***Case Report* / Olgu Sunumu**

The Translabyrinthine Approach of Tos and Thomsen for the Treatment of Acoustic Neuroma and Traumatic Facial Nerve Paralysis: Case Reports

Akustik Nörinom ve Travmatik Fasyal Sinir Paralizisinde Tos ve Thomsen'in Translabirenter Yaklaşımı: Olgu Sunumları

Cem UZUN

Department of Otorhinolaryngology, Medical Faculty of Trakya University, Edirne

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The translabyrinthine approach recommended by Tos and Thomsen has several different aspects compared to the standard method of the translabyrinthine approach recommended by House. Especially, the dissection of facial nerve in the meatus and porus is safer in the Tos and Thomsen's technique. In this report, results of the translabyrinthine approach of Tos and Thomsen in a 50-year-old patient with a 30 mm acoustic tumor (SRT: 70dB) and a 19-year-old patient with traumatic total facial nerve paralysis and hearing loss are presented. The examination over two years of follow-up revealed that both of the patients had no complications without any restrictions in their life. Both of the patients have normal facial nerve function and there is no recurrence in the MRI scan of the acoustic neuroma patient.

Key words: Ear; facial nevre; tumor; paralyses; surgery.

Tos ve Thomsen'in translabirenter yaklaşımı House'ın standart translabirenter yaklaşımından bazı farklılıklar içerir. Özellikle meatus ve porusta fasyal sinirin diseksiyonu Tos ve Thomsen'in tekniğinde daha güvenlidir. Bu raporda Tos ve Thomsen'in translabirenter yaklaşımının uygulandığı 30 mm'lik akustik tümörü olan ve konuşmayı algılama eşği 70 dB olan 50 yaşındaki bir hasta ile travmatik total fasyal paralizili ve total işitme kaybı olan 19 yaşındaki bir hastanın cerrahi tedavi sonuçları sunulmuştur. İki yıldan uzun takip sonucunda her iki hastada da herhangi bir komplikasyon olmadığı ve yaşamlarında herhangi bir kısıtlama gerekmediği görüldü. Her iki hastada da normal fasyal sinir fonksiyonu vardı ve akustik nörinomlu hastada da en son MRG'de rekürrens saptanmadı.

Anahtar sözcükler: Kulak; fasyal sinir; tümör; paralizi; cerrahi.

Management of acoustic neuroma includes

- follow-up (no symptoms, advanced age, small intrameatal tumor, extension < 1 cm),
- microsurgery (translabyrinthine, middle fossa and retrosigmoid suboccipital approaches),
- radiosurgery (gamma knife, fractionated stereotactic radiosurgery, cyberknife) and
- combined therapy (i.e. large tumor: translabyrinthine + fractioned stereotactic radiosurgery).

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Correspondence (İletişim adresi): Dr. Cem Uzun. Trakya Üniversitesi Tıp Fakültesi Kulak Burun Boğaz Hastalıkları Anabilim Dalı, 22030 Edirne. Tel: 0284 - 235 76 41 Fax (Faks): 0284 - 235 27 30 e-mail (e-posta): cemuzun@yahoo.com

In future, another choice for the treatment of acoustic neuroma may be a kind of medical treatment.

Acoustic neuroma tumor size is considered

- small (when it is smaller than 1 cm),
- medium sized (between 1 and 2 cm),
- large (between 2 and 3 cm) and
- giant (over 3 cm) tumor.

