



Effect of CEA and CAS for Ocular Circulation and Chronic Ocular Ischemic Syndrome

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Introduction

One of the important clinical aspects of internal carotid artery stenosis at its origin is the influence on the flow dynamics of the ocular circulation. The blood supply to the eye is mostly provided by branches of the ophthalmic artery (OphAr), which is a branch of the internal carotid artery. This is why many patients with cerebral ischemia in the internal carotid artery may present with ipsilateral visual symptoms [1]. The disturbed ocular circulation correlates with chronic ocular ischemic syndrome symptoms such as frequent amaurosis fugax or a decline of visual acuity [2,3]. Carotid revascularization surgery, such as carotid endarterectomy (CEA) and carotid artery stenting (CAS), may also restore the cerebral perfusion pressure and improve the intracranial vascular hemodynamics including ocular circulation. Therefore, carotid artery revascularization surgery reduces the risk of stroke in symptomatic and asymptomatic patients [4, 5]. Despite this well-established benefit, there have been few reports concerning the effect of carotid revascularization surgery for ocular circulation. Therefore, it is significant to understand the ocular circulation and ocular symptoms in patients with internal carotid artery stenosis before and after CAS.

In this study, we discussed and analyzed the effect of carotid revascularization surgery on the ocular circulation and chronic ocular symptoms in patients with carotid artery stenosis.

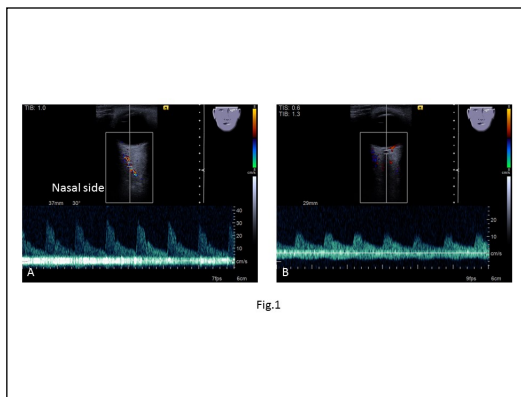


Fig.1

Results

Results: 1) Ocular circulation: Preoperatively, the average OphAr peak systolic flow velocity (Vs) was 0.05 m/sec, and the average CRA Vs was 0.07 m/sec. At 1 week after surgery, the average OphAr Vs significantly increased to 0.32 m/sec ($p < 0.05$), and the average CRA Vs significantly increased to 0.11 m/sec ($p < 0.05$). These significant improvements were sustained throughout the three months of the follow up. 2) OIS: During the follow-up period (mean: 3.8 years), 16 patients (62%) showed visual acuity improvement, and no patients complained of amaurosis fugax or worsening of the chronic OIS.

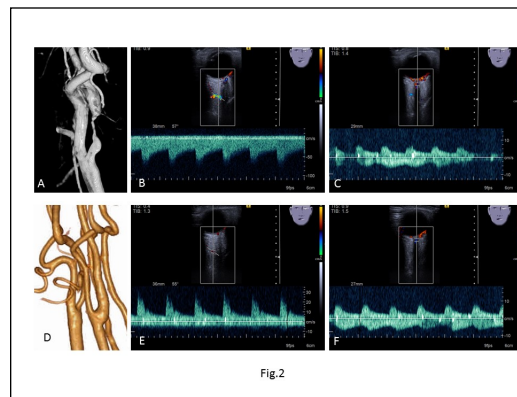


Fig.2

Illustrative case

A 77-year-old man was referred to our hospital complaining of transient right hemiparesis and left visual acuity decline. Left carotid angiography showed 98% stenosis of the right internal carotid artery at its origin (Fig. 2A). The left OphAr CDFI showed reversed flow, and the peak systolic flow velocity was - 0.62 m/sec (Fig. 2B). The left CRA peak systolic flow velocity was 0.06 m/sec (Fig. 2C). Left CEA was performed. Postoperative carotid angiography showed the good patency of the carotid artery (Fig. 2D). At 1 week after CEA, the left OphAr CDFI showed resolution of the reversed flow, and the peak flow velocity was 0.30 m/sec (Fig. 2E). The peak systolic flow velocity of the CRA was 0.12 m/sec (Fig. 2F). At 1 month and 3 months after CEA, there was no marked change of the peak systolic flow velocity of OphAr and CRA. The right visual acuity gradually improved at 3 months after CEA. The patient was followed up for 2.8 years after CEA, and there were no neurological ischemic events including visual symptoms.

Conclusions

Conclusion: Carotid revascularization surgery was effective in improving the ocular circulation, and it was also useful for the chronic OIS due to the carotid artery stenosis.

Learning Objectives

Participants can learn the effect of the carotid revascularization surgery (CEA and CAS) for the ocular circulation and the chronic ocular ischemic syndrome.

References

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