Cross facial nerve grafting as the first stage of congenital facial palsy treatment in a 5-year-old child: a clinical case

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ABSTRACT

Relevance. Facial palsy is a severe somatic disease that significantly deteriorates the quality of life and affects adaptation in society. Both children and their families bear the burden of treating pediatric facial palsy. Some types of acquired facial nerve neuropathy require conservative treatment. Neuroplasty is a method of treating recently acquired acute facial palsy. The aplasia of the facial nerve and facial muscles, which requires myoneuroplasty in two stages, determines the complexity of the congenital facial palsy treatment. Cross-facial nerve grafting is the first stage of myoneuroplasty. A separate article describes the clinical case due to congenital aplasia of the buccal branch of the right facial nerve and the muscles innervated by it and due to the small number of surgeries performed in Russia in children with congenital facial palsy.

Purpose. We aimed to prepare a 5-year-old child for free revascularized gracilis muscle transfer in the position of the right zygomaticus major muscle to treat a congenital facial palsy.

Materials and methods. The paper describes a clinical case of cross facial nerve grafting by microsurgical techniques in a 5-year-old child with congenital palsy of the right zygomaticus major muscle at the Department of Pediatric Maxillofacial Surgery of the Maxillofacial, Plastic Surgery and Dentistry Clinical Center of A.I. Yevdokimov MSUMD.

Results. In the postoperative period, the patient had no complications. Postoperative scars in the maxillofacial area were aesthetically acceptable. Numbness of soft tissues in the leg and foot was insignificant. The final result of the treatment would be after the second stage of treatment, i.e., free revascularized gracilis muscle transfer.

Conclusion. Pediatric cross-facial nerve grafting is a technically advanced surgery. The surgery does not have anthropometric contraindications for a 5-year-old. The use of a microscope and intraoperative neuromonitoring are recommended.

Key words: facial nerve, facial palsy, congenital pathology, cross-facial nerve grafting, neuroplasty

For citation: Askerov ED, Topolnitsky OZ. Cross-facial nerve grafting as the first stage of congenital facial palsy treatment in a 5-year-old child: a clinical case. *Pediatric dentistry and dental prophylaxis*. 2022;22(1):72-78 (In Russ.). DOI: 10.33925/1683-3031-2021-22-1-72-78.

INTRODUCTION

Facial paralysis is quite rare in pediatric practice (15-40 cases per 100,000 children annually), which is 3-4 times less frequent than in adult patients. The etiology of pediatric facial paralysis is multifactorial: congenital pathology, post-infectious, head trauma or somatic disease paralysis [1].

Bell's palsy is rare in children [2], with a favorable prognosis in 70% of cases and restoration of facial expression muscle movements with possible synkinesis development. Surgery is not required if the facial expression is restored.

Recent (up to two years) facial nerve damage – neurotmesis – is treated by neuroplasty with a favorable prognosis if the treatment is timely. Masseteric, hyoid and healthy facial nerves may be used as donor nerves [3, 4].

Facial paralysis, older than 2 years in duration, and congenital paralysis have common characteristics: total facial nerve and muscle atrophy; neuroplasty is less than effective or ineffective in this case; myoneuroplasty combined with cross-facial nerve grafting is a method of choice. Cross-facial nerve grafting is the reinnervation of one-side facial muscles by a contralateral facial nerve. The sural nerve serves as a cable graft [5].

Congenital facial paralysis significantly reduces a child's quality of life, which affects the parents, and is very complicated for treatment and rehabilitation [6, 7].

Moebius syndrome or craniofacial microsomia may include congenital facial paralysis [8]. Moebius syndrome is characterized by abducens nerve damage, which results in eye lateral muscle palsy. In craniofacial microsomia, glossopharyngeal nerve damage leads to characteristic soft palate paresis [9].

Congenital isolated aplasia or hypoplasia of the facial nerve motor nucleus or the facial nerve itself is also possible. The clinical case describes a similar situation.

Surgical treatment by the transfer of the revascularized gracilis muscle with reinnervation is performed in two stages with a six-month break as the treatment requires 8 incisions in 5 anatomical areas, 3 vascular anastomoses, 3 sites of neurorrhaphy, using microsurgical techniques. Two-stage surgery is recommended due to the complexity and duration of the surgery. The first

stage suggests surgical intervention in the unaffected parotideomasseteric region, in the mouth and lower leg, one microsurgical neurorrhaphy. During 6 months, axons sprout from the healthy facial nerve to the damaged side through the sural nerve [10, 11].

A separate publication describes this clinical case due to the presence of congenital aplasia of the buccal branch of the right facial nerve and muscles innervated by it, and as there are comparatively few operations performed in Russia in children with congenital facial palsy.

Purpose – to prepare a 5-year-old child with congenital facial palsy for the transfer of the revascularized gracilis muscle to the position of the greater zygomatic muscle by cross-facial nerve grafting.

MATERIAL AND METHODS

We performed clinical and laboratory examination of the 5-year-old child (Fig. 1) with right greater zygomatic muscle palsy. The patient exhibited a positive Rusetsky sign and "Sail sign" on the right (Fig. 2).

In parents' words, the father's eldest child from another mother had facial muscle dysfunction, no surgery was performed.

The patient hadn't had surgery before. The child had undergone conservative treatment (massage, physiotherapy) without positive changes.

