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Bu dergide yayınlanan yazılar, resim, şekil ve tablolar yayıncının izni olmadan kısmen veya tamamen çoğaltılamaz. Bilimsel amaçlarla kaynak gösterilmek şartıyla özetleme ve alıntı yapılabilir.

Bu derginin yayımını destekleyen kuruluş derginin bilimsel içeriğine karışmamaktadır. İleri sürülen ve savunulan görüşler destekleyen kuruluşun görüşlerini yansıtmak zorunda değildir.

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RETROSPECTIVE STUDY

Otosclerosis Disease and Importance of Long Term Follow-up After Stapedectomy

Suna Tokgöz YILMAZ, Msc.[1], Erol BELGİN, Ph.D.[2]

SUMMARY

Stapedectomy is an operation chosen for correcting the hearing loss of the ear has otosclerosis desease. The operation has potential complications which can happen suddenly or take long years and after the operation so hearing of the patients needs to have a long-term follow-up. Our study has been designed for this objective and the effect of time on hearing threshold has been searched in the individuals with the otosclerosis disease and in those who have the stapedectomy operation.

It has been searched hearing threshold shifts by time following stapedectomy in our study. At 75 ears with stapedectomy which included in long term follow-up period, air conduction and bone conduction thresholds, speech reception threshold (SRT) and speech discrimination score (SD) have been observed consequently 1 week, 1 month, 3 months, 1 year, 2-3 years and 4-17 years after the operation.

In the conclusion of our study, a decrease in hearing thresholds has been observed at all frequencies, particularly at high frequencies. By using the obtained findings, it has been concluded that the long term follow-up after stapedectomy operation is an important criterion to observe the otosclerosis disease.

Anahtar Kelimeler
Otoskleroz
Stapedektomi
Uzun süreli takip

Key Words
Otosclerosis
Stapedectomy
Long-term follow-up

Otoskleroz Hastalığı ve Stapedektomi Sonrası Uzun Dönemli Takibin Önemi

Stapedektomi, otesklerоz hastalığı olan kulağın işitme kaybının düzeltilmesi için seçilen bir operasyondur. Ameliyatın olası komplikasyonları aniden ya da uzun yıllar sonra oluşabilir. Bu sebeple ameliyattan sonra hastaların işitmesinin uzun dönemli takip edilmesi gerekmektedir. Çalışmamız bu amaç doğrultusunda planlanarak, zamanın işitmeye olan etkisi otoskleroz hastalığı olan ve stapedektomi ameliyatı yapılmış bireylerde araştırılmıştır.

Çalışmamızda, stapedektomi ameliyatı sonrası ilerleyen zamanla birlikte işitme eşiklerinin değişimi araştırılmıştır. Uzun dönem izleme periyoduna dahil edilen 75 stapedektomili kulakta, ameliyattan sonra 1 hafta, 1 ay, 3 ay, 1 sene, 2-3 sene ve 4-17 sene dönemlerinde hava yolu, kemik yolu işitme eşikleri, konuşmayı anlama eşiği (SRT) ve konuşmayı ayırt etme skoru (SD) gözlenmiştir.

Çalışmamızın sonucunda, geçen zamanla birlikle özellikle yüksek frekanslarda olmak üzere bütün frekanslarda işitme eşiklerinde düşüş olduğu görülmüştür. Elde edilen bulgulardan, stapedektomi ameliyatından sonra uzun zaman boyunca hastaların takibinin, hastalığın seyri doğrultusunda önemli bir kriter olduğu sonucuna varılmıştır.

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INTRODUCTION

Someone communicates with other people with little interaction if he lacks the ability to speak and hear. So the hearing problem must be evaluated and diagnosed accurately.

