

Traumatic Facial Nerve Neuroma With Facial Palsy Presenting in Infancy

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Objective: To describe the management of traumatic neuroma of the facial nerve in a child and literature review.

Patient: Sixteen-month-old male subject.

Intervention: Radiological imaging and surgery.

Main Outcome Measures: Facial nerve function.

Results: The patient presented at 16 months with a right facial palsy and was found to have a right facial nerve traumatic neuroma. A transmastoid, middle fossa resection of the right facial nerve lesion was undertaken with a successful facial nerve-to-hypoglossal nerve anastomosis. The facial palsy improved postoperatively.

Conclusion: A traumatic neuroma should be considered in an infant who presents with facial palsy, even in the absence of an obvious history of trauma. The treatment of such lesion is complex in any age group but especially in young children. Symptoms, age, lesion size, growth rate, and facial nerve function determine the appropriate management. **Key Words:** Facial nerve—House-Brackmann—Schwannoma—Traumatic neuroma.

Otol Neurotol 31:813–816, 2010.

CASE REPORT

A 16-month-old boy presented with right facial weakness and history of drooling when nursed on his right side. A progressive reduction in the strength and frequency of right eye blinking and worsening of facial symmetry ensued. The ability to swallow and quality of voice was normal. An ophthalmologic evaluation revealed no abnormalities, and audiometry revealed normal speech awareness thresholds.

At birth, he weighed 10 lbs and underwent manual manipulation to correct mentum posterior. There was no history of forceps use. At the age of 1 week, the patient was dropped by a sibling, falling approximately 2 ft. There was no background medical history and no known family history of tumors of the central nervous system or temporal bone.

On examination, there was a House-Brackmann grade III facial palsy. Tongue movement was normal. No neck masses or cutaneous abnormalities were noted.

Chromosomal testing was normal, and genotype screening for neurofibromatosis was negative.

Imaging of brain, temporal bone, and spinal column demonstrated the presence of a 6-mm ovoid enhancing lesion, involving the right facial nerve beginning at the meatal foramen and extending through the stylomastoid foramen (Figs. 1 and 2). The spinal column was normal.

As the facial weakness continued to progress to a House-Brackmann grade IV facial palsy (Fig. 3), a consensus was reached for resection before loss of facial muscle innervation to ensure graft success.

At 3½ years of age, he had a transmastoid middle fossa resection of the right facial nerve lesion, lateral to and including the geniculate fossa. A facial nerve to hypoglossal nerve transposition with an end-to-side anastomosis was accomplished. To accomplish this, the remnant distal portion of the facial nerve was completely mobilized from the stylomastoid foramen beyond the pes within the parotid gland. A tunnel was created within the parotid gland, allowing transposition of the mobilized facial nerve toward the cranium base. The hypoglossal nerve was identified in the neck and traced proximally toward the cranium base. Under microscopic magnification, a partial neurotomy through a third of the nerve fascicles was performed. The mobilized facial nerve was transposed to the hypoglossal nerve and an end-to-side anastomosis was completed. An eyelid gold weight procedure was also performed. These procedures and recovery were uncomplicated.

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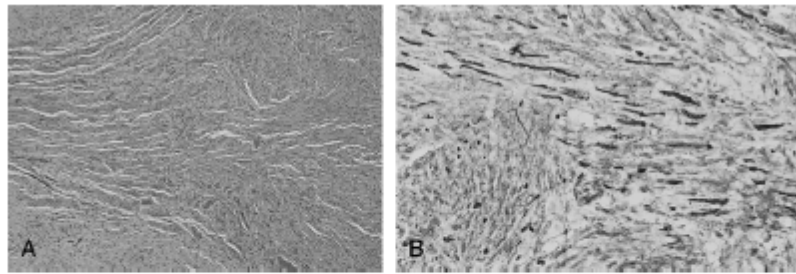


FIG. 4. A, Low magnification—fascicles of cells extend from the end of the partially transected nerve. B, High magnification—many axons are present in the non-neoplastic but tumefactive lesion (neurofilament protein immunohistochemical staining).

The more common schwannoma account for approximately 1% of cerebellopontine angle tumors (4) and may be difficult to distinguish clinically from peripheral sheath tumors, with the diagnosis often depending on the histological differentiation (3). As illustrated in this case, this is not always elementary.

There are currently no guidelines on the management of TN of the facial nerve. Treatment often depends on symptoms, with resection of the lesion being curative. The lesion necessitates division of the facial nerve, with postoperative morbidity potentially being reduced by either direct end-to-end anastomosis or primary graft fashioned from the greater auricular or sural nerve (4). When the proximal stump of the facial nerve is available, an interposition graft with a nerve graft or conduit is always preferable because this allows control of the reinnervated face by the ipsilateral facial nucleus. When the proximal facial nerve is inaccessible as result of tumor involvement or surgical limitations, as in this case, then a nerve substitution technique (hypoglossal to facial anastomosis or cross facial nerve grafting) should be considered.

Peripheral sheath tumors are classified according to the specific features of cellular differentiation, with schwannomas and neurofibroma being most common. They may present sporadically or as a manifestation of an underlying syndrome such as neurofibromatosis 1 and 2 and schwannomatosis (5). The first sporadic facial nerve schwannoma was reported by Schmidt in 1930 (6). Since that time, facial nerve schwannoma has continued to be an infrequent diagnosis. Facial nerve schwannoma (FNS) are particularly rare in children; the youngest reported case was in a 5-year-old (7).

