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Safe surgical approach to deep pontomedullary cavernoma: An iMRI-assisted resection

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A 22-year old patient had a sudden onset diplopia 3 months ago. For 2 months he had left lower limb weakness and unsteadiness in his gait. Examination revealed right abducen nerve and facial nerve paresis. He also had left hemiparesis. MRI showed pontomedullary cavernoma that appeared to extend to the floor of the 4th ventricle. There was evidence of acute haemorrhage. Surgery was carried out in the MRI suite with the use of iMotion as the MRI machine.[1-4] Surgical planning images with gradient echo sequence performed after induction of anaesthesia however revealed that the lesion did not extend to the surface of the brainstem (Figure 1a). A midline suboccipital craniectomy was performed. The floor of the 4th ventricle was exposed by superior retraction of the vermis. There was no surface evidence of the lesion. Neuronavigation

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was used to localize the lesion. The lesion was located relatively deep into the brainstem but was closer to the posterior surface and was to the right of the midline. An incision was taken in the region of the pontomedullary junction in the midline at the level of the lesion. Blunt dissection was used in a vertical direction within a limit of about 4–5 mm using number 7 Rhoton microdissector. The lesion was encountered at a depth of about 4 mm. The lesion was then carefully dissected from the surrounding structures using bipolar diathermy, as well as sharp and blunt dissection. With this technique, it was easy to deliver the tissue as a whole through the small opening. Postoperative imaging confirmed complete resection of the lesion (Figure 1b). Following surgery, the patient developed vertical nystagmus and his diplopia persisted. His left hemiparesis and unsteady gait improved.

Intracranial cavernomas constitute about 5–13% of intracranial vascular malformations and 10–30% of these are located in the posterior cranial fossa.\[5-6\]

Cavernomas often have a rim of gliosis with haemosiderin deposit surrounding it following previous bleeding, thus making surgical dissection from adjoining brain tissue relatively easy. However, when the lesions are located deep in the brain parenchyma, the dissection has a potential risk of injury. Thus, a safe route of access is crucial. The incision on the brainstem and direction of further dissection within it should take into consideration the orientation of the surrounding structures.

In the presented case, the lesion was located relatively deep in the brainstem from the surface and was to the right of the midline. A direct incision over the site of location of the lesion could have resulted in damage to underlying structures like facial colliculus, vestibular nuclei and hypoglossal nucleus. Considering the location in proximity to the midline, an incision simulating midline myelotomy was made. Neuronavigation technique with intraoperatively acquired MRI images helped to localise the lesion. The incision in the brainstem and the further dissection were done in a vertical direction to protect the adjoining critical neural structures.

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