



Image Report

Single-stage clipping with bifrontal and bilateral frontotemporal craniotomies for subarachnoid hemorrhage with multiple cerebral aneurysms using Sugita head holding system: A case report

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Received : 26 February 2020

Accepted : 27 March 2020

Published : 25 April 2020

DOI

10.25259/SNI_73_2020

Quick Response Code:



ABSTRACT

Background: Subarachnoid hemorrhage with multiple aneurysms is very challenging because it is difficult to identify the ruptured aneurysm. We could not identify the ruptured aneurysm preoperatively, so we decided to treat all of the aneurysms as a single-stage surgery.

Case Description: A 79-year-old woman was diagnosed with subarachnoid hemorrhage with multiple cerebral aneurysms at the right distal anterior cerebral artery, left middle cerebral artery, and right internal carotid artery-posterior communicating artery bifurcation. We could not identify the ruptured aneurysm preoperatively. We fixed her head using the Sugita head holding system (Mizuho Co., Ltd., Tokyo) and performed clipping for each aneurysm with bifrontal craniotomy and bilateral frontotemporal craniotomy as a single-stage operation. The last aneurysm seemed ruptured, and clipping for all the aneurysms was successful. She was discharged with a good postoperative course. The Sugita head holding system allowed turning the head of the patient toward the right and left with single fixation, leading to this single-stage operation.

Conclusion: Several methods for identifying a ruptured aneurysm from multiple aneurysms have been reported, but under limited medical resources, this procedure would be one of the treatment strategies.

Keywords: Craniotomy, Multiple aneurysms, Single-stage operation, Subarachnoid hemorrhage, Sugita head holding system

INTRODUCTION

Subarachnoid hemorrhage (SAH) with multiple aneurysms is very challenging because it is difficult to identify the ruptured aneurysm. We herein report a case who underwent single-stage clipping with bifrontal and bilateral frontotemporal craniotomies for SAH with multiple cerebral aneurysms using the Sugita head holding system^[12] because we could not identify the ruptured aneurysm preoperatively.

CASE DESCRIPTION

A 79-year-old woman presented after a sudden headache. Head computed tomography (CT) diagnosed SAH [Figure 1a and b] (Hunt and Kosnik Grade II). The SAH was distributed equally to

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the basal cistern, Sylvian cistern, and interhemispheric cistern. CT angiography revealed multiple cerebral aneurysms at the right distal anterior cerebral artery (rt. DACA) of 2.4 mm in diameter (red circle in Figure 1c), left middle cerebral artery (lt. MCA) of 2.3 mm [green circle in Figure 1c], and right internal carotid artery-posterior communicating artery bifurcation (rt. IC-PC) of 2.1 mm [circle in Figure 1d].

After the introduction of general anesthesia, we fixed her head using the Sugita head holding system (Mizuho Co., Ltd., Tokyo).^[12] Her head could easily rotate along with the frame to perform bifrontal and bilateral frontotemporal craniotomies as a single-stage operation without reperforming head fixation with pins. We first performed bifrontal craniotomy and clipping for the rt. DACA aneurysm because its size^[7] and dome-to-neck ratio were largest.^[13] However, it seemed unruptured [Figure 1e]. Then, her head was rotated to the right and left frontotemporal craniotomy and clipping for the lt. MCA aneurysm was performed without head refixing. MCA aneurysm is the most common ruptured

one in patients with multiple aneurysms.^[7] However, it was unruptured [Figure 1f]. Finally, we rotate the head to the left and performed right frontotemporal craniotomy and clipping for the rt. IC-PC aneurysm. The aneurysm had fibrin cap [arrow in Figure 1g] and seemed ruptured. We closed the cranium with metal plates [Figure 1h]. The operative time was 5 h, and she was discharged with modified Rankin Scale 0 on the 28th postoperative day.

DISCUSSION

The incidence of multiple aneurysms was 17.7–33.5%,^[5-7,9] and identifying the site of rupture is important preoperatively to determine the surgical strategy. Misdiagnosis of the rupture site leads to a poorer outcome as 37% of mortality.^[8] However, morphological features of the aneurysms and hemorrhagic pattern in the preoperative image cannot reliably be used to determine the rupture site, with 4.3% misdiagnosed cases.^[9] Gadolinium-enhanced magnetic resonance imaging, or vessel wall imaging, could have identified the ruptured

