

073. Predictive Value of Early Postoperative Growth Hormone Levels in Determining Long-Term Biochemical Cure of Acromegaly

Tyler J. Kenning (presenter), Peter G. Campbell, Christopher Farrell, David Beahm, Madeline Schaberg, Intekhab Ahmed, Marc Rosen, James J. Evans (Philadelphia, USA)

Introduction: Using strict biochemical remission criteria, the authors assessed surgical outcomes after endoscopic transsphenoidal resection of growth hormone (GH)-secreting pituitary adenomas and identified the predictive value of early postoperative GH levels in determining disease remission.

Methods: A retrospective review of a prospectively maintained database was performed. A total of 35 endoscopic procedures for adenoma resection were reviewed. The average duration of follow-up was 30.7 months. In the postoperative period, growth hormone levels were obtained immediately postsurgically, and on each postoperative day (POD). The thresholds of an age-appropriate, normalized insulin-like growth factor-1 (IGF-1) concentration, a nadir GH level after oral glucose load of less than 1.0 µg/L, and a random GH level of less than 2.5 µg/L were required to establish biochemical cure postoperatively.

Results: Following 45.7% of the operative procedures (16 of 35), an endocrinological cure was achieved. Preoperative GH and IGF-1 levels were not significantly different in those patients who achieved biochemical cure (Group A) and those who did not (Group B). Although, the immediate POD#0 levels were not significantly different, a lower level was achieved on each subsequent POD and noted as early as POD#1 (A: 1.2 ± 0.7 µg/L, B: 4.2 ± 3.8 µg/L, $P = 0.0003$) and POD#2 (A: 1.2 ± 0.7 µg/L, B: 5.8 ± 7.2 µg/L, $P = 0.0001$). In those patients in whom a biochemical cure was attained, nearly all had a GH level < 2.4 µg/L on POD#1 and later. The one exception was a patient with a recurrent adenoma, two previous resections, a preoperative GH level of 9.5 µg/L, and a POD#1 level of 3.0 µg/L. On POD#2, the level had decreased to 1.6 µg/L and continued to decline. In this cohort, the use of a postoperative GH < 2.5 µg/L on POD#1 and later as a predictor of future biochemical remission resulted in a specificity of 100% and a sensitivity of 74%.

Conclusion: Following surgical resection, GH levels may decrease to acceptable levels as early as the first postoperative day. The measurement of growth hormone levels in the immediate preoperative period may be helpful in predicting future biochemical remission. Used in conjunction with intraoperative findings and postoperative imaging, obtaining early postoperative GH levels could potentially identify those patients who require additional treatment, including early revision surgery, medical therapy, and radiation.

074. Petrous Apex Cholesterol Granulomas: Endonasal vs. Infracochlear Approach

Tiago F. Scopel, Juan C. Fernandez-Miranda, Carlos D. Pinheiro-Neto (presenter), Maria Peris-Celda, Alessandro Paluzzi, Barry E. Hirsch, Paul A. Gardner, Carl H. Snyderman (Pittsburgh, USA)

Objectives: This study aims to investigate and compare the surgical anatomy of two different routes to access and drain petrous apex (PA) cholesterol granulomas: the expanded endonasal approach (EEA) and the transcanal infracochlear approach (TICA).

Methods: The EEA and TICA to the petrous apex were performed in 11 anatomical specimens with the assistance of image guidance. The PA was categorized in three zones: superior PA, anterior-inferior PA, and posterior-inferior PA. The maximum drainage window achieved by each approach was calculated using the imaging studies of each anatomical specimen.

Results: The EEA was able to reach superior PA and anterior-inferior PA in all specimens and posterior-inferior PA in 90% of them. The TICA did not provide access to the superior PA in any case. The TICA was suitable to reach anterior-inferior PA in 80% of specimens and posterior-inferior PA in 60%. Based on the radiological study, the EEA provided a drainage window three times larger than the TICA.