Among the microsurgical approaches, translabyrinthine approach is usually used for medium or large tumors as well as giant tumors when the hearing is not good. Middle fossa approach is used for small- or medium-sized intrameatal tumors when the hearing is good. Retrosigmoid suboccipital approach is used for large tumors when the hearing is good. Radiosurgery or radiotherapy are usually used for small- and medium-sized tumors. They are not used for large tumors (i.e. size > 3 cm) because of increased risk of hydrocephalus as a result of post-treatment swelling.[1-3]

The translabyrinthine approach for acoustic neuroma removal is usually performed in mid-size tumors as well as in large and giant tumors when speech reception threshold (SRT) is 50 dB or over. The translabyrinthine approach is one of the safest approaches regarding the complication of facial nerve paralysis. Translabyrinthine approach is also one of the treatment choices for decompression of the facial nerve in traumatic facial nerve paralysis when the hearing is bad or totally lost.[1,2,4,5]

The translabyrinthine approach could be divided into two mean techniques and three subgroups:

- Classic technique (Panse 1904) and
- Extended technique:
- House and Luetje (1979)
- Tos and Thomsen (1991)
- Sanna et al. (1994)

In this report, with the technical details of translabyrinthine approach of Tos and Thomsen, the results of translabyrinthine approach of Tos and Thomsen in an acoustic neuroma patient and in a patient with traumatic facial nerve paralysis and total hearing loss are presented.

CASE REPORT

Case 1. A 50-year-old male patient presented to our clinic with symptoms of tinnitus and hearing loss in his left ear, which had been lasting for one year. Hearing in his right ear was normal. SRT in his left ear was 50 dB. The contralateral stapedius reflex was not present, however, the threshold of the ipsilateral reflex in the left ear was 110 dB. Although ABR did not support the retrocochlear pathology, the MRI revealed a 15 mm acoustic tumor in his left ear. Surgical treatment was advised but the patient came again after six months. His hearing worsened and the SRT in his left ear became 70 dB. MRI was not taken again. However, the tumor size at the operation was almost 30 mm. The translabyrinthine approach of Tos and Thomsen was performed (Figs. 1, 2). The tumor was totally removed without any residue. The facial nerve was dissected and saved. However, the patient awakened from the anesthesia with House-Brackmann grade 3/4 paralyses, which increased to grade 5/6 in the next day. However, the function became normal again (House-Brackmann 1/2) after six months. The patient has no complication now and could have been doing his job (builder) well.

Case 2. A 19-year-old male patient attended to the emergency department due to a traffic accident. After the neurosurgical intervention, the patient interned to our clinic due to hearing loss and facial nerve paralysis. He had total hearing loss in his right ear and also grade 6 peripheral facial paralysis on the same side. The CT scan revealed a small fracture line on the right meatus acousticus internus. Complete facial nerve decompression was performed via translabyrinthine approach (Fig. 1) and fractured bone fragments on the meatal segment were removed. The patient expressed the feeling of movement on his face in the first week of treatment and was completely recovered without any complication six months after the surgery.

