Označitev proksimalnega krna obraznega živca za odloženo rekonstrukcijo živca po odstranitvi vestibularnega švanoma

Marking of the proximal facial nerve stump for delayed repair after vestibular schwannoma removal

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Izvleček

Namen: *Z označitvijo krna obraznega živca ob možganskem deblu je možna poznejša uspešna rekonstrukcija obraznega živca.*

Poročilo o primeru: *Predstavljena bolnica je bila operirana zaradi večjega rezidualnega vestibularnega švanoma z retrosigmoidnim pristopom, ob odstranitvi katerega je bil poškodovan obrazni živec. Krn živca smo označili s kovinsko sponko, da bi ga naknadno lahko identificirali. S translabirintnim pristopom smo pozneje napravili anastomozo s suralnim živcem med obraznim živcem v mastoidu in krnom v pontocerebelarnem kotu. Poseg smo izvedli mesec dni po odstranitvi tumorja.*

Zaključek: *Bolnico smo sledili več kot dve leti po operaciji. Dosegla je*

Abstract

Objective: *To investigate whether marking the facial nerve stump during surgery permits facial nerve reconstruction to be performed successfully at later surgical intervention.*

Case report: *The patient was operated for a large residual vestibular schwannoma via the retrosigmoid approach and the facial nerve was injured during tumor removal. A metal clip was placed on a facial nerve stump to permit localization and identification at a later time. One month after the first operation nerve repair employing a sural nerve graft from the cerebellopontine angle to the mastoid portion of the facial nerve was performed through the translabyrinthine approach.*

Conclusion: *Follow-up of facial function was carried up for more than*

zelo dober funkcionalen rezultat, kar potrjuje, da z odloženo rekonstrukcijo in interponatom suralnega živca res lahko dosežemo dober rezultat.

two years. The patient achieved very good functional results, confirming that end-to-end facial nerve repair with an interposition graft with positive outcome can be successfully performed as a delayed procedure.

INTRODUCTION

Despite advances in vestibular schwannoma surgery situations are often still encountered where the facial nerve is disrupted during surgery, and particularly during the removal of large, giant or residual tumors. Because tumor invasion of the facial nerve is common, preservation of the facial nerve can be difficult or impossible in 5% of medium–sized acoustic tumors up to 2.5 cm in diameter (1). In cases with large acoustic tumors the site of facial nerve involvement can be near the brainstem and the identification of the nerve stump can therefore be difficult (2).

Vestibular schwannoma surgery is a delicate procedure dealing with the integrity of the brainstem, cerebellum and cranial nerves, and can seriously compromise the patient's condition. If the facial nerve is disrupted in the retrosigmoid approach, nerve repair demands the translabyrinthine approach, and this can be performed successfully in a second stage. However, localization and identification of the facial nerve stump is difficult. We therefore investigated whether marking the facial nerve stump during first–round surgery might simplify identification of the nerve during intracranial anastomosis during later surgical intervention.

Case report

A 38–year–old woman underwent surgery by the retrosigmoid approach for a residual vestibular schwannoma. Her hearing was impaired after the first operation but facial nerve function was normal. In a second operation the retrosigmoid approach was chosen. Complete tumor removal was achieved but the facial nerve was disrupted. The operation could not be continued at that time due to blood pressure problems. However, the proximal stump of the facial nerve was identified and marked with a metal clip during surgery (Figure 1). One month after tumor removal we sought to repair the facial nerve. The translabyrinthine approach to the cerebellopontine angle was carried out, and the metal clip permitted localization and identification of the facial nerve stump at the brainstem. A 5 cm sural nerve graft was taken from the patient's leg. Facial nerve endings were cut obliquely with nerve scissors to increase the anastomotic surface. The anastomosis was fixed at the brain stem with fibrin glue and enveloped in the temporalis muscle fascia around half of its circumference. In the mastoid, the anastomosis at the second genu was fixed with a 10–0 suture and fibrin glue.

The first signs of facial nerve function began to appear after six months. After two years the patient had an excellent return of facial function with complete eye closure and voluntary lifting of the mouth (Fig. 2). She achieved grade III on the House–Brackmann classification.

