

Subclavian Steal Syndrome with Otologic Findings

Otolojik Bulgularla Subklavyen Çalma Sendromu

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ABSTRACT Subclavian "steal" syndrome is a condition that causes reverse flow and changes in the flow pattern from the vertebral artery to the subclavian artery on the same side as a result of severe stenosis or obstruction in the proximal section of the subclavian artery before delivery to the vertebral artery. Subclavian steal syndrome is mostly asymptomatic due to collaterals to the head, neck and shoulders, but as a result of subclavian steal syndrome, neurotological symptoms can sometimes be seen due to vertebrobasilar insufficiency as the vertebrobasilar arterial system feeds the peripheral, central auditory and vestibular systems. We found it appropriate to present a patient complained of tinnitus and hearing loss in the right ear, and we detected subclavian steal syndrome during the differential diagnosis we made based on these complaints. For this reason, patients with dizziness, hearing loss, or tinnitus should undergo a careful neurotological examination, and consideration given to a finding of vertebrobasilar insufficiency due to subclavian steal syndrome, although this is rarely seen.

Keywords: Hearing loss; subclavian steal syndrome; tinnitus

ÖZET Subklavyen "çalma" sendromu, subklavyen arterin vertebral arteri vermeden önceki proksimal bölümünde ciddi darlık ya da tıkanıklık sonucunda aynı taraf vertebral arterden subklavyen artere ters yönde akıma ve akım paterninde değişikliklere neden olan durumdur. Subklavyen çalma sendromu baş, boyun ve omuzda kollaterallere bağlı çoğunlukla asemptomatiktir ancak vertebrobaziler arteryel sistem periferik ve merkezi işitsel ve vestibüler sistemleri beslediğinden subklavyen çalma sendromuna bağlı olarak bazen vertebrobaziller yetersizlik nedeniyle nörotolojik semptomlar görülebilir. Biz de polikliniğimize izole sağ kulakta çınlama ve işitme kaybı şikayeti ile gelen ve mevcut şikayetlerine yönelik yaptığımız ayırıcı tanı esnasında subklavyen çalma sendromu tespit ettiğimiz olguyu sunmayı uygun gördük. Bu nedenle baş dönmesi, işitme kaybı veya kulak çınlaması ile gelen hastalarda dikkatli nörotolojik muayene yapılmalı ve nadir de olsa subklavyen çalma sendromu kaynaklı vertebrobaziler yetmezlik bulgularının görülebileceği düşünülmelidir.

Anahtar Kelimeler: İşitme kaybı; subklavyen çalma sendromu; tinnitus

Subclavian "stealing" syndrome is a condition, which causes reverse flow and changes in the flow pattern from the vertebral artery to the subclavian artery on the same side as a result of severe stenosis or obstruction in the proximal section of the subclavian artery before delivery the vertebral artery (Figure 1).^{1,2}

Subclavian steal syndrome is mostly asymptomatic due to collaterals in the head, neck, and shoulders, but as a result of subclavian steal syndrome, neurotological symptoms can sometimes be

present due to vertebrobasilar insufficiency because of the vertebrobasilar feeding of the peripheral, central auditory and vestibular systems.^{3,4} Symptoms such as dizziness, hearing loss, tinnitus, nystagmus, syncope and headache can be seen in symptomatic patients.^{5,6}

In a study by Perler and Becker of 25,000 people, the frequency of subclavian steal syndrome was found to be 1.3%. It has been observed that subclavian steal syndrome increases with an increased risk of atherosclerosis and in those above 55 years of age,

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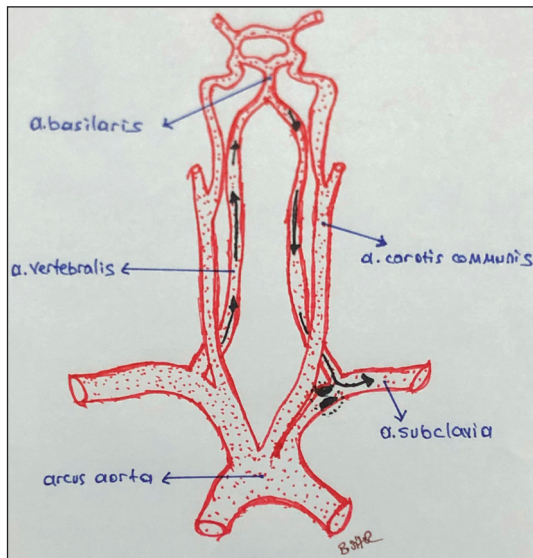


FIGURE 1: Subclavian steal syndrome schematized.

and that twice as many men as women suffer from the syndrome.⁷ It is recommended that doppler ultrasonography be used for diagnosis.² However magnetic resonance (MR) angiography and computed tomography (CT) angiography can also be used. However, they are mostly used in determining the degree of subclavian artery stenosis and planning interventions.^{8,9} Endovascular and open surgical techniques are used in treatment.¹⁰

We present a case identified in our outpatient clinic of subclavian steal syndrome, in which a patient presented with complaints of tinnitus and hearing loss in her right ear; following a differential diagnosis and not seeing any additional findings that would elucidate the etiology, we suggested that their current complaints might be related to subclavian steal syndrome.

