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RESEARCH ARTICLE

Management of Non-Surgical Traumatic Facial Nerve Injuries

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Abstract

Introductıon: Traumatic facial nerve injuries present a unique challenge to clinicians and surgeons because of the intricate facial nerve anatomy and profound impact on the psychological well-being and social interactions of patients. In this study, we aimed to shed light on the multifaceted nature of non-iatrogenic traumatic facial nerve injuries through an in-depth analysis of 12 distinctive cases. **Methods:** Between March 2019 and June 2022, at Ankara City Hospital and Akdeniz University Hospital, we conducted a retrospective analysis of 12 patients who presented with traumatic facial nerve injuries without surgery-related complications. To better understand the particularities of traumatic injuries to the facial nerve outside the context of surgical interventions, all cases selected for this study were of nonsurgical origin. **Results:** Twelve patients (eight males and four females) were included in the study. The average age of the patients was 29 years (range, 5–53 years). The causes of injury varied from dog bites in one patient, work-related injuries with a jigsaw in one patient, traffic accidents in two patients, sharp penetrating injuries in four patients, and temporal bone trauma in four patients. Five patients underwent a direct nerve repair. Three patients had nerve grafting. Three patients underwent reconstruction using a free functional gracilis flap. One patient underwent masseter nerve transfer. Considering the diverse treatment modalities applied and the subsequent outcomes observed, an algorithm was formulated. **Conclusion:** By sharing these experiences, we aspire to contribute a nuanced perspective to the existing body of knowledge on traumatic facial nerve injuries, further supporting clinical decision-making in such rare and challenging scenarios.

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Introduction

The facial nerve, or seventh cranial nerve, is one of the most intricate and clinically significant structures in human anatomy.[1] The facial nerve serves primarily for motor innervation of the facial muscles and transmission of taste sensations. Any injury or anomaly involving this nerve can affect facial movement, expression, and overall quality of life.[2] Traumatic facial nerve injuries present a unique challenge to clinicians and surgeons because of the intricate facial nerve anatomy and profound impact on patients' psychological well-being and social interactions. The etiology of traumatic facial nerve injuries varies from blunt and penetrating trauma to iatrogenic injuries during surgical procedures.[3] Although iatrogenic facial nerve injuries, owing primarily to surgical interventions, have been well documented, the literature offers limited insights into non-iatrogenic traumatic facial nerve injuries. Such injuries, which are less prevalent in clinical scenarios, often present unique diagnostic and therapeutic challenges owing to their distinct etiologies and presentations. Regardless of the cause, the primary goal of treatment is to restore facial symmetry and function. The spectrum of management approaches for these injuries has expanded significantly over the past few decades thanks to advances in surgical techniques, microsurgery, and an improved understanding of nerve physiology.[4] Direct repair, which involves coaptation of nerve ends, has been a cornerstone treatment approach for many years. However, when direct repair is not feasible or in cases with a significant loss of nerve tissue, nerve grafts may serve as a viable solution.[5] More recently, innovative approaches, such as using a free functional gracilis flap or performing masseteric nerve transfer, have expanded the therapeutic horizons for cases where traditional methods might not suffice or have previously failed.[6,7] In this study, we aimed to shed light on the multifaceted nature of non-iatrogenic traumatic facial nerve injuries through an in-depth analysis of 12 distinctive cases.

Material and Methods

We conducted a retrospective analysis of 12 patients who presented with traumatic facial nerve injuries without surgery between March 2019 and June 2022 at Ankara City Hospital and Akdeniz University Hospital. The inclusion criteria were as follows: all traumatic facial paralysis cases selected for this study were exclusively of non-surgical origin; the patients were children or adults; the patients were men or women; and the first intervention was for facial nerve damage. Patients for whom there was a switch to another surgical or result evaluation method were excluded.

This study was approved by the local ethics committee (Approval Number: KAEK-597). Furthermore, the research adhered to the guidelines set forth by the Declaration of Helsinki, ensuring that ethical considerations and patient rights were of paramount importance.

To evaluate facial nerve function pre-and postoperatively, we used the House–Brackmann (HB) scoring system. The HB scoring system, a globally recognized grading system, was used to quantify the degree of facial palsy in the patients, facilitating objective comparisons and assessments of therapeutic outcomes.[8]

Patient data, including demographic details, etiology of injury, time to presentation, HB scores before and after the intervention, and specifics of the surgical procedure, were collected from medical records. All patients were treated by a physiotherapist after the surgical procedure, and patient compliance with physiotherapy was not evaluated.

