

Facial Nerve Schwannoma Located in Middle Cranial Fossa

Kyoung-Tae Kim, M.D., Jeong-Taik Kwon, M.D., Hyun-Jong Hong, M.D., Young-Baeg Kim, M.D.

Department of Neurosurgery, College of Medicine, Chung-Ang University, Seoul, Korea

Facial nerve schwannomas are uncommon tumors. A 40-year-old female presented with left-side facial weakness. Computed tomography(CT) imaging showed a 3 x 2cm lesion on the posterior portion of the left middle cranial fossa. The mass abutted the anterior aspect of the left petrous bone with a wide erosive change involving the area of the left facial nerve ganglion (geniculate ganglion). A well-circumscribed extra-axial mass was seen on magnetic resonance imaging(MRI). The tumor was completely removed through subtemporal approach and the patient was discharged without additional neurological deficit. This rare case is discussed and a review of the relevant literature is presented.

KEY WORDS : Facial nerve schwannoma · Middle cranial fossa · Subtemporal approach.

Introduction

Facial nerve schwannomas are relatively rare. They are benign encapsulated neoplasms of the nerve sheath, and may originate from any segment of the facial nerve, from the cerebropontine angle to the parotid gland^{6,8,10}. Facial nerve schwannomas have various symptoms, including facial palsy, sensorineural hearing loss, vestibular dysfunction, tinnitus, and vertigo^{3,14}. Herein, we report a case of an extensive facial nerve schwannoma at the middle cranial fossa.

Case Report

A 40-year-old female presented with left-side facial weakness, which had begun five years earlier and had slowly worsened. She was treated with traditional oriental medication over those five years, but her symptoms did not improve. On neurological examination, she had total infranuclear facial palsy (House-Brackmann grade V) and lacrimal dysfunction. However, her audiometric function was normal. Computed tomography(CT) showed a 3×2cm mass at the posterior portion of the left middle cranial fossa (Fig. 1A). The mass abutted the anterior aspect of the left petrous bone with a wide erosive change involving the area of the left facial nerve ganglion (geniculate ganglion) (Fig. 1B). On magnetic resonance imaging(MRI), a well-circumscribed extra-axial mass lesion was

seen at the posterior base of the left middle cranial fossa (Fig. 2). The mass showed hypointensity on T1WI imaging (Fig. 2A), heterogeneous hyperintensity on T2WI imaging (Fig. 2B), and strong heterogeneous enhancement on contrast-enhanced T1WI imaging (Fig. 2C). Preoperative facial nerve electromyography (EMG) revealed left-side facial nerve neuropathy (denervation rate, 100%).

The patient was taken to the operating room for removal of the middle cranial fossa mass. A left-side subtemporal cranio-

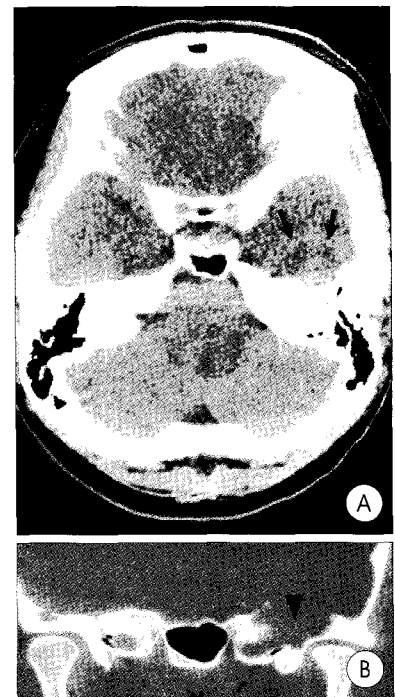


Fig. 1. A : Computed tomography showing a 3 x 2cm sized mass lesion (arrow) at the posterior portion of left middle cranial fossa. B : The mass is abutting to the anterior aspect of left petrous bone with a wide erosive change (arrowhead) involving the area of left facial nerve ganglion (geniculate ganglion).

• Received : March 8, 2006 • Accepted : May 23, 2006

• Address for reprints : Jeong-Taik Kwon, M.D., Department of Neurosurgery, College of Medicine, Chung-Ang University, 224-1, Heukseok-dong, Dongjak-gu, Seoul 156-755, Korea Tel : +82-2-6299-1598, Fax : +82-2-821-8409, E-mail : jtkwon@cau.ac.kr

