

Pituitary Adenomas with Large Suprasellar Components: Assessment of Efficacy of the Endoscopic Endonasal Approach

Marvin Bergsneider MD; Wendy Huang MD, PhD; David L. McArthur

 Department of Neurosurgery, David Geffen School of Medicine,

 University of California, Los Angeles, California, USA

Introduction

Transsphenoidal surgery has eclipsed open transcranial surgery in surgical management of large pituitary adenomas. For tumors with large suprasellar components, however, craniotomy may still be advantageous. Because goal of surgery is to reverse visual loss by chiasmal decompression, the surgeon must assess the probability of diaphragmatic descent via endoscopic endonasal approach. In this study we identified pre-operative MRI features that predict failure of intra-operative diaphragmatic descent.

Methods

A retrospective study of patients who underwent pituitary adenoma surgery by a single neurosurgeon at UCLA from 2008-2016 was performed. All endoscopic surgeries were performed in a Neurosurgery-Rhinology team approach. 109 patients with ≥ 30 mm tumors were included. We correlated intra-operative diaphragmatic descent with pre-operative MRI findings.

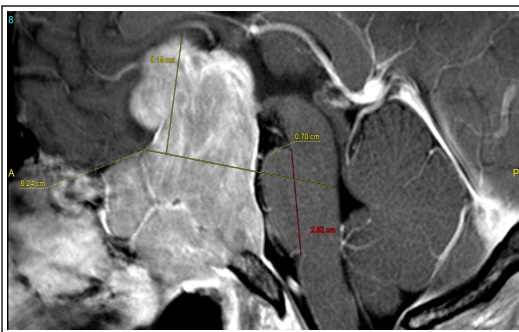


Figure 1. Suprasellar extension of the tumor is measured as the orthogonal distance from superior edge of the sella.

TABLE 1. Pre-operative patient characteristics

	No. (%)
Age (mean \pm SD, yrs)	54 \pm 15
Male	72 (66)
Female	37 (34)
Prior TNTS	18 (17)
Prior craniotomy	5 (5)
Prior radiation	1 (1)
Visual symptoms	90 (83)
Headache	27 (25)
Endocrine dysfunction	78 (72)
Hydrocephalus	1 (1)

Results

The diaphragma descended during surgery in 64% of cases; this rate decreased to 28% in tumors with > 20 mm suprasellar extension ($p < 0.001$). Subarachnoid extension, anterior fossa extension, and dumbbell shape also lowered diaphragma drop rate ($p < 0.05$). Patient age, prior TNTS, apoplexy, and tumor size were not predictive ($p > 0.05$).

TABLE 2. Tumor characteristics

	No. (%)
Tumor size ≥ 40 mm	32 (29)
Tumor size 30-40 mm	77 (71)
Suprasellar extension (mm)	
> 20	29 (27)
0-20	80 (73)
Dumbell shape	55 (50)
Subarachnoid involvement	36 (33)
Anterior cranial fossa extension	14 (13)
Apoplexy	13 (12)
Total with cavernous sinus invasion	65 (60)
Right cavernous sinus invasion	26 (24)
Left cavernous sinus invasion	13 (12)
Bilateral cavernous sinus invasion	26 (24)
Non-functioning	92 (84)
Prolactinoma	8 (7)
Cushing's	3 (3)
Acromegaly	6 (6)
TSH-secreting	0 (0)

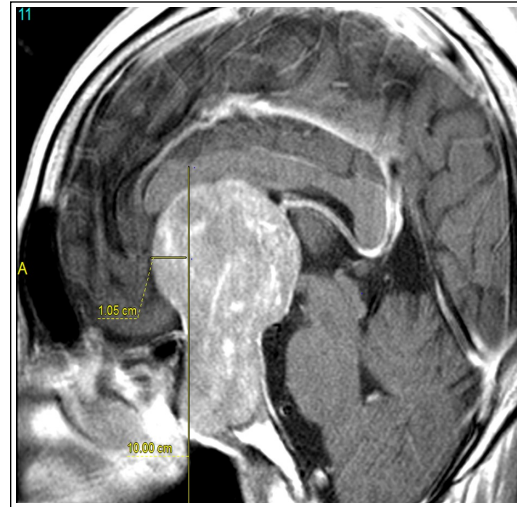


Figure 2. Anterior fossa extension of the tumor is measured as the orthogonal distance from the anterior edge of tuberculum sella to the most anterior tip of the tumor.

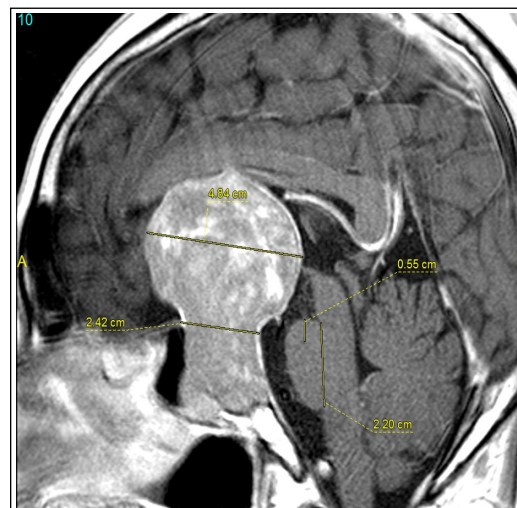


Figure 3. For tumors with dumbbell shape the ratio between width of the sella roof and the widest portion of the tumor was calculated.

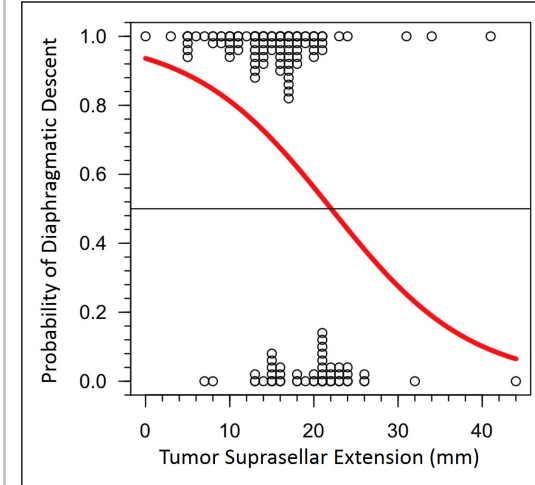


Figure 4. The probability of diaphragmatic descent decreases significantly when the tumor suprasellar extension is > 20 mm.

TABLE 3. Pre-operative predictors of diaphragma drop

	% with drop	p value
Suprasellar Extension > 20 mm	8/29 (28)	0.0015
Suprasellar Extension 0 - 20 mm	62/80 (78)	
Dumbell ratio > 1	25/55 (45)	0.043
Dumbell ratio ≤ 1	45/54 (83)	
Anterior fossa extension > 5 mm	5/14 (36)	0.004
Anterior fossa extension ≤ 5 mm	65/95 (68)	
With subarachnoid involvement	12/36 (33)	< 0.001
No subarachnoid involvement	58/73 (79)	

Conclusions

Pituitary adenomas with > 20 mm suprasellar extension have a significantly lower probability of achieving immediate chiasmal decompression via endoscopic endonasal approach. We identified pre-operative MRI features that predict failure of intra-operative diaphragmatic descent, helpful when selecting a surgical approach and counseling patients pre-operatively.