Results

Twelve patients (eight males and four females) were included in the study. The average age of the patients was 29 years (range, 5–53 years). The mean follow-up period was 15 months. The causes of injury varied from dog bites in one patient, work-related injuries with a jigsaw in one patient, traffic accidents in two patients, sharp penetrating injuries in four patients, and temporal bone trauma in four patients (Table 1). One patient (Case 4) did not undergo any facial nerve decompression surgery because it was thought that there will be no benefit. And other 3 patients with temporal bone fracture had undergone decompression surgery but did not benefit from.

Facial nerve injuries were more common on the right side (seven patients, 58%) than on the left side (five patients, 42%). A detailed breakdown of the injuries, times to presentation, HB scores both before and after the intervention, and specifics of the surgical procedures are presented in Table 1.

Our surgical interventions varied based on the specifics of each case. Five patients underwent direct nerve repair; three patients received nerve grafting; three had the facial nerve reconstructed using the free functional gracilis flap; and one underwent mas-

seteric nerve transfer. Facial nerve healing was not followed by EMG. Recovery was recovery was followed clinically with Tinel test at every consultation.

Acute injuries were treated with direct repair or nerve grafting, as appropriate. Buccal branch masseter nerve transfer was specifically performed in one patient who did not exhibit facial nerve recovery during follow-up (Figure 1). Patients with late-onset facial nerve trauma underwent reconstruction using a functional gracilis muscle flap (Figure 2). In these cases, nerve anastomosis was performed between the masseter and obturator nerves.

Most patients showed improved HB scores after treatment, with the only exceptions being the patients who underwent nerve graft repair. Furthermore, two patients (Patients 3 and 12) had grade-1 HB scores. A common characteristic of these patients was the repair time, which was within 24 h after injury.

Table 1. Patients' characteristics

Case	Sex	Age (years)	Trauma Type	Affected Branches	Time from Injury to Presentation	Follow-up (Months)	House-Brackmann score before treatment	Reconstruction Method	House-Brackmann score after treatment
1	F	5	Dog-bite injury	Fascial Nerve Trunk	Within 24 Hours	14	6	Primary repair	2
2	M	25	Knife	Fascial Nerve Trunk	72 Hours	12	6	Repair with nerve graft (sural nerve)	4
3	M	45	Work-related, Jigsaw	ZB, FB	Within 24 Hours	15	4	Primary repair	1
4	F	43	Traffic accident	Temporal Bone Fracture	3 months	18	6	Masseteric nerve transfer to buccal branch	3
5	F	53	Glass	ZB, FB, BB, MMB	48 Hours	12	6	Primary repair	2
6	M	37	Blunt trauma to head	Temporal Bone Fracture	10 years	17	5	Functional gracilis muscle transfer	2
7	M	10	Blunt trauma to head	Temporal Bone Fracture	8 years	18	5	Functional gracilis muscle transfer	2
8	M	29	Blunt trauma to head	Temporal Bone Fracture	2 years	16	6	Functional gracilis muscle transfer	2
9	F	32	Glass	Fascial Nerve Trunk	72 hours	14	6	Repair with nerve graft (sural nerve)	4
10	M	18	Knife	Fascial nerve trunk	48 hours	14	6	Repair with nerve graft (sural nerve)	3
11	M	25	Traffic accident	ZB, BB	Within 24 hours	12	5	Primary repair	2
12	M	31	Glass	FB,ZB	Within 24 hours	14	4	Primary repair	1

ZB: Zygomatic branch, FB: Frontal branch, BB: Buccal branch, MMB: Marginal mandibular branch