DISCUSSION

In vestibular schwannoma surgery three main approaches are used. The retrosigmoid approach provides access to the cerebellopontine angle without sacrificing the labyrinth. The translabyrinthine approach allows removal of cerebellopontine lesions with no cerebellar retraction. It is not indicated in relation to the remaining functional ear or in cases

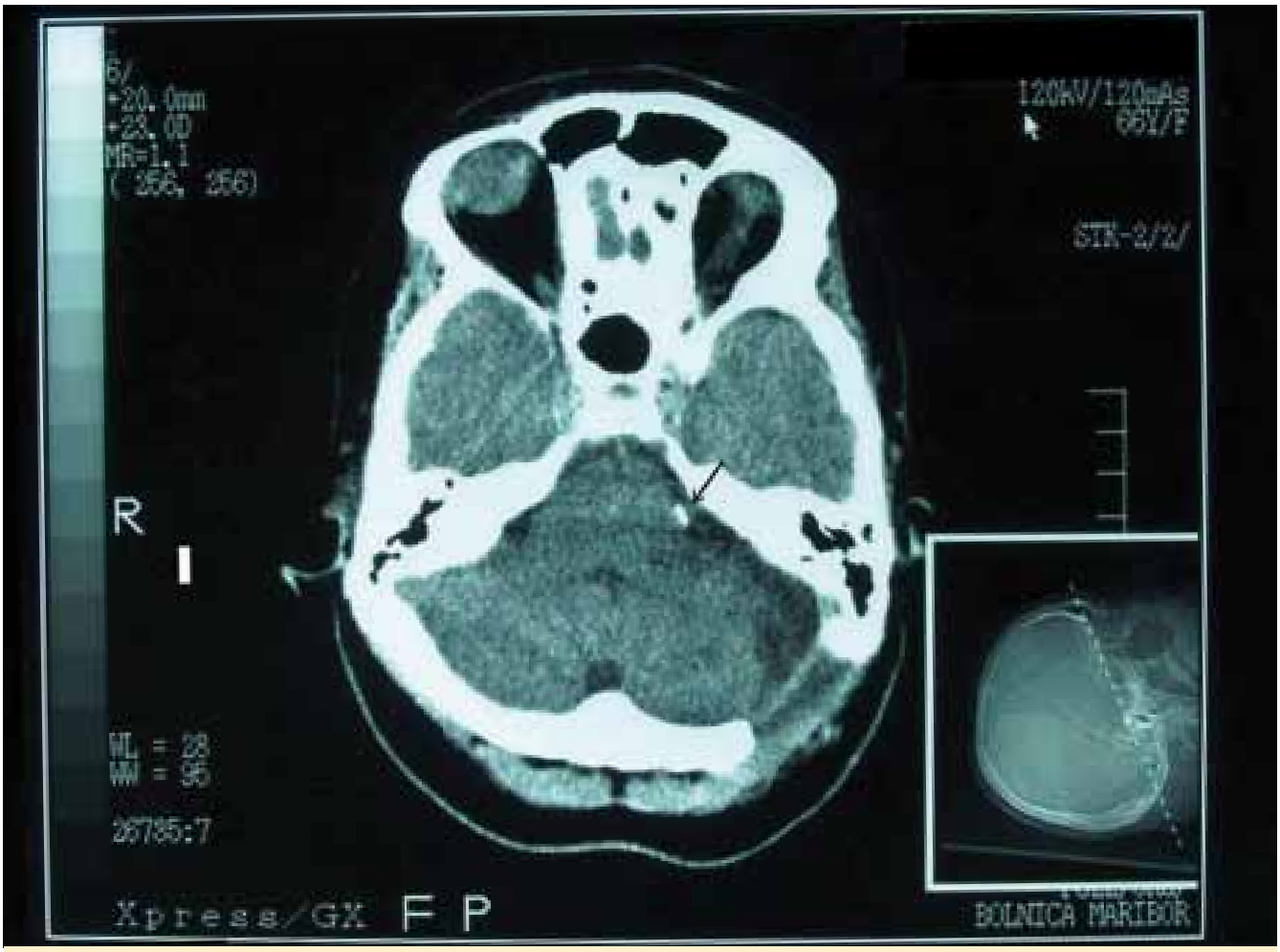

Figure 1. *Facial nerve stump marked with metal clip (arrow) after vestibular schwannoma removal.*

of chronic otitis media. The middle fossa approach is indicated in schwannomas less than or equal to 0.5 cm in extrameatal diameter when preservation of hearing is attempted.

Ideally, in cases where surgical removal of the vestibular schwannomas results in disruption of the facial nerve, repair of the nerve should be performed immediately and without grafting. Draf and Samii performed immediate repair of the facial nerve during vestibular schwannoma surgery via the suboccipital approach (3). The authors used the sural nerve as a graft between the facial nerve stump and the intratemporal facial nerve; this was transected at the second genu after mastoidectomy and labyrinthectomy, and the internal ear canal was opened. The results were reported as satisfactory. In 1978 Brackmann and coauthors reported on 9 patients where facial nerve repairs were carried out from a cerebellopontine angle to the mastoid portion of the facial nerve, and either used nerve grafts or performed repair directly to the rerouted mastoid facial nerve (2). They applied one 7–0 suture at the intracranial anastomosis. The authors reported better results with facial–facial anastomosis than with facial–hypoglossal anastomosis.

