present with Non-Specific Radiological Features, Making the Diagnosis Complex. Knowledge Of Its Imaging Spectrum Is Essential to Improve Diagnostic Accuracy and Optimize Management.

Keywords: Brain Tumor; Diffuse Glioma; Brain CT Scan; Brain MRI

1. Introduction

Brain tumors constitute the leading cause of solid tumors in children and represent a major cause of pediatric morbidity and mortality. Among them, diffuse gliomas are distinguished by their infiltrative nature, their progressive evolution, and their marked histomolecular heterogeneity. Their clinical presentation is often non-specific, making brain imaging, particularly MRI, essential to guide the diagnosis, assess tumor extension, and guide therapeutic management.

However, the radiological features of diffuse gliomas in children may be atypical and may be confused with other inflammatory, infectious, or tumoral lesions, constituting a real diagnostic challenge.

2. Case Presentation

A 08-year-old child, without medical or surgical history, presented to the pediatric emergency department in status epilepticus. At admission to the pediatric resuscitation unit, the patient had impaired consciousness, was afebrile at 36.8 °C, and his vital parameters were within normal limits with a blood pressure of 12/7 mm/Hg, a heart rate of 90 beats/min, and a blood glucose level of 1.42. The rest of the clinical examination was normal.

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Routine laboratory tests showed a hemoglobin level of 12.6 g/dl (normal value: 12 to 16 g/dl), hyperleukocytosis at 14000/mm^3, and a CRP of 31.

A brain CT scan before and after injection of iodinated contrast medium was performed, showing multiple intra- and extra-axial lesion formations in supra- and infratentorial locations, isodense on non-contrast imaging, heterogeneously enhanced after contrast, responsible for an early subfalcine herniation (Figure 1).

