








## TRANSPLANTATION METHODS FOR CORRECTION OF MANDIBULAR SOFT TISSUE DEFECTS

**Polina Zakharova** , **Daria Asatryan**  ,  
**Zinfira Kaitova** , **Valentin Popadyuk** ,  
**Vadim Trufanov**, **Elena Zheludova**,  
**Alexander Penkov** , **Andrei Skvortsov** 

Medical Institute, Peoples' Friendship University of Russia, Moscow, Russia



[download article \(pdf\)](#)



[asterdasha@mail.ru](mailto:asterdasha@mail.ru)

### ABSTRACT

**Goal:** This paper aims to identify optimal transplantation methods for correcting soft tissue defects of the face and mandible based on our medical records and study of up-to-date research literature.

**Materials and methods:** The analysis of standard transplantation procedures was carried out, as well as research of patients charts with extensive defects of the lower jaw at the department of maxillofacial surgery of a Moscow oncological hospital.

There was a comparative analysis of the following most popular methods of correction of soft tissue defects of the face and lower jaw:

1. Trapezoidal flap
2. Filatov and H.D. Gillies stem grafting
3. Deltopectoral flap
4. Thoracodorsal flap
5. Temporal parietal flap - Lexer and Esser method

**Results:** Plastic surgery with complex grafts on the neurovascular pedicle is used in the surgical treatment of injuries and diseases of the mandible, which are accompanied by deep defects in the soft tissues of the face and bones of the mandible. The most optimal methods for restoring the anatomical integrity of the mandible, which is necessary for adaptation of the patient in society, and restoration of speech and chewing functions have been identified.

**Conclusion:** Nowadays, the most common and effective methods in the world of eliminating mandibular defects by transplantation are considered to be Lexer's method (temporal parietal flap), transplantation of the deltopectoral flap, as well as thoracodorsal on feeding pedicle. The clinical researches conducted in the Moscow Oncological Hospital confirmed generally successful outcomes without complications.

**Keywords:** lower jaw, face, graft, mobile neurovascular pedicle, defect, plastic, soft tissue defects, nerve bundle, bone graft, skin-muscle-bone flap.

### INTRODUCTION

Currently, according to statistics, 14-17% of patients treated in the departments of maxillofacial surgery have extensive defects in the soft tissues of the face and lower jaw, accompanied by functional and anatomical disorders. Defects of the lower jaw are accompanied by the loss of not only bone tissues, but also soft tissues. The appearance of the patient varies depending on the localization of the affection site. At the same time, there is a violation of chewing and articulation. An aesthetic defect can be the cause of the development of a secondary neurotic reaction, therefore, the problems of medical rehabilitation should include an integrated approach [8]. It is worth noting that the principles and methods of reconstruction of the mandible have changed significantly over the years, which leads to an improvement in the quality of life for people in this category [12].

In most cases, mandibular defects are the result of injuries, gunshot injuries (comminuted fractures accompanied by bone loss), in cancer patients, due to chemotherapy (bisphosphonate necrosis) and radiation therapy (radiation osteonecrosis) [1,10]. In rare cases, mandibular defects are caused by specific infectious diseases. There are defects of the lower jaw of iatrogenic origin, which are formed when the algorithm of local and conductor anesthesia is violated [4]. According to scientists, toxic osteomyelitis more often affects the lower jaw (68% of adults and 62% of kids), which is associated with the peculiarities of blood supply.[6] Process of osteomyelitis spreads all over structural parts of bones and soft tissues surrounding it. Reconstruction of the free graft is a reasonable option even for very young children who require extensive surgery on the lower jaw.

## MATERIALS AND METHODS

The analysis of clinical surveillances of patients in Moscow City Clinical Oncological Hospital No. 1 was carried out and there also was an analysis of clinical observations on surgical treatment of this pathology with following methods: graft transplantation based on trapezoidal muscle, the use of a deltopectoral flap on the feeding pedicle for a total defect of the chin area and anterior parts of the oral cavity, restoration of lower jaw tissues with a Filatov stalk, as well as closing the defect of the lower jaw with a flap by Lexer method.

