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Clamp-induced carotid artery dissection during carotid endarterectomy

Abstract

Clamp-induced internal carotid artery dissection can develop during carotid endarterectomy surgery. If it is not noticed, serious complications such as acute occlusion of the carotid artery in the early period and false aneurysm formation in the late period may develop. Inadequate back-flow and circumferential halo around the distal internal carotid artery may be the predictor of injury during carotid artery surgery.

Keywords: Carotid artery dissection, clamp induced trauma, intimal disruption

INTRODUCTION

Traumatic internal carotid artery dissections result from a tear in the intima and media of the internal carotid artery (ICA), usually just above the carotid bifurcation (1,2). This leads to accumulation of blood and a separation of arterial layers within the ICA, with the end result being a stenosis, complete occlusion or false aneurysm formation. Recognition of carotid artery damage during the operation is crucial to avoid serious postoperative complications and neurological deficits. Herein we reported clamp-induced circumferential internal carotid artery dissection during carotid artery surgery.

CASE REPORT

Seventy-five years old male patients have been admitted to our department. He complained two times transient ischemic attacks recovered spontaneously. He was both diabetic and hypertensive. He has also higher cholesterol values at the preoperative state. He underwent coronary artery bypass surgery eight years ago. A Carotid Doppler ultrasound revealed severe (>90%) right carotid artery stenosis (NASCET Level-A: Symptomatic in previous six months and 70-99% stenosis). The patient was taken

into the operating room. Common, internal ve external carotid arteries were exposed after general anesthesia. Atherosclerosis was beginning from carotid bifurcation and three centimeters extending into the internal carotid artery. ICA was carefully palpated to find a soft part of the artery. We cannot find a soft place on ICA so we decided to perform carotid artery bypass surgery and the saphenous vein was harvested upper part of the left leg to find an adequate size conduit. Heparin was administered and an clamps were placed. ICA was transected. Proximal ICA ligated externally. Saphenous vein was anastomosed to ICA end-to-end fashion. ICA clamp was removed but there was no adequate back bleeding. A side clamp was placed on a suitable part of the common carotid artery and proximal anastomosis was done in an end-to-side fashion. The antegrade flow was controlled by hand Doppler ultrasound. The adequate flow was detected. The one-millimeter width circumferential dissection in ICA just after end-to-end anastomosis was noticed during this period. We think that it is an circumferential carotid artery dissection caused by the ICA clamp. A small incision was done by an eye-blade scalpel to the dissected part of ICA and massive bleeding occurred. Bleeding point was sutured. We think that it is almost non-transmural dissection and clamps were placed on both ICA

and saphenous conduit. The posterior belly of the digastric muscle was transected to obtain better exposure and then ICA was transected above the dissection (Figure-1). Saphenous vein re-anastomosed to stump of ICA in an end-to-end fashion. Adequate back bleeding was observed. Doppler examination

revealed good ICA flow. The patient awoke just after surgery and the postoperative period was uneventful. Postoperative Doppler ultrasound examination shows adequate blood flow through the venous conduit. Carotid CT-angiogram has made at postoperative 30 days and perfect patency of operation has shown (Figure-2).