CASE REPORT

A 34-year-old woman presented in our outpatient clinic with a complaint of isolated tinnitus and hearing loss in the right ear for a year. It was learned that she had no complaints of fullness, dizziness, nausea and vomiting. There were no symptoms such as speech difficulties, numbness in the face and extremities, or loss of strength. In the otoscopic examination of the patient, the bilateral outer ear canal and tympanic membranes were observed naturally. Spon-

taneous and provocative nystagmus were not observed. Since the patient had no complaints of dizziness, no tests such as videonystagmography etc. were performed.

Although the patient's complaints had been present for a year, congenital causes resulting in sensorineural hearing loss: syndromes such as michel aplasia, mondini deformity, Alport syndrome, Hunter syndrome, prenatal acquired rubella, toxoplasmosis, cytomegalovirus (CMV), radiation exposure, preterm delivery, kernicterus, and perinatal asphyxia were not in the history. It was also determined that there had been no medical drug use for reasons related to ototoxicity. There was no history of acoustic trauma or trauma leading to temporal bone fracture. perilymph fistula, labyrinthitis, etc. In contrast-enhanced temporal MR imaging, no mass formations were seen. It was found that the patient did not have infectious diseases, such as meningitis, mumps, syphilis etc., and it was also determined that she did not have any diseases such as diabetes mellitus (DM), hypothyroidism, kidney failure, hypertension and anemia. The hemogram, biochemistry, lipid profile, TSH, T3, T4, ferritin, B12, and blood values were in the normal range and peripheral pulse flow was found to be normal and normotensive. It was found that the patient did not have symptoms such as weight loss, pain in the arms or legs as a result of exertion, blurred vision, arthralgia, or skin rash.

In audiological examination, there was moderate sensorineural hearing loss in the right ear, which deepened from 2000 Hz (Figure 2). Stapes reflex was taken bilaterally. Tympanometry was type A for both ears.

Since the young patient had unilateral tinnitus and sensorineural hearing loss, we requested doppler ultrasonography to rule out possible conditions such as vascular and vertebrobasilar insufficiency. Since doppler ultrasonography showed reverse flow in the right vertebral artery, it was evaluated by the radiology unit as subclavian steal syndrome (Figure 3, Figure 4). This finding was supported by CT angiography. The patient had subclavian stealing on the right side with sensorineural hearing loss, and tinnitus.

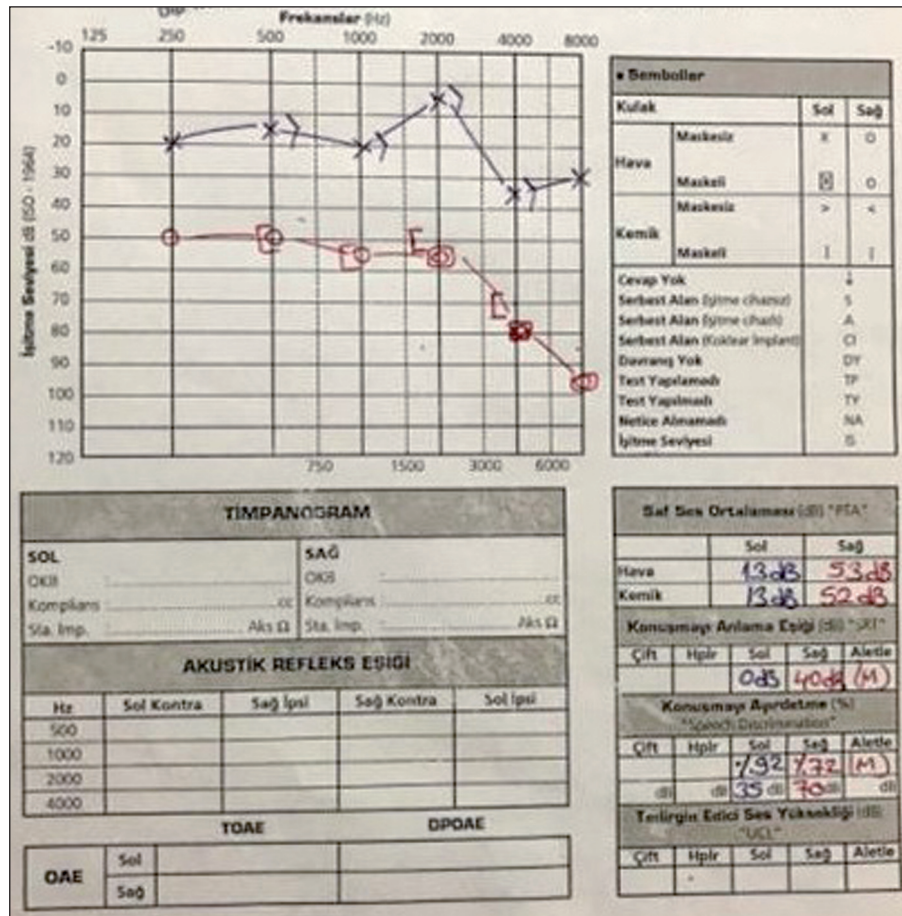


FIGURE 2: Audiometry of the patient.

