Brief communication - Aortic and aneurysmal Type A aortic dissection involving the carotid arteries: carotid stenting during open aortic arch surgery

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Received 10 June 2008; received in revised form 24 September 2008; accepted 26 September 2008

Abstract

Aortic dissection involving the arch can be complicated by extension to the supra-aortic branches. Carotid dissection may be symptomatic or asymptomatic at the time of surgery. Dissection or re-dissection of repaired carotid may happen later, with symptoms occurring days after the surgical repair, increasing the morbidity and mortality of those patients. We report a case of a patient with type A aortic dissection involving the aortic arch and extending to the supra-aortic branches. During surgery the dissection was seen extending to the distal carotid arteries with tears in the inner wall. After use of surgical glue as a sealant, seeing the persistent fragility and the presence of spiral form tears in the internal wall of the carotid arteries, intraoperative stenting of the common carotid arteries was performed using two stents to prevent carotid re-dissection and ischemic stroke in the postoperative period. In patients with aortic dissection and extension into the carotid arteries, especially with presence of tears of the inner wall, after use of a glue as a sealant of the two dissected layers, if the repaired artery wall results are still fragile, use of intraoperative carotid stenting may be of help in preventing late re-dissection.

Keywords: Aortic arch; Dissection; Carotid artery disease; Carotid artery dissection, internal

1. Introduction

Carotid dissection is a well-known cause of stroke. Different causes can be recognized: spontaneous or traumatic [1–3], or due to carotid aneurysm [4] or due to aortic dissection involving the aortic arch and extending to the supra-aortic branches [5]. In those patients, carotid dissection may be symptomatic or asymptomatic at the time of surgery. In this situation, during surgery the ascending aorta or also the arch are replaced by a Dacron prosthesis, and the false lumen of the dissection of the supra-aortic vessels is closed using a surgical glue. However, neurological symptoms even if not present at time of surgery, or in the immediate postoperative period, may sometimes appear days after the surgical repair, increasing the morbidity and mortality of those patients. This is usually due to a re-dissection of the carotid arteries. Different authors described neurologic disorders appearing after surgical repair of type A aortic repair [6, 7] and treated successively by carotid stenting, even in cases appearing one month after surgery [8].

We describe the case of a patient with type A aortic dissection extending to the descending aorta and involving the supra-aortic branches, with distal extension to the carotid vessels. In this case, due to the extension of the lesion, stenting of both of the carotid arteries was performed during surgery, in a preventive fashion.

2. Case report

A 50-year-old man was transferred from another Hospital to our Institution with diagnosis of type A aortic dissection. The patient, since five hours previously, complained of chest pain irradiating to the back and shoulders. No neurological symptoms were present. The limbs appeared perfused, but hypophymia was present in the left arm. CT-scan demonstrated aortic dissection involving the ascending aorta extending down to the iliac arteries, and involving the supra-aortic vessels too (Fig. 1). ECG was normal, and myocardial specific enzymes were also normal. Diuresis was impaired. The patient was transferred to the operating room for replacement of the ascending aorta, arch and reimplant of supra-aortic vessels. During surgery the supra-aortic vessels were exposed. Both of the carotid arteries appeared dissected far from the aortic arch and with spiral form tears inside. Adhesion of the two layers of the dissected carotid arteries was performed by the use of gelatin-resorcinol-formaldehyde (Cardial Technopole, St Etienne, France) glue as a sealant. However, even after this treatment the repaired vessel’s wall resulted in being still quite fragile and with a worrying aspect of the repaired intimar tears. In the aim to give more stability and strength to the repaired carotid walls even far from the surgeon’s suture line, and to reduce the risk of late re-dissection: before-re-implantation on the new prosthetic aorta, two
stents Carotid Endoprothesis Wallstent™ Monorail™ type 7.0 mm/30.0 mm (Boston Scientific, Natick, MA, USA) were inserted inside the common carotid vessels. The insertion of the stents created a wide true lumen closing completely the dissection for a good length far from the suture line with the new aorta prosthesis. Cerebral protection was maintained through selective cannulation of both carotids (DLP Retrograde Coronary Sinus Perfusion Cannula with manual Inflating Cuff, Medtronic Inc, Minneapolis, USA). Cerebral monitoring was performed with near infrared spectroscopy (INVOS cerebral oxymeter, Somanetics Inc, Troy, USA), brain tissue oxygen saturation measured 60–65% continuously during perfusion.

Surgical procedure was concluded in standard fashion with reimplantation of the supra-aortic branches on the new prosthetic aorta. Postoperative control of the stented vessels was performed both in-hospital and in out-patient clinic using Doppler ultrasound scan (Fig. 2); showing good carotid flow and no residual dissection. Postoperative contrast medium imaging was not performed due to chronic renal failure. In the postoperative period the patient did not show neurological disorders, nor at the six-month postoperative follow-up.

3. Discussion

In aortic dissection extending to the arch, carotid arteries may be involved. Neurological symptoms may be soon present, or sometimes may appear after surgery even if adhesion of the two layers of the dissected vessel was good at time of surgery. This is because a re-dissection of the vessels can appear after surgery, and this may need later stenting treatment to treat this complication [9]. This re-dissection may probably be due to the fragility of the repaired wall where the surgeon has to insert a suture line causing further trauma.

Using a stent inside the dissected vessel gives more stability and strength to the wall even far from the surgeon’s suture line, and may prevent further re-dissection and new neurological symptoms.

We think that this technique, used at time of surgery, and therefore, as an ‘open/hybrid technique’, may be useful in cases of aortic dissection involving the supra aortic branches when the repaired carotid wall appears still fragile or with extending tears. Further investigation will be of help to demonstrate the utility of this technique.

3.1. Limit of the report

The authors understand they used this technique in only one case. The question is, if carotid stenting should be used in all cases of aortic dissection extending to the carotid arteries or only in selected cases? We believe that at the moment this treatment should be reserved just to vessels presenting at time of surgery with extending tears in their inside, and that appear with fragile walls after a standard repair. Therefore, it seems appropriate for the moment to use it in extreme cases. This, also in consideration of the associated risks of stenting as stenosis in their inside, and that appear with fragile walls after a standard repair.

In conclusion, this technique was useful in the case we presented. However, we aim to perform a series to give more information to the scientific community.

References


eComment: Everyday clinical practice consequences?

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doi:10.1510/icvts.2008.186023A

This report by Lentini et al. [1] raises some interesting issues like the indication to stent, its eventual necessity for stroke prevention to avoid treating ‘images’ and the real long-term patency.

Nowadays, published studies on stenting in dissected precerebral arteries are all retrospective and non-randomized, summarizing experiences on about 200 patients. Stenting was performed acutely to open a stenosis or seal an intimal flap, and chronically to exclude a pseudoaneurysm. A relatively high technical success was reported with a failure rate of 5% and few perioperative complications.

However, the efficacy of stenting – and whether it is even necessary in many cases – remains uncertain. Many stenotic lesions, following dissection, spontaneously recanalise. A recent study [2] even suggested that the risk of recurrent embolization from pseudoaneurysm in dissection is very low. Therefore, for all these reasons, the widespread use of stenting in dissection in our everyday clinical practice and its efficacy should be assessed in randomized trials.

References