Horizontal contraletral approach for the distal anterior cerebral artery aneurysm: Technical note.

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Abstract

Background: The authors present a modified interhemispheric approach for the distal anterior cerebral artery aneurysm to resolve several problems including the narrow surgical corridor, the difficulty of proximal control, and the aneurysmal projection toward the surgeon.

Methods: We refined positions of the patient head and the surgeon. The patient head is fixed with flexion and tilted to the contralateral side. The surgeon sits on the contralateral side of the patient, not cranial side.

Results: The present approach allows the surgeon comfortably use both hands in the horizontal operative filed, obtain a minimum retraction of the brain, and easily secure the proximal artery.

Conclusions: This modified interhemispheric approach is useful for a patient with the distal anterior cerebral artery aneurysm.

Key words: aneurysm, anterior cerebral artery, clipping

Introduction

Various interhemispheric approaches to the distal anterior cerebral artery (ACA) aneurysm have been advocated (2;4;7;10;11). Several problems regarding to the interhemispheric approach include the narrow surgical corridor, the difficulty of proximal control, and the aneurysmal projection toward the surgeon. To resolve these problems, we propose simple modifications of both the patient head and the surgeon positions for the contralateral interhemispheric approach.

Surgical Technique

Under general anesthesia, the patient is positioned supine and the head flexed and tilted 45 degrees to the contralateral side with Sugita head frame (Figure 1). After bicoronal skin incision, a bifrontal craniotomy is performed and the dura at the contralateral side is divided up to the midline. The surgeon sits on the contralateral side of the patient (Figure 2) and faces the operative field in parallel with the falx (Figure 3). In this approach, both hands can be easily used in the operative field (Figure 3 and 4). The contralateral interhemispheric fissure is opened microsurgically, dissecting the adhesions between the frontal lobe and the falx to allow the brain to fall away from the falx. Head rotation enables to allow minimum retraction of the frontal lobe (Figure 5). The A4 segment of ACA (6) is identified and followed proximally (Figure 3). The parent artery is traced without dissection around the aneurysm and the proximal artery is secured (Figure 4). The proximal artery is easily exposed comparing with the standard interhemispheric approach. Finally, neck clipping proceeds in the standard fashion (Figure 5).

Illustrative Case

This 68-year-old man had a history of the left frontal lobe contusion due to a motor-bicycle accident at the age of 58. A partially thrombosed aneurysm at the right distal anterior cerebral artery was incidentally found out (Figure 6). Neuroimagings revealed that the aneurysm was embedded into the right frontal lobe. The aneurysm was clipped through the present interhemispheric approach (Figure 1 to 5). Follow-up angiograms demonstrated the complete obliteration of the aneurysm and the patient was discharged without neurological deficits.

Results

The present approach was used in 7 patients with the distal ACA aneurysm between March 2003 and March 2007. There were two ruptured and five unruptured distal ACA aneurysms. In all patients, the aneurysms were adequately clipped with this approach. There were no premature ruptures during the surgery. No complications related to the approach happened.

Discussion

Surgical positions of the patient and the surgeon are very important to avoid intraoperative difficulties and postoperative complications. Our method is distinctive in that the patient is placed in supine position with the head flexed and tilted. The surgeon also sits on the contralateral side of the patient. In this approach, there are three major advantages: the comfortable operative field, the minimum retraction of the brain, and the easy securing of the parent artery. The present interhemispheric approach is also a versatile approach for a variety of vascular lesions and tumors in the anterior midline.

The standard approach for the distal anterior cerebral artery aneurysm consists of the ipsilateral craniotomy with the patient in the supine position. The head is straight or extended in the sagittal plane and the surgeon sits on the cranial side. The surgeon accesses the lesion through a narrow corridor because the interhemispheric fissure is a vertical plane. The present approach allows the surgeon to use both hands more comfortably because a horizontal operative field is easily used for surgeon than a vertical one.

In the present approach, the frontal lobe sinks by its own weight and brain retraction is minimum. When the head is tilted to the approach side, mechanical retraction on the frontal lobe will be unnecessary during the surgery little by little (Figure 4). Ausman et al.(1) introduced the operated side down approach for pineal tumors in three-quarter prone position and reported that the retraction of parietal-occipital lobe could be minimum.