Conclusions: The transnasal approach provides reliable access to the PA when combined with internal carotid artery exposure and allows for a large drainage window. The transcanal approach is less versatile and more limited than the transnasal approach but provides access to the most posterior and inferior portion of the PA without eustachian tube transection. Here we propose a new surgical classification that may help to decide the most suitable approach to the PA according to the location and extension of the lesion.

075. The Artery of Davidoff and Schechter: An Anatomical Study

Christoph J. Griessenauer (presenter), Martin M. Mortazavi, Shane R. Tubbs (Birmingham, USA)

Introduction: Few reports have mentioned the artery of Davidoff and Schechter. Therefore, this tentorial branch of the posterior cerebral artery was studied.

Materials and Methods: Twenty adult latex-injected cadaveric heads (40 sides) underwent microdissection with specific attention given to the presence of the artery of Davidoff and Schechter. When identified, measurements were made and observations given to the source and course of this vessel.

Results: An artery of Davidoff and Schechter was identified on 10 sides (25%). This artery was found to always be a branch of the P2 segment of the posterior cerebral artery and typically traveled posterolateral under the superior cerebellar artery and superior to the trochlear nerve to enter the deep surface of the tentorium cerebelli roughly near the midpoint of the ipsilateral one half of the incisura. From this point, the vessel traveled posterior to approximately the midline, where it took an upward course to supply the falcotentorial junction. The average diameter of the vessel was 0.8 mm with a mean length of 1.2 cm. The artery was found to be more common in male specimens and was more common on left sides ($P < 0.05$). Bilateral occurrence was seen in only one male specimen.

Conclusions: Knowledge of the artery of Davidoff and Schechter may be important during approaches to the ambient cistern or in interpretation of imaging such as in tentorial arteriovenous malformations.

076. The Artery of Percheron: An Anatomical Study

Christoph J. Griessenauer (presenter), Martin M. Mortazavi, Shane R. Tubbs (Birmingham, USA)

Introduction: One variant branch of the P1 segment of the posterior cerebral artery is the artery of Percheron.

This unilateral trunk supplies both thalami and potentially mesencephalic structures as well. As studies of this vessel are scant in the literature, the present study was performed to better elucidate its morphology.

Materials and Methods: Twenty-five adult latex-injected cadaveric heads underwent brain removal and microdissection with specific attention given to the presence of the artery of Percheron. When identified, measurements were made and observations given to the origin and course of this vessel.

Results: An artery of Percheron was identified on three sides (12%). The artery was seen on two right and one left side and in one male and two female specimens; it arose on average 8 mm lateral to the basilar artery bifurcation. The average diameter was 2.1 mm, and the length between origin and brain penetration had a mean distance of 1.5 cm. In all specimens, the artery of Percheron had a coiled appearance, especially in its proximal extraparenchymal segment. The contralateral P1 segment of the posterior cerebral artery was not absent or hypoplastic in any of the three specimens. All arteries supplied small branches to the ipsilateral and contralateral thalami and midbrain.

Conclusions: Knowledge of the artery of Percheron may be important during approaches to the basilar bifurcation or during interpretation of imaging, especially in patients presenting with bilateral thalamic and midbrain infarctions.

077. Second Stage in Predictive Measure for Transnasal Transsphenoidal Approach to Petrous Apex Cholesterol Granuloma

Angela M. Donaldson (presenter), Nael Shoman, Jeffrey Ksiazek, Myles L. Pensak, Lee A. Zimmer (Cincinnati, USA)

Objective: This study is the second stage in a three-stage study, which aimed to identify the narrowest petrous angle that would allow a transsphenoidal approach for treatment of cholesterol granulomas based on our operative experience.

Study Design: Retrospective review.

Setting: University of Cincinnati Medical Center.

