Surgery of basilar aneurysms associated with unexpected rupture of an internal carotid artery aneurysm

Abstract During a surgery of basilar aneurysms via the trans-sylvian approach, we encountered an arterial bleeding caused by rupture of an internal carotid artery aneurysm that had been difficult to diagnose before surgery, as it was a small and broad-neck aneurysm and mimicked arteriosclerosis. In spite of several surgical procedures, the surgical path at the basilar aneurysms became narrow, and we had to abandon the clipping of the aneurysms. Consideration of radiological and intra-operative findings was made for this case, demonstrating a pitfall that neurosurgeons may encounter during surgery.

Key words Basilar aneurysm · Digital angiography · Multiple aneurysms · Subarachnoid hemorrhage

Introduction

Preoperative determination of the rupture site is mandatory in patients with multiple intracranial aneurysms, and aneurysms should be treated as many as possible in one operative session [4, 10]. The site of rupture can be determined on the basis of computerized tomography (CT) scan and angiogram with a high degree of reliability, and Nehls et al. reported that irregularity of contour was more important than size in identifying the site of rupture [5]. When multiple aneurysms are identified in a patient with subarachnoid hemorrhage (SAH), we usually suspect that one of the aneurysms is the site of rupture although the aneurysm is small and regular shape.

A 66 year-old woman had suffered from acute onset of headache. A CT scan showed diffuse SAH (Fig. 1). Angiograms showed two aneurysms in the basilar artery bifurcation, however, the diagnosis of the internal carotid artery aneurysm had been difficult, because it was a small and broad-neck aneurysm, and lateral and Scheuller views of angiograms suggested arteriosclerosis (Fig. 2). We suspected that one of the basilar aneurysms had ruptured, and planned clipping of aneurysms via the right trans-sylvian approach.

At the beginning of surgery, when we were dissecting around the right internal carotid artery, we encountered unexpected rupture of the right internal carotid artery aneurysm (Fig. 3, top). Hemostasis was achieved by packing the rupture site, and we clipped the small and broad-neck aneurysm using two mini clips. Approximately one thousand milliliter of blood was lost during these procedures. We tried subtemporal approach, and subsequently, unroofing of the right optic canal to shift the optic nerve to widen the optico-carotid space. However, the surgical path at the basilar aneurysms became too narrow and the P1 segment of the left posterior cerebral artery was not visible (Fig. 3, bottom). Further approach to the basilar aneurysms was abandoned.

Several weeks later, clipping of the basilar aneurysms was made via the left trans-sylvian approach. The walls of the basilar aneurysms were smooth and appeared unruptured. The patient was in the good recovery course.

Discussion

Preoperative determination of the rupture site is sometimes difficult in patients with multiple intracranial aneurysms, although the site of rupture can be determined on
the basis of CT scan and angiogram with a high degree of reliability [5]. Magnetic resonance (MR) images may indicate the ruptured one in cases of multiple aneurysms by showing hemorrhagic lesions more clearly than CT, particularly when CT findings are normal [1, 6], however, in case of diffuse SAH, determination of the rupture site is difficult by MR images. Nehls et al. reported that irregularity of contour was more important than size in identifying the site of rupture [5]. Although the source of bleeding can not be detected by CT or angiography, aneurysms or microaneurysms are sometimes detected during surgery [2, 9].

In this presented case, we suspected that one of a basilar aneurysm was the rupture site, and we encountered unexpected rupture of an internal carotid artery aneurysm during a surgery. Angiograms showed the sclerotic right internal carotid artery, and the small and broad-neck aneurysm had not been detected before surgery. Clips of the small and broad-neck aneurysm obstructed the lateral retrocarotid route, that has the wide range of basilar bifurcation [3, 7]. We removed the anterior clinoid process to mobilize the internal carotid artery and widen the optico-carotid space [3, 8]; however, the surgical path at the basilar aneurysms was still too narrow and we had to abandon the clipping.

Fig. 1 A CT scan showing a diffuse subarachnoid hemorrhage

Fig. 2 A A vertebral angiogram showing large and small aneurysms arising from the basilar artery bifurcation. B A right internal carotid angiogram, oblique view. C Scheuller view, showing some double contour suggesting a small and broad-neck aneurysm at the origin of the posterior communicating artery (arrowheads)