Facial nerve preservation in geniculate ganglion hemangiomas

XIAOFENG MA¹, DONG CHEN¹, LI CAI¹ & DAOWEN WANG²

¹Department of Otolaryngology Head and Neck Surgery, The First Affiliated Hospital of Liaoning Medical University, Jinzhou and ²Department of Otolaryngology Head and Neck Surgery, Peking University Health Science Center, Beijing, PR China

Abstract

Conclusions: Facial nerve preservation was related to tumor size, and the patients with facial nerve preservation obtained better recovery. Hence it is necessary to perform surgical removal as soon as possible. Objective: To study facial nerve preservation in patients with geniculate ganglion (GG) hemangiomas. Methods: Twelve patients who had GG hemangiomas were managed at a single institute. All patients underwent total tumor removal, and the surgeon attempted to preserve the facial nerve. Tumor size was measured by MRI, and the patients were divided into two groups according to tumor size: larger size group (≥10 mm) and smaller size group (<10 mm). Results: Generally, the facial nerve was successfully preserved in 10 of 12 cases (83.30%), and nerve grafting was required in 2 cases. Seven of 10 patients (70%) with nerve intact recovered to grade I or grade II, while the 2 cases with nerve grafting recovered to grade III or grade IV. Among the smaller size group, the facial nerves of all patients (100%) were intact. In contrast, only one of three patients (33.3%) in the larger size group maintained nerve integrity after surgery.

Keywords: Facial palsy, nerve graft, nerve deficit

Introduction

Geniculate ganglion (GG) hemangiomas were first described by Pulec in 1969 [1]. Since then, over 40 cases of GG hemangiomas have been reported [2]. Unlike hemangiomas at the internal auditory canal [3], the greater majority of patients with GG hemangiomas presented with facial nerve deficit symptoms, even when the tumors were extremely small in size [4].

GG hemangiomas were thought to arise from the geniculate capillary plexus and compressed nerve outside [5]. Hence, it was possible to remove the tumors without damaging the facial nerve. However, it became impossible to preserve the facial nerve when the tumors infiltrated the nerve directly [6]. Here, we report 12 cases with GG hemangiomas and discuss facial nerve preservation in GG hemangiomas.

Material and methods

A consecutive case series of 12 patients who had GG hemangiomas underwent surgery at the authors’ institute by the same surgeon between 1998 and 2011. The diagnosis was pathologically confirmed. The case series consisted of eight females and four males, with an average age of 41.2 ± 1.4 years (range 22–68 years).

We performed total tumor removal, and attempted to preserve nerve integrity. In detail, the facial nerve was identified from the tumors under intraoperative facial nerve monitoring and electrical stimulation. We made an incision through the tumor near its junction with the facial nerve, and tried to identify the facial nerve fascicles. The tumors were removed around the nerve fascicles. There were two cases in which the tumors infiltrated into nerve fascicles, and the facial nerve was sacrificed, followed by nerve grafting using greater auricular nerve or sural nerve as the graft material.
The surgical approach was mainly determined by tumor location. We used the middle cranial fossa approach to resect hemangiomas at the GG or labyrinthine segment, and used the middle cranial fossa combined with the transmastoid approach to remove tumors at the GG and tympanic segment. Hearing was saved in all patients, among which one recovered from 50 dB to 20 dB.

Tumor size referred to the maximum diameter of hemangiomas on MRI. The patients were divided into two groups: larger size group (≥10 mm) and smaller size group (<10 mm). They were followed up for 5.2 ± 2.1 years (range 2–9 years). CT scan of temporal bone was performed to assess tumor recurrence, and facial nerve function was evaluated by the House-Brackmann (H-B) grading system [7]. Hearing before and after surgery was measured by clinical audiometer. Fisher’s exact test was used for statistical analysis, and SPSS 16.0 software was utilized.

Results

In all, 11 of 12 patients (91.7%) complained of facial nerve deficit symptoms, and only 1 patient presented with pulsatile tinnitus instead of facial weakness. One case suffered from conductive hearing loss, since the tumors invaded the middle ear cavity. Taste disturbance was found in only one patient.

The facial nerve remained intact in 10 of 12 cases (83.30%) after surgery, and the facial nerve was sacrificed and grafted in 2 cases. Specifically, the facial nerve was intact in 100% of the patients in the smaller size group, compared with one of three patients (33.3%) in the larger size group (p < 0.05).