Otosclerosis is a primary disease of the ossicles and otic capsule, in which endochondral bone is replaced with periosteal bone. The formation called otospongiosis has made the bone more porous and less dense. This lesion can come out at any place of vestibuleosteapedial joint capsule and the location of the lesion determines whether the hearing loss is conductive, sensorineural, mixed or never exists.[1,2]

In the etiology of otosclerosis a strong family tendency has been focused on and a lot of studies accept that family incidence is over %50. In its etiology, many theories have been suggested such as metabolic, infection, trauma, anatomical and histological anomalies of temporal bone. In clinical practice, otosclerosis is more frequent in women and the average risk period is accepted as between the ages of 15-35.[1,2]

Otosclerosis is sometimes difficult to distinguish from other diseases that affect ossicular chain or tympanic membran mobility. It is diagnosed with physical examination, audiometric and impedancemetric findings and with CT scan especially in the otosclerosis of cochlear capsule. The final diagnosis is often delayed until surgical exploration.[4,12]

In the diseases of otosclerosis, histological features of the stapedial footplate fragments have been studied and the stage of the otosclerotic lesion was classified as spongiotic, fibrotic or sclerotic. It has been found out that the problem of tinnitus, the vestibuler disorders and a better closure in the air-bone gap are common with the patients having sclerotic type of lesion.[6]

In Nadol's and et al.[11] histological study on individuals with residual and recurrent conductive hearing loss after stapedectomy, the most common histopathologic correlates have been included resoptive osteitis of the incus (%64), obliteration of the round window by otosclerosis (%23), the prosthesis lying on a residual footplate fragment (%23), the prosthesis abutting the bony margin of the oval window (%18), adhesions in the middle ear (%14) and a new bone formation in the oval window (%14).

Audiometrically, the most common appearance in conductive hearing loss is appeared in the low frequencies rather than high frequencies. The sensorineural hearing loss in most of the patients doesn't fit the age of the patient. Due to the stapes fixation, if there is Carhart's Notch the disease of otosclerosis has almaost been diagnosed. If there is no ossicular discountinty the maximum hearing loss is 50 dB HL. If there is no serious sensorineural hearing loss or endolymphatic hydrops, the speech discrimination score is much better than expected.[3,12] Audiometric appearance of otosclerosis disease is shown in **(Figure. 1)**.

Impedancemetrically, at the onset of the disease eardrum activity or acoustic reflexes are normal, as the hardness of ossicular chain increases, there happens an on-off effect and afterwards a normal tympanogram finding (sometimes with low static impedance) and an absence of acoustic stapedial reflexes are observed together.[3,12]

Individuals with the sensorineural hearing loss or vestibuler symptoms or individuals rejecting surgical operations aren't adviced operations but hearing aids and/or medical treatment is suggested.[12]

Stapedectomy is an operation chosen for correcting the hearing loss of the ear has otosclerosis desease, most patients benefit from this operation. The operation has potential complications which result in total hearing loss or considerable sensorineural hearing loss which can happen suddenly or take long years. So after the operation hearing of the patients needs to have a long-term follow-up. Our study has been designed for this objective and the effect of time on hearing threshold has been searched in the individuals with the otosclerosis disease and in those who have the stapedectomy operation.

MATERIALS AND METHODS

Between the years of 1967-1990, 100 patients who had already been diagnosed with otosclerosis and

