

Endoscopic Transtuberculum Transplanum Approach to Suprasellar Meningiomas

Thesis

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List of Abbreviations

Abb.	Full term
ACA.....	Anterior cerebral artery
AcoA.....	Anterior communicating artery
BA	Basilar artery
CSF	Cerebrospinal fluid
DI	Diabetes Insipidus
GTR.....	Gross total resection
ICA.....	Internal carotid artery
OCR	Optico-carotid recess
PCA.....	Posterior cerebral artery
PEA.....	Posterior ethmoidal artery
SCA.....	superior cerebellar artery
SIS	superior inter-cavernous sinus
VA	Vertebral artery

INTRODUCTION

“There is today nothing in the whole realm of surgery more gratifying than successful removal of a meningioma with perfect functional recovery, especially should a correct pathological diagnosis have been previously made. The difficulties are admittedly great, sometimes insurmountable, and though the disappointments still are many, another generation of neurological surgeons will unquestionably see them largely overcome” a quote by Harvey Cushing the man who resected the first suprasellar meningioma via a transcranial approach in 1916.

Suprasellar meningiomas arising from planum sphenoidale, chiasmatic sulcus, tuberculum sellae and diaphragma sellae, are about 10% of intracranial meningiomas and constitute such a challenge for skull base surgeons due to their location and relation to critical neurovascular structure mainly the optic apparatus and the anterior cerebral artery (ACA) complex⁴⁰. Visual manifestations are the most common presentation of suprasellar meningiomas. Ideally, suprasellar meningioma surgery should aim at alleviating visual signs and symptoms, or at least saving any residual visual function, and achieving Simpson grade I resection with no or minimal morbidities³¹. The introduction of the microscope in neurosurgery markedly improved the outcomes of surgical resection of suprasellar meningiomas. Various transcranial

approaches are well described in the literature used to tackle suprasellar meningiomas, most commonly performed are anterior subfrontal approaches and lateral transsylvian (pterional) approach. In the past few years, with the major breakthroughs in endoscopic skull base surgery and the advent of endoscopic extended transsphenoidal approaches, the endoscopic transtuberculum transplanum approach was presented as a viable option or alternative to the microsurgical transcranial route⁴⁶. Some authors suggest that if visual outcome was the sole predictor for choice of the approach to suprasellar meningiomas, the endoscopic endonasal route will be superior to open transcranial route, given superior visual outcome following endoscopic approaches⁴⁰. Radiosurgery and fractionated stereotactic radiotherapy has evolved in recent years, with conventional radiotherapy providing long term control rates reaching 80% and fractionated stereotactic radiotherapy showing promising results with shorter follow up periods³⁴. More recent reports suggest that Simpson grade may not be a statistically significant predictor for outcome in modern neurosurgical era³⁴. Some authors suggest that tumors extending lateral to the optic and carotids, making GTR not feasible, is not an absolute contraindication for endoscopic endonasal route⁴⁰. These findings highlight the importance of further studies of extended endoscopic approach to suprasellar meningiomas with larger number of patients & long term follow up to further assess feasibility & define the criteria for proper patient selection to optimize the outcomes.

AIM OF THE WORK

The objective of this study is to add another case series to the small number of cases reported in the literature for endoscopic approaches to suprasellar meningiomas, in an effort to help assess its feasibility with special emphasis on visual outcome. The study also aims at defining the criteria for proper patient selection to endoscopic endonasal approaches to suprasellar meningiomas.

REVIEW OF LITERATURE

History & evolution of surgical approaches to suprasellar meningiomas

Cushing and Eisenhardt published their historical paper in 1929 where they classified suprasellar meningiomas in to four stages according to their size. Stage I & II were defined as being asymptomatic thus not encountered in their series. Stage III & IV were symptomatic & thus treated surgically. Cushing and Eisenhardt further elucidated the “chiasmal syndrome” in suprasellar meningiomas, first described in 1927 by Holmes and Sargent. Chiasmal syndrome is defined as primary optic atrophy with bitemporal field defects in the presence of normal sellae in plain x-ray skull (**Fig 1**)¹⁰.

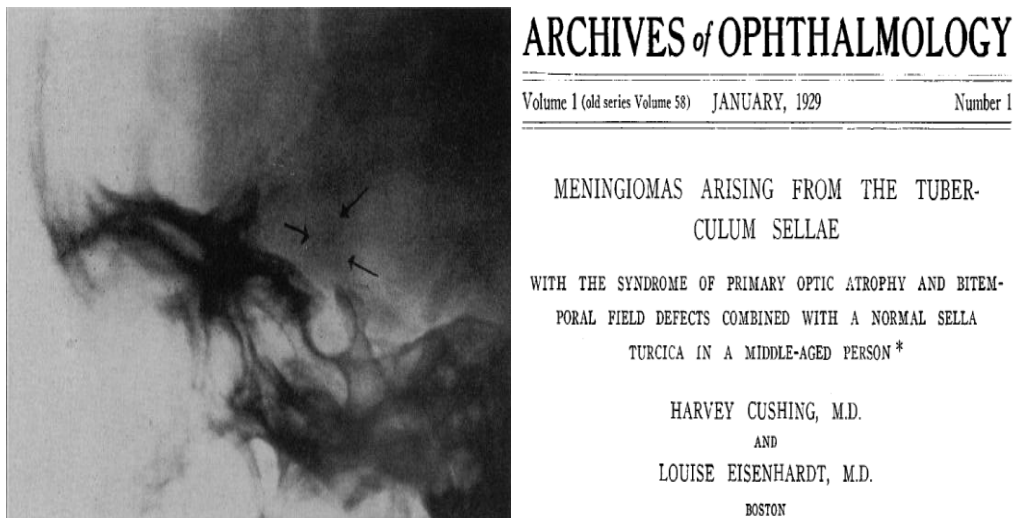


Figure (1): Plain x-ray skull from Cushing and Eisenhardt seminal study in 1929. Arrows are pointing to suprasellar shadow with normal appearing sella, which characterizes the chiasmal syndrome.¹⁰

Al-Mefty reclassified suprasellar meningiomas as those arising via arachnoid cap cells from the planum sphenoidale, tuberculum sella, diaphragma sella, and anterior clinoid process¹. de Divitiis later distinguished clinoidal meningiomas from other suprasellar meningiomas²¹. Kinjo et al. in 1995 classified diaphragma sellae meningioma into 3 types: 1) **Type A**, arising from the upper leaf of the diaphragma sellae anterior to the pituitary stalk; 2) **Type B**, arising from the upper leaf of the diaphragm sellae posterior to the pituitary stalk; and 3) **Type C**, arising from the inferior leaf of the diaphragm sellae. Type C tumors involve the sella and cause enlargement, mimicking a pituitary adenoma²⁴.

Various prognostic scoring systems have been proposed to classify these tumors all included tumor size while variably including optic canal invasion, vascular invasion, brain invasion, peritumoral edema, previous surgery, previous radiation, and duration of visual symptoms in their schemes. S. Magill et al. recently proposed a classification system, which evaluates tumor size, optic canal involvement & vascular encasement which they proposed can help for choice of surgical approach & predict post-operative outcome (**Fig 2**)³³. However though, these proposed classification schemes have yet to be externally validated, widely adopted, or prospectively used to guide surgical approaches.