Rupture of an intracerebral aneurysm after carotid endarterectomy: a case report

J. H. Riphagen and H. J. J. A. Bernsen
Canisius Wilhelmina Ziekenhuis, Nijmegen, The Netherlands

Abstract

Coincidental intracerebral aneurysm and internal carotid artery stenosis is a rare combination. This case report describes the development of an intracerebral aneurysm in the presence of an internal carotid artery stenosis in an 58-year old woman. Furthermore, the management of intracerebral aneurysm in combination with an internal carotid artery stenosis is discussed as well as the role of potential important hemodynamic factors involved in the development and rupture of these aneurysms.

Key words: Intracerebral; aneurysm; carotid; stenosis; endarterectomy; hemodynamic; development.

Introduction

A number of congenital and degenerative factors are thought to be involved in the pathogenesis of cerebral aneurysms. Among these, hemodynamic stress plays an important role (Spallone and Cantore, 1981). Increased pressure in the intracranial vessels during a prolonged period of time may result in degenerative changes in the elastic intimal membranes and ultimately in the formation of aneurysms. Although there is experimental evidence in favour for this pathogenesis, clinical studies are limited. We had the unique opportunity to observe a patient who developed an anterior communicating artery aneurysm in a period of 7 years following stenosis of the right internal carotid artery and occlusion of the left internal carotid artery. After right-sided carotid endarterectomy (CE) rupture of the aneurysm occurred.

Case report

A 58-year-old woman was referred to the hospital because of a sudden collapse. Seven years before, this patient was seen in the hospital because of transient left sided paresis. A duplex scan of the carotid arteries showed a complete stenosis of the left internal carotid artery and a stenosis of 50-80% of the right internal carotid artery. She was a heavy smoker and known with hypertension. Carotid angiography disclosed an occlusion of the left internal carotid artery (Fig. 1), furthermore a non-significant stenosis of the right internal carotid artery (< 50%). Cerebral vessels showed no abnormality. Five years later, the patient had noted several periods of blurred vision of the left eye during 30 minutes but also for a period of 45 minutes a weakness of the left hand. The duplex scan of the carotid arteries was unchanged. On her request the patient was referred to another hospital for a second opinion, however the treatment strategy remained unchanged until a year later. She was then again seen because of renewed complaints of amaurosis fugax of the left eye. Although duplex scan investigations of the carotid arteries remained unchanged, a right-sided carotid endarterectomy was performed. Ten days after this procedure, the patient suddenly collapsed and complained of severe headache. Computed tomography showed extensive subarachnoid hemorrhage in the basal cisterns and third ventricle. Cerebral angiography and magnetic resonance angiography demonstrated a communciants anterior aneurysm of 6 mm on the right side (Fig. 2). The aneurysm was subsequently clipped and the patient made a good clinical recovery.

Discussion

Although seldom, the combination of internal carotid stenosis and an intracerebral aneurysm is described in several reports. Estimates of the incidence of this condition varies from 0.5 to 5% of patients (Dippel et al., 1994; Griffiths et al., 1996; Pappada et al., 1996; Kappelle et al., 2000; Navaneethan et
al., 2006; Héman et al., 2009). In our patient, the existence of the aneurysm was not demonstrated before CE surgery. However, usually intracerebral aneurysms in combination with carotid artery stenosis are detected during angiographic procedures for stenosis and are still asymptomatic. Once an aneurysm has ruptured, it is generally recommended that the aneurysm should be treated before the endarterectomy is performed (Porter et al., 1997). The management of unruptured aneurysms in association with a significant internal carotid stenosis is still subject for discussion and the risk of rupture against the risk of aneurysm surgery, stroke, and endarterectomy has to be considered. Several authors recommend that CE can be done with minimal risk if the aneurysm is small, ie < 6 mm (Kann et al., 1997) or < 10 mm (Kappelle et al., 2000). In larger aneurysms, it is advised to make decisions on individual basis (Kappelle et al., 2000; Navaneethan et al., 2006; Kann et al., 1997). In contrast, Ballotta (2006) postulates that detection of any aneurysm does not influence the decision of performing a CE. Héman (2009) concludes that there are no reliable data that carotid revascularisation increases the rupture risk of intracranial aneurysms. However, the clinical course of our patient clearly suggests that there is a potential risk of rupture of the aneurysm in these patients after a CE procedure. Therefore, we believe that in these cases, treatment of the aneurysm before CE should be seriously considered.

In the pathogenesis of aneurysms several mechanisms are thought to be involved. Apart from congenital vascular disturbances, many investigators have suggested an important role for hemodynamic forces in the development of aneurysms (Fujiwara et al., 1993; Senn et al., 2000; Briganti et al., 2002; Wang et al., 2008). The fact that one of the most important risk factors of aneurysms is hypertension is in accordance with this assumption (Obray et al., 2003). In our patient the first angiography did not show any aneurysmatic abnormalities but the second angiography 6 years later clearly showed an aneurysm of the anterior communicating artery. It
might be hypothesized that continued increased pressure in the right internal carotid artery and anterior communicating artery due to occlusion of the opposite side resulted in aneurysm dilatation of the anterior communicating artery. In this regard, it has been shown that reconstruction of an artery with 50% stenosis can increase blood flow by an average of 40% and thus it is likely that the sudden increase in blood flow after the CE in our patient might have resulted in the rupture of the aneurysm (Shumann et al., 1996).

In conclusion, this case report demonstrates the importance of hemodynamic factors in the development of cerebral aneurysms in patients with vascular risk factors. Moreover, the significance of an adequate carotid angiography together with illustration of the intracerebral vasculature is stressed to detect cerebral aneurysms. This case report demonstrates also that small aneurysms have a risk of rupture after an carotid endarterectomy.

REFERENCES


J. H. Riphagen, Weg door Jonkerbos 100, 6532 SZ Nijmegen (The Netherlands) E-mail: j.riphagen@cwz.nl