Far lateral transcondylar craniotomy

see Far lateral approach.

The far lateral transcondylar craniotomy is the standard approach for posterior inferior cerebellar artery aneurysm exposure through the microsurgical dissection in the vagoaccessory triangle (VAT). However, the extended retrosigmoid craniotomy and dissection through the glossopharyngeal-cochlear triangle (GCT) may be more appropriate when the patient has an aneurysm arising from a high-riding vertebral artery (VA)-PICA origin.

The far lateral approach with occipital condyle resection is often used to clip vertebral artery aneurysm and posterior inferior cerebellar artery aneurysms.

A far-lateral approach that leaves the occipital condyle intact is adequate for treating most patients with VA-PICA aneurysms [1].

The lateral transcondylar approach is an effective approach to clival chordomas.

The approach allowed resection of all the involved tissues, intra- and extracranial, and afforded excellent neurovascular control [2].

It provides access to the lower clivus and pre-medullary area. Its difference to the standard far lateral approach is the need to drill the posterior half or posterior two thirds of the occipital condyle [3] [4] [5].

It enables access to the anterior brainstem and foramen magnum region with minimum retraction. This extension of the unilateral suboccipital approach optimizes the surgical treatment of lesions in this region, including benign tumors, bony and locally invasive tumors, and vascular lesions.

Many variations of the lateral skull-base approach to the anterior craniovertebral junction, which include variable resection of the condyle, have been published.

Extreme lateral transcondylar approach or Far-Lateral Transcondylar Approach

The transcondylar variation of the far-lateral, retrosigmoid approach is intended for pathologies in the anterolateral portion of the foramen magnum.

The role of condyle resection during this approach is controversial.

Removing the posteromedial two-thirds of one occipital condyle alters the normal axial rotational movements of the craniovertebral junction on both sides. The insertion of the alar ligament can be inadvertently removed during condylar resection, and this could contribute to atlanto-axial instability. There is a biomechanical substrate to cranio-cervical instability following a transcondylar approach; these patients may need to be followed over several years to ensure it does not progress and necessitate occipito-cervical fusion. [6].

See

1: Matsushima T, Kawashima M, Inoue K, Matsushima K, Miki K. Exposure of wide cerebellomedullary cisterns for vascular lesion surgeries in cerebellomedullary cisterns: opening of unilateral cerebellomedullary fissures combined with lateral foramen magnum approach. World Neurosurg. 2014 Nov;82(5):e615-21. doi: 10.1016/j.wneu.2014.04.064. Epub 2014 Apr 30. PubMed PMID: 24793562.

2: Nakahara Y, Kawashima M, Matsushima T, Kouguchi M, Takase Y, Nanri Y, Yakusiji Y. Microvascular decompression surgery for vertebral artery compression of the medulla oblongata: 3 cases with respiratory failure and/or dysphagia. World Neurosurg. 2014 Sep-Oct;82(3-4):535.e11-6. doi: 10.1016/j.wneu.2014.01.012. Epub 2014 Jan 25. PubMed PMID: 24473337.

3: Matsushima K, Kawashima M, Matsushima T, Hiraishi T, Noguchi T, Kuraoka A. Posterior condylar canals and posterior condylar emissary veins-a microsurgical and CT anatomical study. Neurosurg Rev. 2014 Jan;37(1):115-26. doi: 10.1007/s10143-013-0493-7. Epub 2013 Aug 31. PubMed PMID: 23996282.

4: Hiraishi T, Matsushima T, Kawashima M, Nakahara Y, Takahashi Y, Ito H, Oishi M, Fujii Y. 3D Computer graphics simulation to obtain optimal surgical exposure during microvascular decompression of the glossopharyngeal nerve. Neurosurg Rev. 2013 Oct;36(4):629-35; discussion 635. doi: 10.1007/s10143-013-0479-5. Epub 2013 Jun 15. PubMed PMID: 23771632.

5: Masuoka J, Matsushima T, Kawashima M, Nakahara Y, Funaki T, Mineta T. Stitched sling retraction technique for microvascular decompression: procedures and techniques based on an anatomical viewpoint. Neurosurg Rev. 2011 Jul;34(3):373-9; discussion 379-80. doi: 10.1007/s10143-011-0310-0. Epub 2011 Feb 24. PubMed PMID: 21347661.

6: Matsushima T, Kawashima M, Masuoka J, Mineta T, Inoue T. Transcondylar fossa (supracondylar transjugular tubercle) approach: anatomic basis for the approach, surgical procedures, and surgical experience. Skull Base. 2010 Mar;20(2):83-91. doi: 10.1055/s-0029-1242193. PubMed PMID: 20808532; PubMed Central PMCID: PMC2853075.

