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CASE REPORT
Reconstructive

First Russian Experience of Pediatric Subtotal Facial Tissue Replantation

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Summary: Treatment and rehabilitation of patients with posttraumatic, contaminated, lacerated wounds present a complex challenge. The concept of delayed, multistage treatment, as well as the rehabilitation protocols for pediatric patients is associated with a series of reconstructive procedures, one of which is face transplantation; however, it remains an unresolved issue to date due to the development of immunologic tissue intolerance by the recipient, as well as various psychosocial rehabilitation challenges. The challenge of successful pediatric replantation creates interest in the global medical community to develop generalized algorithms for managing patients with posttraumatic subtotal facial defects. This case report demonstrated the experience of the first posttraumatic subtotal facial replantation less than 12 hours after injury in a pediatric patient in Russia. The goal of this work was to show the algorithm used in the case of a pediatric posttraumatic subtotal facial defect in hopes of aiding the future development of such guidelines.
(Plast Reconstr Surg Glob Open 2025;13:e6906; doi: 10.1097/GOX.0000000000006906; Published online 24 June 2025.)

In the structure of pediatric trauma, scalp wounds of the face account for 12.3% of the total number of injuries. Among these injuries, bite wounds predominate, especially in the preschool age group. Bites can cause serious anatomical, functional, and neurological disorders in pediatric patients. In addition, severe injuries require prolonged inpatient treatment and a series of repeated surgical procedures. The number of children with facial soft tissue bite wounds reaches 53.7% of the total number of patients admitted for inpatient treatment in the maxillofacial surgery department.[1] It is generally recommended after the initial washout and debridement of such wounds to manage them with dressing changes until the risk of developing infection is low. Afterward, further delayed reconstruction procedures are performed.[2]

Although replantation of amputated segments of the face remains challenging in reconstructive surgery, it offers excellent aesthetic and functional outcomes. Microsurgical replantation of facial tissues is a promising and effective procedure for patients, as autologous tissues are immunologically tolerant and provide the most accurate aesthetic rehabilitation of lost facial parameters due to trauma.[3]

CASE PRESENTATION

An extensive bite wound of the midface, nasal bridge, glabella, and upper lip with amputation of soft tissues and the bony-cartilaginous part of the nose is shown in Supplemental Digital Content 1. (**See figure, Supplemental Digital Content 1**, which displays facial tissue flap, **https://links.lww.com/PRSGO/E138**.)

LOCAL STATUS

The patient had an extensive laceration from a dog bite wound, involving the upper and middle thirds of the face and affecting the nasal region, frontal area, infraorbital area, upper lip region, and right periorbital area. The wound edges were irregular and jagged. The wound base consisted of the alveolar process of the maxilla, a bony fragment of the nasal septum, nasal bones, and soft tissue of the face. The wound showed no signs of active bleeding (Fig. 1).

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

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Received for publication September 25, 2024; accepted May 6, 2025.

DOI: 10.1097/GOX.0000000000006906

Fig. 1. Local status.

SURGICAL TECHNIQUE

Upon revision of the detached tissues, the following was identified: a fragment on the right side extending to the conditionally intact facial artery at the level of the lower mid-third of the nasolabial fold. The only present vein was the angular vein in the area of the upper part of the transplant; no vessels were identified on the left side of the flap, and conditions for anastomosis were lacking.

The left artery and vein were located in the wound bed, not connected to the fragment bitten by the dog. The right angular vein was visualized, with a diameter of 0.4 mm. The right facial artery was identified within the soft tissues and mobilized for transposition, with a diameter of 0.4 mm.

Blood flow was present upon clamping. Microsurgical reanastomosis of the artery was performed. The vessels were prepared for anastomosis. An arterial anastomosis was performed end-to-end between 2 fragments of the right facial artery with interrupted sutures. Blood flow was restored. Bleeding from the upper lip artery was noted, and indirect signs of flap reperfusion were observed. Venous anastomosis for further observation was performed. The venous anastomosis was made end to end between 2 fragments of the right angular vein (0.5 mm in diameter). Blood flow was initiated, with pulsation in the artery and filled vein. Hemostasis was achieved. Wound cleansing was done, hemostasis control was performed, and mucous membrane sutures of the oral cavity were placed. Mucous membrane and nasal septum sutures of the right and left nasal cavities were made.

The detached soft tissue fragment was fixed in 2 layers, congruently restoring the posttraumatic tissue deficit. The skin was sutured. Ultrasound monitoring of blood supply was conducted, indicating adequate blood perfusion of the flap. Silicone tubes were inserted into the right and left nasal passages and secured. An aseptic dressing was applied. Blood loss was up to 100 mL.