Other organs and systems were unremarkable.

On external examination at rest, the patient exhibited right midfacial ptosis and a downturned right corner of the mouth. The facial expression muscle tests revealed palsy of the right greater zygomatic muscle, the absence of the right nasolabial fold formation. Other facial muscles were within normal limits.

The child was treated in a hospital of Moscow State University of Medicine and Dentistry in November 2021.

Preoperative ENMG of the facial muscles revealed the signs of axonal damage of the facial nerve. Head MRI was normal.

Differential diagnosis from Moebius syndrome did not reveal the eye lateral rectus muscle palsy.

Right preauricular approach, dissection of the trunk and branches of the right facial nerve were performed under the endotracheal anesthesia. Aplasia of the right facial nerve buccal branch was noted (Fig. 3). On intraoperative neurophysiological monitoring, we noted the absence of M-response from the muscles innervated by the absent buccal branch of the right facial nerve.

The preauricular approach was made on the healthy left side. The buccal branch of the left facial nerve was dissected (Fig. 4). M-responses were normal from all branches of the left facial nerve.

A soft tissue incision was made between the left Achilles tendon and the left lateral malleolus. The sural nerve was isolated, ligated and severed distally. The nerve was dissected 12 cm proximally using a stripper. The skin was incised 12 cm higher than the previous incision, the lateral branch of the sural nerve was cut off. The sural nerve was dissected for another 12 cm proximally using a stripper. An incision was made 12 cm higher than the previous one. The sural nerve was cut, the graft was 24-cm long (Fig. 5). The lower leg wounds were sutured.

The incisions in the maxillary vestibulum were made at teeth 5.3, 6.3. The sural nerve was tunnelled from the right parotideomasseteric to the left parotideomasseteric region through the intraoral incisions using a neuroconductor. The neurrhoraphy was microsurgically completed between one of the branchlets of the left buccal branch and the sural nerve distal end. Parotideomasseteric and oral wounds were sutured.

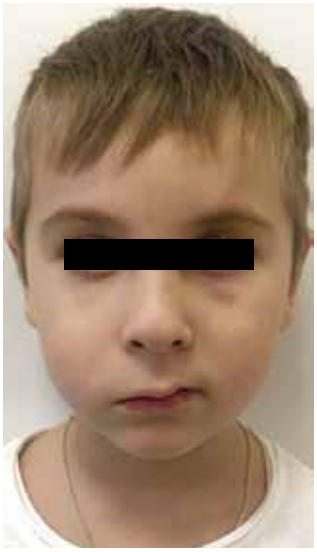

Fig. 1. Patient at rest

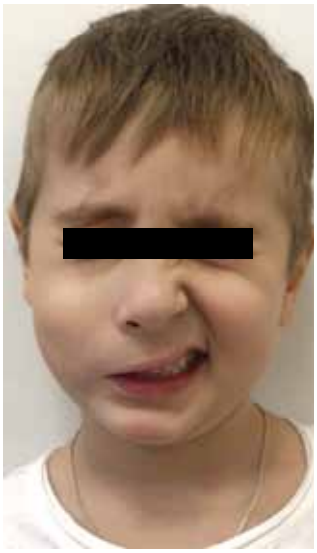

Fig. 2. Patient during facial expression testing

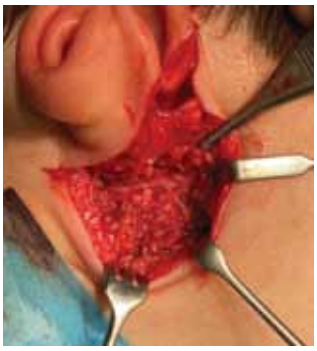

Fig. 3. Aplasia of the right facial nerve buccal branch

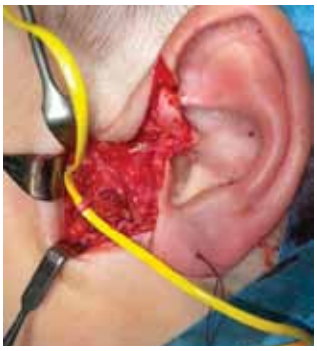

Fig. 4. Buccal branch of the left facial nerve

Fig. 5. Sural nerve

Postoperative antibiotics were prescribed according to age and body mass.

RESULTS AND DISCUSSION

There were no intraoperative, early or delayed postoperative complications. The wounds healed by primary intention. Soft tissue numbness in the area of sural nerve innervation was noted, which is typical for this surgery. Postoperative scars were normotrophic. No impairment of major maxillofacial vessels and facial nerve branches on the healthy and damaged sides was noted. The child was ready for the next surgical step.

CONCLUSION

Cross-facial nerve grafting in children is technically advanced surgery due to the age and child anatomy features. The length of the sural nerve is sufficient for tunnelling between buccal branches of the facial nerve in the healthy and impaired sides. The surgery does not have anthropometric contraindications for a 5-year-old. An operating microscope and intraoperative neurophysiological monitoring are necessary during surgery.

We did not receive negative feedback from the patient or the parents. Written informed consent for publication was obtained from the child's parents.

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Conflict of interests:
The authors declare no conflict of interests
Article received 04.01.2022
Revised 22.01.2022
Accepted 31.01.2022