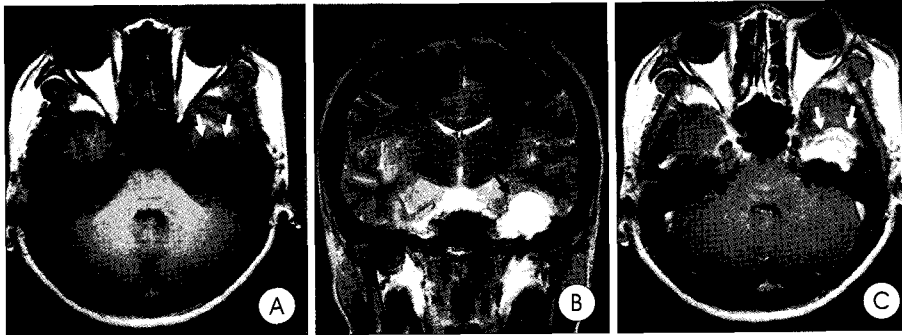


Fig. 2. On magnetic resonance imaging, a well circumscribed extra-axial mass lesion is seen at the posterior base of left middle cranial fossa. The mass (arrow) showing hypointensity on T1WI (A), heterogeneous hyperintensity on T2WI (B), and strong heterogeneous enhancement on contrast-enhanced T1WI (C).

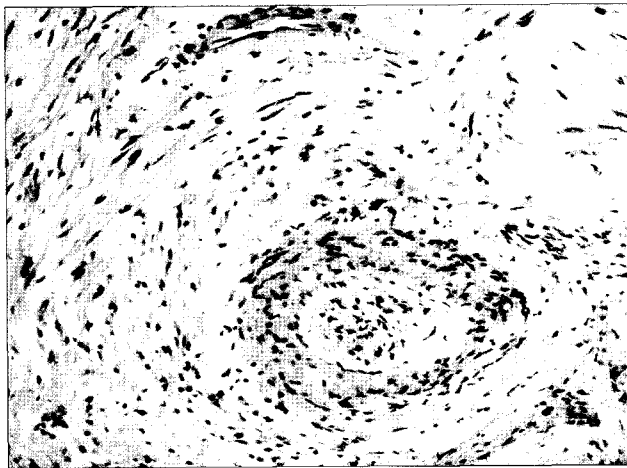


Fig. 3. Photomicrograph showing a benign neoplasm composed of bundles of spindle cells with varying cellularity and nuclear palisading (H&E, X100).

tomy and extradural approach were performed via a navigation system. During the procedure, the tumor was found to be originated from the geniculate ganglion of the facial nerve. During the resection, the integrity of the facial nerve could not be protected, and it was not reconstructed. Surgical margins were checked by frozen biopsy and the navigation system. The tumor was completely removed and the bony defect in the petrous bone was repaired with temporalis muscle. Postoperatively, the patient's facial function was not changed and auditory function was preserved. Pathologically, the tumor showed a mixture of two growth patterns, Antoni types A and B. In the Antoni A pattern of growth, elongated cells were arranged in areas of moderate to high cellularity with little stromal matrix. In the Antoni B pattern of growth, the tumor was less densely cellular, had a loose meshwork of cells, as well as microcysts and myxoid changes (Fig. 3).

Discussion

Facial nerve schwannomas are relatively rare, with about 467 cases reported in the literature^{12,14}. Its incidence is

reported to be 1/23,000 cases yearly in a otology study¹³. The facial nerve is the most frequently paralyzed motor nerve, with 95% of infranuclear palsies due to a pathological process within the temporal bone¹⁴. Tumors account for fewer than 5% of facial palsies. Facial nerve schwannomas are postulated to arise from the nervus intermedius and its connection in the geniculate ganglion. The geniculate ganglion lies at the middle

cranial fossa, from which it is sometimes separated only by dura¹. In this case, the tumor arose from the geniculate ganglion and was located in the middle cranial fossa. Approximately 30 cases of facial nerve schwannomas presenting as middle cranial fossa lesions have been reported in the literature^{4,14}.

The clinical features depend upon the involved segments of the tumor^{5,7}. Progressive facial nerve palsy is the most common presenting symptom. However, up to 20% of patients develop a sudden onset of facial weakness which may be mistaken for Bell's palsy^{8,10}. Facial nerve palsy that does not demonstrate recovery within 6 months must be worked up for neoplasm, as Bell's palsy usually resolves within this time period. In this case, the patient's symptoms had lasted over five years, but unfortunately during that time she had not undergone any evaluation. Audiovestibular symptoms are also common with facial nerve schwannomas. Conductive or sensorineural hearing loss may occur, depending on whether the middle ear is involved or the cochlear nerve is compressed by the tumor within the internal auditory canal(IAC)¹⁵. The tumor in this case did not involve the middle ear, and thus, the patient had no audiovestibular impairment. However, she complained of disturbed lacrimation, which was caused by the involvement of the greater superficial petrosal nerve.

Treatment of facial nerve schwannomas is controversial because facial paralysis is inevitable after surgical resection. A few cases have been reported in which the schwannoma was able to be peeled off the facial nerve, thus sparing the majority of motor neurons¹⁰. However, these cases are very rare, and most cases require complete excision of the involved nerve.

