The Pterygoclival Ligament: A Novel Landmark for Localization of the Internal Carotid Artery during the Endoscopic Endonasal Approach

Ali Tayebi Meybodi, MD¹, Vera Vigo, MD², Arnau Benet, MD¹, Sofia Kakaizada², Michael T. Lawton, MD¹

¹Division of Neurosurgery, Barrow Neurological Institute, Phoenix, Arizona, USA
²Department of Neurosurgery, University of California, San Francisco, California, USA
Disclosure

• Dr. Tayebi Meybodi’s post-doc research fellowship is supported by funding source from Barrow Neurological Foundation

• The rest of the authors have not conflict of interests to disclose
Introduction

• The transpterygoid extension of the endoscopic endonasal approach provides exposure of the petrous apex, Meckel’s cave, paraclival area, and the infratemporal fossa.

• Safe and efficient localization of the lacerum internal carotid artery (ICA) is a crucial part of such exposure.

• This study introduces a novel landmark for safe and efficient localization of the lacerum ICA.
Methods

• Ten cadaveric heads were prepared for transnasal endoscopic surgical simulation.
• The floor of the sphenoid sinus was drilled to expose an extension of the pharyngobasilar fascia between the sphenoid floor and the pterygoid process (the pterygoclival ligament [PCL]).
• Several features of the PCL were assessed. In addition, 31 dry skulls were also studied to assess features of the bony groove harboring the pterygoclival ligament.
Results

• The PCL was identified during drilling of sphenoid floor in all specimens. The ligament invariably extended posterolaterally and superiorly to blend into the fibrous tissue around the lacerum ICA.

• The average length of the ligament was 10.5mm ± 1.8. There was an average of 6mm distance between the posterior end of the pterygoclival ligament and the posterior end of the vidian nerve on the lacerum segment of the ICA.
Results - Stepwise exposure of PCL

- A – transnasal exposure of sphenoid face
- B – Sphenoidotomy and posterior ethmoidectomy
- C – initial exposure of PCL (arrow) by drilling the sphenoid floor
- D & E – PCL (small arrows) leads to carotid protuberance
- E – Full exposure of lacerum ICA (green area shows the bony area between vidian canal and PCL)

* = sphenopalatine foramen; cav. = cavernous; lig. = ligament; CR = clival recess; n. = nerve.
Results

• The bony pterygoclival groove was identified at the confluence of vomer, pterygoid process of the sphenoid, and basilar part of the occipital bone, running from posterolateral to anteromedial with an average length of 7.6mm.

• Its posterolateral end faced the anteromedial aspect of the foramen lacerum medial to the posterior end of the vidian canal.
Results

*Left,* exocranial surface of the bony cranium showing the relationship between the pterygoclival groove and adjacent Structures. *Right,* oblique view of the sphenoid bone showing the course of the pterygoclival groove (red arrow) reaching The carotid sulcus.
Conclusion

• The PCL is a consistent landmark for localization of the lacerum ICA. It may be used as an adjunct or alternative to the vidian nerve to localize the ICA during endoscopic endonasal surgery.