Unilateral Medial Trans-palpebral Transfrontal Interhemispheric Approach to the Frontal Pole and the Anterior Skull Base.

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RHOTON PROGRAM

BACKGROUND

Several approaches have been described to reach lesions of the anterior fossa. These include the transbasal transfrontal, subfrontal, pterional, lateral supraorbital, and endoscopic endonasal transcribriform approach. While the open approaches offer excellent maneuverability, exposure, and the possibility of preserving olfaction, large craniofacial approaches are often required to reach the olfactory groove when the cribriform plate is low-lying.

The endoscopic endonasal approaches afford excellent visualization of the lesion and obviate brain retraction, but they require extensive removal of the nasal structures and sacrifice olfaction. To provide direct access to the cribriform plate while preserving the olfactory apparatus, a transpalpebral transfrontal may be utilized.

OBJECTIVE

This approach and its indications, however, have not been well described in the literature. In this study, we illustrate the the step-by-step trans-palpebral transfrontal approach with cadaveric dissections and quantitatively describe its anatomical limitations and indications.

MATERIAL AND METHODS

Twelve sides of six formalin-fixed, latex-injected anatomical specimens were dissected. Photogrammetry models were created for each dissected specimen. Subsequently, the depth of the surgical field from the skin, the area of exposure, and the angle of attack at the superior, inferomedial, and inferolateral borders of the dural opening were evaluated. Key steps were photographed in 3D on illustrative specimens.

RESULTS

The key steps of the approach include a 2-cm subperiosteal skin incision in the medial eyelid that does not extend lateral to the supraorbital notch; the frontal bone is then exposed and drilled away to enter the frontal sinus; under endoscopic visualization, the posterior table of the frontal sinus is then removed to expose the dura of the frontal pole; the dura of the frontal pole is removed and the anterior cranial base and interhemispheric fissure can be dissected (**Figures 1** - **4**).

Key structures accessed in this approach include the olfactory bulb and nerve and the contents of the anterior interhemispheric fissure including the distal anterior cerebral artery segments.

RESULTS

The mean depth of the surgical field was 13.5 mm, and the mean area of exposure was 290.1 cm². The vertical and horizontal angles of attack at the inferomedial border were 37.6° and 45.5°, respectively.

The vertical and horizontal angles of attack at the inferolateral border were 36.7° and 40.3°, respectively. The vertical and horizontal angles of attack at the uppermost border were 28.2° and 46.9°, respectively.