The management strategies for facial nerve schwannomas consist of observation, decompression surgery, and surgical removal. Some authors advise observation until the patient exhibits at least a House-Brackmann grade III of facial nerve paralysis with follow-up radiologic study^{10,11}. Another conservative treatment is decompression surgery, if the patient has normal facial function². The final option is surgical removal of the schwannoma and facial nerve reconstruction. The su-

rgical approach is selected according to the location and extension of the tumor, as well as the hearing state of the patient^{8,10}. If the tumor arises in the cerebellopontine angle(CPA), IAC, or labyrinthine segment and there is no serviceable hearing, the translabyrinthine or transotic approach is appropriate. But if the patient has a good hearing level in that tumor localization, the middle fossa approach is preferred. Nevertheless, it is difficult to reach the CPA with this technique. The transmastoid approach is used for tumors arising in the tympanic or vertical segment of the facial nerve. The retrosigmoid approach is used for exposing the intracranial facial segment, and can provide good exposure to the facial nerve within the lateral IAC. For patients with tumors arising in the peripheral segment, the superficial parotidectomy approach is appropriate. In this patient, the tumor was located in the middle cranial fossa with normal hearing function, so the subtemporal approach was chosen for this procedure. The outcome of facial nerve reconstruction varies according to the duration and severity of the preoperative facial weakness^{8,14,16}. Several options are available for facial nerve reinnervation, including a sural nerve interposition graft or hypoglossal-facial nerve anastomosis. In the case herein, the patient's facial nerve was completely denervated and the symptoms had lasted over five years; thus, we did not reconstruct the facial nerve.

Conclusion

We report a very rare case of a facial nerve schwannoma in the middle cranial fossa, which could be removed through the subtemporal approach. The operative approach for facial nerve schwannomas must be determined in consideration

with the facial nerve function, as well as the location and extension of the tumor, and hearing function.

References

1. Andrew HK, Edward RL Jr : **Brain tumors**, ed 2. London : Churchill & Livingston, 2001, pp697-699
2. Angeli SI, Brackmann DE : Is surgical excision of facial nerve always indicated? **Otolaryngol Head Neck Surg** 117 : 144-147, 1997
3. Chun YM, Park K, Lee JS, Chun SH : The management of facial nerve schwannoma. **Korean J Otolaryngol** 40 : 1052-1057, 1997
4. Devi BI, Panigrahi M, Jaiswal VK, Bhat DI, Das S, Das BS : Facial nerve neurinoma presenting as middle cranial fossa and cerebellopontine angle mass : a case report. **Neurol India** 48 : 385-387, 2000
5. Eum SW, Kim JR, Park JY, Chung YG, Lee KC, Lee HK : Atypically located brainstem schwannoma. **J Korean Neurosurg Soc** 28 : 97-101, 1999
6. Ginberg LF, DeMonte F : Facial nerve schwannoma with middle cranial fossa involvement. **Radiology** 213 : 364-368, 1999
7. Jeon JH, Cha SH, Song GS, Choi CH : A case of large foramen magnum schwannoma. **J Korean Neurosurg Soc** 35 : 317-320, 2004
8. King TT, Morrison AW : Primary facial nerve tumors within the skull. **J Neurosurg** 72 : 1-8, 1990
9. Kumon Y, Sakaki S, Ohta S, Shue S, Nakagawa K, Tanaka K : Greater superficial petrosal nerve neurinoma. **J Neurosurg** 91 : 691-696, 1999
10. Lipkin AF, Coker NJ, Jenkins HA, Alford BR : Intracranial and intratemporal facial neuroma. **Otolaryngol Head Neck Surg** 96 : 71-79, 1987
11. Liu R, Fagan P : Facial nerve schwannoma: surgical excision versus conservative management. **Ann Otol Rhinol Laryngol** 110 : 1025-1029, 2001
12. Mutlu C, Djeriç DR, Tekin M, Paparella MM, Schachern PA : Facial neuroma in the internal auditory canal. **Auris Nasus Larynx** 27 : 175-178, 2000
13. Shambaugh GE Jr, Arenberg IK, Barney PL, Valvassori GE : Facial nerve neuromas. A study of four diverse cases. **Arch Otolaryngol** 90 : 742-755, 1969
14. Sherman JD, Dagnev E, Pensak ML, van Loveren HR, Tew JM : Facial nerve neuromas : report of 10 cases and review of the literature. **Neurosurgery** 50 : 450-460, 2002
15. Ulku CH, Uyar Y, Acar O, Yaman H, Avunduk MC : Facial nerve schwannomas : a report of four cases and a review of the literature. **Am J Otolaryngol** 25 : 426-431, 2004
16. Yamaki T, Morimoto S, Ohtaki M : Intracranial facial nerve neuroma : surgical strategy of tumor removal and functional reconstruction. **Surg Neurol** 49 : 538-546, 1998