Neuroendoscope-Assisted Removal of an Organized Chronic Subdural Hematoma in a Patient on Bevacizumab Therapy
—Case Report—

Satoshi TAKAHASHI,1,2 Takahito YAZAKI,1 Nobuhiro NITORI,3 Tadashige KANO,1,2 Kazunari YOSHIDA,2 and Takeshi KAWASE2

Departments of 1Neurosurgery and 3Surgery, Mita Hospital, International University of Health and Welfare, Tokyo; 2Department of Neurosurgery, Keio University School of Medicine, Tokyo

Abstract

A 78-year-old Japanese man with a history of colon cancer was referred to our department of neurosurgery for the management of asymptomatic left chronic subdural hematoma (CSDH). He was receiving bevacizumab therapy for colon cancer, and the size of the CSDH increased or decreased depending on bevacizumab administration. Simple drainage was performed because of the risk of a critical increase in the size of CSDH during bevacizumab therapy, but since the CSDH was organized and firm, the drainage was insufficient. Therefore, neuroendoscope-assisted craniotomy was performed, and the organized CSDH was almost completely removed. The present case indicates the possible involvement of bevacizumab in the occurrence of CSDH and the efficacy of the neuroendoscopic approach in the surgical treatment of organized CSDH.

Key words: chronic subdural hematoma, neuroendoscope, bevacizumab, chemotherapy, minimally invasive surgical procedure

Introduction

Targeted biologic agents are an established treatment for some types of malignancies, including metastatic colorectal cancer. Bevacizumab is a recombinant monoclonal antibody against vascular endothelial growth factor. Clinical trials with bevacizumab have shown increased risk of hemorrhage at the site of the primary tumors. In a case series, intracranial hemorrhages were reported in 2 patients receiving bevacizumab for systemic cancer combined with anticoagulation therapy. Retrospective review of 21 patients who received anticoagulants and bevacizumab concurrently for a median time of 72 days concluded that bevacizumab can be used in combination with anticoagulants and does not appear to be a contraindication; but we believe that the hemorrhagic side effects of bevacizumab should be considered, and intracranial hemorrhagic lesions developing in patients on bevacizumab therapy should be carefully treated.

Case Report

A 78-year-old Japanese man with colon cancer was referred to our outpatient clinic for the management of an asymptomatic left CSDH, which was detected by positron-emission tomography (PET)-computed tomography (CT) obtained during a follow-up examination of colon cancer treatment consisting of adjuvant chemotherapy in combination with bevacizumab. At the initial presentation to our department, he was alert and oriented without headache or urinary incontinence. Neurological examination found no abnormalities and no muscle weakness. However, magnetic resonance imaging conducted after the PET-CT showed CSDH over the left convexity and slight indication of brain compression (Fig. 1A, B). On the basis of the clinical and radiological findings, we decided to conservatively follow up the patient by conducting regular CT examinations. CT during and at the end of 4 months after the initial presentation showed that the CSDH had gradually increased in size (Fig. 1C–E). The patient was scheduled to receive another regimen of chemotherapy in combination with bevacizumab, but because of the risk of further increase in the size of the CSDH, we decided to perform simple drainage of the CSDH and postpone the chemotherapy session.

The patient underwent simple drainage for the CSDH
located over the left convexity 1 month after the most recent intravenous infusion of bevacizumab. CT conducted just before drainage revealed a slight spontaneous decrease in the size of the hematoma (Fig. 1F). During the operation, a burr hole was made on the left convexity, the dura mater and the thickened outer membrane of the hematoma opened, and a drainage tube inserted into the cavity of the hematoma. CT performed 1 day after the operation revealed insufficient drainage, probably because of the firmness of the hematoma (Fig. 1G). Since adequate drainage to allow the continuation of bevacizumab therapy was not achieved, we decided to perform an additional operation for complete removal of the CSDH. Considering his age and the presence of cancer, we decided to minimize the extension of craniotomy and invasiveness by utilizing a neuroendoscope.

One month after the first operation, a small craniotomy was performed via the burr hole created for the first operation under general anesthesia (Fig. 1I). During the operation, the dura mater was opened to expose the thick outer membrane of the hematoma; the hematoma was organized and very firm (Fig. 2A–C). A 30-degree rigid-rod neuroendoscope (EndoArm™ Neuroendoscopy System; Olympus Corp., Tokyo) was used to visualize the hematoma, which was covered by the dura mater and the cranial bone. The hematoma was removed using an aspirator and forceps under direct vision using the neuroendoscope (Fig. 2D–F). The endoscope was used only to visualize the entire hematoma cavity and was withdrawn for a distance of 3–5 cm when the aspirator and forceps were inserted. CT conducted after the second operation confirmed almost complete removal of the hematoma (Fig. 1H). He did not ex-
wide and clear operative view from a narrow window. More recently, neuroendoscopes have been utilized in the surgical procedures for CSDH treatment. Neuroendoscopically techniques for the treatment of septated CSDHs were introduced in 1992 using flexible-steerable endoscopes through a burr-hole approach and small microscissors or microforceps for resection of the neomembranes. Another neuroendoscopic technique for treating CSDH was introduced in 1995 based on small craniectomy under local standby anesthesia. The main advantage of this method is access to almost the entire hematoma cavity through the small craniectomies performed under local standby anesthesia. The maximum removal of organized CSDH is essential to prevent the recurrence of organized CSDH. Normal craniotomy has been employed in most previously reported cases of organized CSDH, and only 1 case series of 2 patients has reported use of neuroendoscope-assisted small craniectomy.

Therefore, in the management of the present case, we had to select 1 of the following 3 different types of surgical procedures as the second operation: procedure using flexible-steerable endoscopes through a burr-hole, small craniotomy assisted by a neuroendoscope, or a large craniotomy covering the entire surface of the CSDH cavity with or without the use of a neuroendoscope. The invasiveness of the operative procedure could be minimized by adapting a procedure using flexible-steerable endoscopes, but the risk of recurrence with this approach would be high since removal of an adequate amount of the organized hematoma would not be possible. To minimize the risk of recurrence, large craniotomy of the entire surface of CSDH cavity seemed to be the best option, but this procedure would be the longest. Although our patient was treated under general anesthesia, considering his age and the colon cancer, we preferred small craniotomy and closure to shorten the duration and minimize the operative invasiveness. In addition, despite the use of small craniotomy, the entire hematoma cavity could be viewed clearly without inconvenience (Fig. 1). It is important to perform the craniotomy over the hematoma cavity and not over the adjacent brain. We believe that the thickened inner membrane of the CSDH (Fig. 2D, E) protected the brain surface from the movements of the neuroendoscope and other instruments, which is another advantage of this procedure. We encountered some amount of blood oozing during the operation which was managed with bipolar forceps without difficulty.

The present case indicates that the size of the organized CSDH in a patient on bevacizumab therapy may depend on bevacizumab administration. Patients receiving bevacizumab should be carefully followed up for the development and progress of CSDH. The organized CSDH in the present case was almost completely evacuated by neuroendoscope-assisted small craniotomy. The neuroendoscope is very useful for managing organized CSDH in terms of minimizing the operative invasiveness.

References


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Address reprint requests to: Satoshi Takahashi, MD, PhD. Department of Neurosurgery, Keio University School of Medicine, 35 Shinano-machi, Shinjuku-ku, Tokyo 160-8582, Japan. e-mail: satoshi710@mac.com