American Journal of Medical Case Reports, 2021, Vol. 9, No. 4, 216-218
Available online at http://pubs.sciepub.com/ajmcr/9/4/3
Published by Science and Education Publishing
DOI:10.12691/ajmcr-9-4-3

A Challenging Case of Corpus Callosum Anaplastic Astrocytoma

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Received January 01, 2021; Revised January 15, 2021; Accepted January 24, 2021

Abstract Anaplastic astrocytoma is a rare, malignant brain tumor that arises from astrocytes, with a poor prognosis. Herein, we report a challenging diagnostic case of a 76 years old female with an Anaplastic astrocytoma metastasized to the corpus callosum.

Keywords: *Anaplastic astrocytoma corpus callosum imaging CT MRI*

Cite This Article: Ahmed K A Ahmed, Ahamed Elkhair, Omeralfaroug Adam, Mohamedanwar Ghandour, and Rabab Elhassan, "A Challenging Case of Corpus Callosum Anaplastic Astrocytoma." *American Journal of Medical Case Reports*, vol. 9, no. 4 (2021): 216-218. doi: 10.12691/ajmcr-9-4-3.

1. Introduction

Anaplastic astrocytoma (AA) is a rapidly progressive, diffusely infiltrating, and a malignant primary brain tumor that typically presents with subacute neurologic signs and symptoms that progress over days to weeks. It is defined as a grade III anaplastic glioma by the World Health Organization (WHO) [1]. Anaplastic astrocytoma has a median survival of around 3 years, particularly in young patients [2]. MRI with administration of gadolinium contrast is the imaging modality of choice for diagnosis. MRI reveals AA to be an ill-defined, T1-weighted hypointense and T2-weighted hyperintense mass with surrounding vasogenic edema. Nodular areas of enhancement are usually observed, however, almost one-third of AA display no contrast enhancement [3,4]. Herein, we present a case of a 76-year-old female diagnosed with anaplastic astrocytoma centred at the corpus callosum (CC).

2. Case Presentation

A 76-year-old female with no significant past medical history presented with acute confusion and headache, with no concrete neurological signs. Her inflammatory markers and blood work were unremarkable. An unenhanced CT Head showed a hypodense and thickened splenium of the corpus callosum; worrying for a mass lesion (Figure 1a/b).

An MRI Brain with contrast demonstrated a diffuse infiltrative lesion involving the corpus callosum and bilateral periventricular parieto-occipital white matter which extended into the left hippocampal region, with gyral thickening in the left medial occipital and hippocampal regions (Figure 2a). This lesion was T1 hypointense, with no evidence of abnormal restricted diffusion on diffusion weighted imaging or blooming artefact on susceptibility weighted imaging to suggest haemorrhage (Figure 2b). There was also a 4mm nodular region of enhancement in the left parasagittal parietal lobe (Figure 2c). The patient underwent a brain biopsy via mini craniotomy, which determined the diagnosis of WHO grade 3, IDH1 wild type of an Anaplastic Astrocytoma. The patient was not a candidate for surgical intervention and was started on a course of palliative radiotherapy. The patient's condition continued to deteriorate, and the patient passed away within the year.

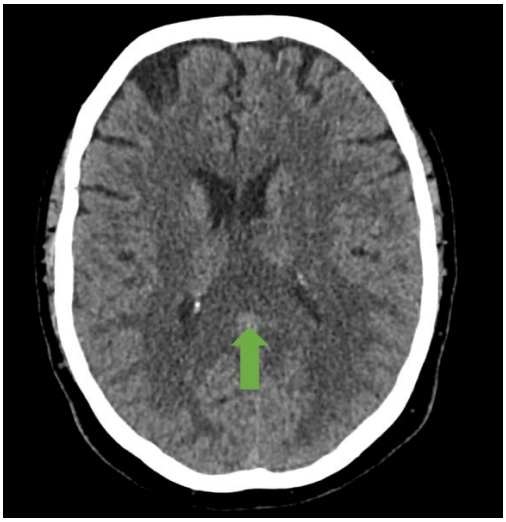

Figure 1a. Axial projection of an unenhanced CT Head showing thickening and hypodensity of the corpus callosum