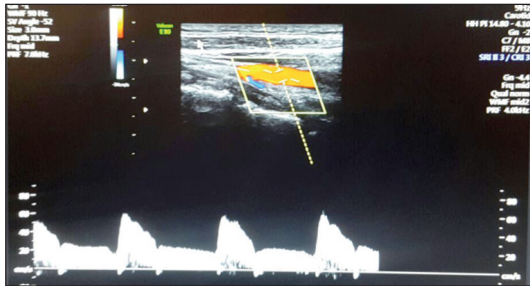


FIGURE 3: Doppler ultrasonography image of the right carotid artery.

Based on this situation, the patient was consulted for neurology and cardiovascular surgery. In the evaluation made by the relevant branches, it was reported that the neurological examination was normal, and that after evaluations with respect to cardiovascular surgery, no further examination and treatment were required. It was thought that the sensorineural hearing loss and tinnitus, whose etiology is multifactorial and not yet fully elucidated, might be due to subclavian steal syndrome.

Betahistine 2x24 mg was started for tinnitus treatment. After three months, it was determined that the patient's hearing loss was still at the same level and that the tinnitus persisted; on the other hand, the patient did not have any dizziness, cardiac or neurological problems.

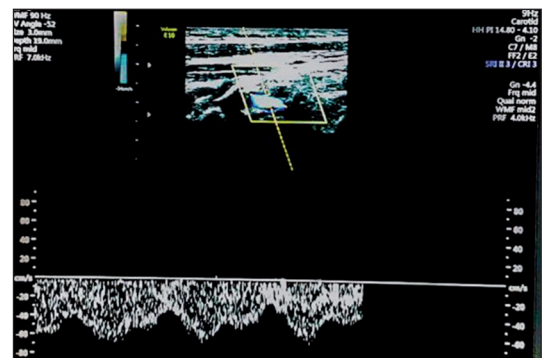


FIGURE 4: Reverse flow image in the right vertebral artery on doppler ultrasonography.

DISCUSSION

Subclavian steal syndrome is mostly seen in men over the age of 55, and while the left side is predominant; our case was that of a 34-year-old female patient with subclavian steal syndrome on the right side.^{7,11}

Subclavian steal syndrome is generally asymptomatic and diagnosed incidentally via examination². In subclavian steal syndrome, narrowing of the subclavian artery proximal to the vertebral artery results in a pressure difference between the subclavian artery and the basilar artery. Therefore, there is a reverse flow of blood from the vertebral artery on the occluded side. This, in turn, can cause signs of failure due to hypoperfusion in the vertebrobasilar system. Symptoms such as dizziness, nystagmus, hearing loss, syncope, ataxia, and double vision can be observed in subclavian steal syndrome.¹² In a series of 168 cases with subclavian steal syndrome, vertigo was observed in 52% of cases and tinnitus in 4%.³ Psillas et al. in a series of three cases, reported that hearing loss due to vertebrobasilar insufficiency was detected in 2 patients, vertigo in 1 patient, spontaneous nystagmus in 1 patient and tinnitus in 2 patients.¹³ In our case, there was only sensorineural hearing loss and tinnitus, and no other neurootological symptoms. In our patient, anamnesis, laboratory tests and imaging methods were used in order to investigate sensorineural hearing loss and tinnitus etiology to the greatest extent possible.

Diagnosis in subclavian steal syndrome is based on showing reverse flow and occlusion in the vertebral artery in doppler ultrasonography, but magnetic resonance imaging, magnetic resonance angiography, and computed tomography can also be used.¹⁴ In our case, in the doppler ultrasonography performed to illuminate the etiology, reverse flow was observed in the right vertebral artery (Figure 3). Current findings

were supported by computed tomography angiography. Accompanied by these findings, and after the exclusion of the etiology, our case was evaluated as subclavian steal syndrome.

Open surgical techniques and endovascular interventions are applied in symptomatic cases.¹⁰ In our case, there was no pathology other than tinnitus and hearing loss. No pathologies such as ischemia and mass were observed in the brain imaging. After the evaluations made for the relevant branches, it was determined that there was no need for further examination and treatment. Betahistine 2x24 mg was started for tinnitus in terms of ear and nose diseases, and follow-up and treatment was continued.

With this case report, we sought to emphasize that in patients with hearing loss or tinnitus, subclavian steal syndrome, although rare, may be the cause.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Bilal Sizer, Müzeyyen Yıldırım Baylan; **Design:** Ümit Yılmaz, Bilal Sizer; **Control/Supervision:** Müzeyyen Yıldırım Baylan; **Data Collection and/or Processing:** Sadullah Şimşek, Ümit Yılmaz; **Analysis and/or Interpretation:** Bilal Sizer, Müzeyyen Yıldırım Baylan; **Literature Review:** Ümit Yılmaz; **Writing the Article:** Bilal Sizer; **Critical Review:** Müzeyyen Yıldırım Baylan.

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