## RESULTS AND DISCUSSION

Most common approach of downsides correction is a method patented by Tatianichenko V. K. and Novgorodskiy S.V. and others. Treatment of deep disorders of the face and lower jaw is made by cutting out a myofasciocutaneous-bone graft based on the trapezius muscle. The graft includes the distal end with the skin located above it and a split section of the scapula awn and its subsequent movement to the defect area. This technique differs from others with additionally isolating from the proximal part of the muscle, leaving the neurovascular bundle intact, and cutting it off from the occipital bone. The integrity of the fascial sheath of the muscle part of the graft is restored. Then a cut-out skin-fascial-musculoskeletal-bone graft on a mobile neurovascular pedicle is unfolded at an angle from 60 to 70 degrees and layer-by-layer fixation is performed [9]. Method is applied for expansive soft tissues imperfections and is especially needed in case of osteomyelitis and gunshot wounds.

Among the indications for face plastic surgery with Filatovsky stem should be identified such as extensive non-through defects of soft tissue and cicatricial deformities of the face and neck, exit defects of the face that require recovery not only for the outer cover and the face, but also eliminate the defect of mucous membrane in the oral hygiene and also recurrent ankylosis of temporomandibular joint, etc. [2]. Nevertheless, this method is rarely used, because it is laborious, multi-step and associated with risks of morbidities. Statistics show that post-surgery complications occur quite often (after 20% of surgeries). At the same time, for some patients, it is the only technical way to restore the lost or scar-altered skin, which makes the practicing surgeon remember the features of all stages and be ready to use it according to indications [8].

Stem grafting (Filatov and H.D. Gillies method) has been a relevant way of hiding defects for over a hundred years. Among the indications for face plastic surgery with Filatovsky stem should be identified such as extensive non-through defects of soft tissue and cicatricial deformities of the face and neck, exit defects of the face that require recovery not only for the outer cover and the face, but also eliminate the defect of mucous membrane in the oral hygiene and also recurrent ankylosis of temporomandibular joint, etc. [2]. Nevertheless, this method is rarely used, because it is laborious, multi-step and associated with risks of morbidities. Statistics show that post-surgery complications occur quite often (after 20% of surgeries). We reviewed a clinical case from year 2009, in which patient had a total disorder of temporomandibular area after car crash. Two transplants were used (from the anterior abdominal wall to the dorslim of hand, from the underarm area to the ulnar eminence of wrist). Ingrafting was completed in 2 stages. As a result, disorder was resolved, language function was reclaimed and patient could

recover himself in a social environment.

In case of total disorder of the chin area and anterior parts of the oral floor, most suited method is to use a deltopectoral flap [3]. Flaps are formed for the outer and inner lining of the defect of the lower lip and the bottom of the oral cavity. The method is widely used and successful in the treatment of lower jaw pathologies. Case review under Moscow City Clinical Oncological Hospital No. 1 showed no post-surgery complications apparently due to the absence of orostoma at the stages of surgical interventions. The patient underwent rehabilitation until the speech and chewing functions were fully restored.

Nowadays, a widely used method of correction for total defects in the soft tissues of the lower jaw is the thoracodorsal flap's method [4].

This method is more frequently applied for remodelling lower jaw after excision in case of tumor involvement. The presence of a well-defined nerve trunk of the thoracodorsal flap allows performing microsurgical anastomoses with the facial nerve, and after block removal of the tissues of the lateral surface of the face with the preservation of the central part of the facial nerve, it is possible to simultaneously replace the extensive defect. The muscle is placed in the formed subcutaneous tunnel, preserving a small piece of skin near the central pedicle, which allows monitoring the viability of the flap and serves as an additional plastic material [5].

Extensive experience in using this method with a rib has also identified a number of disadvantages. In some cases, suppuration and microcirculatory disorders were detected along the periphery of the skin islet of the flap. The following measures have been taken to improve: rib fabrication as part of the flap, deepidermization of skin's edges "island" of the graft, the creation of additional intravascular microanastomoses. According to case review in Moscow City Clinical Oncological Hospital No. 8, 35 out of 36 patients revealed a tumor-like formation with germination into the lower jaw from surrounding tissues. In 100% of cases (36 patients), the soft tissue part of the graft was completely implanted, in 82% all components of the graft were implanted, 5 ribs were necrotic due to suppuration. No significant complications and functional disorders were detected [4]. According to the statistics of Moscow City Clinical Oncological Hospital No. 1, thoracodorsal flap is one of the most frequently used in reconstructive surgery.