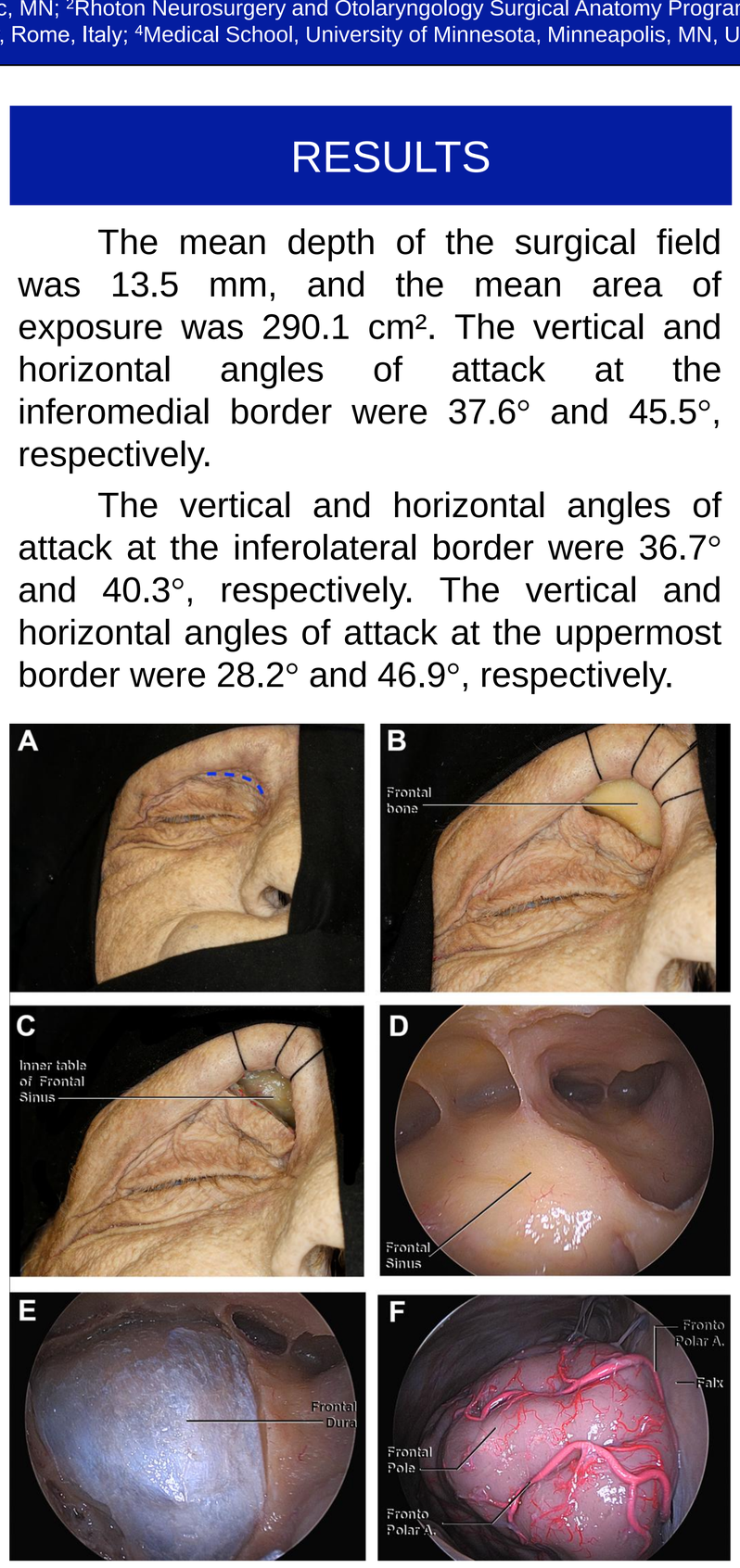

Figure 1. **A-** The dotted line depicts the skin incision along the medial eye line. **B-** Bony exposure after subperiosteal dissection. **C-** A craniotomy that is limited by the boundaries of the skin incision is performed. **D-** Endoscopic view of the frontal sinus. **E-**Drilling the inner table of the frontal sinus to expose the dura of the temporal pole. **F-** The durotomy is performed in a C-shaped fashion and reflected inferiorly.

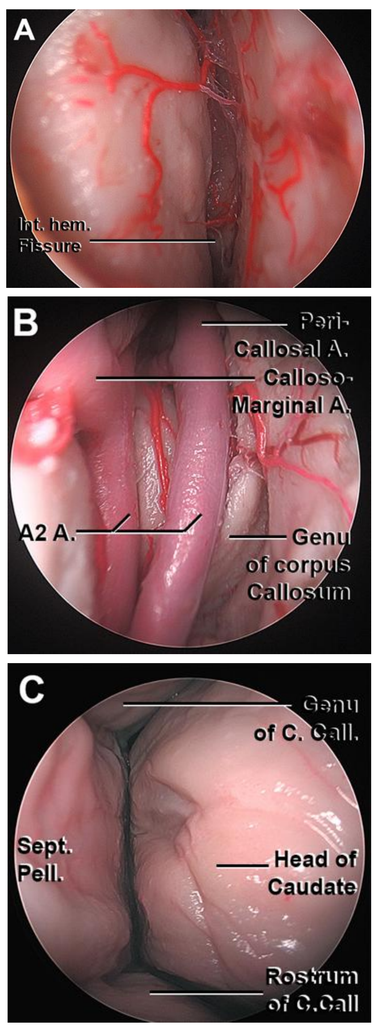

Figure 2. Dissection of the interhemispheric fissure and lateral ventricle. **A-** The interhemispheric fissure is exposed and dissected between the mesial frontal pole and the falx. **B-** The genu of the corpus callosum and the A2 segments of the anterior cerebral arateries and the callosomarginal and pericallosal arteries are exposed, bilaterally. **C-** After a 1 cm horizontal callosotomy on the genu, the frontal horn of the lateral ventricle is enterd. At this level, lateral ventricle is bouneded laterally by the head of the caudate, medially by the septum pellucidum, inferiorly by the rostrum of the corpus callosum, and superiorly by the genu and body of the corpus callosum.

