A new intracranial Silastic encircling clip for hemostasis

Technical note

YUSUKE ISHIWATA, M.D., SHIGEO INOMORI, M.D., KAZUHIKO FUJITSU, M.D., SATOSHI NISHIMURA, M.D., KAZUHIRO HIRATA, M.D., GAKUJI GONDO, M.D., TOSHINORI YAMASHITA, M.D., HIDEYO FUJINO, M.D., AND TAKEO KUWABARA, M.D.

Department of Neurosurgery, Shonan Kamakura Hospital, Yokohama City University School of Medicine, Yokohama, Japan

A new encircling clip made of a silicone tube has been designed for treating accidentally injured cerebral vessels. No special holders are necessary. This clip can be tailored depending on the shape of the injured vessel. The clip is a simple and effective tool for achieving complete hemostasis.

KEY WORDS – hemostasis • arterial injury • clip • instrumentation

A VARIETY of hemostatic procedures have been described in the field of neurosurgery.1–4 We have designed a new hemostatic clip made of silicone to obtain rapid and complete hemostasis. The merits and characteristics of this Silastic encircling clip are discussed.

Description and Use of Instrument

The Silastic encircling clip* is made of silicone and has two components: a cylindrical part with a longitudinal slit and two wings (Fig. 1). The clips are available in five sizes, with a luminal diameter of 1.5, 2.0, 2.5, 3.0, or 3.5 mm. Special clip holders are not required. The grasping force of these encircling clips is shown in Fig. 2.

The advantages of the Silastic encircling clip are as follows: 1) it is simple and effective to use; 2) it may be tailored intraoperatively to correspond to the anatomy (Fig. 1 lower); 3) it does not cause luminal stenosis of the injured vessel; 4) no special holders are needed; 5) further surgery is not hampered; and 6) postoperative magnetic resonance imaging and angiography will show the exact condition of the vessels. The disadvantage is that it cannot be used for larger injuries of the arterial wall.

Experimental studies using mongrel dogs showed that complete hemostasis could be obtained with normal blood pressure (< 140 mm Hg) when a linear injury was shorter than 2.0 mm in length or a puncture injury was smaller than 18 gauge in diameter. Induced hypotension was useful in obtaining hemostasis when the injury was larger than those mentioned.

FIG. 1. Photograph and drawing of the Silastic encircling clips. The clip can be used with conventional forceps (upper) and can easily be tailored with scissors without sacrificing a branching vessel (lower).
Satisfactory treatment of accidental bleeding was obtained in 12 clinical cases. In this series, arterial injury involved the internal carotid artery in two cases, the pericallosal artery in two, the middle cerebral artery in one, the vein of Labbé in one, and a superficial temporal artery-middle cerebral artery anastomosis in six.

Discussion

Accidental bleeding is one of the most troublesome problems in a neurosurgical operation. If it should occur in a deep and narrow operative field, conventional hemostatic procedures may not be sufficient to stop the bleeding completely. Yokoo, et al., reported a unique hemostatic method using a metal shield for injuries of a major cerebral artery; they described its characteristics and compared it with other hemostatic procedures. Our new Silastic encircling clip can apply constant even pressure to an injured vessel, which Yokoo, et al., emphasized as important in achieving complete hemostasis. One may be afraid of the "weak grasping" force of these encircling clips, but the essential force for complete hemostasis is weak.

Our experimental studies have shown that bleeding from a linear injury shorter than 2.0 mm in length or a puncture injury smaller in diameter than 18 gauge can easily and instantly be controlled by our method. This means that an injury caused by cutting a perforating vessel of a major cerebral artery can be satisfactorily treated by our method because most perforators are smaller than described. Furthermore, we would emphasize that these encircling clips may easily be tailored intraoperatively when necessary in order to avoid sacrificing small branches of injured vessels.

Acknowledgment

The authors thank Mr. Junichi Okumura of Dow Corning K.K. for designing the Silastic encircling clips with us.

References


Manuscript received September 12, 1989. Accepted in final form March 16, 1990.

Address reprint requests to: Yusuke Ishiwata, M.D., Department of Neurological Surgery, Yokohama City University School of Medicine, 3-46 Urafune-cho, Minami-ku, Yokohama 232, Japan.