POSTOPERATIVE PERIOD

In the first 24 hours after the operation, flap massage was performed every 15 minutes, chlorhexidine gluconate antiseptic solution was applied, and the eyes were rinsed with saline. On the second day, antibiotic eye drops were administered, and flap massage continued every 30 minutes for 4 days along with antiseptic application, heparin gel, and Finalgon cream. Starting from the seventh day, flap massage was performed every 60 minutes, and signs of venous stasis were observed and treated with medicinal leech therapy once a day. Starting from the eighth day, leech therapy was performed 2–3 times a day with 1–2 leeches per flap, followed by antiseptic application. Debridement of the left cheek area and nasal septum was done. Topical application of Hebermin cream was used to promote epithelialization. Medical therapy included ceftriaxone+sulbactam and vancomycin as initial antibiotic therapy, followed by vancomycin+meropenem after the patient developed early signs of infection (body temperature >37.5°C, leukocytosis, and elevated acute phase protein levels), and heparin, omeprazole, and fluconazole. Partial necrectomy of the left cheek and glabella with skin tissue flap preservation was done on April 11. Rabies vaccination was administered. The patient received fresh frozen plasma in different volumes over several days, including 213–303 mL per day as part of transfusion therapy support.

CASE DISCUSSION

The most challenging parts in pediatric replantation are small vessel diameter, as well as small dimensions of the replanted tissues and contamination of the replant leading to potential compromised viability and infectious complications.[4] Nevertheless, the surgical team was prepared to perform the operation, as they had conducted anatomical studies and practiced facial transplants on primates at the primatology center previously.[5,6] The algorithm for assessing tissue flaps for replantation suitability includes identifying the recipient artery and vein, if possible, and evaluating the wound for the presence of donor vessels[7] (Fig. 2). One of the unfavorable prognostic factors was that the small diameter of the facial artery was not suitable for anastomosis, with only 1 angular vein available. First, it should be understood that devascularization of the flap for more than 8 hours makes replantation fundamentally

Fig. 2. Final treatment result.

impossible; therefore, every possible effort should be made to organize early patient transport to the location where the surgery will be performed. Second, replantation is impossible in the absence of a viable tissue flap containing at least 1 intact artery for revascularization. In our case, flap viability was confirmed, and the decision for replantation was made based on preoperative identification of supplying vessels.[8,9] Third, the "rule of three compartments" as well as cold support during flap transport, are undoubtedly important for flap preservation. Fourth, readiness of the medical staff to set up a microsurgical operating room at any time, as well as optimal anesthesiologic support, are clearly crucial success factors in treatment (Figs. 2, 3).

CONCLUSIONS

This case could serve as a starting point for the development of a special protocol for managing this category of patients, as the sociopsychological effects of immediate replantation of a lost body part far outweigh those of other treatment methods. In addition, immediate replantation of a subtotal facial defect, as shown by global experience, is a relatively rare option due to the risks of failure; however, this case serves as an example that could encourage surgeons worldwide not to overlook the effectiveness of replantation. In some cases, the potential risks of surgical intervention become insignificant in the face of the obvious necessity for the immediate return of the patient to society, integrating them into educational and cultural processes, which is impossible to imagine in the case of choosing a treatment method that involves long-term, multistage rehabilitation.[10]

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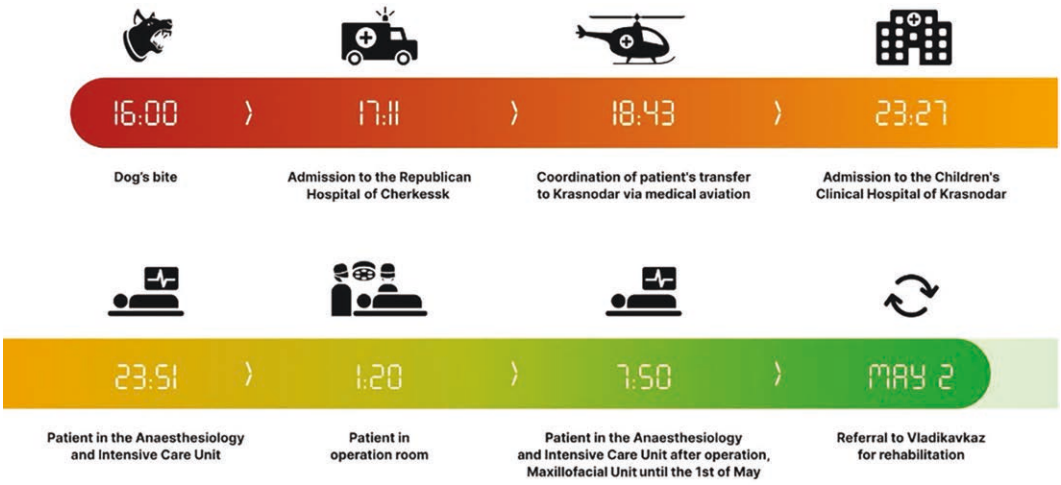

Fig. 3. Temporary scale.

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PHOTOGRAPHIC CONSENT STATEMENT

The patient's parents or guardians provided written consent for the use of the patient's image.

ACKNOWLEDGMENTS

The authors would like to thank all the study participants and staff of Children's Regional Clinical Hospital of Krasnodar for their contribution to the study.

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