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КАФЕДРА ЧЕЛЮСТНО-ЛИЦЕВОЙ ХИРУРГИИ

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СВОБОДНАЯ ПЕРЕСАДКА ТКАНЕЙ В ХИРУРГИИ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ

MAXILLOFACIAL RECONSTRUCTIVE SURGERY BY USING TISSUE TRANSPLANTATION

Минск БГМУ 2019

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Содержит план изучения темы и современную информацию по диагностике, клинической картине, лечению дефектов и деформаций челюстно-лицевой области.

Предназначено для студентов 5-го курса медицинского факультета иностранных учащихся, обучающихся на английском языке по специальности «Стоматология».

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Motivational characteristics of the topic

The topic of the lesson: “Maxillofacial reconstructive surgery by using tissue transplantation".

Total Lesson Time: 315 minutes.

Free skin grafting is one of the most common types of free transfer of plastic material duringreconstructive and reconstructive operations on the face, mouth and neck in modern maxillofacial surgery, free transplant of fascia, fatty tissue, cartilage and bone tissue in the form of auto- and allogeneic transplants, revascularized complexes fabrics for elimination of difficult and volume defects and deformations.

Knowledge of graft types, indications for the use of free transplantation of tissues to compensate for defects and deformations of the maxillofacial region, the basic operational and technical principles and stages surgical interventions will allow the student and the doctor to choose the optimal tactics in the diagnosis, treatment and rehabilitation of patients with this pathology. When studying the topic of classes should be a special attention focus on clinical, supplementary, radiological and special examination, diagnosis and analysis of congenital and acquired defects and deformities of the face and neck, the elimination of which should be carried out using free tissue grafting. When studying this topic, students also need to have an idea about the main historical stages of the development of transplantology, as a section of maxillofacial plastic surgery.

The purpose of the lesson: to acquaint students with the main types of transplants, indications for their use, biological principles transplantology in maxillofacial surgery; train the analysis of defects and deformities of the face and neck with the preparation of a plan for a phased surgical treatment based on the operational and technical principles of reconstructive and reconstructive surgery of the maxillofacial areawith the use of free grafts of the main types of tissue.

Tasks of the lesson:

1. To acquaint students with the main types of transplants used in oral and maxillofacial surgery, depending on their origin and antigenic properties.

2. To teach students the basic skills of properly conducting analysis of the defect or deformity of the face and neck, comparing the resulting clinical symptoms with additional and special data examination methods to determine indications and contraindications to plastic with the use of free transplantation of the main types of tissue.

3. To study the basic operational and technical principles and stages reconstructive and reconstructive surgery of the maxillofacial area using free graft of the main types of tissues (dermis, bone, cartilage, fatty tissue, fascia, revascularized tissue complexes) with the definition of adequate zones of donor sites.

4. Teach students to plan preoperative preparation patients with defects and deformities of the maxillofacial area and neck and rehabilitation activities after surgeries using free tissue grafting.

Requirements for the initial level of knowledge. For full learning the topics need to be repeated from the following sections:

1. human morphology:

– topographic-anatomical and histological structure of tissues maxillofacial area and neck;

– features of blood supply and innervation of tissues of the maxillofacial region and neck;

2. maxillofacial surgery:

– examination of a patient with maxillofacial pathology;

3. human physiology:

– features of reparative-regenerative mechanisms of wound healing.

Test questions from related disciplines:

1. Features of the histological structure of the skin of the face and oral mucosa.

2. Features of the histological structure of the jaws.

3. The main anatomical structures of blood supply and innervation of the maxillofacial area and neck.

4. Methods of objective examination used to diagnose defects and deformities of the face and neck.

5. Additional methods of examination for the diagnosis of defects and deformations of the face and neck.

6. The main special methods of examination for diagnosis defects and deformities of the face and neck.

7. Physiological features affecting the reparative-regenerative potential of the tissues of the maxillofacial area and neck.

