

Microsurgical anatomy of the lateral condylar vein: Application to skull base and endovascular surgeries

Ken Matsushima MD; Takeshi Funaki MD; Noritaka Komune; Toshio Matsushima; Albert L. Rhoton MD Department of Neurological surgery, University of Florida, Gainesville, FL Department of Neurosurgery, Kyoto University, Kyoto, Japan, Department of Neurosurgery, Saga University, Saga, Japan,

Introduction

Although the lateral condylar vein has been encountered in some skull base approaches and used as a route to access the anterior condylar venous confluence, few descriptions can be found in the literature regarding its morphology. This study examined the anatomy of this vein and its clinical significance.

Methods

The craniocervical junctions of 3 cadaveric heads, 15 dry bones, and 25 CT venography images were examined.

Conclusions

The lateral condylar vein may be encountered in exposing the jugular bulb, hypoglossal canal, or foramen magnum. This vein has been reported to be a main draining route of dural arteriovenous fistulas, in which case it can be utilized as a transvenous route for endovascular treatment, or obliterated. An understanding of the anatomy of this vein may prove useful in planning skull base and endovascular procedures.

Results

The lateral condylar vein was identified in 44 of 50 paracondylar areas (88.0%), and had an average diameter of 3.6 mm. This vein originated near the jugular bulb, descended along the lateral surface of the occipital condyle and medial to the internal jugular vein and CNs IX-XI. It coursed medial or lateral to the descending course of CN XII and medial to the rectus capitis lateralis muscle to drain into the vertebral venous plexus surrounding the 3rd segment of the vertebral artery. The veins were classified according to their origin from either the: 1) anterior condylar confluence (95.5%), or 2) internal jugular vein (4.5%). In some specimens, the lateral condylar vein courses within a small osseous canal lateral to the occipital condyle, referred to as the paracondylar canal, which was identified in 5 of 30 paracondylar areas (16.7%) of the dry bones.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the multiple venous connections around the craniocervical junction including the lateral condylar vein, and 2) Discuss the clinical significance of veins around the craniocervical junction in the surgical and endovascular procedures of the skull base.

References

Arnautovic KI, al-Mefty O, Pait TG, Krisht AF, Husain MM. The suboccipital cavernous sinus. Journal of neurosurgery. Feb 1997;86(2):252-262.

Liu JK, Mahaney K, Barnwell SL, McMenomey SO, Delashaw JB, Jr. Dural arteriovenous fistula of the anterior condylar confluence and hypoglossal canal mimicking a jugular foramen tumor. Journal of neurosurgery. Aug 2008;109(2):335-340.

Miyachi S, Ohshima T, Izumi T, Kojima T, Yoshida J. Dural arteriovenous fistula at the anterior condylar confluence. Interventional neuroradiology : journal of peritherapeutic neuroradiology, surgical procedures and related neurosciences. Sep 30 2008;14(3):303-311.



Fig. 1: A groove between the occipital condyle and jugular foramen was identified in 33% of paracondylar areas (B), and a canal, the paracondylar canal, was seen in 17% (C). Fig. 2: Inferior view. The lateral condylar vein originates from the anterior condylar confluence and descends along the lateral surface of the occipital condyle medial to the internal jugular vein, the descending course of CNs IX-XI, and rectus capitis lateralis muscle to drain into the vertebral venous plexus. Fig. 3: Right lateral view, demonstrating the transjugular approach. Drilling the jugular process and lateral part of the occipital condyle exposes the posterior condylar vein (A). The whole course of the lateral condylar vein was exposed after removing the rectus capitis lateralis muscle (B).

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Epst. Carl V. CH AI

 Fig. 52:-CT Venograpiu
 biblicitati — Ch AI

 Fig. 52:-CT Venograpiu
 biblicitati — Ch AI

 Fig. 52:-CT Venograpiu

Fig. 4: Posterior view, right paracondylar approach. Drilling the jugular process and lateral part of the occipital condyle exposed the posterior wall of the jugular bulb, and lateral and posterior condylar veins (A). Additional drilling of the occipital condyle exposes CN XII and the venous plexus of the hypoglossal canal. The lateral condylar vein originates from the anterior condylar confluence on the external orifice of the hypoglossal canal (B). Fig. 5: Lateral condylar vein visualized with 3D-CT venography images. The veins were classified according to their origin from either the: 1) anterior condylar confluence (A-C), or 2) internal jugular vein (D).