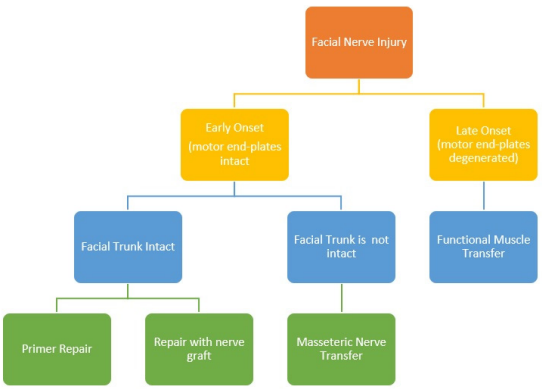

Figure 1: Treatment algorithm of non-surgical traumatic facial nerve injuries

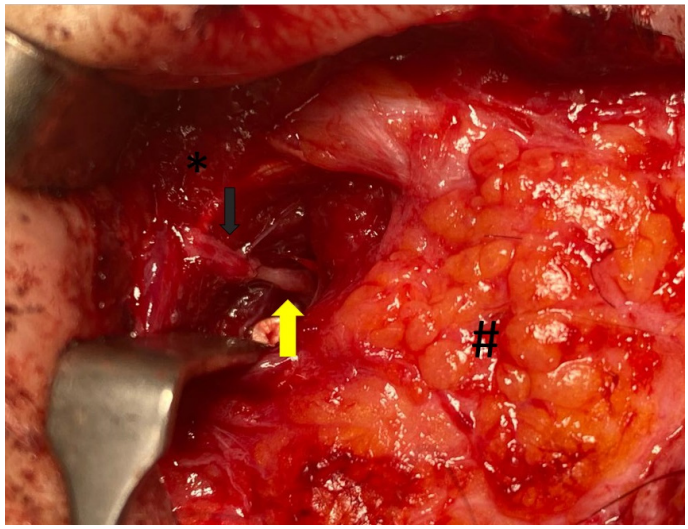

Figure 2. Intraoperative view of masseteric nerve transfer of Case 4. *: Massater muscle, #: Parotis gland, Black arrow: Masseteric nerve, Yellow arrow: Buccal Nerve

Based on our observations and surgical outcomes, we formulated an algorithm to address traumatic facial nerve injuries, as shown in Figure 3. This algorithm encapsulates the decision-making process and serves as a guide for potential therapeutic interventions in traumatic facial nerve injuries.

Figure 3: Case 6 a) Preoperative photo of the Case 6. b) 13 months After functional gracilis muscle transfer, gracilis muscle bulk can be seen at cheek level.

Discussion

Management of traumatic facial nerve injuries requires surgical expertise, timely interventions, and structured postoperative care. In conjunction with previous studies, this study seeks to provide a

comprehensive approach for optimizing the outcomes of such injuries. Moreover, this study focused on traumatic facial nerve injuries due to non-surgical causes to fill an existing gap in the current literature.

The HB scoring system employed in our study remains the main approach for assessing facial nerve function. Its widespread acceptance stems from its objectivity and granularity, which allow standardized comparisons across cases. Our findings indicated a significant improvement in HB scores across most cases after intervention, testifying to the efficacy of our approach. These findings are also supported by previous studies. A study of surgical timing and outcomes by Kim et al. stressed the utility of the HB scoring system as a reliable indicator of functional recovery.[9]

The surgical choice between primary repair, nerve grafting, nerve transfer, and muscle transfer approaches is pivotal. Frijters and Fliss highlighted the consistent outcomes associated with primary repair and the occasional unpredictability associated with nerve grafting.[10,11] This inconsistency was notable in our case series; thus, nerve grafting did not yield the desired outcomes in two out of the three cases. The underlying reasons for this variability may lie within individual variations in nerve regeneration, surgical techniques, or graft quality, warranting further exploration. As expected, we obtained the best scores for the primary repairs in our study.

Surgical intervention is the first step towards patient recovery, with post-facial nerve repair physiotherapy playing a crucial role in functional restoration. Physical rehabilitation aids in preventing muscle atrophy, promoting nerve regeneration, and retraining the facial muscles.[12] The role of physiotherapy has become even more crucial in cases involving muscle transfers or nerve grafts, where neural-muscular dynamics are significantly altered.[12] The emphasis on early and structured physiotherapy may partly explain the notable improvements observed in our patient cohort. Although we did not evaluate the effect of post-surgical physiotherapy in our study, this is an important part of the treatment, regardless of whether primary repair or muscle transfer is performed.

Chronic presentation adds another layer of complexity. As elucidated by Erkan and Carre, the surgical decision between muscle and nerve transfers depends on the time elapsed since injury.[5,12] Our algorithm provides a structured approach to these decisions, ensuring that interventions are timely and evidence-based.

In conclusion, the management of traumatic facial nerve injuries requires a holistic approach, beginning with timely surgical intervention guided by anatomical precision, followed by dedicated postoperative physiotherapy. The HB scoring system is a valuable tool for ongoing assessment and monitoring, and allows clinicians to tailor interventions and rehabilitation according to individual patient needs. With the growing body of evidence, it is imperative that clinicians remain abreast of the latest techniques and findings, ensuring that patients receive the best possible care at every stage of their recovery. Building on previous studies, our study helps provide clinicians with a comprehensive guide for managing these injuries and ensuring improved facial function and patient satisfaction.

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