

# A Giant Aneurysm of the Internal Carotid Artery

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## A.CAROTIS INTERNA'nın DEV ANEVRIZMASI

### Özet

19 yaşındaki genç bir kızda görülen *a.carotis interna'* nin dev anevrizması cerrahi yöntemle tedavi edildi. İntrapetöz yerleşim gösteren olgudaki tüm bulgular glomus jugulare tümörünü anımsatıyordu.

### Summary

This paper is about a giant aneurysm of the petrous segment of the internal carotid artery which was treated surgically after completing all the main diagnostic studies. The subject is a 19-year old girl having a giant intrapetrous carotid artery aneurysm mimicking a glomus jugulare tumor. The methods of surgical operation are discussed and literature is reviewed.

**Key words:** *Giant aneurysm - Intrapetrous carotid artery - Carotid artery ligation - Glomus jugulare tumor*

The treatment of the giant aneurysm of the intracranial carotid artery is still considered to be a therapeutic challenge due to its location and anatomic configuration. Ligation of the carotid artery in the neck has been a useful treatment for some aneurysms but unsuitable for direct intracranial clipping. Direct surgical exposure of giant aneurysm of the intrapetrous carotid artery is difficult due to its specific location and anatomic configuration. According to English literature, 40 cases have been reported until 1986 (2,3,8,9,12,14,16,17,22,24-27). Most of the intrapetrous giant aneurysms have been treated by ligation of the internal carotid artery, common carotid artery, extracranial-intracranial bypass, aneurysmectomy and primary anastomosis, trapping of the aneurysm between ligation and clipping and also by detachable intraluminal balloon techniques (2,3,5-8,10,13,16,21,22,24,25,27).

This report will focus especially on the ligation of the internal carotid artery together with the common carotid artery in the neck and clipping of the internal carotid artery intracranially to treat a giant intrapetrous internal carotid artery aneurysm.

## CASE REPORT

A nineteen year-old girl was admitted to clinic with the complaints of loss of hearing at her left ear, numbness at the left side of her face and facial weakness at left side of her face on 12th of December 1987. On January 1987, following a headache she had impairment of hearing at her left ear, while she also had numbness and facial weakness at the same side of her face. On neurologic examination, she was found to have left facial paresis of the peripheral type, hypoesthesia especially at the maxillary and mandibular divisions of the left side of her face, and absent gag reflex. Her left ear was anacoustic and the uvula was deviated to the left side. Her neurological findings and history suggested that she had a glomus jugulare tumor.

### *Preoperative Period:*

At the preoperative radiologic examination, the following findings were detected: Stenvers graphy showed that there was destruction of the acoustic canal proximally. Craniography of the base of the skull revealed that there was bone destruction that coincided with the localization of the left carotid canal. Tomography of the petrous bone hinted that there was a destruction of the left petrous bone. Computerised tomography (CT) scann revealed a large space occupying lesion at the left side (Fig. 1). Four channel angiography demonstrated a giant (4 x 4 x 2.5 cm) aneurysm of the petrous segment of the internal carotid artery with a good collateral circulation (Fig. 2a; 2b). Dynamic brain scanning showed that there was a hyperactive area at the entrance of the left carotid artery into the circle of Willis. Besides, a hyperactive focus at the left temporal area was revealed at the bone scanning. In EMG no motor activity was detected in the muscles innervated by the left facial nerve. There was no response of the lower branch to stimulation, and very low amplitude responses were recorded from the upper branch. Neuro-otological examinations were found as follows: Bithermal caloric test revealed VII th and VIII th cranial nerve palsy after stimulation of the left labyrinthine system. Odiometric test showed that there was a total neurosensorial loss of hearing at the left side and the recruitment was thought to be low as the acoustic reflex was present at 95 and 100 dB (Fig. 3). Schirmer test pointed out that there was partial peripheral paresis of the facial nerve of the supraorbital type. Matas test was performed under the control of EEG. The EEG, recorded during left carotid compression for 20 minutes, was founded to be normal (Fig. 4).

### *Operation:*

After all diagnostic studies were completed the patient underwent surgical treatment. At the first stage under local anesthesia both the common carotid artery and internal carotid artery were exposed at the neck level. Both of them were temporarily compressed at the first 15 minutes while the neurological state was continuously checked. Since this procedures was well tolerated, two bulldog clamps were applied to the arteries and then the wound was closed. The patient's neurological state did not change and the EEG findings remained at normal limits during the 24 hours of observation. In this respect, we decided that we would be able to operate according to our plan. On the 8 th of December 1987, she underwent an operation of ligation of the left common carotid artery, ligation of external and internal carotid artery in the neck separately, then a left pterional craniotomy was performed. After left internal carotid artery had been exposed, it was clipped just behind of the ophthalmic artery, then the aneurysm was explored, evacuated and decompressed extradurally.

### *Postoperative Period:*

No complication was observed postoperatively. She subjectively stated that, the hearing on the left ear slightly improved. The postoperative enhanced CT scann showed that the aneurysm was not filled (Fig. 5). Four channel angiography demonstrated that the left common carotid artery was occluded, and there was a good collateral circulation in the brain. The giant aneurysm was not being filled (Fig. 6). Neuro-otological examinations were as follows: Caloric test revealed that left vestibular nerve was hypoeixitable. Odiometric test showed that there was a subtotal neurosensorial loss of hearing at the left ear (Fig. 7). Schirmer test pointed out that there was no difference between the preoperative and postoperative findings. The EEG recordings indicated that there was no abnormality (Fig. 8).

