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A Giant Pituitary Adenoma: Surgical Excision via a Staged Endoscopic and Open Approach

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Abstract

The operative management of giant pituitary adenomas represents a significant challenge for neurosurgeons. This challenge is amplified by the degree of local tumour infiltration into adjacent structures such as the cavernous sinus. The degree of parasellar tumour extension can be classified according to the Knosp grading system' while suprasellar extension is qualified in accordance with the Modified Hardys classification system. We report a 59 year male with a Knosp grade 4, Hardys C giant pituitary adenoma in which two-stage near total surgical resection via an expanded endoscopic transphenoidal approach and subsequent bifrontal craniotomy was achieved. Typically, resection rates of less than 50% have been reported following surgery on giant pituitary adenomas. Traditionally multi-modal treatment strategies with adjuvant stereotactic radiotherapy or radio surgery, has been the gold standard in the management of these locally aggressive tumours. This case serves to illustrate that even in the presence of significant suprasellar and parasellar extension, radical resection of giant pituitary adenomas can be achieved.

Keywords

Pituitary Adenoma, Giant, Endoscopy

1. Case Report

This gentleman initially presented at the age of 52 years with a 1-year history of a reduction in his peripheral visual field. This was associated with a shorter history of occipital headache and periorbital pain. Ophthalmological examination revealed a bilateral superior temporal quadrantanopia with a visual acuity of 6/24 bilaterally.

A subsequent MRI scan of the brain and pituitary demonstrated a large enhancing macroadenoma expanding the pituitary fossa and extending into the suprasellar cistern. The lesion had encased both optic nerves. Parasel-

lar extension was noted with tumour seen extending into the right cavernous sinus enclosing the cavernous carotid artery. Endocrinology confirmed this to be a gonadotrophinoma.

The patient initially underwent a subtotal pituitary adenectomy via a microscopic transphenoidal approach, achieving an approximate 20% reduction in tumour bulk. Post operatively the patient's bilateral superior quadrantanopia improved and his headache resolved. Given the considerable residual tumour mass the patient was offered further surgical debulking and radiation therapy. However the patient refused further intervention at that point as clinically he was asymptomatic. An expectant management policy was adopted with serial MR imaging and 6 monthly reviews in the outpatient setting.

The conservative management strategy was continued for approximately 6 years. During this time the pituitary lesion demonstrated slow but persistent progression.

The patient re-presented acutely with clinical features of a decompensated suprasellar lesion including headache, bi-temporal visual field loss, and confusion. Urgent MRI imaging of the brain demonstrated a very large pituitary macroadenoma with marked suprasellar extension. Hydrocephalus secondary to significant mass effect on the lateral and third ventricles was evident. Bilateral parasellar involvement was again noted.

The patient underwent extended endonasal endoscopic excision of the giant pituitary adenoma together with insertion of an external ventricular drain. The optic chiasm was identified and preserved with debulking of the tumour up to the floor of the third ventricle. Following an interval of 2 weeks the patient underwent a bifrontal craniotomy and subfrontaldebulking of the residual giant pituitary macroadenoma. 95% tumour resection was achieved. Post-operatively the patient developed diabetes insipidus. There were no other operative complications.

2. Discussion

Primary pituitary neoplasms represent 10% - 15% of all intracranial tumours [1]. Giant macroadenomas are defined as lesions greater than 4cm in diameter; and represent in the region of 15% of all pituitary adenomas [2] [3]. Since the original description of this pathological entity by Jefferson in the 1940s, surgical treatment of giant pituitary adenomas has been extremely challenging [4]. Post-operative mortality rates as high as 35% has been reported [4].

The complexity of surgery for giant pituitary adenomas relate to the degree and direction of perisellar spread. Typically these types of tumours extend in either a suprasellar or parasellar trajectory. The degree of parasellar tumour extension can be classified according to the Knosp grading system, while suprasellar extension is qualified in accordance with the Modified Hardys classification system [5]. Various studies have demonstrated that the completeness of microsurgical resection achievable via the transpheniodal approach is inversely related to both the Knosp and Hardys grade of the tumour [6] [7]. In fact true cavernous sinus invasion typically prohibits complete tumour resection [8]-[11].

It is generally accepted that the goal of surgical treatment for giant pituitary adenomas must be maximal tumour resection with minimal associated morbidity. This aim is qualified by the necessity to achieve near total surgical resection in order to avoid the catastrophic complication of post-operative pituitary apoplexy.

Traditionally, the microscopic transphenoidal approach has been the preferred initial treatment paradigm for the management of giant pituitary adenomas. Even so, results from various series within the literature have been unsatisfactory. One series by Garibi *et al.* reported a complete tumour resection rate of 27% [12]. Zhang *et al.* achieved total resection in 16.7% of patients [13], while Goel *et al.* reported a rate of 29.7% for complete resection [8].

With recent advances in the expanded endoscopic endonasal approach and the associated benefits of improve panoramic visualisation afforded, one would surmise that these historical resection rates would improve. Despite this, an open craniotomy may still be indicated in patients with dumbbell tumours extending far into the anterior cranial fossa, middle fossa, or retro-chiasmatic space [14] [15]. This is especially true for patients with a shallow pituitary fossa and/or a narrow interval between the cavernous carotid arteries [15].

We would advocate a two staged surgical strategy for total resection of giant pituitary adenomas. Although it has been argued that given the proven safety and efficacy of adjuvant radiotherapy, aggressive attempts at total tumour resection should be limited; our case serves to illustrate that radical resection of these giant lesions can be achieved with minimal surgical morbidity.

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