As the ipsilateral approach for distal ACA aneurysm, the aneurysmal dome is sometimes projected toward the surgeon and the callosal manipulation is sometimes needed to secure the parent artery depending on the location of the proximal artery (11). With the present contralateral approach, these problems can be resolved because the parent artery is easily traced and secured (Figure 3). Because the proximal parent artery can be looked up from more lateral side.

Kurtsoy and colleagues (7) proposed the similar concepts (comfortable operative field and the gravity retraction) to our present approach for the distal ACA aneurysm in the supine-lateral position. According to their approach, the head is fixed horizontally and the surgeon faces at the cranial side in parallel with the interhemispheric fissure. This interhemispheric approach was originally introduced for the transcallosal approach to the contralateral ventricle (9). Then, refinements have been performed for vascular lesions and tumors in the midline (3;5;8). Two benefits of the present technique compared with the previous methods are as follows: the head is not needed to rotate much and more anterior interhemispheric approach can be performed because the bicoronal skin incision can be placed in the present head pin location.

This approach dose not increase the preparation time required, as compared with the standard approach. We recommend considering this approach as a useful technique for the distal ACA aneurysm surgery.

Figure legends

Figure 1. Photographs showing the head position for the right distal anterior cerebral artery (ACA) aneurysm. Note the head is flexed with tilt to the left side (contralateral side).

Figure 2. Illustration showing positions of the patient and surgeon for the right distal ACA aneurysm surgery.

Figure 3. Intraoperative photographs of the present contralateral approach for the right distal ACA aneurysm showing the horizontal operative field and the dissection of the interhemispheric fissure with both hands.

Figure 4. Intraoperative photographs for the right distal ACA aneurysm showing interhemispheric approach in a vertical space (left: standard approach view) and a horizontal space (right: the present approach view) in the same patient. Note easy use of both hands and better visualization of the parent artery (arrowheads) in the horizontal space rather than the vertical one.

Figure 5. Intraoperative photograph for the right distal ACA aneurysm showing no retraction of the brain.

Figure 6. Preoperative digital subtraction angiography (upper column) and three-dimensional CT angiography (lower column) showing a right distal ACA aneurysm.

