Case Report

Technique of Posterior Clinoidectomy and Its Applications

Abstract

An understanding of the microsurgical anatomy of posterior clinoid process (PCP) is extremely important to where the removal of PCP is required to access the interpeduncular and prepontine cisterns and upper basilar artery region to manage the aneurysms located in this region. In the present article, we describe our experience with a technique that is safe and provides ample space to look into these regions. The key to safe drilling is that the drilling of the posterior clinoid needs to be performed in a "touch and back" manner (rather than clockwise or counterclockwise motion) to break the cortex.

Keywords: *Dorsum sella, interpeduncular cistern, posterior clinoid process, posterior clinoidectomy*

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Introduction

The posterior clinoid process (PCP) is a bony prominence located at the superolateral aspect of the dorsum sellae and can have a variable anatomical structure which is adjacent to the clivus.[1-6] An understanding of the microsurgical anatomy of PCP is extremely important to understand the approaches to the interpeduncular cistern region (i.e., upper basilar artery and basilar tip aneurysms), particularly where the removal of PCP is required.[1-3] In the present article, we describe our experience with a technique that is safe and provides ample space to look into the prepontine cisterns and its contents, whether it is the lesion involves the basilar artery or is a tumor.

Surgical Technique

The posterior clinoid may be exposed in the opticocarotid triangle between the carotid, A1 segment, and the optic nerve or between the carotid and the third nerve. Removal of the posterior clinoid along with mobilization of the carotid after incision of the distal dural ring can provide much needed space in pterional approach to basilar tip or superior cerebellar aneurysms. It can help in approaching the interpeduncular fossa, lesions extending along the clivus, and for low-lying basilar tip aneurysms. In severe head trauma, if one is doing cisternostomy along with or independent of decompressive hemicraniectomy, there can be scenarios when the membrane of Liliequist may be difficult to open due to a large PCP. In this case also, a posterior clinoidectomy may be done. The posterior clinoid needs to be exposed at first along the two triangles mentioned before. After exposure, the dura of the posterior clinoid will need to be incised. There is chance that brisk venous bleeding may be encountered during this time which may be controlled by a small piece of surgical computed tomography for bone buttress between the posterior clinoid dura and the C5 segment of the carotid, and peroperatively palpation of the posterior clinoid should be done to confirm this fact. Once the bone of the posterior clinoid is exposed, the exposure may be widened and the posterior clinoid may be further exposed with blunt dissection using a dissector. After this, a very careful drilling may be performed to remove the posterior clinoid. After removing the clinoid, the dura can be pulled anteriorly with a dissector to provide the extra space one would require for a temporary clip or to visualize part of a tumor or incise the membrane of Liliequist in this window. The drilling here does not involve clockwise or counterclockwise motion. It is a "touch and back" drilling. The bone is very smooth after the dural removal. Hence, we have to take the drill close to the bone, with full speed, and then just touch the bone and come back. Once you break through the cortex, you can drill the rest of the bone

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and use a very small disc forceps or pituitary biting to complete the resection [Video].

Discussion

The concept of posterior clinoidectomy is well described by several authors including microsurgical anatomy of the PCP and its relationship to the surrounding structures.[4-6] The key structures in the vicinity of PCP are petrosphenoidal ligament and the 6th nerve medial to it, the 3rd nerve lateral to it, and the C5 portion of the carotid deep into it and in the cavernous sinus.[1,4-6] Removal of the PCP facilitates the exposure to the interpeduncular and prepontine cisterns and upper basilar artery region (while approached through a pterional-transsylvian approach) to manage the aneurysms located in this region.[1-3,7-11] Depending on the pathology and how much space is required, the PCP can be drilled either partially or completely.[1,9,12-14] The resection can be carried out by opening the dura (transclinoid-transsellar-transcavernous approach)[2,3] or it can be carried out by extradural drilling, thus potentially decreasing the chances of injury to the surrounding structures.[1,15] The reported complication associated with posterior clinoidectomy includes oculomotor nerve injury (partial or complete), venous bleeding (injury to basilar plexus), cerebrospinal fluid fistula (excessive drilling into the sphenoid sinus), abducens nerve injury in Dorello's canal, and injury to the medial loop of the cavernous carotid artery.[1,16-19]

Conclusion

Posterior clinoidectomy is a well-described microsurgical approach to the interpeduncular and prepontine cisterns. The drilling of the posterior clinoid in a "touch and back" manner (rather than clockwise or counterclockwise motion) is a relatively safer alternative to break the cortex.

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Conflicts of interest

There are no conflicts of interest.

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