Subjects and Methods: Patients in the study were seen in our tertiary care center from 2000–2010 with isolated petrous cholesterol granulomas on noncontrast orbital/sella/internal auditory canal CT images of the temporal bone. The angle between the medial-most aspect of the vertical portion of petrous internal carotid artery (ICA), vomer, and occipital protuberance was measured. The distance between the posterior sphenoid wall (SW) and the medial aspect of the cholesterol granuloma (CG) was measured.

Results: Seventeen patients had radiographically evident isolated petrous CGs, and 17/18 or 94% of the CGs abutted the posterior sphenoid wall (SW), as defined by a sphenoid wall to medial aspect of CG distance of 5 mm or less. In our study, a petrous angle of 10 degrees with SW to CG distance of 7 mm was the narrowest angle for which the transsphenoidal approach was successful.

Conclusion: The first study in our three-stage study looked at 400 normal CT scans of the temporal bone and found that the majority of patients had a petrous angle—the angle between the medial aspect of the petrous ICA, the vomer, and the occipital protuberance—between 10 and 20 degrees. This was the second study that looked at a quantitative predictive measure of feasibility of the transsphenoidal approach using three consistent landmarks. We found

that the majority of petrous apex CGs in our practice had an angle between 10 and 20 degrees. We determined that a petrous angle of 10 degrees and a SW to CG of less than 10 mm is a reasonable cutoff for performing incision and drainage of petrous apex CGs in the hands of an experienced surgeon.

078. Accessing the Parapharyngeal Space: An Anatomical Study Comparing the Endoscopic Endonasal and the Subtemporal Preauricular Approaches

Jason Van Rompaey, Marcos Francisco Mirambeaux Casso (presenter), C. Arturo Solares (Augusta, USA)

Background: A subtemporal preauricular approach to the infratemporal fossa and parapharyngeal portion of the skull base has been the traditional path to tumors of this region. However, the high morbidity associated with this procedure has led to the pursuit of less invasive techniques. Endoscopic endonasal access utilizing a minimally invasive transmaxillary/transpterygoid approach could potentially obviate the drawbacks associated with open surgery.

Methods: A subtemporal preauricular approach and an endoscopic endonasal transmaxillary/transpterygoid approach were completed. Access was gained to the superior portion of the parapharyngeal space by making a pterional craniotomy and removing the temporal bone lateral and posterior to the foramen ovale extending to the mandibular fossa. The same area was accessed endonasally by removal of the medial and posterior wall of the maxillary sinus. The medial and lateral pterygoid plates were removed with reflection of the medial pterygoid and the tensor veli palatini muscles exposing the relevant anatomy of the parapharyngeal space.

Results: The endoscopic endonasal approach provided sufficient access to the superior portion of the parapharyngeal space. The anatomy of this region was easily identified. The open approach also provided adequate access; however it required a larger surgical window causing greater iatrogenic injury to the bone, muscles, and neurovasculature. However, the subtemporal approach did provide improved access to the petrous portion of the internal carotid artery. The endonasal approach provided improved access to the anterior and medial portions of the superior parapharyngeal space.

Conclusion: Endoscopic endonasal access using a transmaxillary/transpterygoid approach provided a sufficient surgical window for tumor extirpation. Use of this approach obviated the morbidity associated with an open procedure. Further understanding of the endoscopic anatomy of this region can lead to improvements in morbidity associated with tumor resection in this dense neurovascular region.

079. Mapping of Transverse and Sigmoid Sinus Junction: Application in Vertical Extension of Suboccipital Craniotomy

Ashish Sonig (presenter), Jai Deep Thakur, Imad Khan, Sashikanth Patil, Cedric Shorter, Anil Nanda, Bharat Guthikonda (Shreveport, USA)

Introduction: There is paucity of data regarding the surface landmarks and the vertical course of the sigmoid sinus. Moreover, the junction between transverse and sigmoid sinus is gradual, with transitional dural zone seen over superior and inferior limb and not at a focal point. Earlier studies have addressed the distances between various bone