

Malignant Craniopharyngioma: A Case Report and Comprehensive Review

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Citation

J Jaggon, S Abrikian, T Gibson, P Johnson, J Liburd. *Malignant Craniopharyngioma: A Case Report and Comprehensive Review*. The Internet Journal of Pathology. 2009 Volume 11 Number 1.

Abstract

Introduction Craniopharyngiomas are histologically benign epithelial tumors occurring almost exclusively in the sellar/suprasellar region. Histologic malignancy is extremely rare in these lesions. **Case Report** We describe a case of a malignant craniopharyngioma in a 54 year old woman with no history of previous resection or cranial vault radiotherapy. She presented with a short history of headaches, vomiting and blurred vision, and died two weeks after partial resection of a suprasellar mass. Histologic analysis revealed a basaloid squamous cell carcinoma. A complete autopsy performed did not reveal any other possible primary tumor site. **Conclusion** Malignancy in craniopharyngiomas, though extremely rare, does occur. We believe that the malignant craniopharyngioma described here arose de novo. Such a possibility should always be kept in mind by both clinicians and pathologists when encountering suprasellar lesions.

INTRODUCTION

Craniopharyngiomas are classified as benign, WHO Grade I tumors, but they may show locally invasive behavior with infiltration of the surrounding brain and encasement of nearby structures. For this reason, they are sometimes difficult to resect in toto, thereby resulting in a partial resection which predisposes to recurrences. It has also been shown that recurrent tumors may exhibit even more aggressive behavior and grow more rapidly given their higher MIB-1 labeling index.[1]. Thus, adjuvant postoperative radiotherapy is usually given.

To date, a total of nine cases of malignant craniopharyngioma have been reported in humans in the literature, with only one of those apparently arising de novo, [2] with the latter representing one of three cases described by Rodriguez et al. All the others have been documented as recurrent cases with multiple partial resections and adjuvant radiotherapy.

As these lesions are relatively rare, there is very little information available in the literature regarding specific clinical or imaging features.

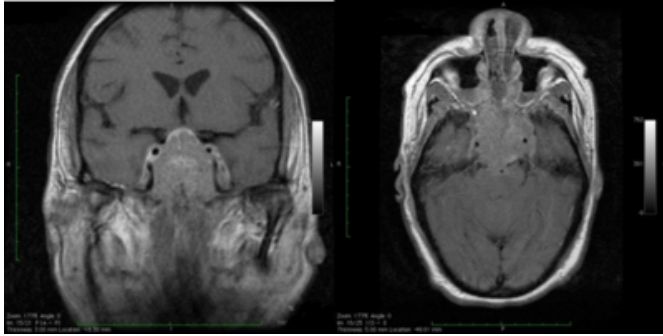
CASE REPORT

A 54-year-old hypertensive woman was referred to the neurosurgical service at the University Hospital of the West

Indies with a three-month history of headaches and a one-week history of vomiting and blurred vision. Examination revealed bilateral palsies of cranial nerves III, IV and VI. Magnetic resonance imaging of the brain showed a 4.6 x 4.3 x 3.4 cm heterogeneously enhancing mass centered in the pituitary fossa and extending superiorly to compress the optic chiasma. Laterally, it extended into both cavernous sinuses and encased the internal carotid arteries (Fig. 1). It also extended inferiorly through the floor of the sella to fill the sphenoidal sinus, and posteriorly through the dorsum sellae to compress the basilar artery and pons (Fig. 1). No normal pituitary gland was identified. The overall appearance was suggestive of a pituitary origin of this mass. All her sinuses appeared normal radiologically.

Figure 1

Figure 1: Left: Coronal T1 weighted image post gadolinium administration showing a suprasellar mass with lateral extension into the cavernous sinuses bilaterally with encasement of both internal carotid arteries, and superior extension with compression of the optic chiasma. Right: Axial T1 weighted image post gadolinium administration showing posterior extension of the suprasellar tumor to compress the basilar artery and pons.



