Sinonasal Disease in Proteus Syndrome: A Case Report and Review of the Literature

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Introduction

Proteus syndrome (PS) is an exceedingly rare disorder with an estimated prevalence of 1/1,000,000-10,000,000. PS is driven by a somatic activating mutation of the AKT1 gene, which encodes a serine/threonine kinase central to the PI3K/AKT signaling pathway[1,2]. PS is characterized by a multi-organ mosaic overgrowth disorder, involving asymmetric overgrowth of connective tissue, bone, skin, and internal organs[3]. As such, PS has a highly variable presentation, including increased risk for tumors, with meningiomas being the most commonly reported tumor. Meningiomas in this context tend to be unilateral, reflecting the mosaic distribution of the AKT1 mutation[4]. Notably, the co-occurrence of meningiomas with sinonasal pathology in PS has not been described in the literature.

Clinical Case Presentation

- 62-year-old male with a history of PS, including left-sided multifocal meningiomas status post multiple resections followed by radiosurgery in the 2000s for recurrence, who presented to our rhinology clinic with facial pain and nasal obstruction associated with snoring and apneic events.
- An MRI was obtained and demonstrated an enhancing left-sided sinonasal lesion (Figures 1-2).
- Based on the patient's imaging, the decision was made to proceed to the operating room for endoscopic endonasal resection of an anterior cranial fossa extradural skull base lesion.
- Resection of sinonasal cavity lesion extending to cribriform plate with intraoperative specimens negative for malignancy or meningioma.
- Final pathology revealed benign nasal polyps without evidence to suggest the spread of meningioma into the nasal cavity.
- Unfortunately, in the interim the patient has since deceased from causes unrelated to his skull base involvement.

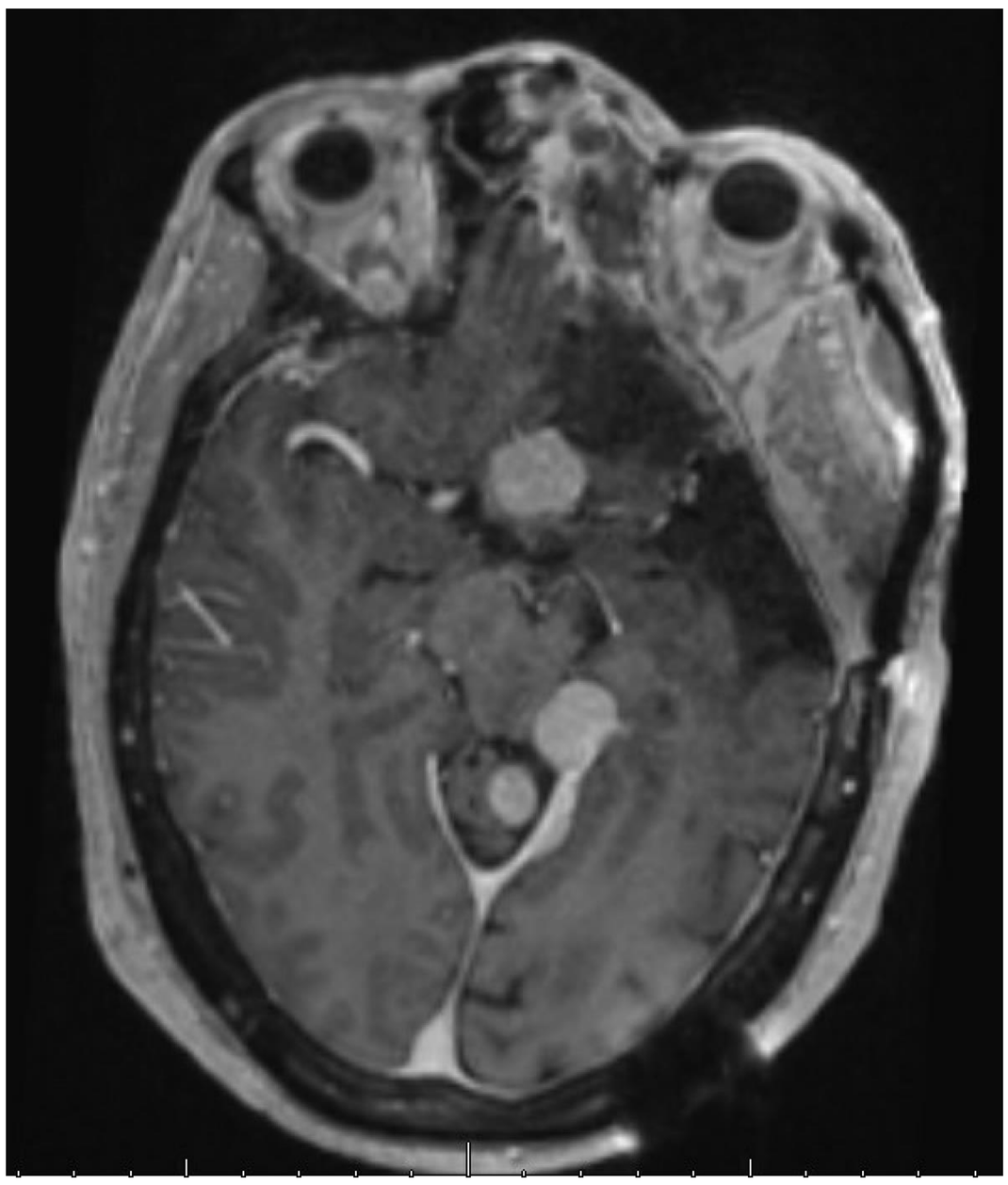
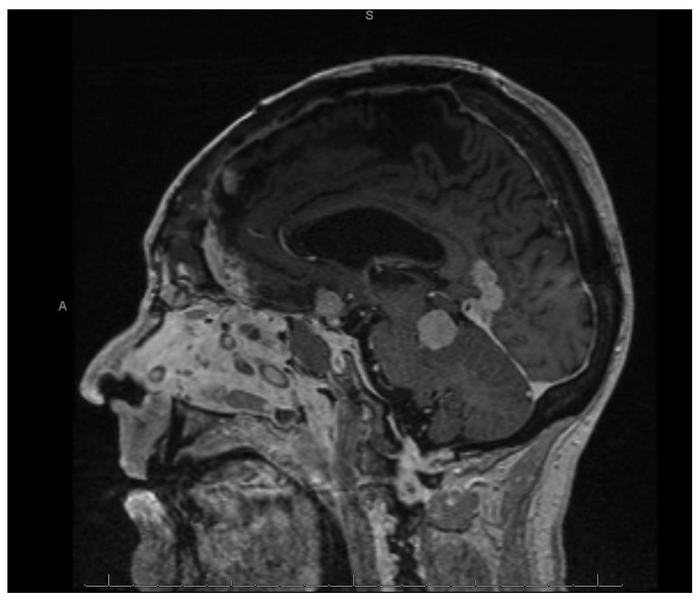