All patients with nerve intact recovered to grade III or better according to the H-B system, among which 7 of 10 patients (70%) recovered to grade I or grade II. In contrast, two cases who had nerve grafting recovered to grade III or grade IV. There was no evidence of tumor recurrence during the follow-up. Eleven cases maintained normal hearing after surgery, and the other one improved from 50 dB to 20 dB.

Discussion

GG hemangiomas mainly present with progressive facial palsy even when they are extremely small in size, and can also cause other symptoms such as sensorineural hearing loss, vertigo, and conductive hearing loss [8]. Different from GG neuromas, which usually involved labyrinthine segment, internal auditory canal segment or tympanic segment [9], GG hemangiomas tended to be restricted at the GG only. In all, 91.7% of the current cases complained of facial palsy. Interestingly, one case was free from any facial nerve deficit symptoms, and instead, presented with pulsatile tinnitus. Hemangiomas affected the GG in only 10 of 12 cases (83.3%), with involvement of neither labyrinthine segment nor tympanic segment.

On CT images, the characteristic appearance of hemangiomas was irregular borders with intraslesional stippled calcification [10]. However, intraslesional calcification was not present in every patient [8]. On MRI images, hemangiomas were isointense on T1 images and hyperintense on T2 images [11].

Clinically, GG hemangiomas should be differentiated from neuromas. GG neuromas were characterized by local enlargement of the GG region with well-defined borders rather than irregular borders, and there was no intraslesional stippled calcification [9]. Moreover, as discussed above, neuromas more commonly affected multiple segments of the facial nerve, while GG hemangiomas were always restricted at the GG region. Another point to notice was that GG hemangiomas produced facial nerve deficit symptoms, even when they were quite small in size [4].

Cholesteatoma should not be confused with ossifying hemangiomas, although dystrophic calcification may occur within the lesion. Congenital cholesteatoma exhibited a more defined and smooth erosion of the bone on CT, and did not show up as enhanced with the administration of contrast medium [12].

Meningiomas could be not distinguished from hemangiomas on CT, but the two tumors were different on T2 images of MRI. Meningiomas were isointense on both T1 and T2 images, while GG hemangiomas were isointense on T1 images and hyperintense on T2 images [11].

Since GG hemangiomas seemed to arise extraneurally, it was possible to remove the tumors without damaging the facial nerve. Dai et al. [13] successfully removed GG hemangiomas in all of their nine cases without destruction of the nerve fascicle, and Casas-Rodera et al. [14] reported two cases of GG hemangiomas in which the tumors were dissected totally with conservation of the anatomy and function of facial nerve.

However, some authors claimed that they preserved facial nerve in the minority of cases [6,8,15], since larger GG hemangiomas were found to be intimately adhered to the facial nerve in most cases [8]. The tumors even directly infiltrated into the nerve [6,10,16–18]. In that case, facial nerve integrity could not be preserved. However, we assumed there was still a chance to dissect the tumors without destruction of nerve integrity when they were intimately adhered to the facial nerve, although it was difficult, but it became impossible when the tumors infiltrated into the nerve fascicle.
In the current series, the anatomy of the facial nerve was preserved in 83.30% of the cases, except two cases that were found to have tumor infiltration into the nerve without clear borders, supporting our assumption above. In detail, facial nerve integrity was maintained in 100% of the patients in the smaller size group in contrast to 33.3% in the larger size group \((p < 0.05)\). This indicated that facial nerve integrity was correlated with tumor size, and with tumors of smaller size there was much more chance of preserving the facial nerve. Among the patients with nerve intact, 70% recovered to normal or near-normal level, while the two cases with nerve grafting recovered to H-B grade III or grade IV, demonstrating that nerve integrity was critical for better outcomes of the facial nerve.

Of note, both of the two hemangiomas that infiltrated into the nerve in our study had tumor size \(\geq 10\) mm, and the three GG hemangiomas with nerve infiltration reported by Isaacscon et al. [6] and Escada et al. [18] were all sized \(\geq 10\) mm. It seemed that GG hemangiomas infiltrated into the nerve only when they reached a larger size. The findings above suggest the necessity of managing GG hemangiomas during the early stage.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References