Neurol Med Chir (Tokyo) 33, 44~45, 1993

Cryosurgical Retraction in the Removal of Intracranial Vascular Tumors

—Technical Note—

Shunro ENDO, Michiharu NISHIJIMA and Akira TAKAKU

Department of Neurosurgery, Toyama Medical and Pharmaceutical University, Toyama

Abstract

We describe a technique using a cryoprobe as a retractor in the removal of intracranial vascular tumors. This simple method is safe and effective especially for the extraction of tumor embedded in the brain tissue.

Key words: cryosurgery, instrumentation, retractor, vascular tumor

Introduction

Cryosurgery produces sharply delineated, hemostatic lesions safely, simply, and rapidly. Although this technique is used in intracranial surgery,[3,4,7,8] difficulties have prevented more widespread use. Here, we describe the use of a cryoprobe as a tumor retractor during the removal of intracranial vascular tumors.

Technique

The Keeler Amolis Cryo Unit system ACU22GC (Keeler, London, U.K.) with footswitch and various ophthalmic cryoprobes (1.5 mm curved cataracta, 1.0 mm intravitreal, *etc.*) is used (Fig. 1). The freezing temperature of the cryoprobe is set at −70°C. Freezing of the cryoprobe tip achieves firm adhesion to any tissue surface within approximately 10 seconds. Tip defrosting is rapid, and the probe can be smoothly detached from the tissue surface a few seconds later. The frozen tissue surrounding the tip is about 5 mm in diameter, and the areas affected by the freezing process are restricted. Freezing of vessels of more than 1 mm diameter is temporary, and blood flow recovers as the vessels defrost. Small bleeding points on the tissue surface are easily managed by direct contact with the frozen tip.

We used this cryoprobe as a tumor retractor during the surgical removal of intracranial solid vascular tumors embedded in the surrounding brain tissues (4 hemangioblastomas, 1 cavernous angioma, and 1 hemangiopericytoma) (Fig. 2). These vascular tumors were about 3–4 cm in diameter, and had expanded, smooth surfaces with rich vascularity. The cryoprobe was used as a tumor retractor to remove tumors more easily and safely. The adhesion between the frozen tip and the tumor surface was firm enough to retract and withdraw the tumors in any direction. No hemorrhage caused by injury to the tumor capsule or blood vessels occurred, even when they were very thin. No complications in the surrounding normal brain were observed during surgery or postoperatively.

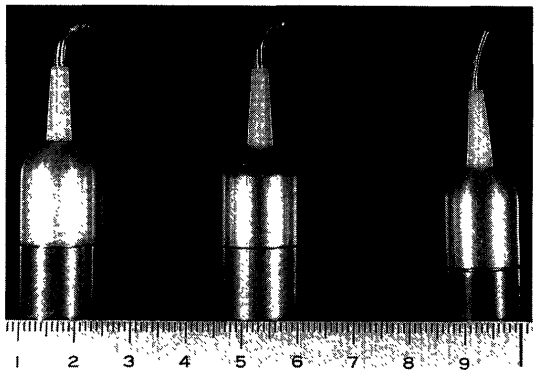

Fig. 1 The three types of cryoprobe tip used in this series. Freezing cryoprobe tip achieves firm adhesion to any tissue surface.

Received March 12, 1992; Accepted August 19, 1992

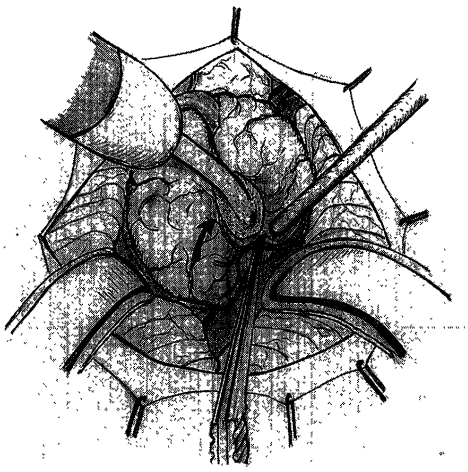

Fig. 2 The operative procedure in a case of cerebellar hemangioblastoma. The tumor is frozen and extracted with a curved-tip cryosurgical probe. The cryosurgical probe and bipolar forceps are handled by an operator and the aspirator is controlled by an assistant. *arrow*: frozen tip of cryosurgical probe and ice ball on the tumor.

Discussion

Cryosurgery is a conventional technique used in the neurosurgical treatment of intracranial tumors and arteriovenous anomalies[3,4,7,8] to freeze the lesion itself, or to achieve direct hemostasis in the abnormal vessels. Although cryosurgery has some useful applications in such neurosurgical procedures, results to date have been mixed. In addition, damage to normal tissue situated near the frozen cryoprobe remains a problem, so this technique is not widely used compared with stereotactic surgery.[1,2,5,6,9]

Here, we present an alternative idea of using the cryoprobe simply as a tumor retractor. In the ophthalmological field, this simple method has proved to be safe and effective for the extraction of intraorbital tumors embedded in the fatty tissue. Our experience suggests that this procedure is also effective for the removal of the intracranial vascular tumors embedded in the brain tissue. In such tumors, retractor or conventional forceps are sometimes ineffective and may tear the vessels on the surface or the thin tumor wall. The area affected by the freezing process in our method was about 5 mm in diameter, so surrounding normal brain is undoubtedly safe, if the freezing process is performed on suitable points of the tumor. Experimental studies and our clinical series demonstrated no complications. The operative procedure can be further facilitated by reconstruction of the cryotips and use of a self-retractor to hold the cryoprobe in place.

References

1) Conway LW: Stereotaxic diagnosis and treatment of intracranial tumors including an initial experience with cryosurgery for pinealomas. *J Neurosurg* 38: 453–460, 1973
2) Cooper IS: A cryogenic method for physiologic inhibition and production of lesions in the brain. *J Neurosurg* 19: 853–855, 1962
3) Cooper IS: Cryogenic surgery. *Surg Annu* 2: 239–264, 1970
4) Cooper IS, Stellar S: Cryogenic freezing of brain tumors for excision or destruction in situ. *J Neurosurg* 20: 921–928, 1963
5) Rand RW: Cryosurgery of the pituitary in acromegaly: Reduced growth hormone levels following hypophysectomy in 13 cases. *Ann Surg* 164: 587–592, 1966
6) Rand RW, Dashe AM, Paglia DE, Conway LW, Salomon DH: Stereotaxic cryohypophysectomy. *JAMA* 189: 255, 1964
7) Rowbotham GF, Haigh AL, Leslie WG: Cooling cannula for use in the treatment of cerebral neoplasms. *Lancet* 1: 12–15, 1959
8) Walder HAD: Freezing arteriovenous anomalies in the brain, *in* Pia HW, Gleave JRW, Grote E, Zierski J (*eds*): *Cerebral Angioma: Advances in Diagnosis and Therapy*. Berlin, Springer-Verlag, 1975, pp 183–197
9) Walts JM, Riklam M, Stellar S, Cooper IS: Cryothalamectomy for Parkinson's disease. A statistical analysis. *Neurology* (*Minneap*) 16: 994–1002, 1966

Address reprint requests to: S. Endo, M.D., Department of Neurosurgery, Toyama Medical and Pharmaceutical University, 2630 Sugitani, Toyama 930-01, Japan.