RESULTS

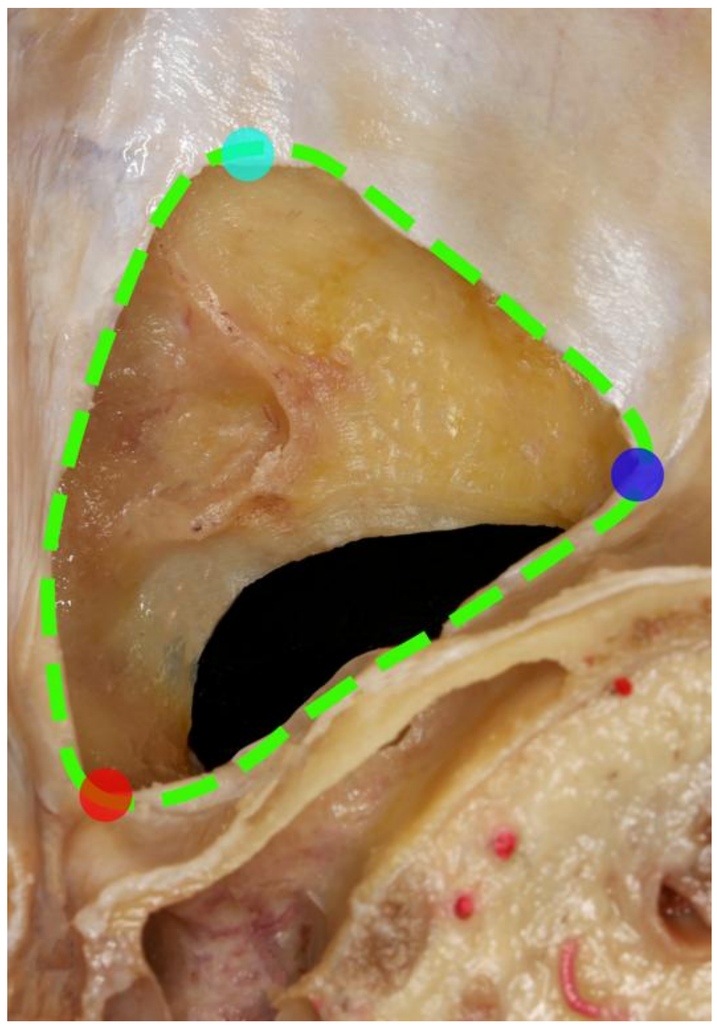

Figure 3. Detailed view of the inner table osteotomy from a posterior to anterior perspective. The superior angle of attack is marked by a light blue circle, the inferomedial angle of attack is marked by a red circle, and the inferolateral angle of attack is marked by a blue circle.

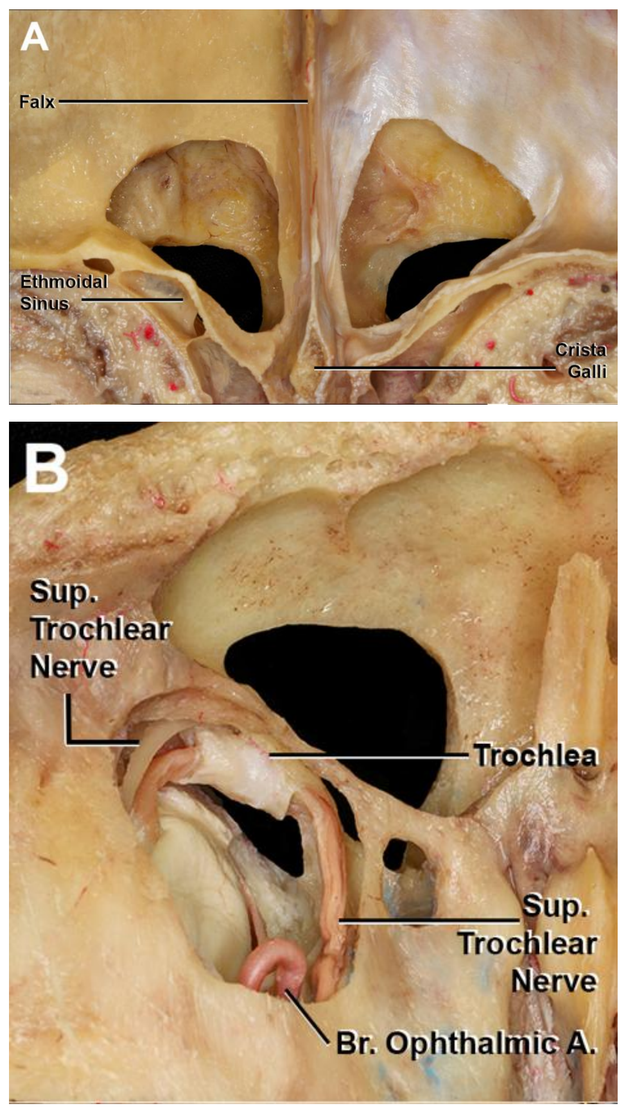

Figure 4. Relationship of the craniotomy to the trochlea and supratrochlear nerve.

CONCLUSIONS

The unilateral medial trans-palpebral transfrontal approach offers a safe and short corridor with good maneuverability. The approach provides excellent exposure of the anterior interhemispheric fissure, and the olfactory bulbs and nerves.