In recent years, the Lexer's method has been significantly changed and improved and is more often used in combination with other methods (Esser, etc.). The technique is provided for the plasty of extensive facial disorders. The operation is recommended to be performed under anesthesia with simultaneous blood transfusion and with the use of a Heydenhain suture, since it is very traumatic and is accompanied by profuse bleeding from incisions on the head [2]. Case review in maxillofacial surgery's department of Moscow City Clinical Oncological Hospital No. 1 showed no post-surgery complications for subject with lower jaw disorder. This method is also anatomically suitable for restoring mouth floor, which gives it an edge.

These techniques help to achieve the restoration of the lower jaw as close as possible to anatomical integrity under the condition of a total defect of the face. Denervation and devascularization ensure normal articulation and restore the function of chewing.

## CONCLUSION

Thus we may conclude that lining with a flap according to Lexer's methods provides complete closure of the total defect, due to the lining of the outer cover and the oral mucosa, with extensive tumor lesion. The use of deltopectoral flap makes it possible to eliminate a through defect in the tissues of the oral cavity, chin, lower lip, inner and outer surfaces of the lower jaw. Thoracodorsal flap is used for extensive defects with significant soft tissue deficiency and deep bone damage, while obtaining the best aesthetic and functional results. These methods help to hide the extensive defect of the lower jaw, which gives a possibility for social adaptation.

## REFERENCES:

1. Abakarova S. I. Orthopedic treatment of defects and deformities of the maxillofacial region. 2017, p. 32.
2. Alexandrov N. M. Clinical operative maxillofacial surgery. 1985, pp. 180-183.
3. Arzhantsev P, Vissarionov V. A., Davydov B. N. ed. Nerobeeva A. I., Plotnikova N. A. A guide for doctors. 1997, p. 288.
4. Kalakutskii N.V. Bone grafting of the lower jaw with vascularized autografts. 2004. Pp 6-8

5. Nerobeev A. I., Karayan A. S. The use of a skin-fascial-bone flap with the inclusion of the tibia to close the combined defects of the lower facial area. 1998, no. 3, pp. 54-63.
6. Nerobeev A. I., Plotnikov N. A. Reconstructive surgery of soft tissues of the maxillofacial area. 1997, pp. 37-38.
7. Novgorodsky S. V. Plastic surgery with complex grafts on a mobile neurovascular pedicle in surgery of the lower jaw. 1999, pp. 60-95.
8. Oleinik N. P. Defects of the lower jaw. 2020, p. 3.
9. Polyakov A.V., Bogdanov S. B., Savchenko Yu. P., Fomenko Yu. M. Relevance of the use of the Filatov stem in the surgical treatment of patients with wounds and scar deformities of the skin. 2017, p. 47.
10. Tatianichenko V. K., Novgorodsky S. V., Maksyukov S. U. Method of treatment of deep defects of the face and lower jaw. 1999, pp. 4-7.
11. Tereshchuk S.V., M.M. Rasulov. Modern techniques of reconstructive operations on the lower jaw. Medicina i vysokie tehnologii – Medicine and high technology, 2016, pp. 31-36.
12. Benoit M.McK., Vargas S.O., Bhattacharyya N. et al. The presentation and management of mandibular tumors in the pediatric population // Laryngoscope. 2013. Vol. 123. P. 2035–2042. DOI: [10.1002/lary.24020](https://doi.org/10.1002/lary.24020)
13. Goh BT, Lee S, Tideman H, Stoelinga PJW. Mandibular reconstruction in adults: a review. Int. J. Maxillofacial oral cavity. Surgeon, 2008, 37, pp. 597-605. DOI: [10.1016/j.ijom.2008.03.002](https://doi.org/10.1016/j.ijom.2008.03.002)
14. Brown, Emile N. M.D.; Dorafshar, Amir H. M.B.Ch.B.; Bojovic, Branko M.D. Total Face, Double Jaw, and Tongue Transplant Simulation. A Cadaveric Study Using Computer-Assisted Techniques. 2012. DOI: [10.1097/PRS.0b013e318262f2c9](https://doi.org/10.1097/PRS.0b013e318262f2c9)
15. Petrov BD. Myoplasty in chronic osteomyelitis and other postoperative defects of the lower jaw. Higher Medical Institute, Department of Oral and Maxillofacial Surgery, Faculty of Stomatology, 24 Veliko Tarnovo St., 4000 Plovdiv, Bulgaria. 2000

[back](#)