

Surgical repair of a giant internal carotid artery aneurysm using a jugular venous double layer patch

Dev internal karotis arter anevrizmasının çift katlı juguler ven yaması ile cerrahi tamiri

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Aneurysms of the extracranial carotid arteries are uncommon vascular lesions. We report a case of giant extracranial internal carotid artery aneurysm and its repair with an autogenic double layer jugular venous patch. A 46-year-old female patient had a growing mass in her neck for two years. On physical examination, a pulsatile mass was palpated under the sternocleidomastoid muscle between the mandibular angle and the mastoid process. Angiographic examination showed a saccular aneurysm of the internal carotid artery, measuring 6x8 cm, starting 1 cm after the carotid artery bifurcation and ending at the cranial base. The sac was not completely excised to avoid damage to the vagus and ansa cervicalis nerves which were attached to the aneurysmal sac. Then, a double layer jugular venous patch was sutured to the defect on the vessel wall. On control examinations in the first postoperative month, the patient had no complaints and normal blood flow pattern was observed in Doppler ultrasonography and control angiography. Partial aneurysmectomy with double layer venous patch repair is an appropriate alternative in extracranial internal carotid artery aneurysms with cranial nerve attachment to the aneurysmatic sac.

Key words: Aneurysm/surgery; carotid artery, internal/surgery; jugular veins/transplantation.

Aneurysms of the extracranial carotid arteries (ECA) are uncommon vascular lesions. Houser and Baker^[1] found carotid aneurysms in eight patients in their series of 5,000 cervical and cerebral angiographies. Beall et al.^[2] detected only seven ECA aneurysms in 2,300 patients with arterial aneurysms within a period of 13 years. In the same institution, 37 patients were reported to have ECA aneurysms among 8,500 patients operated on for peripheral arterial aneurysms during a 37-year period.^[3]

Ekstrakraniyal karotis arter anevrizmaları nadir görülen vasküler lezyonlardır. Bu yazıda, otojen çift katlı juguler venöz yama ile tamir edilen dev ekstrakraniyal karotis arter anevrizması sunuldu. Kırk altı yaşındaki kadın hasta, boyunda iki yıldır büyüme gösteren bir kitle nedeniyle başvurdu. Fizik muayenede, mandibüler açı ile mastoid proses arasında, sternokleidomastoid kas altında pulsatil bir kitle palpe edildi. Anjiyografik incelemede, internal karotis arterde, karotis arter bifurkasyonundan 1 cm sonra başlayan ve kafatabanında sonlanan, 6x8 cm'lik dev bir sakküler anevrizma saptandı. Ameliyatta, anevrizma kesesine bağlı vagus ve ansa servikalıs sinirlerine zarar vermemek için keseye kısmi eksizyon uygulandı. Daha sonra, otojenik çift katlı juguler venöz yama damar duvarındaki defekte dikildi. Ameliyat sonrası ilk aydaki kontrollerde hastanın yakınmasının kaybolduğu gözlemlendi; Doppler ultrasonografide ve kontrol anjiyografide normal akım paterni izlendi. Kraniyal sinirlerin anevrizma kesesine bağlı olduğu olgularda kısmi anevrizmektomi ve çift katlı juguler venöz yama ile tamir, kolay uygulanan uygun bir seçenektir.

Anahtar sözcükler: Anevrizma/cerrahi; karotis arter, internal/cerrahi; juguler ven/transplantasyon.

Among the etiologic factors of carotid aneurysms are atherosclerosis, carotid surgery, trauma, dissecting aneurysm, local infection, Behcet's disease, syphilis, and congenital diseases. Presently, the most common factors are atherosclerosis, surgery, and local trauma. They are usually detected in the fifth decade in various short segments of common and internal carotid arteries.^[4-7]

Although resection of the aneurysmatic segment and end-to-end anastomosis or graft reconstruction

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are the major surgical methods, ligation can also be applied when necessary.^[6,8-10] Surgical repair of an ECA aneurysm, in particular with total resection and arterial reconstruction is strongly recommended. Extended cervical approach has many technical difficulties, but can allow treatment of high-lying aneurysms.^[11]

Herein we report a case of giant extracranial internal carotid artery aneurysm which was repaired with an autogenic double layer jugular venous patch. This technique represents an alternative and easily applied method for repair.

CASE REPORT

A 46-year-old female patient with a history of a growing mass in her neck for two years presented to a local hospital with dysphagia as the chief symptom. After detection of a vascular pathology in a cervical computed tomography scan, she was referred to our institution. On physical examination, a pulsatile mass was palpated under the sternocleidomastoid muscle between the mandibular angle and the mastoid process. Angiographic examination showed a saccular aneurysm of the internal carotid artery, measuring 6x8 cm, starting 1 cm after the carotid artery bifurcation and ending at the cranial base (Fig. 1).

