Fenestrated clips for internal carotid artery aneurysms

Technical note

SHIGEKIYO FUJITA, M.D., D.M.Sc.

Department of Neurosurgery, Hyogo Brain and Heart Center at Himeji, Hyogo, Japan

A new aneurysm clip has been developed specifically for internal carotid artery (ICA) aneurysms. This fenestrated clip's occluding blades deviate laterally, since the majority of ICA aneurysms protrude posterolateral to the parent artery. The clip was applied safely in seven recent patients with ICA aneurysms.

KEY WORDS • clip • internal carotid artery • cerebral aneurysm

A LARGE majority of internal carotid artery (ICA) aneurysms grow toward the posterior or posterolateral aspect of the parent artery.1 The fenestrated clips that are currently available are hard to apply except when the aneurysm protrudes toward the posteromedial aspect of the ICA. In addition, when an ICA aneurysm becomes larger, the diameter of the neck enlarges in the direction of the major axis of the parent artery. To clip the aneurysm safely, the ICA should be inserted into the window of a fenestrated clip with blades bent almost at a right angle so that the neck of the aneurysm lies between the blades. The blades can then close in the direction of the major cross-sectional axis of the neck.

We have developed a fenestrated clip the occluding blades of which deviate lateral to the face of the clip.

Description of the Clip

The clip* is designed with a fenestration of 5-mm inside diameter. The two occluding blades are bent at an angle of about 80° to the window face and deviated 32° to the right or to the left (Fig. 1). The blades are either 5 mm or 7.5 mm in length, and the maximum opening distance is 6 mm. Basically, the principal part of this clip is similar to the angled fenestrated clips of the Sugita type.4 If the neck of a cerebral aneurysm is located on the outside or inside rear portion of the ICA within the field of operation, this clip is particularly useful.

Clinical Results

Of 11 cases of ICA aneurysm that we have treated recently (seven ICA-posterior communicating artery (PCoA) aneurysms, three ICA-paraophthalmic artery aneurysms, and one anterior choroidal aneurysm), this clip was used in four of the ICA-PCoA aneurysms and in all three ICA-paraophthalmic aneurysms. Sugita's angled fenestrated clip was applied to one ICA-PCoA aneurysm, and nonfenestrated clips were applied in the remaining three cases. In one case in which a nonfenestrated clip was applied, the aneurysm neck ruptured on clipping. The deviated-blade fenestrated clip was

* Clip manufactured by Mizuho Ikakogyo Co., Ltd., Bunkyo-ku, Tokyo 113, Japan.
Fenestrated internal carotid aneurysm clips

![Intraoperative photographs of an aneurysm, before neck is clipped (left) and after neck occlusion (right). The single arrows indicate the posterior communicating artery and the double arrow the aneurysm neck.](image)

the easiest to use safely for exact neck approximation (Fig. 2).

**Discussion**

Internal carotid artery aneurysms are most apt to cause difficulties at the time of clipping the neck. A rupture near the neck can cause violent hemorrhage, in some cases requiring carotid artery occlusion with its ensuing bad prognosis. These aneurysms are easily accessible via the commonly used lateral subfrontal approach, and the operative exposure is relatively satisfactory. However, when the wall near the neck of the aneurysm is very thin adjacent to an atherosclerotic plaque or if clipping causes stress in that region, the aneurysm is easily ruptured. This is particularly true when a nonfenestrated clip is forcibly applied despite the fact that there is little or no space to insert a blade between the proximal side of the neck and the anterior clinoid process.

Sugita, et al.,3 insisted that the clip should be placed as parallel to the artery as possible and that angled fenestrated clips are suitable to accomplish this. They stated, however, that the clips cannot be applied to an aneurysm protruding laterally from the carotid artery because there is not enough space.

Aneurysms of the ICA-PCoA are the most frequent type of ICA aneurysm. A large majority (86.3%) protrude posterolaterally, and only 3.6% are directed medially. These special clips were developed for use on this larger group of ICA aneurysms to provide safer and more exact occlusion.

Application of these special clips to ICA aneurysms is useful in cases in which the neck of the aneurysm lies in the posterolateral region of the parent artery. They are also helpful when the neck is narrow with the major axis parallel to the artery. The blade angle is adjusted before it is applied with the Sano clip applicator.2 After application, the blades are fixed with adhesive to prevent slipping of the clip.

**References**


Manuscript received July 3, 1985. Accepted in final form January 2, 1986. Address reprint requests to: Shigekiyo Fujita, M.D., D.M.Sc., Department of Neurosurgery, Hyogo Brain and Heart Center at Himeji, Hyogo 670, Japan.