Test questions on the topic of classes:

1. Definition of the term "graft".

2. Tissue used as grafts in modern maxillofacial surgery.

3. The main types of transplants, depending on the origin and antigenic properties.

4. Basic indications for free skin grafts in the maxillofacial region.

5. The main types of dermotransplants depending on the thickness collected layer of the dermis, their basic biological properties.

6. Periods of biological restructuring processes in freely transplanted skin autografts, their essence.

7. Operational and technical principles of skin transplantation.

8. Basic operational techniques and stages of derotransplantation.

9. Conditions necessary for the prevention of complications in skin graft transplantation.

10. Basic indications for bone grafting.

11. Bone grafting, depending on the timing.

12. Types of transplants in modern maxillofacial surgery, used to replace bone defects.

13. Biological basis of free bone graft.

14. Basic operational and technical principles and stages of bone plastics of the lower jaw using autografts.

15. Features of osteoplasty of the lower jaw using allografts.

16. The main methods of preservation of bone allografts.

17. Definition of the term “angiosomes”.

18. Types of grafts on the microvascular anastomosis, which are most common.

19. Tissue complexes that include grafts on microvascular anastomosis.

20. Contraindications to free transplantation of revascularized tissues.

21. Equipment required for microsurgical operations with transplantation of free revascularized complexes tissues.

22. Basic operational and technical principles and stages of operations maxillofacial tissue transplantation using microvascular anastomoses.

23. Possible complications with the imposition of a vascular anastomosis.

24. Features of the postoperative period and rehabilitation of patients with transplantation of tissues of the maxillofacial area using microvascular anastomoses.

25. Basic indications for free cartilage transplantation.

26. Biological features of cartilage tissue in humans that are important for its transplantation.

27. The main donor areas for the collection of autohrist grafts, used in plastic restoration operations.

28. Basic operational and technical principles and stages of autotransplantation of costal cartilage.

29. Indications for free transplantation of fatty autograft.

30. Biological features of adipose tissue used as a transplant material.

31. The basic principles and stages of free fat transferautograft.

32. The main indications for lipofilling.

33. The basic principles and stages of lipofilling.

34. Indications for free transplant fascial autograft.

35. Biological features of fascial tissue used as a transplant material.

36. The basic principles and stages of free transplant fascial autograft.

Definition
The main types of transplantation

Free organ and tissue transplantation (**transplantation**) widely presented in modern maxillofacial surgery. It is used to eliminate complex extensive defects, deformations of the face and neck and can be combined with plastic grafts on the feeding leg, and with local plastic surgery.

Thanks to the accumulated experience of previous generations of plastic surgeons, in-depth study of the biological basis and principles of tissue trans-

plantation, the improvement of operational and technical methods, development and use of modern tools, complex technological and operating systems (including using microsurgical, optical, computer, genetic engineering, nano- and biotechnology), advances in pharmacology and the provision of all stages of surgical rehabilitation treatment, currently time during transplantation in order to eliminate defects and deformities virtually any tissue can be used, taking into account the principle of organotypicality (skin, fascia, fatty tissue, muscles, nerves, blood vessels, cartilage, bone, mucous membrane, hair follicles, etc.) as in the form mono-tissue, and in the form of complex combinations, up to the transplantation of certain organs and tissues of the maxillofacial region with a single anatomofunctional block or in the form of a cloned biotissue. At the same time, it is necessary to evaluate the possibility of adequate choice donor source and sufficient amount of transplantation material, taking into account its antigenic and biological properties.

Advances in materials science and biotechnology have significantly expanded the range of organic and inorganic materials, as well as their composites, which can be used as implant material in maxillofacial surgery.

Transplants are called a formed array of tissues (soft or supporting) or an organ that has lost its nourishing connection with the area or place of harvesting. The area in which the transplant is transferred is called the recipient.