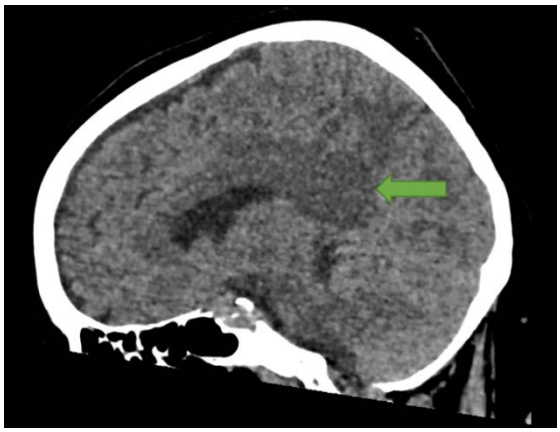

Figure 1b. Sagittal projection of an unenhanced CT Head showing thickening and hypodensity of the corpus callosum.

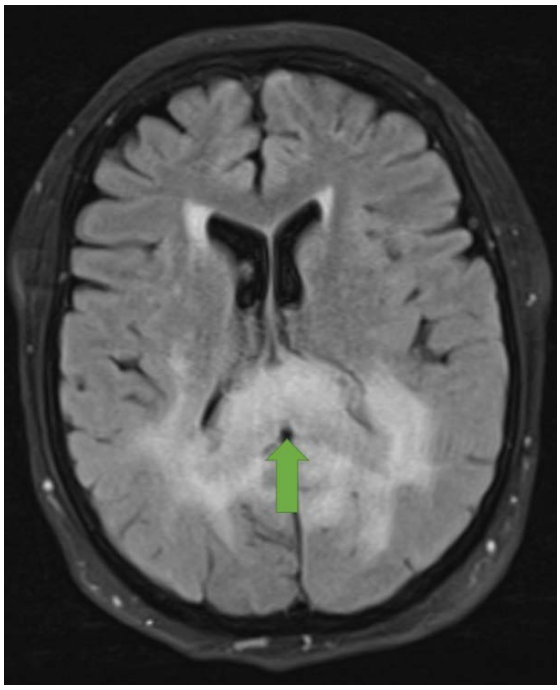

Figure 2a. Axial projection of a T2 FLAIR weighted MRI Brain showing high signal within the corpus callosum.

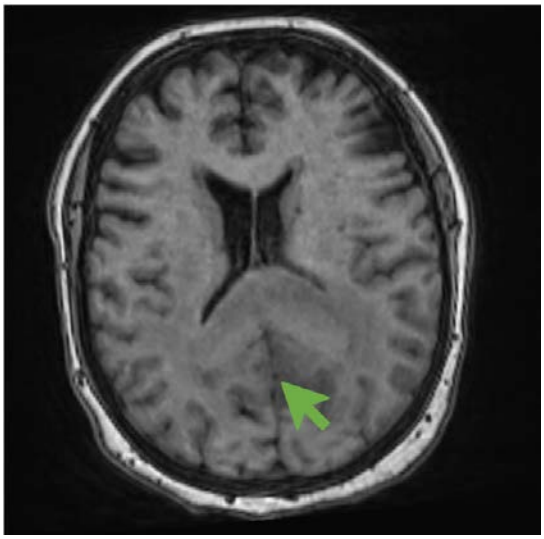

Figure 2b. Axial projection of an enhanced T1 weighted MRI Brain showing low signal within the corpus callosum, with no evidence of enhancement or haemorrhage.