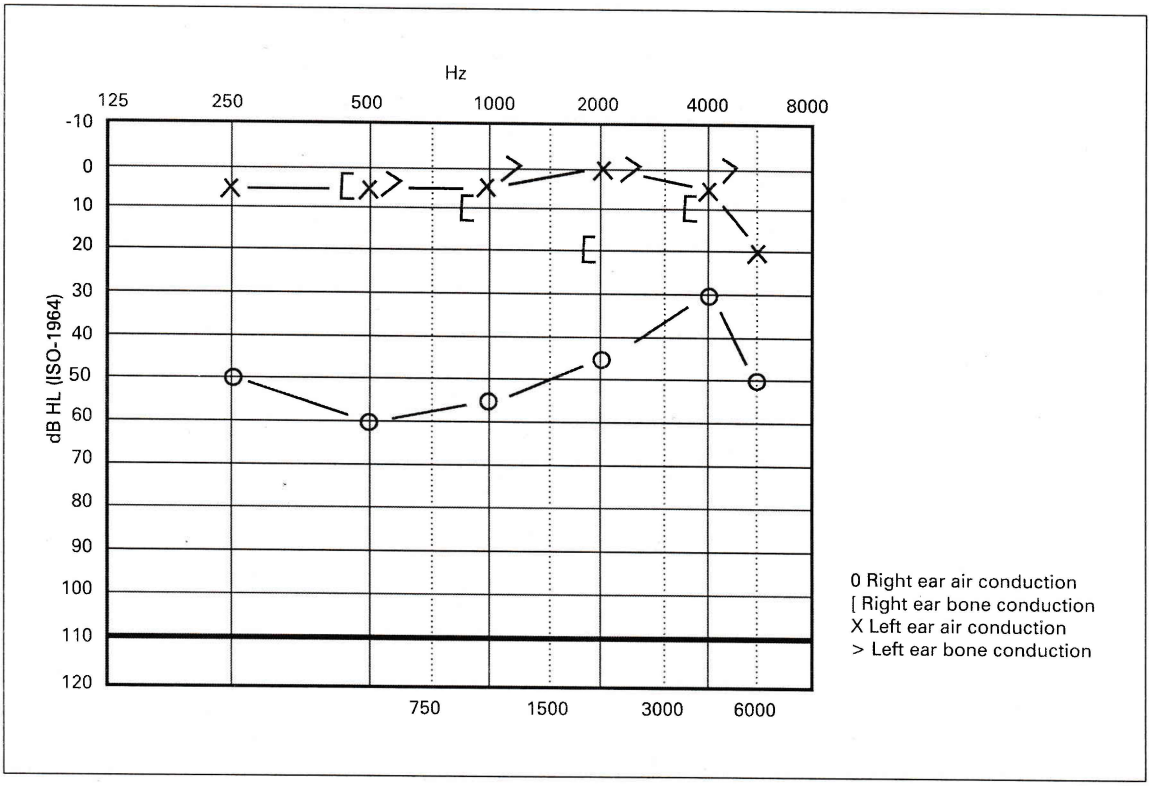


FIGURE 1. Audiometric appearance of otosclerosis disease, hearing level is normal in the left ear.

undergone the operation of stapedectomy, were invited to this study by mail. 68 patients (26 male, 42 female) and 83 ears (15 with bilateral stapedectomy) included the study. Patients' ages between 19-72 and the average is 42.75, all the patients have been operated on under the local anesthesia with a modification of Shea method. After the systemic and the otorhinolaryngological examinations, 68 individuals' anamnesis have been noted down and audiometrical and impedancemetrical tests have been made. The following criteria have been the fundemental principles to follow the postoperative period for the ears which have undergone the operation of stapedectomy.

1- No pathology has been determined in systemic examination.

2- No pathology has been determined in otorhinolaryngological examination.

3- After the patients' operations, no treatment of histamine or sodium fluoride.

Audiometrical measurements of 75 ears which have been included for the long term follow-up period have been made in the postoperative period for 1 week, 1 month, 3 months, 2-3 years, 4-17 years. Since the patients have not been ready for controls within these periods air cunduction hearing thresholds and pure tone averages have been evaluated. Statistical data for the 75 ears have been evaluated with Paired T Test and the 8 ears having revision stapedectomy have been evaluated with 2 Specimen tests matched with Wilcoxon.

