A successful double-layer facial nerve repair: A case presentation

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ABSTRACT

The best method to repair the facial nerve is to perform the primary repair soon after the injury, without any tension in the nerve ends. We present a case of patient who had a full-thickness facial nerve cut at two different levels. The patient underwent primary repair, recovered almost completely in the fourth postoperative month, and had full movement in mimic muscles. Despite lower success rates in double-level cuts, performing appropriate primary repair at an appropriate time can reverse functional losses at early stages, and lead to recovery without any complications.

Key words: Facial nerve, neurorrhaphy

Introduction

The facial nerve is a mixed cranial nerve that consists of motor, sensorial, and secretomotor fibers, and it is of significant importance with respect to functionality and aesthetics. While various causes can lead to facial nerve injuries, the most common one is trauma. Facial nerve injuries can result from sharp and/or blunt traumas, as well as iatrogenic causes that emerge during surgical approaches in the neighboring areas. All of these injuries can result in temporary or permanent facial paralysis [1, 2].

It is important to determine the severity of traumatic facial paralysis in the early stages. The type and time of treatment depend on the overall condition of the patient, the degree of paralysis onset, complete/partial paralysis, immediate/delayed onset, clean/contaminated injuries (in case of external traumas), and the localization of the injury. The level of nerve exposure and the determination of neuromuscular conduction play an important role in determining the type and success of the treatment. When the facial nerve is cut after a traumatic event, the ability of the nerve to conduct signals is lost immediately, which results in paralysis. While the ability to conduct impulses generated via an electrical current is initially preserved after the nerve is cut, conduction in the distal nerve segment stops after 72 hours due to Wallerian degeneration. This change is only detected after 10–14 days with an electromyogram (EMG). Therefore, the nerve undergoes rapid degeneration before the exact damage is determined. Given these reasons, early intervention and primary repair lead to the best outcomes in traumatic facial paralysis [1-5].

In the present study, we present a case of patient who
had a full-thickness facial nerve cut at two different levels. The patient underwent primary repair, and recovered almost completely in the fourth postoperative month.

**Case report**

A 22-year-old male patient was admitted to the emergency department after receiving a knife wound to his face during a fight. Physical examination showed a 4-cm full-thickness cut at the mandibula angulus level. The patient was unable to use the mimic muscles on his left side, was unable to close his left eye, his mouth was deviated to the right, and the mouth edge was displaced downward (Figure 1). The left nasolabial sulcus was completely weak. Considering that the patient’s symptoms were incompatible with the results of the examination of the cut area, we considered the possibility of another nerve injury at the stylomastoid foramen exit. The patient underwent surgery under general anesthesia. The exploration of the injury showed that the injury extended above the mandibula angulus, and within the mastoid part of the temporal bone. To determine the cut line of the facial nerve, an incision was performed from the lower part of the ear lobe to the mastoid bone. The exploration of the facial nerve showed that the nerve was cut full-thickness from its origination point in the stylomastoid foramen. To perform facial nerve repair, the mastoid bone was rounded by an otorhinolaryngologist, and the nerve was set free to allow repair. The facial nerve was brought to an opposing position, and nerve coaptation was performed using an 8-0 nylon suture (Figure 2). The exploration of the other cut at the cheek region showed that the zygomatic and buccal branches were cut; therefore, nerve coaptations were also performed at this level. A branule was placed within the Stensen duct, and then sutured...
with 7-0 prolene. The patient did not have any complications in the postoperative period, and was followed up routinely for xerophthalmia. Physiotherapy was initiated in the postoperative period, and the patient was able to close his eye fully on the fourth postoperative month, and the patient had full movement in the mimic muscles (Figure 3,4). Postoperative EMG results were close to normal.

Discussion

Facial nerve paralysis can result from idiopathic, traumatic, inflammatory, tumoral, or iatrogenic causes. Traumatic facial nerve injuries are among the most common causes of facial nerve paralysis. They can occur in intracranial and intratemporal regions due to head traumas, or they can result from blunt or penetrant traumas that occur directly on the nerve on the extratemporal region or parotid surgery. The extracranial part of the nerve emerges from the stylomastoid foramen as a single stem, and forms posterior, auricular, posterior digastric, and styloid branches before entering the parotid duct. Within the parotid duct, it is divided into two branches: temporozygomatic and cervicofacial. Then, these branches form the temporal, zygomatic, buccal, marginal mandibular, and cervical subbranches [1-4].

A multi-faceted and systematic approach is required for the treatment of patients with traumatic facial paralysis. The first step is to locate the lesion. Classically, in the case of clean-cut facial injuries when facial paralysis occurs immediately, repair should be performed as soon as the overall condition of the patient allows for such an operation. In case of contamination of the face wounds, the proximal and distal ends of the nerve are identified and labeled. Following cleaning and debridement, the wound is sutured, if possible. Because the results of neurorrhaphy are better in wounds that are clean and which have better vascularization, it is possible to wait up to three weeks for wound cleaning. Primary end-to-end anastomosis should be preferred when the continuity of the facial nerve is lost [2,3,5,6]. Functional recovery in end-to-end anastomosis is better compared with a multiple anastomosis interposition graft. To avoid using interposition grafts for small defects, the decompression of the mastoid segment and a partial parotidectomy can be performed, which is followed by the mobilization of the nerve, and the length of the proximal and distal nerves can be prolonged. If the injury is in the stylomastoid foramina, it is necessary to open the mastoid tip and decompress the mastoid segment to provide sufficient exposure for the anastomosis. In our case, the facial nerve cut was present in the stylomastoid foramen exit, and sufficient length for an anastomosis was provided by rounding the mastoid bone. It is difficult to perform neurorrhaphy in the case of contaminated wounds with widespread soft tissue defects and nerve distal end losses, or iatrogenic injuries. Interposition nerve grafts can be used for long nerve defects and when an end-to-end anastomosis is not possible [2-5].

It is necessary to provide patients who will undergo facial nerve exploration and nerve repair with accurate information about the recovery time for the reversal of facial function. The regeneration rate in cases without a nerve cut is approximately 1 mm/day or 1 inch/month. In the case of end-to-end anastomosis or grafting, it is not possible to determine the time required for the regeneration to pass through the site of the anastomosis [2,4,5]. The recovery time is 15 months for pontocerebellar edge nerve repair, nine months for the geniculate ganglion, and four months for the pes anserinus [5,7]. Patients should be informed about these potential recovery periods. During these periods, patients should perform warm applications to their face, massage their facial nerves, and perform facial exercises. Electrical stimulation can also be performed. All of these applications are directed toward preventing atrophy of denervated facial nerves prior to reinnervation.

The best repair method for the facial nerve is to perform the primary repair in the early period, without any tension in the nerve ends. Despite lower success rates in double-level cuts, performing appropriate primary repair at an appropriate time can reverse functional losses at the early stages and lead to recovery without any complication.

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