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Experience with the high occipital transcortical approach in the treatment of intraventricular hemorrhage

Report of two cases

KEISUKE ONODA, M.D., KAZUHIKO KUROZUMI, M.D., SHOJI TSUCHIMOTO, M.D., AND TORU SATOH, M.D.

Department of Neurosurgery, Onomichi Municipal Hospital; and Department of Neurosurgery, Satoh Neurosurgical Clinic, Onomichi City, Hiroshima, Japan

Two patients with intraventricular hemorrhage (IVH) were treated by direct removal of their intraventricular hematomas via a high occipital transcortical approach with successful results. This approach lies between the parietooccipital transcortical approach and the occipital transcortical approach. The patients were a 90-year-old woman with idiopathic IVH and a 60-year-old man with hemorrhage caused by bleeding in the thalamus. In both cases, the hematoma was tightly packed in the lateral ventricle. In the former case, the inferior horn of the lateral ventricle was extremely swollen, and the patient was at risk for development of uncal herniation. With the goals of complete elimination of the hematoma in the inferior horn and identification of the source of bleeding, a high occipital transcortical approach was applied, and the hematoma was removed under direct vision. With the patient in the lateral position, a minor craniotomy of approximately 3 cm was performed around the puncture site of the posterior horn (8 cm craniad from the inion and 3 cm lateral from the midline). A 1-cm cortical incision was made and the posterior horn was reached. First, the portion of hematoma at this site was removed, and then the remainder was completely removed from the interior horn and corpus. Using this method, the entire region of the lateral ventricle, including the inferior horn, corpus, and posterior horn, can be covered in a single operative field, and it is also possible to have sufficient working space for the operation.

KEY WORDS • high occipital transcortical approach • intraventricular hemorrhage

THERE are two different methods for the treatment of hemorrhage in the lateral ventricle. The first is an indirect method[1,3–5,8] in which a ventricular drainage tube is used to direct injections of thrombolytic agents. The second is a direct method[8] in which a minor craniotomy is performed to reach the lateral ventricle and to remove the hematoma under direct vision. The former method is relatively less invasive, but makes it difficult to identify the source of bleeding. In this study, we defined the high occipital cortex as the site near the parietooccipital sulcus in the parasagittal occipital region. This site is far from the visual cortex. We applied the present method by using a high occipital transcortical approach in two cases, and successfully removed the hematoma in the ventricle. The results of our study are reported.

Case Reports

Case 1

This 90-year-old woman presented with sudden headache and vomiting and was transported to our department. On admission, the patient was in a comatose state. The results of CT scanning revealed severe IVH with hematoma, which was packed in the right lateral ventricle and extended up to the third and fourth ventricles (Fig. 1 *upper*). Computerized tomography scans obtained after addition of contrast agent demonstrated no enhanced abnormal lesions. Minor craniotomy was performed to control acute hydrocephalus, to remove the hematoma in the inferior horn completely, and to identify the source of bleeding. The hematoma was directly removed via a high occipital transcortical approach. With the patient in the left inferior lateral position, a minor 3-cm craniotomy was performed at the right posterior horn puncture site (8 cm craniad from the inion and 3 cm lateral from the midline). A 1-cm cortical incision was made near the parietooccipital sulcus in the occipital lobe, and the suction device was advanced by 5 mm. The posterior horn of the lateral ventricle was reached, and the hematoma in the posterior horn was removed. It was then possible to confirm the presence of hematoma in the corpus and inferior horn under direct vision (Fig. 2), and the hematoma in the lateral ventricle could be successfully removed (Fig. 1 *lower*). The thrombosed plexus was found, and bleeding from the plexus was sus-

Abbreviations used in this paper: CT = computerized tomography; IVH = intraventricular hemorrhage.