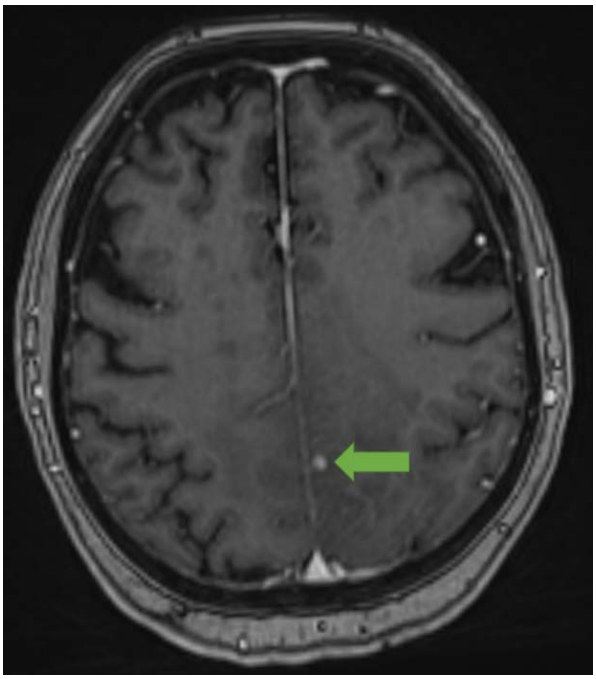

Figure 2c. Axial projection of a contrast enhanced T1 weighted MRI Brain showing a 4mm enhancing nodule in the left parasagittal parietal lobe.

3. Discussion

Anaplastic astrocytoma (AA) contributes 10% of all cases of gliomas, making it a rare form of malignant CNS tumors (4%) [5]. AA typically presents with a focal or generalized neurological manifestation such as weakness, visual impairment, personality changes, and seizures [6]. The reported case presented with headache and confusion with no neurological symptoms.

The reported patient initial unenhanced CT Head was largely unremarkable on first inspection. There was no evidence of hemorrhage or mass lesion causing midline shift. Assessing symmetry within the brain is a powerful tool within the radiologist's arsenal to identify pathology. When assessing a CT head for symmetry, the primary focus is on comparing the right and left hemispheres to each other. Given the almost perfectly symmetrical appearance centered on the CC on axial imaging; detection is difficult. However, on closer inspection, we can see the subtle asymmetry of the CC in the anteroposterior dimension, with the splenium appearing thickened relative to the genu (Figure 1a). Another powerful tool is a multiplanar reconstruction, with the sagittal images showing definite thickening of the splenium in relation to the genu (Figure 1b).

This case aims to highlight the importance of these techniques when reporting CT Heads with subtle findings. Especially given the vague clinical presentation (headache and confusion in an elderly patient) it is easy not to scrutinize the imaging, given the low probability of positive findings. Assessing brain symmetry in the anteroposterior direction and fully utilizing multiplanar reconstruction will aid the radiologist in detecting subtle findings such as these.

MRI with gadolinium contrast is the gold standard imaging modality for the diagnosis and treatment of AA,

with contrast enhancement associated with higher-grade components unless proven otherwise by biopsy [7]. This coincided with our findings as enhancement was revealed within the CC and confirmed via biopsy revealing AA (Figure 2b). To our knowledge, AA centered on the CC is not common and it favors a poor prognosis [8]. Furthermore, few studies showed that the resection of tumors involving the CC improves patients' overall survival [9,10,11], while a study done by Dziurzynski et al. reported no benefit of the resection of butterfly glioblastomas [12].

Recommended therapy for AA includes surgical resection following radiotherapy, however elderly patients (age>70) poorly tolerate standard radiotherapy following resection, due to unfavorable molecular signaling [7]. Also, AA IDH wild type median survival after radiotherapy is 1.3 years and 1.8 years following radiotherapy + PCV [13]. Given the age, poor molecular signaling, and the poor candidacy of surgery, radiotherapy without resection was the decision made for treatment.

Our patient passed away under a year after the diagnosis of AA. As previously stated, the median survival post-radiotherapy after resection is 1.3 years [8]. As such, the outcome demonstrated in our case was expected based on the illustrated evidence.

4. Conclusion

In summary, Anaplastic astrocytoma involving the CC is rare but carries a grave prognosis. Having a central location means that they can occasionally appear symmetrical and difficult to detect. Assessing symmetry in the anteroposterior direction and utilizing multiplanar reconstruction, will reduce the likelihood of subtle lesions being missed.

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