The whole audiometrical evaluations have been carried out by the clinical audiometers of Interacoustics DA-111 and Viennatone M-142 in Industrial Acoustic Company (IAC) Inc. sound proof rooms. Air-conduction hearing thresholds have been measured by TDH-39 standard earphone and MX41/AR cushion between 250-6000 Hz whereas bone-conduction hearing thresholds have been measured by M.127 Radioear vibrator between 5.5-4 kHz. One-syllabic phonetically ba-

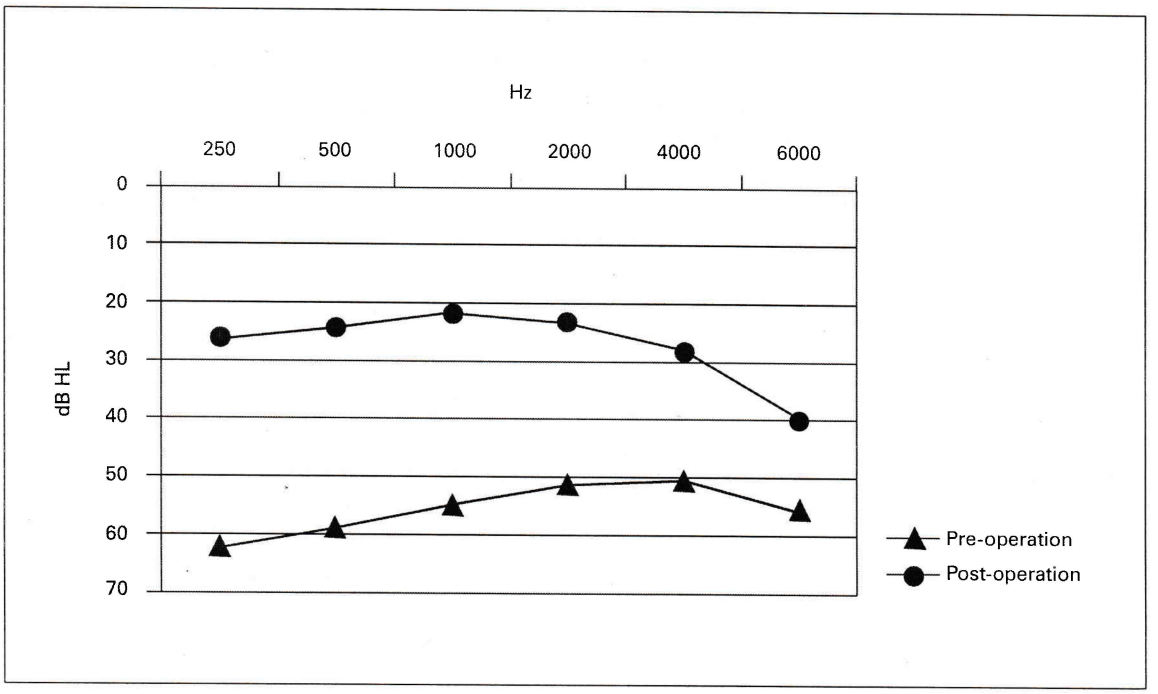


FIGURE 2. The average of hearing thresholds of the patients pre-operation and post-operation 1 year.

lanced words prepared in the Department of Audiology and Speech Patologies have been used for the speech discrimination tests whereas the lists of two-syllabic words have been used for speech reception tests.

Impedancemetric measurements have been done by Interacoustic AZ-3 electroacoustic impedancemeter. Middle ear pressure and acoustic reflexes (ipsilateral and contralateral) have been measured.

RESULTS

Our results have been caried out as planned in material and method, the findings obtained have been discussed over and the following results heve been put forward.

1- The average of hearing thresholds of the patients a week just after the operation in the low and middle frequencies a considerable recovery but in the high frequencies a fall has been observed. Before and after the operation between the averages of the air conduction thresholds the earnings has been 27.9 dB for 250 Hz, 30.8 dB for 500 Hz, 25.5 dB for 1000 Hz, 14.3 dB for 2000 Hz, a statistically unimportant gain 2.9 dB for 4000 Hz and a statistically unimportant fall 3.8 dB for 6000 Hz.