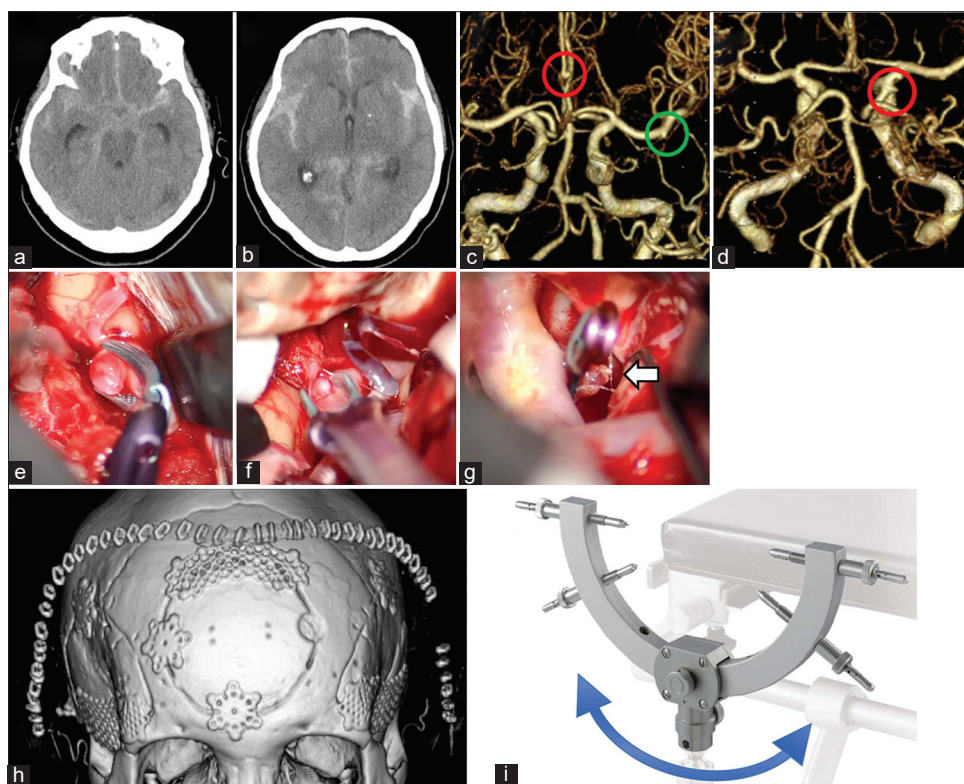


Figure 1: Head computed tomography diagnosed diffuse subarachnoid hemorrhage (a and b). Computed tomography angiography revealed multiple cerebral aneurysms at the right distal anterior cerebral artery (rt. DACA) of 2.4 mm in diameter (red circle in c), left middle cerebral artery (lt. MCA) of 2.3 mm (green circle in c), and right internal carotid artery-posterior communicating artery bifurcation (rt. IC-PC) of 2.1 mm (circle in d). Intraoperative findings of the rt. DACA aneurysm (e) and the lt. MCA aneurysm (f), which seemed unruptured either. Intraoperatively, the IC-PC aneurysm had fibrin cap (arrow in g) and seemed as ruptured (g). After clipping these aneurysms, we closed the cranium with metal plates, and these procedures were performed as a single-stage operation (h). Schematic illustration of the Sugita head holding system (Mizuho Co., Ltd., Tokyo). It allowed turning the head of the patient toward the right and left with single fixation and performing this single-stage operation (i).

aneurysm as another way.^[1-3] However, it needs contrast media and a patient's rest with some time and cannot always be performed depending on the situation, such as holidays. Our case demonstrated similar aneurysms in multiple located sites, and the SAH was distributed equally. We could not perform the vessel wall imaging. We could not identify the ruptured aneurysm, so we decided to treat all of the aneurysms as a single-stage surgery.

Naturally, our single-stage surgery is invasive. The increased manipulation of cerebral arteries and brain tissue during multiple aneurysm surgery results in poorer outcomes than in a single aneurysm.^[4] On the other hand, endovascular treatment is less invasive and contributes to cost reduction.^[4,11] However, the number of specialists in endovascular surgery is small as 1.04/100,000 people in 2018 in Japan,^[10] so endovascular coiling cannot always be performed. The Sugita system allowed turning the head of the patient toward the right and left with a single fixation [Figure 1i]. This enabled us to perform clipping for aneurysms located in various sites as a single-stage surgery. Therefore, under limited medical resources, our single-stage procedure would be one of the strategies.

CONCLUSION

Several methods for identifying the ruptured aneurysm from multiple aneurysms have been reported. However, under limited medical resources, our procedure would be one of the treatment strategies for SAH with multiple aneurysms.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Katsuki M, Wada N, Yamamoto Y. Single-stage clipping with bifrontal and bilateral frontotemporal craniotomies for subarachnoid hemorrhage with multiple cerebral aneurysms using Sugita head holding system: A case report. *Surg Neurol Int* 2020;11:76.