Figure 1: Preoperative imaging. Axial T1 MRI Brain post-contrast. Multifocal unilateral meningiomas.



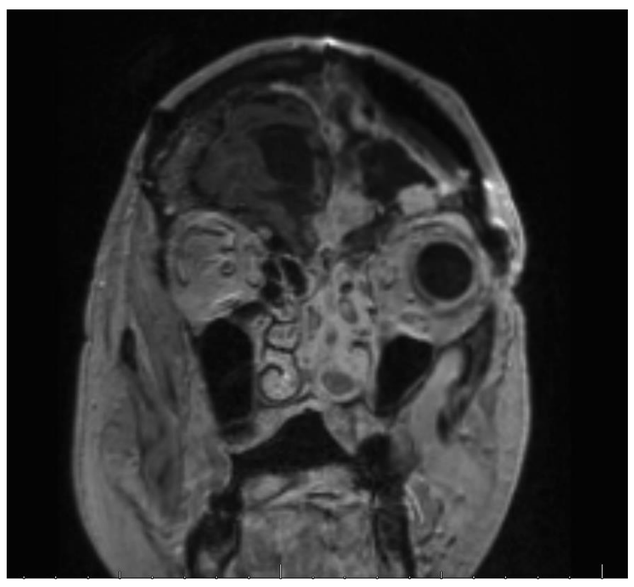


Figure 2: Pre-operative images. A) Sagittal T1 MRI Brain post-contrast. Left-sided meningiomas.
B) Coronal T1 MRI Brain post-contrast. Left-sided meningiomas

Discussion

- The frequency and character of unilateral meningiomas in patients with PS are poorly understood.
- There is a lack of literature exploring sinonasal disease in patients with PS.
- There is a limited body of data to suggest that dysregulation in AKT1-regulated pathways may play a role in the development of nasal polyps[5,6].
- Indeed, if both disease processes are driven by activating mutations in the AKT1 gene or its downstream pathways, one would expect nasal polyps to be commonly seen in PS. However, there is no known literature demonstrating such a relationship.
- Notably, our patient's significant polyp burden was on the ipsilateral side of the patient's multifocal meningiomas, including a skull base meningioma.
- Our patient's presentation raises the question of whether the sinonasal disease may have been driven by chronic inflammation in response to a skull base meningioma or potentially related to the AKT1 dysregulation.
- Meningiomas are well recognized neoplastic manifestations of PS, however, the simultaneous occurrence of sinonasal polyps has not been previously reported, posing an important consideration regarding the relationship between AKT1-driven disease, chronic mucosal inflammation in response to skull base meningiomas, and sinonasal disease in PS.
- Our case report is not without limitations, including limited literature exploring such a rare disease. Additionally, our tissue sample was not analyzed for AKT1 gene mutations.

Conclusions

While there is evidence to suggest both PS and sinonasal polyposis may be related to AKT1 pathway dysregulation, there is a paucity of literature exploring the relationship between PS and sinonasal disease, particularly in the setting of a skull base meningioma.

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