Immediate Frontal Nerve Repair Produces Early Facial Reanimation: A Case Report and Literature Review

Frontal Sinirin Acil Onarımı Yüz Reanimasyonunun Erken Geri Dönüşümünde Etkilidir: Vaka Raporu ve Literatür Taraması

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Öz

Frontal sinirin hasarı yüzde kalıcı asimetriye sebep olabilmektedir. Bunun sonucunda hastaların sosyal hayatı ve psikolojisi ciddi derecede etkilenmektedir. Frontal sinirin erken dönem onarımlarının geç döneme göre daha etkili olduğu bilinmektedir. Literatürde acil müdahale sonucu frontal sinirin fonksiyonunun ne kadar süre içerisinde geri geldiği bilinmemektedir. Olguda 27 yaşında bir erkek hastanın travma sonrası sağ frontotemporalkesisi meydana gelmiştir. Hastanın acil müdahalesi yapılmış, sinir mikroskop altında eksplore edilmiştir. Frontal sinirin, cilt kesisinin her iki yanındaki uçları görülerek onarımı yapılmıştır. Hastanın 1 hafta sonraki kontrolünde kaşlarının hareket etmeye başladığı bildirilmiş, 1 ay sonra ise tama yakın fonksiyon kazandığı görülmüştür. House-Brackmann Evre VI olan sinir hasarının direkt onarımı sonrasında 1 ay içerisinde Evre II'ye geldiği görülmüştür. Sonuç olarak frontal sinir kesilerinde acil müdahalenin yüz hareketlerinde tama yakın geri dönüşün sağlanmasında etkili olduğu gösterilmiştir.

Anahtar Kelimeler: Frontal Sinir, Yüz Felci, Yüz Reanimasyonu

Abstract

Frontal nerve injury may result with permanent facial asymmetry. This may severely affect social and psychological status. It is known that early repair of frontal nerve is more effective than delayed repair. However, it is not well defined how the frontal nerve repairment responds to emergency coaptation. A case report of a 27 years old male whom had a right frontotemporal laceration after a trauma has been presented. The patient was operated immediately and the frontal nerve was explored under microscope. Either ends of the frontal nerve were found within the injury zone and repaired. Frontal muscle reanimation started after one week and recorded to be nearly fully gained in post-operative one month. House-Brackmann Grade VI injuryimprovedto a Grade II nervefuncitonwithin 1 monthafteroperation. In conclusion, emergency coaptation of frontal nerve injuries may result with full reanimation of the muscle.

Keywords: Frontal Nerve, Facial Palsy, Facial Reanimation

Introduction

Facial nerve injuries may cause psychological, functional and social disturbances. The most common causes of facial palsy are Bell's palsy, tumor resections and traumas. Frontal nerve injuries are mostly seen after traumas (1). Among the 5 distal branches of the facial nerve, the frontal branches are more susceptible to damage as it has little amount of subcutaneous fat for the nerve protection (2). Permanent functional damage in the long term after injury is also high due to low amount of interconnections between other branches (3).

Frontal nerve injuries result with low localization and immobilization of the eyebrow with asymmetry on the face. Although frontal nerve paralysis does not cause functional disturbance such as drooling from the mouth or keratitis, it has a severe impact on psychology of the patients. The best chance of frontal nerve re-animation is immediate coaptation of the nerve ends (4). To the best of our knowledge, the duration of regaining the stimulation after frontal nerve coaptation has not been described. This case report aims to present a frontal nerve coaptation and the timing of the restimulation.

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Case

A 26 years old male patient referred to our clinic approximately 2 hours after a facial laceration. He had a head injury due to a heavy tinplate falling on his face. A 5cm horizontal hairline laceration and a C shaped 7cm frontotemporal deep laceration had occurred on the right side of his face (Fig 1). The wounds were closed with dressings and not sutured elsewhere. His main complaint was the asymmetry on the face which manifested itself mainly with eyebrow lifting. Frontal muscle paralysis with blepharoptosis was observed (Fig 2). The patient was operated in a full-fledged private hospital. Frontal nerve was explored under the microscope and nerve gap was not observed. Both ends of the frontal nerve were found approximately 2cm superior of the lateral end of the eyebrow (Fig 3). Nerve coaptation was done via 3 epineural sutures of 11/0 nylon in an end-to-end manner without tension. Lacerations were approximated with 5/0 and 6/0 absorbable sutures.

The right eyebrow started its movements 1 week post-operatively and gained full strength and movement after 1 month. Frontal mimic lines and symmetrical eyebrow elevation could be observed (Fig 4). The patient was fully satisfied after the procedure.

Figure 1. A 5cm long 'C' shaped deep laceration on the frontotemporal region.

Figure 2. Paralysis of the right side of the frontalis muscle due to damage of frontal nerve.

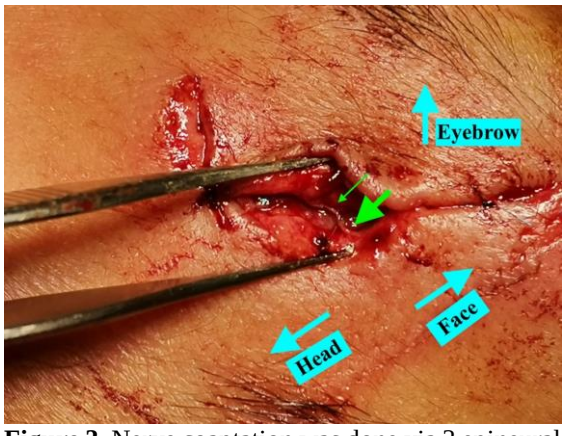

Figure 3. Nerve coaptation was done via 3 epineural sutures of 11/0 nylon in an end-to-end manner without tension.