She was diagnosed as having a pituitary macroadenoma, and subsequently underwent subtotal resection of the tumor via a transphenoidal approach. The microscopic features of the tumor were initially reported as being consistent with a pituitary adenoma.

Her postoperative course was complicated by diabetes insipidus, panhypopituitarism and sepsis. Following fluctuations in her conscious level and deterioration in cardiorespiratory function, a computed tomography (CT) scan of the brain was done. This showed extension of the mass to compress the brainstem with resultant mild hydrocephalus of the lateral and third ventricles. An external ventricular drain was placed in the right lateral ventricle. However, her neurological status deteriorated to a Glasgow Coma Scale (GCS) score of 3/15, despite admission to the Intensive Care Unit. Two weeks later, she suffered a cardio-pulmonary arrest and died.

PATHOLOGIC FINDINGS

At autopsy, the body was that of a middle-aged woman with a body mass index of 27 kg/m². The brain weighed 1300g and showed evidence of cerebral oedema. There was a 6.0 x 5.0 x 4.0 cm sellar tumor present, and this was adherent to and caused destruction of the sellar turcica. The tumor extended posteriorly to encase the basilar artery and infiltrate the midbrain, pons and cerebellar peduncles (Fig. 2).

Microscopic examination revealed sheets, nests and islands of moderately pleomorphic, malignant, basaloid epithelial cells, with an average mitotic rate of 4 mitotic figures per 10

high power fields (HPF). Individual cell keratinization was evident in the centers of some islands, and areas of tumor necrosis were also identified. Additionally, some islands and nests displayed vague peripheral palisading (Fig. 3). The intervening stroma showed marked desmoplasia and large areas of metaplastic bone formation. Immunohistochemistry revealed cytoplasmic positivity of the tumor cells for keratin and nuclear positivity for p63 (Fig. 4), in keeping with squamous cell carcinoma.

Figure 2

Figure 2: Large tumor compressing the pons and basilar artery (arrow).

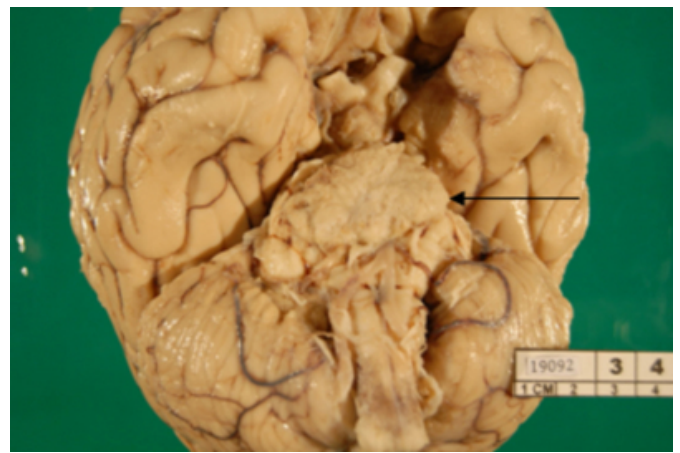


Figure 3

Fig. 3: H&E sections showing tumor nests exhibiting vague peripheral palisading and squamoid differentiation