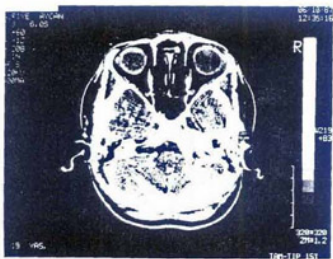
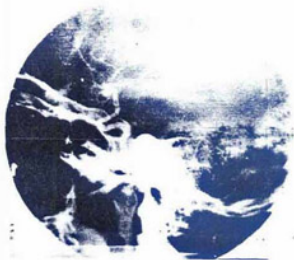


Figure 1. Preoperative CT scan.



a



b

Figure 2. a ) Preoperative AP angiogram, b ) Preoperative lateral angiogram.

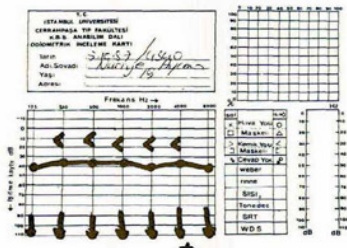


Figure 3. Preoperative audiogram.

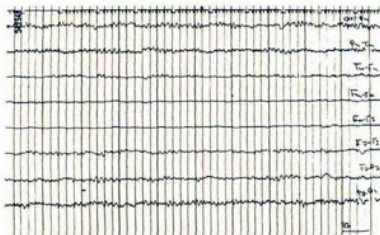


Figure 4. Preoperative EEG by MATAS test.



Figure 5. Postoperative CT scan.



Figure 6. Postoperative AP angiogram.



## DISCUSSION

Aneurysm of the petrous bone segment of internal carotid artery may be mycotic, posttraumatic or congenital in origin (2, 4, 9, 12, 16, 17, 26). However, in the majority of reported cases, obvious aetiology could not be discerned. Therefore most of them have been presumed to be of congenital or developmental in origin (3, 9, 12, 17).

The clinical symptoms of the aneurysm of the petrous bone segment of the internal carotid artery are of two different types. One is spontaneous hemorrhage into either eustachian tube or middle ear cavity, that would result in epistaxis and otorrhagia (3, 8, 12). The other is aural symptoms due to mass effect, by the influence of structures adjacent to the carotid canal (2, 13, 16, 24). Patients with extremely large aneurysm may complain not only of decrement in hearing, pulsative tinnitus in the affected ear, but also of facial weakness, facial pain, facial numbness and lower cranial nerve dysfunction. It can be said that cranial nerves affected by these aneurysms include the dysfunction of 5th to 10th and 11th cranial nerves according to the degree of involvement (9, 16, 26). Therefore these symptoms of the intrapetrous carotid artery aneurysm may be confused with the tumors of the glomus jugulare (16).

Direct surgical approach to the intrapetrous aneurysm via infratemporal fossa and its resection has been described (8). In some cases this procedure is completed with the resection of the aneurysm and reconstruction of the internal carotid artery (8, 27). Since direct surgical exposure is difficult due to their anatomic location, attempts has been frequently made such as proximal ligation of the ipsilateral internal carotid artery or of the common carotid artery in the neck (3, 5, 6, 10, 12, 14, 17, 19, 23, 24, 26). The main goal is to decrease intraarterial pressure of the distal segment of the internal carotid artery to prevent rupture of the aneurysm and help to provide aneurysmal thrombosis. Problems originating from this treatment depend upon the uncertainty of the patient's tolerance to the occlusion of the carotid arteries, development of ischemic phenomena (6, 10, 11, 13, 18, 24, 25), delayed neurological deficit from embolus arising from the thrombosed internal carotid artery (1, 19, 23). There are two different opinions about the carotid artery occlusion: acute occlusion or gradual occlusion. While some authors advocated acute occlusion of the common carotid artery or internal carotid artery for these kinds of aneurysms, most other authors favor a gradual occlusion over a number of days (5, 7, 10, 13, 18, 20, 23, 25). According to the results of the cooperative study, the rate of the ischemic complications are 34% for acute occlusion and the 25% for gradual occlusion (18). It has also been reported that there was no difference between the complication rates of acute and gradual occlusion (10, 13, 15).

The selection of carotid arteries for ligation is also an important factor. This point has been extensively discussed in the literature (3, 5, 7, 12, 14, 17, 21, 24). According to the results of the cooperative study (18) the frequency or percentage of ischemic complications were found to be 49% in the internal carotid artery occlusion, and 28% in

the common carotid artery occlusion, but there were no significant differences in effectiveness of the kind of the ligation on the rebleeding frequencies. The long term complications of carotid ligations are also well described in the literature (10, 13, 16, 19, 23, 25).

Our preoperative study showed that there was a good collateral circulation through the circle of Willis as evaluated by cross compression during angiography as well as by clinical determination of the tolerance to the carotid occlusion. Therefore, the patient has been accepted as a good candidate for proximal carotid artery ligation. It has been planned that the main goal of the treatment of this aneurysm should be to exclude the aneurysm from the circulation, and reduce its mass effect to some cranial nerves. Therefore, ipsilateral proximal, internal, common and external carotid arteries have been ligated in the neck. Besides, internal carotid artery was clipped at right after cavernous sinus by intracranial approach to prevent possible embolic complications from the thrombosed aneurysm via retrograde blood flow. However this operation was not able to prevent the pressure of the thrombosed aneurysm on the cranial nerves in this case. For this reason the aneurysm has been exposed, evacuated and clipped extradurally in order to decompress the cranial nerves.

Postoperative period was free of complications and the dysfunctions of the cranial nerves diminished. We presume that this surgical treatment may be applied to similar cases.

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