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Figure 1

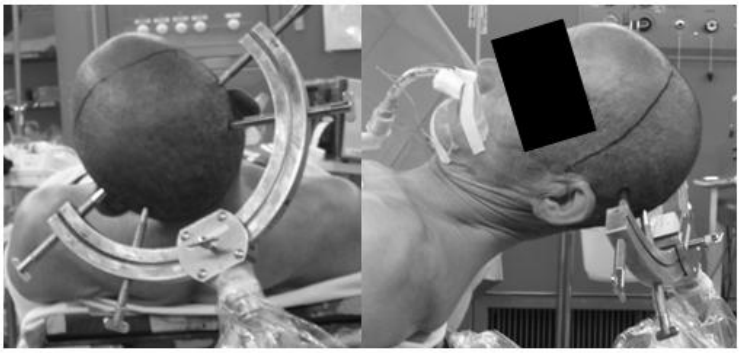

Figure 2

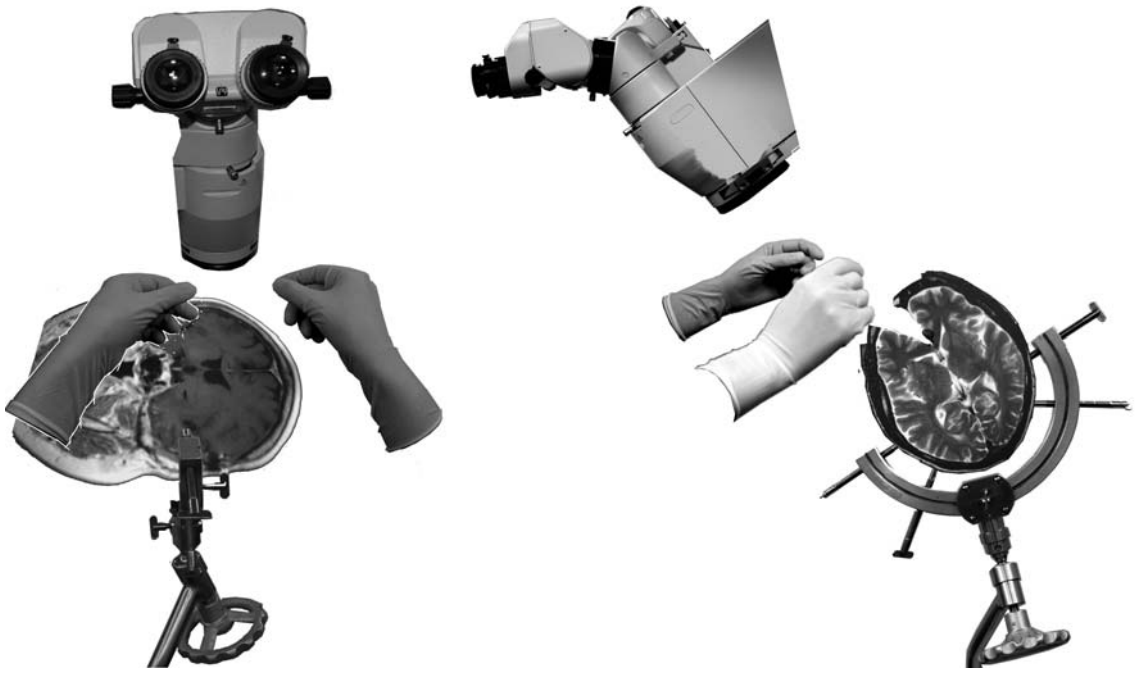

Figure 3

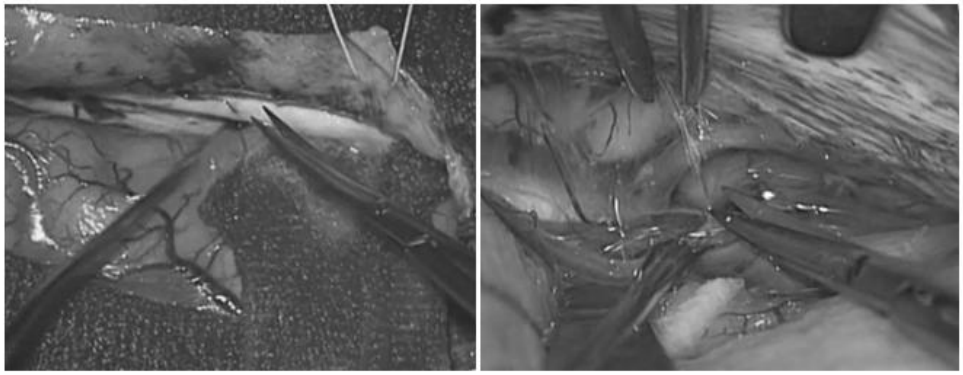

Figure 4

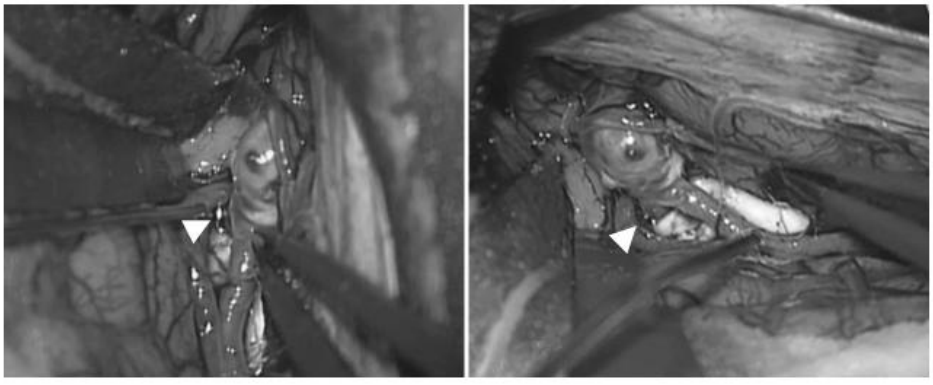

Figure 5

Figure 6