2- An important recovery has been observed in all frequencies 1 month, 3 months and 1 year after the operation. The best recovery has realized in 1 year. After the operation of stapedectomy in 2-3 year and 4-17 year periods, a fall has been observed for the hearing thresholds compared with 1 year period but this fall means nothing statistically. In the speech reception threshold (SRT) and in the speech discrimination score (SD) an important recovery has been happened after the operation.

3- In the group with the stapedectomy revision for the values before and after the operation an unimportant recovery for 250, 500, 1000 and 2000 Hz has been observed and an average which is almost the same with the preoperation period has been obtained for 4000 Hz and an important fall has happened for 6000 Hz in comparison with the preoperation period.

DISCUSSION

The aim of the stapedectomy is to restore the patients' hearing for social adequacy or to bring him to the level of using hearing aids rather well. Recovery depends on many factors such as surgical technique, period of disease, age, the localization of otospongiotic focus.[5,6,10,14]

In our study recovery in low and middle frequencies is much better than that of high frequencies. Esquivel and et al.[5] have compared the techniques of small and big windows in their ten-year studies on 34 individuals and they have obtained a deterioration for 4000 Hz in both groups (the less deterioration in small window operations).

The study published in 1974 by Hoşal and et al.[9] has supported our results. One-year results of the patients with the stapedectomy operation have been observed and air-bone gap has been closed down to a large extent for 500, 1000, 2000 Hz but this closing down hasn't been the same for 4000 Hz. Meyer[10], states that being an old age person during the operation has been an important criterion to obtain worse results in high frequencies.

In our study the best air conduction thresholds have been obtained one year after the operation. The average of hearing thresholds of the patients 1 year after the operation are shown in **(Figure 2)**. As the time goes on, a statistically unimportant deterioration has happened in hearing after the operation. Spandow and at al.[14] have compared the different operation techniques in their studies on 55 individuals and revealed that the best hearing thresholds have been obtained one year after the operation. The best earnings made one year after the operation seems to support our study.

Hause and et al.[8] in their study on 209 patients' ears have compared the different operation techniques and concluded that the long-term results are satisfactory. This study doesn't conform to the fall in the long-term results in our study.

Aarnisalo and et al.[1] in their 20 year study have compared the different surgical methods and discovered that the air bone gap has a tendency of widening as a function of the time and the deterioration in the averages of pure tone is 0.9 in a year and concluded that the techniques compared in the long-term contributes to the recovery of hearing and those techniques are effective and reliable to improve the life quality.

Shea[13], published the conclusions of 14.449 stapedectomy operations within a period of 40 year in 1998. In the group with primary stapedectomy the success rate has been %95.1 in a year, %94.7 in 2-5 years and %62.5 in 30-40 years; in the group with stapedectomy revision %71.1 in a year, %62.4 in 2-3 years, %59.4 in 6-36 years. As the time passes, the fall in the success rate is due to the delayed conductive hearing loss and afterwards developing sensorineural hearing loss.

If there is a gradual increase of sensorineural loss of hearing levels as the patient's age rises, this is possibly due to the presbyacusis. If there is an unconformity of sensorineural hearing loss with the patient's age, it has been revealed that this is because otospongiosis has developed again in cochlear capsule and this deterioration in hearing could be vascular and enzymatic originally or otoimmune.[2,7,14]

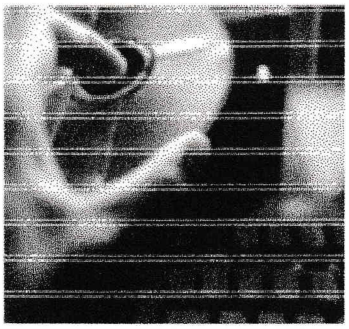
CONCLUSION

In the conclusion of our study, a decrease in hearing thresholds has been observed at all frequencies, particularly at high frequencies. By using the obtained findings, it has been concluded that the long term follow-up after stapedectomy operation is an important criterion to observe the otosclerosis disease.

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