

# Minimally Invasive Transpalpebral (Trans-eyelid) Approach to Anterior and Middle Skull Base Tumors – A Preliminary Study from Cadaveric Anatomy to Clinical Operations of Shanghai Huashan Hospital

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## Introduction

Transpalpebral or trans-eyelid approach is a recently modified trans-orbital access to the anterior and middle cranial fossa, while previous reported cases were mainly situated at the midline. We describe our preliminary study from cadaveric anatomy to clinical operations with some revisions and new experience in Asian people.

## Methods

We used 5 cadavers to compare trans-orbital (n=5) and trans-eyelid approaches (n=5) in a step-by-step fashion. The surgical procedures were performed as described previously by Andaluz(2008) and Abdel Aziz(2011). And then assisted by an experienced ophthalmologist, we operated on three patients (3 female) of skull base meningiomas via this approach: Two with medial sphenoidal ridge meningiomas, and the other with sellar tuberculum meningioma.

## Results

After carefully studied the anatomy of cadavers, we made several revisions to this approach: 1) The incision may be moved a little lower close to the edge of the eyelid, which resembles the double-eyelid incision and a fashioned surgery many Chinese young people would love to have. 2) A vascularized periosteum flap is dissected for repairing the opened frontal sinus and reconstruction of the skull base. 3) The dura is sutured up with a slice of temporalis muscle, which we think is very important to keep the dura water-tightly. We also used virtual reality technique to simulate the surgical approach, from designing the mini-bone flap and the surgical route. All tumors were totally resected (2 in Simpson Grade I, 1 in Grade II). No cerebrospinal fluid leakage happened and the wound healed well. Cosmetic outcome of the eyes was well in 2 patients, but one with permanent orbital apex syndrome due to invasion of tumor into the orbit, the other with transient oculomotor paralysis but recovered.

- References:**
1. N. Andaluz, et al. J Neurosurg, 2008, 109:341-6.
  2. K.M. Abdel Aziz, et al. Neurosurgery (Suppl), 2011, ons195-206.
  3. R. Reisch, et al. Neurosurgery (Suppl), 2005, ons242-55.
  4. HD Jho. Minim Invas Neurosurg, 1997, 91-7.

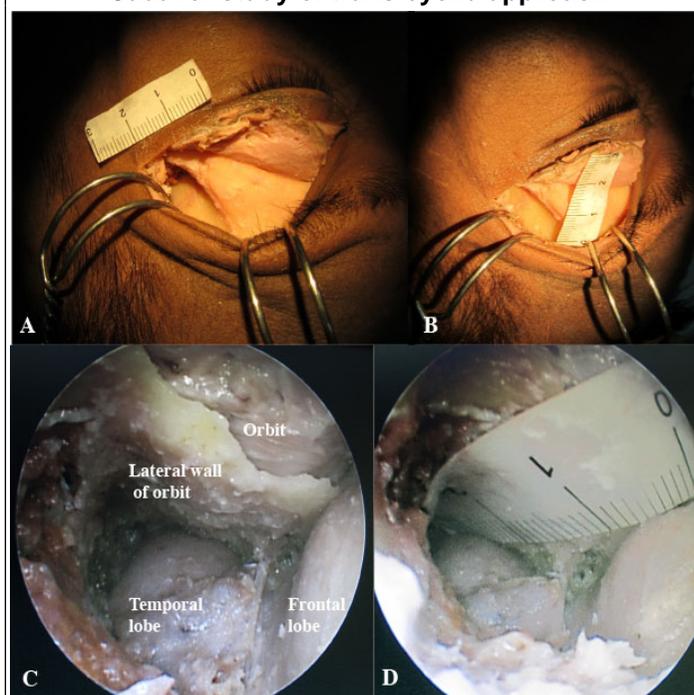
## Conclusions

Trans-eyelid approach is also suitable for lesions situated around sphenoidal wings within 2cm range, especially lesions invading the orbital. Cadaveric study and virtual reality proved to be good method to exploit the advantages of this approach. Asian people of old age and remarkable crease of the upper eyelid are more suitable to this approach. This is a safe and minimally invasive approach, with an acceptable cosmetic results.

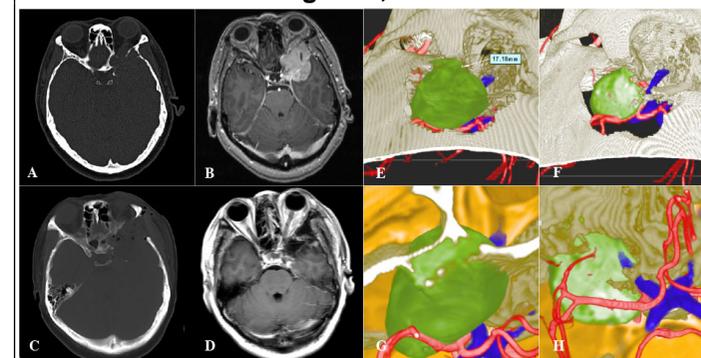
## Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of this new modified approach for tumors of anterior and middle cranial fossa, 2) Discuss, in small groups, this new modified approach, 3) Identify an effective treatment for tumors of anterior and middle cranial fossa.

### Cadaver study of trans-eyelid approach

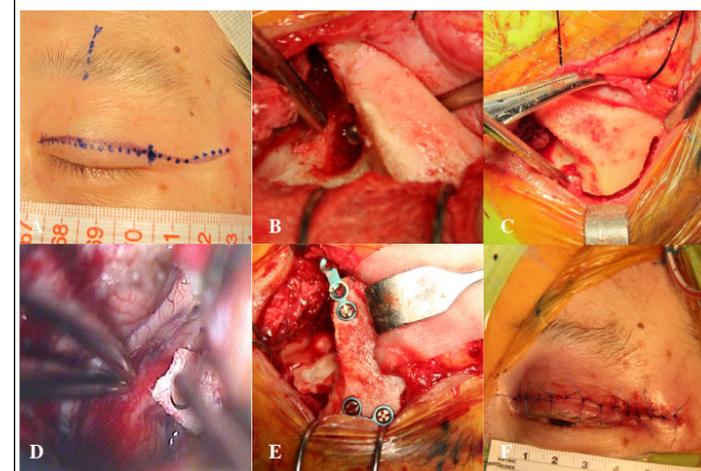


### CT, MRI and virtual reality of left sphenoidal ridge meningioma, Case #1.



A), B) CT and MRI before the surgery, showing that the tumor invaded into the orbit. C), D) CT and MRI after the surgery, showing that the tumor was totally removed. E)-H) virtual reality simulated the bone window, the boundary of the tumor, the exposure of the tumor through the mini-craniotomy, and the relationship of tumor, vessel, and optic nerve.

### The surgical steps of trans-eyelid approach in Case #1.



A) Design of incision, marking the supra-orbital notch and nerve-vessel bundle. B) Speno-orbital burr hole exposing the periorbita, frontal lobe and temporal lobe. C) Mini-craniotomy of one piece. D) Resecting the tumor. E) Bone fixation. F) Closure of skin.