7: Kawashima M, Matsushima T, Inoue T, Mineta T, Masuoka J, Hirakawa N. Microvascular decompression for glossopharyngeal neuralgia through the transcondylar fossa (supracondylar transjugular tubercle) approach. Neurosurgery. 2010 Jun;66(6 Suppl Operative):275-80; discussion 280. doi: 10.1227/01.NEU.0000369662.36524.CF. PubMed PMID: 20489516.

8: Kawashima M, Matsushima T, Nakahara Y, Takase Y, Masuoka J, Ohata K. Trans-cerebellomedullary fissure approach with special reference to lateral route. Neurosurg Rev. 2009 Oct;32(4):457-64. doi: 10.1007/s10143-009-0211-7. Epub 2009 Jul 17. PubMed PMID: 19609581.

9: Matsushima T, Natori Y, Katsuta T, Ikezaki K, Fukui M, Rhoton AL. Microsurgical anatomy for lateral approaches to the foramen magnum with special reference to transcondylar fossa (supracondylar transjugular tubercle) approach. Skull Base Surg. 1998;8(3):119-25. PubMed PMID: 17171046; PubMed Central PMCID: PMC1656679.

10: Huynh-Le P, Matsushima T, Miyazono M, Sayama T, Muratani H, Tashima T, Sasaki T. Three-dimensional CT angiography for the surgical management of the vertebral artery-posterior inferior cerebellar artery aneurysms. Acta Neurochir (Wien). 2004 Apr;146(4):329-35; discussion 335. Epub

2003 Dec 22. PubMed PMID: 15057526.

11: Hitotsumatsu T, Matsushima T, Inoue T. Microvascular decompression for treatment of trigeminal neuralgia, hemifacial spasm, and glossopharyngeal neuralgia: three surgical approach variations: technical note. Neurosurgery. 2003 Dec;53(6):1436-41; discussion 1442-3. Review. PubMed PMID: 14633313.

12: Matsushima T, Matsukado K, Natori Y, Inamura T, Hitotsumatsu T, Fukui M. Surgery on a saccular vertebral artery-posterior inferior cerebellar artery aneurysm via the transcondylar fossa (supracondylar transjugular tubercle) approach or the transcondylar approach: surgical results and indications for using two different lateral skull base approaches. J Neurosurg. 2001 Aug;95(2):268-74. PubMed PMID: 11780897.

13: Matsushima T, Goto Y, Natori Y, Matsukado K, Fukui M. Surgical treatment of glossopharyngeal neuralgia as vascular compression syndrome via transcondylar fossa (supracondylar transjugular tubercle) approach. Acta Neurochir (Wien). 2000;142(12):1359-63. PubMed PMID: 11214629.

14: Katsuta T, Matsushima T, Wen HT, Rhoton AL Jr. Trajectory of the hypoglossal nerve in the hypoglossal canal: significance for the transcondylar approach. Neurol Med Chir (Tokyo). 2000 Apr;40(4):206-9; discussion 210. PubMed PMID: 10853319.

15: Matsushima T, Fukui M. [Lateral approaches to the foramen magnum: with special reference to the transcondylar fossa approach and the transcondylar approach]. No Shinkei Geka. 1996 Feb;24(2):119-24. Japanese. PubMed PMID: 8849471.

1)
Seoane P, Kalb S, Clark JC, Rivas JC, Xu DS, Mendes GA, Preul MC, Zabramski JM, Spetzler RF, Nakaji P. Far-Lateral Approach Without Drilling the Occipital Condyle for Vertebral Artery-Posterior Inferior Cerebellar Artery Aneurysms. Neurosurgery. 2017 Apr 4. doi: 10.1093/neuros/nyw136. [Epub ahead of print] PubMed PMID: 28379515.
2)
Sen C, Shrivastava R, Anwar S, Triana A. Lateral transcondylar approach for tumors at the anterior aspect of the craniovertebral junction. Neurosurgery. 2010 Mar;66(3 Suppl):104-12. doi: 10.1227/01.NEU.0000365930.95389.60. PubMed PMID: 20173511.
3)
HT Wen, AL Rhoton Jr, T Katsuta, E Oliveira. Microsurgical anatomy of transcondylar, supracondylar and paracondylar extensions of the far lateral approach. J Neurosurg 1997;87:555-585.
4)
Ferreira MAT, Tedeschi H, Wen HT, E Oliveira. Posterior circulation aneurysms: guideline to management. Op Tech Neurosurg 2000;3:169-178.
5)
Drake CG. The surgical treatment of aneurysms of basilar artery. J Neurosurg 1968;29:436-446.
6)
Cardoso AC, Fontes RB, Tan LA, Rhoton AL Jr, Roh SW, Fessler RG. Biomechanical effects of the transcondylar approach on the craniovertebral junction. Clin Anat. 2015 Apr 23. doi: 10.1002/ca.22551. [Epub ahead of print] PubMed PMID: 25914225.