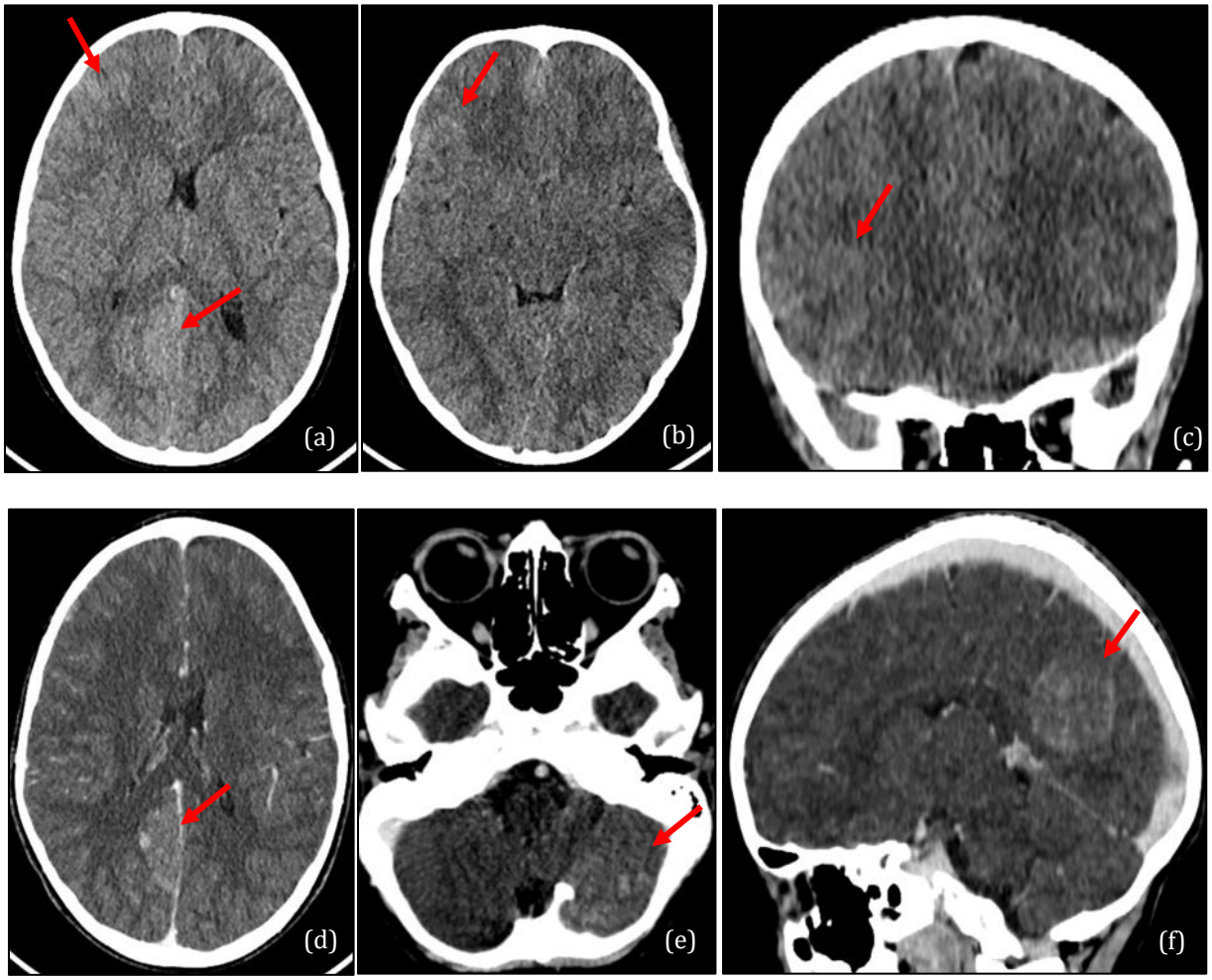

Figure 1 Multiple intra-axial nodular lesions in supra- and infra-tentorial locations, isodense on non-contrast imaging (a, b, c), heterogeneously enhanced after contrast, with leptomeningeal contrast enhancement (d, e, f). Images from the mother and Child Radiology Department, CHU HASSAN II, Fez, Morocco

A brain MRI was performed showing multiple intra- and extra-axial nodular lesions in supra- and infratentorial locations, described as T1 hypointense, T2 hyperintense, with diffusion restriction, heterogeneously enhanced after contrast, delineating areas of central necrosis (Figure 2).

