The detachable balloon technique
in the treatment of direct carotid-cavernous fistulas

A. J. M. van der Werf and F. L. M. Peeters

Departments of Neurosurgery and Diagnostic Radiology,
A.M.C., University of Amsterdam, Amsterdam, The Netherlands

This paper describes our [1, 9] further results in 26 patients treated for a
direct carotid cavernous fistula.

It is follow-up to our previous communications where we described the
results in our first 7 patients and 12 patients respectively.

The fistulas were occluded by intraarterial detachable balloon as
described by Serbinenko and later modified by Debrun.

The aim of this treatment is to close the fistula, leaving carotid patency
intact. We succeeded in this respect in 20 of our patients.

Introduction

Fistulas between the carotid artery and the cavernous sinus can be either
direct communications between the intracavernous segment of the internal
carotid artery and the cavernous sinus (direct fistulas) or communications
between the internal or external carotid arteries or both and the cavernous
sinus via meningeal vessels. The latter can be interpreted as arteriovenous
malformations draining directly into the cavernous sinus, so-called dural
fistulas. Direct fistulas usually develop as a result of a severe head injury, but
can also be the result of the bursting of an intracavernous carotid aneurysm.

The classical clinical features are pulsating exophthalmus, chemosis,
continuous murmur, arterialization of the orbital veins, headache, impaired
eye movements.

Differentiation of the various type of cavernous sinus fistulas did not use
to be essential for treatment by carotid ligation, which in fact, was the only
treatment in the past.

However, in view of recently developed methods of treatment, deter-
mination of the kind of fistula and in direct fistulas the exact localization of the fistula is imperative. Fistulas between meningeal branches of the external carotid and the cavernous sinus can be closed by gel-foam embolization [2, 3]. Direct fistulas between the internal carotid and the cavernous sinus can be closed with the aid of one or several balloons [1, 4, 5]. As yet, there are no reports on closure of fistulas between meningeal branches of the internal carotid and the cavernous sinus by catheterization techniques. Closure of these fistulas is possible by deposition of a balloon at the site of origin of these meningeal branches or electro thrombosis [6]. This article describes our experiences in the treatment of direct carotid-cavernous fistulas using a detachable balloon catheter in 26 patients.

Material and methods

We treated direct carotid-cavernous fistulas in 26 patients, ranging in age from 16 to 76 years. In 21 patients the fistula was posttraumatic in origin, while in 5 patients the fistula developed spontaneously as a result of rupture of an intracavernous-carotid aneurysm (pat. 10, 14, 20, 23, 26). The balloon catheter (Ingenor, Paris, France) and the method used were largely those described by Debrun et al. [4] and were the same as described in our previous communications [1, 9].

As far as possible all patients underwent control carotid angiography one month and one year after closure of the fistula. In 8 patients the follow-up was not performed for the following reasons. The fifth patient died as a late sequela of his accident. The tenth, fourteenth, twentieth and twenty-third patient had no check-up after one year because of their age being 76, 73, 67 and 63 years respectively. The seventh, ninth and twenty-fourth patient refused the check-up angiography.

Results

In our first communication about our first seven patients we were able to mention a success rate of 100%, which means closure of the fistula with one or more balloons leaving the carotid artery involved patent. But this time we have to report some disappointments too. In 6 patients we did not achieve our goal. Tables 1 and 2 summarize the clinical data and results in this series of patients.

Let us discuss the 6 patients in whom we did not succeed in closing the fistula and preserving the patency of the carotid artery involved. In patient 2 it was impossible to close the fistula using a balloon with a maximum volume of 1 ml. Consequently two balloons were inserted. The contrast medium in the first balloon (0.4 ml) was not replaced by silicone so that, in