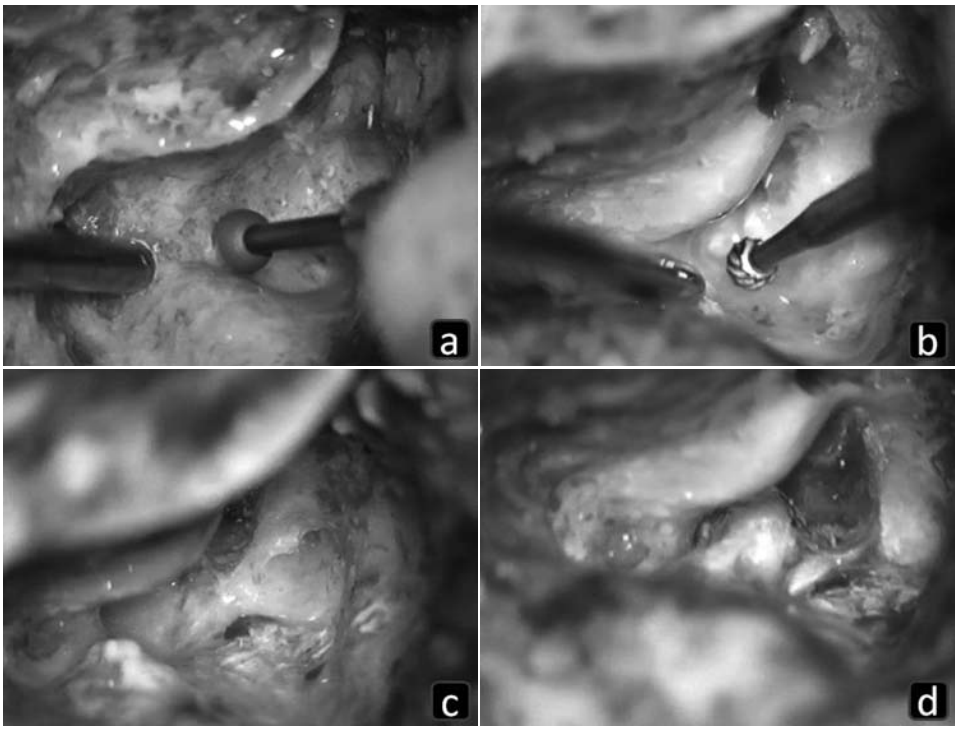

Fig. 1. *Bone work of translabyrinthine approach of Tos and Thomsen:* ***(a)*** *extended mastoidectomy,* ***(b)*** *labyrinthectomy,* ***(c)*** *exposure of the ear canalis and* ***(d)*** *porus bone removed.*

The examination over two years of follow-up revealed that both of the patients neither had complications nor restrictions in their life. Both of the patients had normal facial nerve function, and there was no recurrence in the MRI scan of the acoustic neuroma patient.

DISCUSSION

Minimally required hand instruments in addition to the standard ear surgery set are strait and curved microcoagulation forceps, cottonoids and neurosuction tubes. Facial nerve monitoring system may also be useful during surgery. However, none of the above patients underwent surgery with monitoring the facial nerve function.

Surgical technique of the translabyrinthine approach of Tos and Thomsen includes two main works: bone removal (Fig. 1) and tumor removal (Fig. 2) for the acoustic neuroma removal. Bone work alone is usually enough for the decompression of the facial nerve in traumatic facial nerve paralysis.

After a large (4 cm posteriorly) postauricular incision, a large (3x4 cm) temporalis muscle fascia is taken. The skin-subcutis periostal flap is fixated and intact canal wall extended mastoidectomy, which comprises skeletonizing the middle cranial fossa and sigmoid sinus (between jugular bulb and petrosal sinus), as well as the posterior cranial fossa, is performed (Fig. 1a). Then, labyrinthectomy with the opening of lateral, posterior and superior semicircular canals and vestibulum is performed (Fig. 1b). At the final step of the bone work, exposure of the ear canal (Fig. 1c) is provided by either the classic or modified order: transverse crest – fundus – meatus – porus or opposite.[1] Then the porus bone is removed (Fig. 1d).

The translabyrinthine approach recommended by Tos and Thomsen has several different aspects compared to the standard method of translabyrinthine approach recommended by House. Especially, the dissection of facial nerve in the meatus and porus is safer in the translabyrinthine approach of Tos and Thomsen than in the translabyrinthine approach of House. In the House technique, the tumor with the acoustic nerve, vessels and the arachnoid sheath are pulled posteriorly leaving only the facial nerve in place. However, in the Tos and Thomsen technique, only the tumor capsule is pulled pos-