Discussion

Facial palsy is a devastating disorder including social, psychological and functional problems. Tumor resections, Bell's palsy and direct injuries are the most common causes of facial nerve paralysis. The golden standard treatment method of facial nerve paralysis is direct coaptation of the nerve and should be overcome in an urgent manner. Complete rupture of the facial nerve is challenging and the treatment is surgery, which requires careful planning (5). It is highly effective if it is done in a way that the re-approximation procedure results in a tensionless repair (6). Although it is well known that immediate coaptation of the frontal nerve creates the best result, the timing of re-animation has not been well defined after frontal nerve coaptation. This case report aims to present the definition of 'early' recovery.

Figure 4. Right eyebrow elevation with obvious frontal crease after 1 month post-operation. Please note the weak motion of the most medial part of the eyebrow.

There is no singular technique in order to achieve facial re-animation. However, end-to-end repair is the simplest form of nerve repair and that should be accomplished in a tensionless manner. Tension will reduce the vascularization of the nerve and cause severe damage. Wallarian degeneration starts by 24 hours after injury and completes around 72 hours (6). Thus, nerve coaptation should be approached as an emergency surgery. 'The earlier, the better' is the key factor for a satisfying symmetry and function of the facial muscle (7). The best result in late repairment of frontal nerve has a recovery time of 5.5 months and House-Brackmann (HB) Grade III

(8). Recovery time also depends on the type of injury as well. A crush injury may not be able to heal as rapid as a guillotine type nerve injury (9). A clean cut on the frontotemporal region of the face, made it easy to find and coapt the nerve.

Anatomic landmarks are helpful in finding the location of branches of the facial nerve. Frontal branch of the facial nerve can be detected by Pitanguy's line which is drawn from the root of the ear lobe to the midpoint between the root of the helix and the lateral cantus (10). Pitanguy's line is also defined as an imaginary line drawn from 0.5 cm inferior to the tragus to a point 1.5 cm superolateral to the eyebrow. Temporal/frontal branch of the facial nerve lies between the superficial and deep temporal fascia and is vulnerable to traumas. Direct coaptation is mostly done under microscope with 9/0 or 10/0 sutures in the literature (10, 11). However, distal branches get more smaller in size and thus necessitate super-micro sutures such as 11/0 as we used in this case.

Recovery of immediate frontal nerve repair has not been well defined in the literature. Injuries to the distal frontal nerve may not be amenable to repair as it is far more smaller in diameter than the proximal segments. Additionaly, the recovery of the frontalis muscle function is often poorer than other mimic muscles (12). According to a literature review, patients with facial nerve repair most often achieve a HB score of III or IV with a mean time to first facial movements to be reported as 5 to 7 months (12). Surgery after 1 month of injury recovers within several months in 'good' improvement (13). Kannan et al. (7) shown full recovery return 6 months post-operatively in immediate nerve repair while it was 18 months in the late group (7). Our case presented first facial movement in 1 week and full recovery in 1 month after surgery. The onset of weak facial movements at the end of 1 week post-operatively is the major signal of a successful nerve coaptation. However, there are no recognized evidence of first muscle motions after frontal nerve repair. There was not much edema after surgery thus the possible recoveries may not be due to edema relief.

In conclusion, immediate repair of frontal nerve maintains an early and almost excellent result even in the most distal part of the nerve. Early mobilization of frontal muscles indicates promising results of nerve repair.

Written consent: Written consents of the patients were obtained on 11.01.2022.

References

1. Zhang W, Xu L, Luo T, et al. The etiology of Bell's palsy: a review. J Neurol. 2020;267(7):1896-905.
2. Davies J, Al-Hassani F, Kannan R. Facial nerve disorder: a review of the literature. Int. J. Surg. Oncol. 2018;3(7):65.
3. Myckatyn TM, Mackinnon SE. A Review of Facial Nerve Anatomy. Semin Plast Surg. 2004;18(1):5-12.
4. Li L, Fan Z, Wang H, et al. Efficacy of surgical repair for the functional restoration of injured facial nerve. BMC Surg. 2021;21(1):32.
5. Shafaiee Y, Shahbazzadegan B. Facial nerve laceration and its repair. Trauma Mon. 2016;21(2):20-2.
6. Surgery M. Facial reanimation through nerve repair : A review literature. 2020;7(4):1499-504.
7. Kannan RY, Hills A, Shelley MJ, et al. Immediate compared with late repair of extracranial branches of the facial nerve: A comparative study. Br J Oral Maxillofac Surg. 2020;58(2):163-9.
8. Nakamura Y, Takanari K, Ebisawa K, et al. Repair of temporal branch of the facial nerve with novel polyglycolic acid-collagen tube: A case report of two cases. Nagoya J Med Sci. 2020;82(1):123-8.
9. McGee DL, Dalsey WC. The mangled extremity. Compartment syndrome and amputations. Emerg Med Clin North Am. 1992;10(4):783-800.
10. McElwee TJ, Poche JN, Sowder JC, et al. Management of acute facial nerve and parotid injuries. Facial Plast Surg. 2021;37(4):490-9.
11. Sánchez-Ocando M, Gavilán J, Penarrocha J, et al. Facial nerve repair: the impact of technical variations on the final outcome. Eur Arch Otorhinolaryngol. 2019;276(12):3301-8.
12. Condie D, Tolkachjov SN. Facial nerve injury and repair: a practical review for cutaneous surgery. Dermatol Surg. 2019;45(3):340-57.
13. Emamhadi MR, Mahmoudi D. Recovery of facial nerve paralysis after temporal nerve reconstruction: A case report. Trauma Mon. 2015;20(4):4-6.