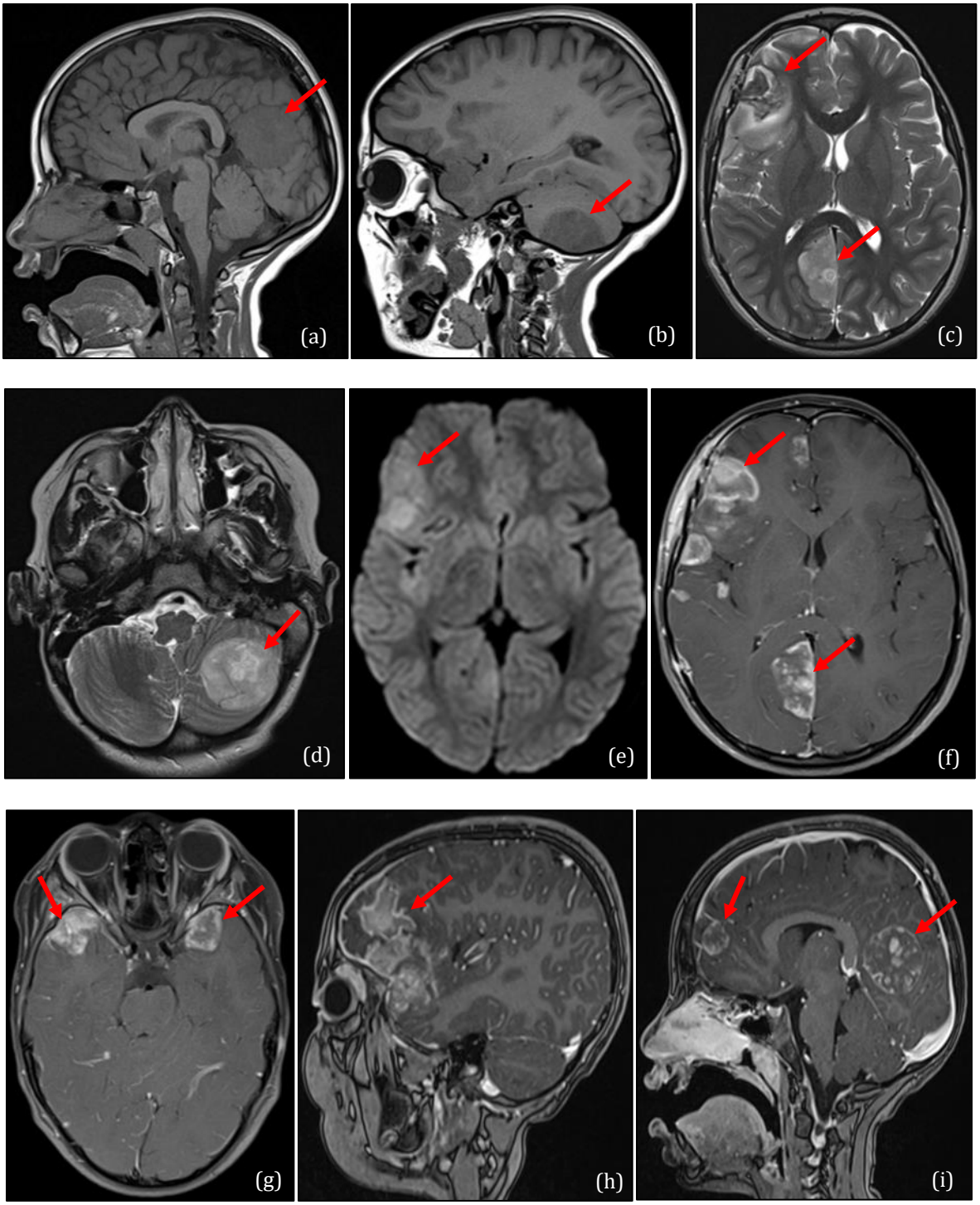

Figure 2 Multiple intra-axial tissue nodular lesions in supra- and infratentorial locations, confluent at the right frontal level (c), described as T1 hypointense (a, b), T2 hyperintense (c, d), with diffusion restriction (e), heterogeneously enhanced after contrast (f, g, h, i), particularly at the leptomeningeal level. Images from the mother and Child Radiology Department, CHU HASSAN II, Fez, Morocco

Spectroscopic sequence analysis revealed a tumoral profile characterized by a choline peak and a decrease in NAA with a choline/creatine ratio measured at 5.45.

The patient underwent a stereotactic biopsy a few days later, with anatomopathological and immunohistochemical results in favor of a diffuse midline glioma.

Therapeutic management with radiotherapy associated with chemotherapy is currently ongoing.

3. Discussion

Diffuse gliomas represent a heterogeneous entity within pediatric brain tumors, both clinically and in terms of radio morphological and molecular features. According to international epidemiological data, gliomas account for approximately 30 to 40% of brain tumors in children, with a predominance of low-grade forms, although diffuse high-grade forms are associated with a poorer prognosis [1,2].

MRI remains the key examination in the initial evaluation. Diffuse gliomas classically present as infiltrative poorly defined lesions, hyperintense on T2/FLAIR, with variable enhancement after gadolinium injection. However, several series have highlighted the great variability of these features, with some gliomas showing only slight enhancement or even none, complicating the distinction from inflammatory or demyelinating pathologies [3,4]. This radiological heterogeneity constitutes one of the main diagnostic challenges, as illustrated by our observation.

Advanced imaging techniques provide additional information. Cerebral perfusion (rCBV) may help differentiate high-grade gliomas from low-grade or non-tumoral lesions, while spectroscopy demonstrates an increase in the choline peak and a decrease in NAA in favor of a tumoral process [5]. Nevertheless, despite these advances, imaging does not always allow definitive characterization, and histopathological confirmation remains essential.

Recent molecular advances have profoundly modified the classification of diffuse gliomas. The WHO 2021 classification now integrates molecular alterations, notably H3K27 and H3G34 mutations in pediatric midline gliomas, conferring major diagnostic and prognostic value [1]. Recent studies have also demonstrated the importance of intratumoral heterogeneity and integrated genomic analysis in understanding tumor behavior [8,9].

4. Conclusion

Diffuse cerebral glioma in children represents a real diagnostic challenge due to its often-non-specific clinical presentation and sometimes misleading radiological features. MRI, complemented, when necessary, by advanced techniques, plays a central role in diagnostic orientation and assessment of tumor extension, but histopathological confirmation and molecular analysis remain indispensable. A multidisciplinary approach involving radiologists, neuropathologists, and oncologists is essential to optimize management and improve the prognosis of these patients.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study

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