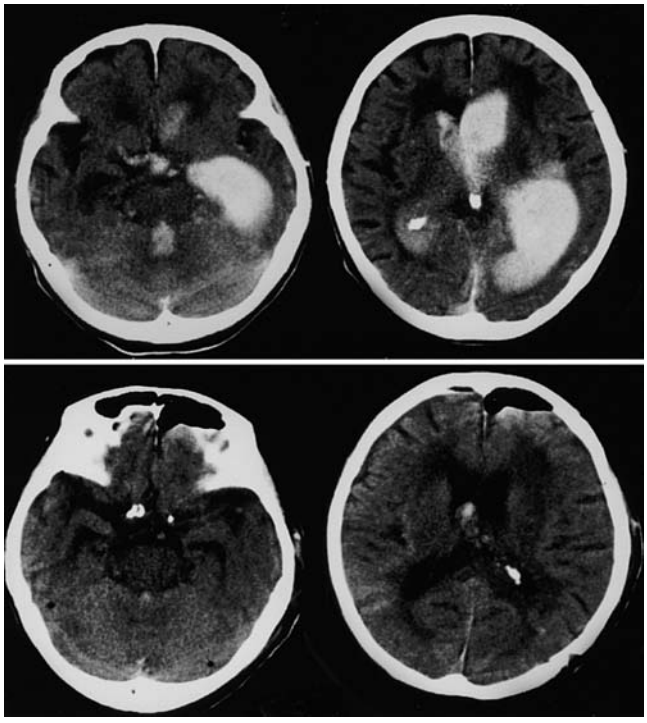

FIG. 1. Case 1. Admission CT scans *(upper)* demonstrating the highly packed hematoma filling the entire right lateral ventricle, which is especially extensive in the inferior horn. Postoperative CT scans *(lower)* demonstrating the complete removal of hematoma in the right lateral ventricle.

pected. A ventricular drainage tube was inserted. After the operation, there was the possibility that hemianopsia might develop as a complication, but frank hemianopsia did not occur, and the patient was discharged from the hospital after 2 weeks.

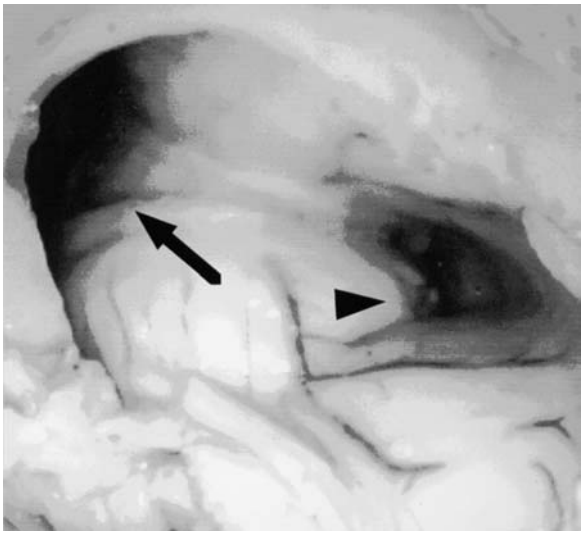

FIG. 2. Case 1. Intraoperative view. With the patient in the left inferior lateral position, the cortical incision was performed at the right posterior puncture site. The posterior horn was reached and the hematoma was removed. The inferior horn *(arrow)* and corpus *(arrowhead)* could then be visualized in a single operative field.

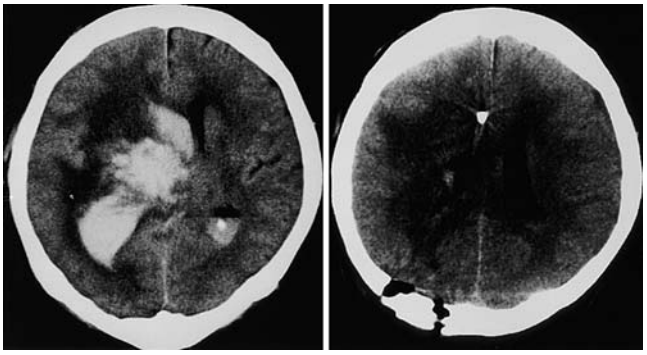

FIG. 3. Case 2. *Left:* Axial CT scan obtained after stereotactic aspiration and ventricular drainage of the left-sided thalamic hemorrhage, demonstrating a swollen left lateral ventricle packed with hematoma. *Right:* Postoperative CT scan demonstrating successful removal of the hematoma in the left lateral ventricle.