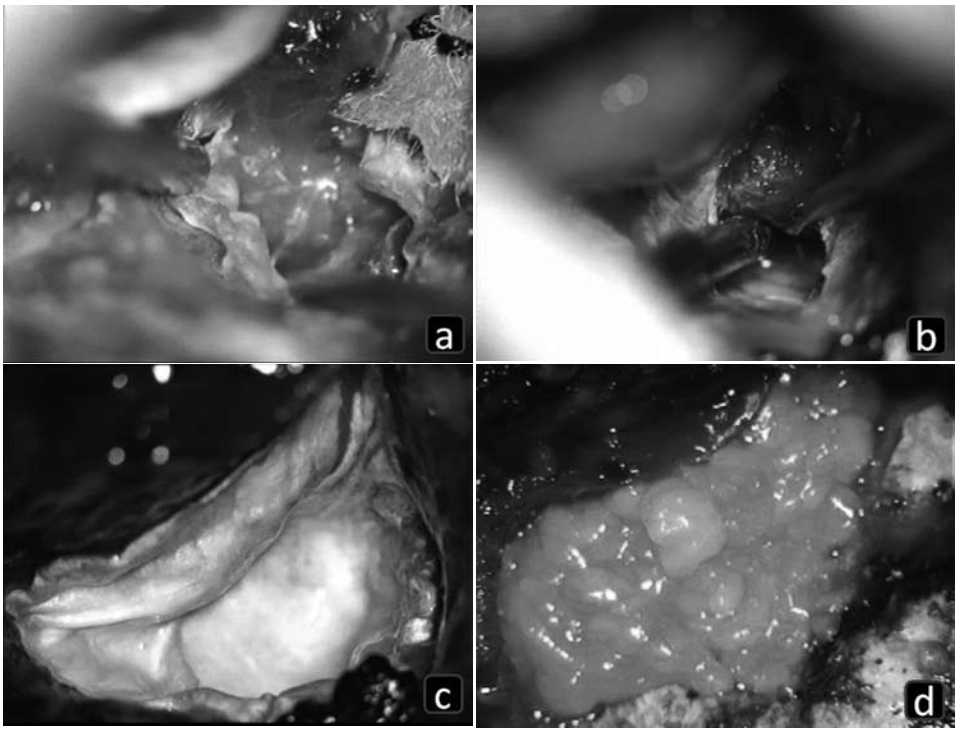

Fig. 2. *Tumor removal of translabyrinthine approach of Tos and Thomsen:* ***(a)*** *opening of the dura,* ***(b)*** *dissection and removal of the tumor,* ***(c)*** *fascia cover and* ***(d)*** *obliteration with fat.*

teriorly leaving all structures intact as an anterior curtain and subarcuate artery and vein as superior curtain. In addition, only the vestibular nerve is cut and the vessels entering the tumor are coagulated.[1] Other structures are dissected in the Tos and Thomsen technique (Fig. 2).

Bleeding (from emissary veins, sigmoid sinus, superior petrosal sinus, jugular bulb, arachnoid sheath and dural veins, anterior inferior cerebellar artery, basilar artery or other arteries), cerebellar lesions, cerebellar edema, brain stem lesions, facial paralysis (more than 50% of the cases, for the large tumors (2-3 cm) more than 75% and 50% sequel), dizziness, problems with the other cranial nerves, hematoma (hypertension and consciousness), ventricular hemorrhage, meningitis and cerebrospinal fluid leakage are the possible complications of the translabyrinthine approach.[1,2,4]

In conclusion, the translabyrinthine approach of Tos and Thomsen may be valuable in decreasing the morbidity due to facial nerve paralysis in the treatment of acoustic neuroma as well as in the treatment of traumatic facial nerve paralysis.

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REFERENCES

1. Tos M, Thomsen J. Translabyrinthine acoustic neuroma surgery. Stuttgart: Thieme Publishing Group; 1991.
2. Bennett M, Haynes DS. Surgical approaches and complications in the removal of vestibular schwannomas. Otolaryngol Clin North Am 2007;40:589-609.
3. Acoustic neuroma patient archive. Available from: http://www.anarchive.org
4. Brackmann DE, Cullen RD, Fisher LM. Facial nerve function after translabyrinthine vestibular schwannoma surgery. Otolaryngol Head Neck Surg 2007;136:773-7.
5. Coker NJ, Kendall KA, Jenkins HA, Alford BR. Traumatic intratemporal facial nerve injury: management rationale for preservation of function. Otolaryngol Head Neck Surg 1987;97:262-9.