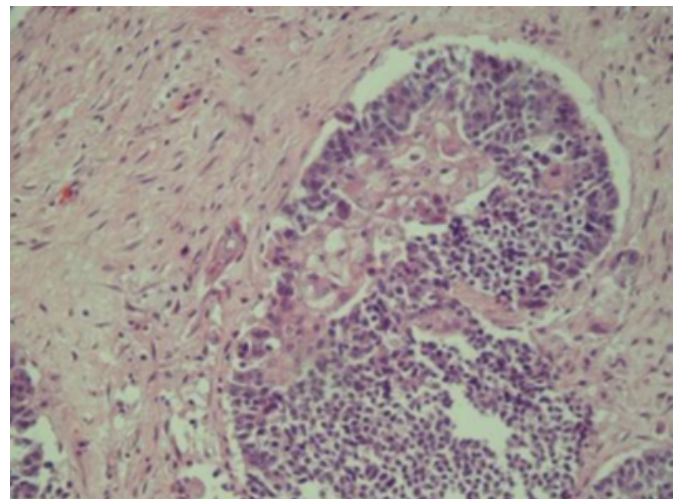
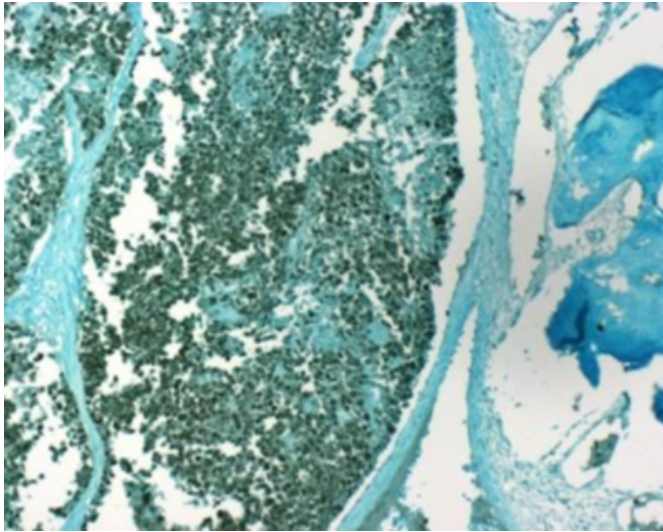


Figure 4

Fig. 4: Tumor cells showing widespread positive nuclear staining for p63.



Given the fact that no other primary tumor was found, a diagnosis of malignant craniopharyngioma was made. Features of a precursor benign craniopharyngioma were not identified histologically. On review of the initial partial resection specimen by another pathologist, it was noted that despite severe crush artifact, the features present appeared to be similar to those described in the autopsy specimen, with nests of basaloid cells some of which displayed evidence of individual cell keratinization. The surrounding stroma was markedly desmoplastic with osseous metaplasia.

DISCUSSION

In the eight previously reported cases of malignant craniopharyngioma occurring after tumor resection and radiotherapy, a low-grade precursor lesion was identified on microscopic examination. In our case, no precursor lesion was identified. Antemortem imaging and a complete post mortem examination excluded the possibility of another primary site in our case, and therefore the authors have assumed that our suprasellar mass represents a de novo

malignancy. It may be argued that a precursor lesion may have been present, but had become completely overrun by the time of death.

Kristopaitis et al [3] and Rodriguez et al [2] in their cases reported much stronger expression of p53 protein in the malignant elements compared to the precursor lesion, suggesting that p53 mutations may be involved in the malignant transformation of craniopharyngiomas. Our case showed nuclear positivity for the p63 protein, a member of the p53 family. Over-expression of select p63 splice variants is observed in many squamous cell carcinomas, suggesting that p63 may act as an oncogene [4].

CONCLUSION

Most suprasellar lesions tend to be benign and thus this highly malignant lesion must always be suspected in all patients who present to clinicians with symptoms of a suprasellar mass. Pathologists must also always be very wary of this entity, particularly if a smear preparation or frozen section is requested at the time of surgery even if the history is not supportive, as in this case. Our patient had no previous history of brain surgery or cranial radiotherapy and imaging did not reveal the malignant nature of the tumor.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. Mehrdad Nadji of the University of Miami for performing and interpreting the immunohistochemical analysis of the tumour.

References

1. Nishi T, Kuratsu J, Takeshima H, et al. Prognostic significance of the MIB-1 labeling index for patient with craniopharyngioma. *Int J Mol Med* 1999;3:157-61.
2. Rodriguez FJ, Scheithauer BW, Tsunoda S, et al. The spectrum of malignancy in craniopharyngioma. *Am J Surg Pathol* 2007;31:1020-28.
3. Kristopaitis T, Thomas C, Petruzzelli GJ, et al. Malignant craniopharyngioma. *Arch Pathol Lab Med* 2000;124:1356-60.
4. Westfall MD, Pietenpol JA. P63: molecular complexity in development and cancer. *Carcinogenesis* 2004; 25: 857-64.

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