Case 2

This 60-year-old man with right hemiplegia was admitted to our department in a comatose state. The results of a CT examination revealed a hemorrhage in the left thalamus that was associated with severe IVH, leaving the possibility that acute hydrocephalus might develop as a complication. Stereotactic aspiration of the hemorrhage in the left thalamus was performed, and a ventricular drainage tube was applied to the IVH. According to the postoperative CT scans, 70% of the hemorrhage in the thalamus had been suctioned out and removed, whereas the hematoma in the posterior horn and corpus of the left lateral ventricle had not been removed and remained in a packed state (Fig. 3). The patient's consciousness disorder was also only slightly improved. Similar to the patient in Case 1, we decided to use an occipital transcortical approach in this patient to remove the intraventricular hematoma. The lesion in the lateral ventricle was completely removed under direct vision, and the patient's postoperative consciousness disorder improved. There was no obvious sign to indicate the onset of hemianopsia.

Discussion

As a direct route for the treatment of IVH, the transcortical approach can be classified as a frontal,[6,9–12] temporal,[6,12] parietal,[2,6,9–12] and occipital[9,10,12] approach. It is difficult to remove a hematoma in the inferior horn via a frontal approach.[6,9–12] The distance to the posterior horn is too long via a parietal approach,[2,6,9–12] and it is difficult to remove hematomas in the anterior and inferior horns. Clinically, it is important to remove hematoma in the inferior horn completely, because it may induce grave conditions such as uncal herniation.[7] The temporal approach[6,12] is advantageous for hematoma removal in the inferior horn, but it is not useful for confirming lesions in the corpus and anterior horn. In contrast, in the occipital approach, the distance to the swollen posterior horn is relatively short, and it is possible to cover the entire region of the lateral ventricle, including the inferior horn, in the surgical field. In the high occipital approach, the distance to the dilated posterior horn is shorter than that encountered in the occipital approach. Furthermore, the posterior horn,

inferior horn, and corpus are parallel to the optical axis of the surgical microscope. In the patient in Case 1, the region extending up to the inferior horn of the lateral ventricle was packed with hematoma, and the region was greatly swollen. By applying this approach, we had sufficient working space up to the inferior horn, and the hematoma could easily be removed. This appears to be a very useful method in cases of IVH, in which the region extending up to the inferior horn is packed with hematoma in addition to most of the posterior horn.

In the present approach, the incision is made in the cortex of the high occipital lobe, and there is the possibility of developing hemianopsia.[12] Our method is considered relatively safe for the following reasons: 1) it is an approach via the high occipital cortex, which is far away from the visual cortex; 2) the cortical incision is only 1 cm long; and 3) the operation is performed at a site closest to the swollen posterior horn so that injury to the cerebral cortex can be minimized. In fact, there was no obvious sign of postoperative development of hemianopsia in the two patients described, at least as it relates to their daily activities.

For the treatment of IVH, the application of a ventricular drainage tube and addition of a thrombolytic agent to the ventricle are considered relatively less invasive and very effective.[1,3–5,8] However, the drawback of this method is that the source of bleeding cannot be confirmed. In the patient in Case 2, the hematoma could not be removed effectively by using a ventricular drainage tube. We did not apply the thrombolytic agent in this case to avoid rebleeding. The present method is very useful because intraventricular hematoma can be removed successfully under direct vision.

By using the present approach, it is possible to cover the entire region, including the posterior horn, inferior horn, and corpus, within a single surgical field and to maintain a sufficiently large working space. Hematoma in the lateral ventricle can be completely removed under direct vision, and the source of bleeding can be confirmed. It is possible to observe and deal with the lesion in the plexus. In the patient in Case 1, the hematoma was also removed in the third and fourth ventricles, and it may be possible to remove hematoma in the entire ventricular area. This approach is a useful method that can also be applied for the treatment of lesions in the posterior horn, inferior horn, and corpus of the lateral ventricle. However, experience with a large number of cases treated in this fashion is required to confirm the effects and drawbacks of the method.

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Address reprint requests to: Shoji Tsuchimoto, Department of Neurosurgery, Onomichi Municipal Hospital, 3-1170-177 Shintakayama, Onomichi City, Hiroshima, 722–8503 Japan.