The management of FNS is better established than TN. There are 3 management options generally recognized: observation, surgical intervention, and more recently, radiation therapy. Asymptomatic patients or those with House-Brackmann grades I to II palsies may maintain a stable level of facial function for years because of the lesions' slow growth rates. Perez et al. (8) demonstrated that the average growth rate of FNS was slow at 1.4 mm/yr (range, 0.7–2.6 mm/yr). Surgical intervention often involves resection of the facial nerve with subsequent repair using a nerve graft resulting in a probable

House-Brackmann score of III or IV (7). Therefore, morbidity of surgery may be a poorer outcome in facial muscle function compared with preoperative function. Although surgery remains the primary intervention, the indications for surgical resection remain uncertain.

Saleh et al. (9) advocated that in young patients, tumor resection should be undertaken at an early stage as the lesions are likely to grow, often with intracranial or extratemporal extension that makes resection more difficult. The benefit of early intervention was supported by McMonagle et al. (7) as the facial nerve is composed of approximately 10,000 neurons, 7,000 of which are myelinated and innervate the muscles of facial expression (10). If surgery is delayed and performed when most facial function is lost, there are fewer cell bodies remaining within the facial motor nucleus, and the motor end plate and muscle fibers will have degenerated significantly. This in turn reduces the likelihood of successful innervation of the facial nerve (7). Early intervention in children



FIG. 5. After 3 months, there was improved facial tone evident by redefinition of the effaced melolabial crease on the paralyzed side.

takes advantage of the plasticity of their maturing neural system, which may improve the final outcome.

With the exception of radiation therapy, which is not appropriate for facial nerve TN, many of the dilemmas of management mirror those for facial nerve schwannoma. With the possible exception of disease presentation and clinical course, these 2 pathological processes display many similarities. Facial nerve TNs are rare but should be considered in any case of congenital facial palsy, with or without a history of local trauma.

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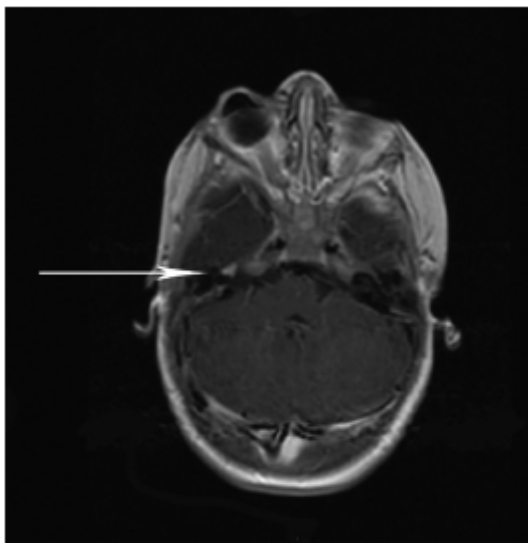


FIG. 1. Magnetic resonance imaging (T1) post contrast show the lesion extending from the right geniculate body along the facial nerve to the level of the right stylomastoid foramen (arrows).

Pathologically, the intensely and diffusely S100-positive lesion was formed of dense sheets of spindle-shaped cells with markedly uniform nuclei. There were interwoven fascicles near what seemed to be the nerve of origin (Fig. 4A), but elsewhere, the cells were uniformly aligned along the long axis of the lesion as it extended from the parent nerve. Verocay bodies, loose Antoni B tissue, and hyalinized vessels were absent. There were many intratumoral axons as demonstrated

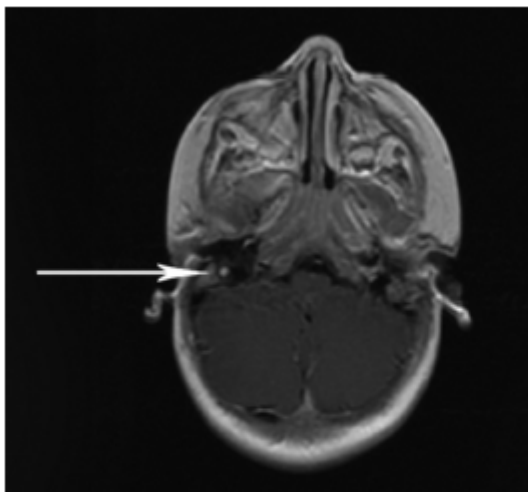


FIG. 2. Magnetic resonance imaging (T1) post contrast show the lesion extending from the right geniculate body along the facial nerve to the level of the right stylomastoid foramen (arrows).

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FIG. 3. A preoperative House-Brackmann grade IV facial palsy.

by immunostaining for phosphorylated neurofilament protein (Fig. 4B). One observer noted the unusual features and considered it a schwannoma, but the overall architecture and rich content of axons were more consistent with traumatic neuroma (TN).

After 3 months, there was improved facial tone evident by redefinition of the effaced melolabial crease on the paralyzed side (Fig. 5). By 1 year, there was excellent facial symmetry at rest and a symmetric smile. There was no appreciable atrophy or impaired movement of the tongue. Weber test localized to the right side. Rinne testing found air conduction to be greater than bone conduction bilaterally.

The patient was followed up regularly, with no sign of recurrence of disease on repeat imaging.

DISCUSSION

Traumatic neuromas are the result of attempted neuronal regeneration after injury (1). Such lesions of the facial nerve have been reported before but are rare—only 10 reported cases. Facial TNs are traditionally associated with chronic middle ear disease (2); however, they can occur secondary to seemingly insignificant trauma. Snyderman et al. (3) described a case in a 15-year-old who presented at birth with a facial nerve palsy and was found to have a TN located in the fallopian canal and geniculate ganglion, which they attribute to trauma of forceps delivery. Although there was no history of forceps usage in this case, there are a number of factors that could be attributed to precipitating trauma such as large birth weight, manual manipulation, and history of fall.