The intracranial nerve gap resulting from tumor removal is usually too large to permit end–to–end anastomosis and requires an interposition graft anastomosis (4); this can be performed later when the patient's condition has stabilized. The translabyrinthine approach allows nerve repair to be performed safely.

We believe that marking the facial nerve stump provides a useful aid for its localization and identification, thus facilitating intracranial anastomosis. Marking of anatomical structures has previously been performed successfully in other fields of surgery. In the case of facial nerve repair the nerve stump is likely to contract with time, and could be difficult to differentiate from the VIII cranial nerve. The placement of the marker avoids this problem and, because the facial nerve stump has to be cut to about 1 mm proximally before performing an anastomosis, this facilitates removal of the marker clip.

The length of the graft is important because it has been found that the functional outcome of facial nerve repair is better if the graft exceeds 1 cm (5). The greater auricular nerve can be used for the grafts of less than 6 cm; the sural nerve is recommended for longer grafts.

Although some authors advise suturing with a 10–0 suture at a cerebellopontine angle, the use of fibrin glue is enough to achieve good anastomosis. Sutures at a pontocerebellar angle are difficult to perform because the facial nerve has no epineurium in its intracranial portion, the operative field is deep and narrow, and it is necessary to accommodate constant brainstem arterial pulsation. For stabilization we used a temporalis fascia over half of the circumference at the site of the anastomosis.

An anastomosis in the mastoid can be performed using a single suture and it is important to cover this with fibrin glue. In contrast to facial–hypoglossal anastomosis in the neck, both anastomosis sites are without movements and this is likely to facilitate healing. This consideration could explain in part why the results of intracranial and intratemporal facial nerve repair are better than for peripheral anastomosis. The fact that the intracranial portion of the facial nerve lacks an epineurium, and is thus less prone to fibrosis, could also contribute.

According to the HB classification, patients undergoing facial nerve repair procedures cannot be expected to exceed grade III because movement of the forehead is seldom achieved (6,7).

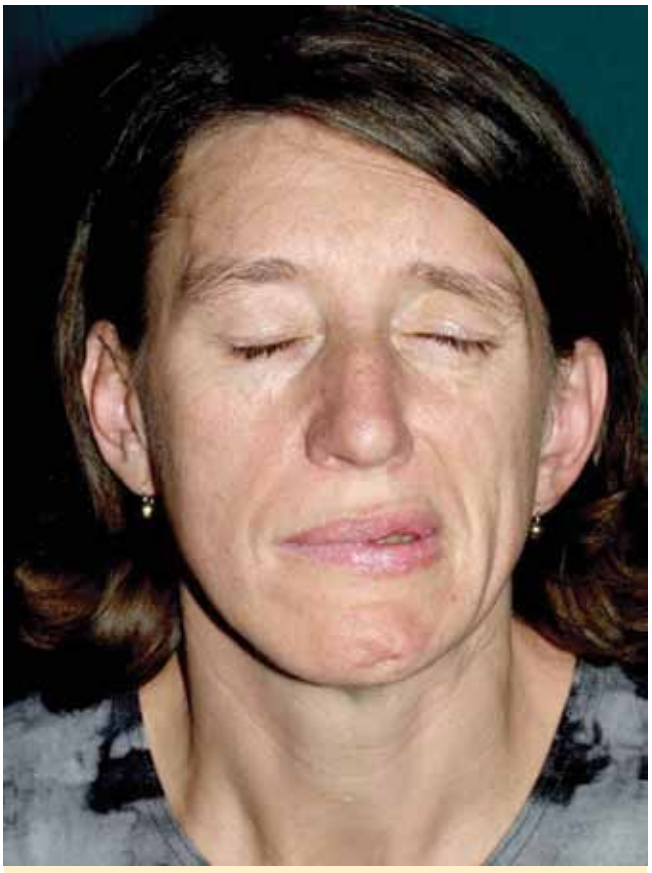

Figure 2. *Patient after intracranial–intratemporal facial nerve repair with complete closure of the eyes and good function of the mouth.*

In vestibular schwannoma surgery, the intracranial–intratemporal grafting technique is performed more easily when using the translabyrinthine approach to remove of the vestibular schwannoma. With the retrosigmoid approach, facial nerve anastomosis can also be performed in a second stage procedure, as with the patient reported here, and placement of a metal clip was used to permit rapid identification of the facial nerve stump. In cases where the proximal facial stump is not identifiable a nerve substitution procedure similar to side–to–end facial–hypoglossal anastomosis, or the end–to–end facial–hypoglossal anastomosis should be planned for a later date (8–11).

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