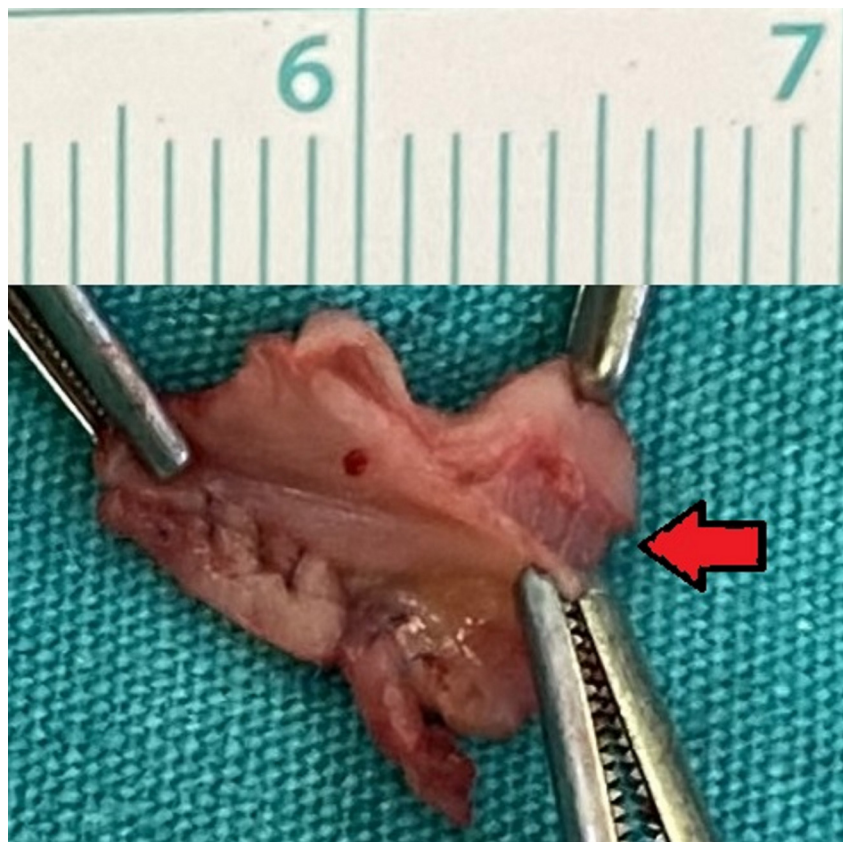


Figure 1. Clamp-induced both intima and media layers dissection lines (arrow) can be noticed just after previous end-to-end fashion anastomosis

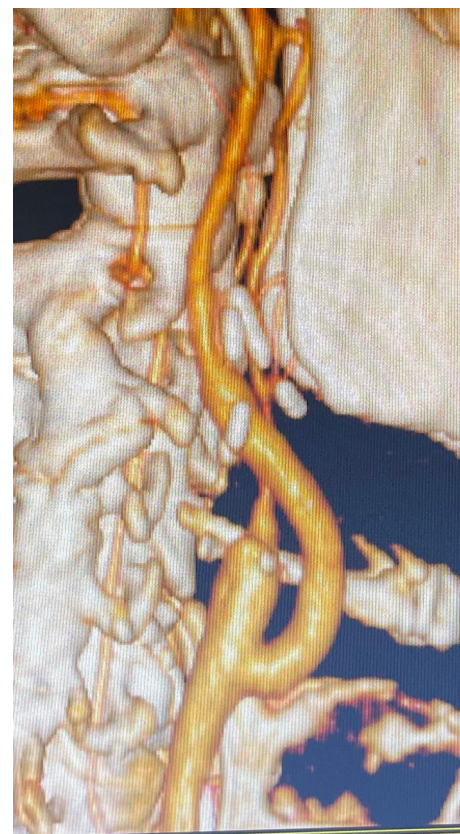


Figure 2. postoperative 30th days carotid ct-angiography showed perfect patency of surgery

DISCUSSION

Spontaneous or traumatic internal carotid artery dissections result from a tear in the intima of the internal carotid artery, usually about 2-3cm above the carotid bifurcation. This leads to accumulation of blood and separation of arterial layers within the ICA, with the end result being stenosis (where thrombus in the false lumen partially compresses flow within the true lumen), complete occlusion (if thrombus in the false lumen completely obstructs flow within the true lumen), or false aneurysm formation (where an accumulation of blood is subadventitial) (3-4). Usually, dual antiplatelet or anticoagulant therapy is used in order to prevent thromboembolic stroke. The highest risk period for suffering a stroke after carotid artery dissection is the first 7 days, despite antiplatelet therapy. Carotid artery injuries may be developed during the carotid shunt insertion

(5). Carotid artery rupture related to shunt insertion can be noticed due to bleeding and it can be repaired by a saphenous vein patch. Carotid-shunt-induced intimal disruption cannot be noticed during carotid surgery (6). Intimal disruption may cause thrombosis, embolization, and pseudoaneurysm after surgery. Carotid artery clamping may also produce a variety of injury patterns ranging from simple endothelial cell disruption to full-thickness arterial wall crushing (1). ICA circumferential wall damage can be developed during carotid artery surgery. These kinds of injuries are usually overlooked during surgery. We have noticed that the back-bleeding of ICA was extremely low. We suspected that something was wrong. Adventitial manipulation of ICA caused massive bleeding because of complete intimal and medial disruption. Intimal and medial disruption may cause acute thrombosis just after surgery. ICA dissection may advance towards intracranial arteries. A false aneurysm may also

develop in the long-term period. False aneurysms are reported to complicate 13 to 49% of all internal carotid artery dissections (2).

CONCLUSION

Inadequate back-bleeding may be a predictor of intimal and medial disruption. Halo around the clamped part of the ICA is another finding of ICA dissection. We prefer common carotid to internal carotid artery saphenous vein bypass in our case because ICA stiffness was extending to higher levels. ICA diffuse stiffness may also contribute to developing this kind of complication. Clamping soft part of ICA may avoid clamp-induced arterial damage.

Patient informed consent: Informed consent was obtained from patients.

Conflict of Interests: The author declares that there are no conflict of interests.

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