Under general anesthesia, the skin and subcutaneous fascia were opened by an oblique incision. As the first step, a venous graft was prepared from the external jugular vein in order to be used as a patch tissue later in the course. For this purpose, a 5-cm segment of the vein was resected without disturbing circular continuity, and inverted so that the endothelial surface faced outward. During exploration, the giant saccular aneurysm was found. It arose from the

internal carotid artery at a level 1 cm above the carotid bifurcation and extended up to the cranial base. The common, internal and external carotid arteries were explored. The distal internal carotid artery was explored by resection of the lateral part of the digastric muscle. The aneurysmal sac extended to the cranial base, but had a short neck that allowed easy cross-clamping. The sac was not completely excised to avoid damage to the vagus and ansa cervicalis nerves which were attached to the aneurysmal sac. The carotid artery was clamped after heparinization and stump pressure was measured as 90 mmHg. The sac was opened, no thrombus was detected in the sac, and 50% of the sac was removed. Then, the inside-out graft was sutured to the defect on the vessel wall as a double layered patch and circulatory integrity was reestablished (Fig. 2).

After hemostasis and capitonage of aneurysmal remnants, the skin was sutured. Acetylsalicylic acid 150 mg/day was started and the patient was discharged on the fifth postoperative day without any complication. Pathologic examination of the resected specimen revealed atherosclerotic changes. No microorganisms were detected in microbiologic cultures. On control examinations on the 10th and 30th days after discharge, the patient had no complaints and normal blood flow pattern was observed in Doppler ultrasonography and control angiography (Fig. 3).

DISCUSSION

Due to the uncommon nature of extracranial internal carotid aneurysms, our knowledge about the methods of surgical management and their possible complications is limited. Even asymptomatic patients should be operated on to prevent risk for thromboembolism and



Figure 1. Angiographic appearance of giant aneurysm of the internal carotid artery. (A) Lateral view, (B) oblique view.

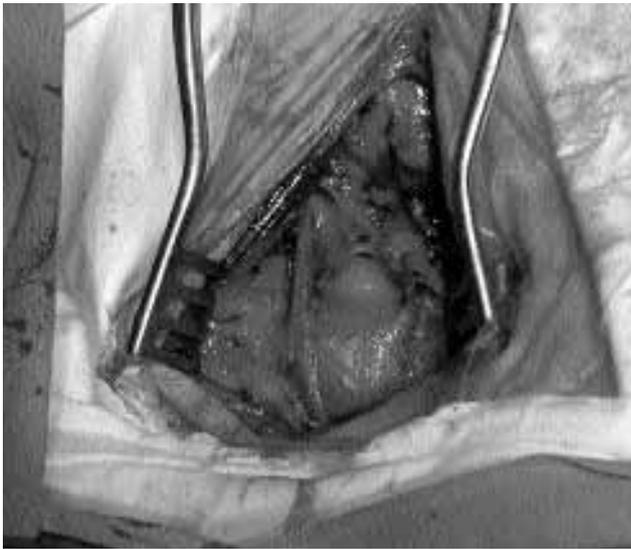


Figure 2. Intraoperative appearance of the internal carotid artery aneurysm attached to the plexus nerves.



Figure 3. Carotid angiography showing normal blood flow and smoothly reconstructed carotid artery.

rupture.^[6,12] Since surgical intervention was not possible in the past, mortality of such aneurysms was very high. Partial excision of the aneurysmatic sac is recommended especially when there is severe inflammation around it. Restoration of the arterial continuity by graft interposition is the preferred method. Autogenic saphenous vein graft, Dacron and PTFE grafts are the most commonly used options. In anastomotic aneurysms, there was evidence for an infectious process in up to 50% or more of the cases involving a prosthetic suture line.^[6] Based on this finding, autonomic graft usage should be preferred.^[6,12,13]

Moreau et al.^[14] reported 37 patients treated with aneurysmectomy for extracranial internal carotid artery aneurysms. Arterial continuity was established by graft interposition in 12 patients, end-to-end anastomosis in 11 patients, and primary repair in 14 patients. Carotid ligation is another alternative in high risk patients. Alexic et al.^[15] operated on 14 patients and had to ligate the carotid artery in three. In our case, primary repair was not performed due to the huge size of the arterial defect; end-to-end anastomosis was not considered due to the potential risk for damage to the nerves attached to the carotid artery, and instead of carotid ligation, we used venous patch for arterial continuity.

Although partial aneurysmectomy with patch repair is a good alternative, its use has been rare in previous studies. Faggioli et al.^[16] used patch repair in only three patients in a series of 20 patients.

The difference in the use of the patch in our case was that it was placed double layer, inside-out, and

reverse to flow direction. Its double layer use was to reinforce patch support.

Due to the fact that aneurysm repair operations require a relatively longer time than carotid endarterectomy, an intraluminal shunt becomes necessary. However, we did not use intraluminal shunt because distal stump pressure was satisfactory.^[17]

Cerebrovascular accidents, hypoglossal or recurrent laryngeal nerve paralyse are the most common postoperative complications. Cranial nerve injuries occur in 7% to 20% of cases.^[18-21]

In conclusion, partial aneurysmectomy and double layer inside-out venous patch repair for extracranial internal carotid artery aneurysms seems to be an appropriate alternative in cases with cranial nerve attachment to the aneurysmatic sac.

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