Depending on the origin and antigenic properties of the graft used, there are:

1. **Autotransplantation** — transplantation of the patient's own tissues or organs (at the same time, he is also a donor, and recipient) taken from one (donor) site and transplanted to other (recipient in the maxillofacial region) or cloned from auto cells based on relevant bionanotechnologies.

At the same time, there are differences in the antigenic structure of the graft tissue there are no donor and recipient sites, which contributes to engraftment and adaptation of the graft in the new conditions of life.

2. **Isotransplantation** — the transplantation of tissues or organs from an organism from one genetically identical twin to another.

At the same time, there are differences in the antigenic structure of the graft tissue donor and recipient sites also not.

3. **Allotransplantation** — the transfer of tissues or organs from an organism from one genetically different individual to another of the same biological species.

At the same time, it is necessary to take into account differences in the antigenic structure donor and recipient transplant tissues and carry out the necessary arrangements for the collection, subsequent storage, preoperative preparation and postoperative protection of such transplants, including and using the necessary pharmacological agents (immunosuppressors), which reduces the risk of their rejection and promotes engraftment and adaptation of the graft in the new conditions of life.

The types of allotransplantation include:

– **allovital transplantation** — viable transplantation allograft, which is engrafted in the body of the recipient and retains its vital activity and function (for example: kidney, heart, liver, lungs, pancreas, bone marrow);

– **allostatic transplantation** — transplantation of a non-viable allograft whose tissues are not engrafted in the body recipient, and serve as a framework of the restored organ and as the resorption is replaced by similar organ-like tissues recipient (for example: lyophilized or fresh frozen cartilage and bone, fascia);

– **xenotransplantation** — transplantation of tissues or organs from the body of an individual of one biological species to an individual of another biological species.

At the same time, significant differences in the antigenic structure of the tissues of the donor and the recipient of such transplants, even with the use of a pharmacological cover, do not currently allow their long-term life support.

– **implantation** — use of transplants from artificial organic, inorganic and composite materials (metal, plastic, ceramics, etc.).

However, depending on the chemical structure, they can biodegrade (dissolve), being replaced by the recipient's tissues, rendering as a rule, a stimulating effect on such a process (for example, hydroxyapatite, calcium phosphate ceramics); encapsulate (for example, plastics) can be bioinert (therefore, durable in use: for example, titanium, gold) to the tissues of the body of the recipient.

Definition
The main types of transplantation

The first official report on successful skin transplantation belongs to J.-L. Reverden (J.-L. Reverdin), in 1869 published results of transplantation of circular islets of skin with a diameter of 3–4 mm, taken with a scalpel and transplanted onto a granulating wound in the chest.

In 1938, Pedgett's surgeon and Hood engineer used a drum dermat designed by them with adjustable depth of movement blades for skin grafts, after which free skin grafts have found wide application in clinical practice in domestic surgery, the first followers in the free skin transplants were S. M. Yanovich-Chainsky and A. S. Yatsenko (1871).

Indications for free skin grafts:

1) the presence of an extensive fresh or granulating wound, which it is impossible to cover with local tissue or patches;
2) significant atrophy of the alveolar process and the associated the need to deepen the vestibule of the mouth to ensure better fixation of the removable plate prosthesis;
3) the presence of extensive scars of the oral mucosa;
4) extensive wounds in the mouth after resection of the upper jaw;

5) synechiae after inflammatory processes, as well as post-traumatic in the nasal passages and nasopharynx;

6) epidermization of the wound surfaces of flaps with uranostaphiloplasty, otoplasty, blepharoplasty and the formation of other duplicate flaps;

7) extensive post-traumatic deep scars or post-burn scars on the face and neck;

8) skin transplantation using submersible methods skin plastics in maxillofacial reconstructive surgery, skin grafts of different thickness are used, which, depending on the thickness the collected dermis layer Yu. K. Janelidze proposed to classify in the following way.

Properties and characteristics of autodermal transplants:

1. Thin dermatoepithelial graft by Tirsh (0.2–0.4 mm) takes root better than others; prone to severe wrinkling, the wound of the donor site heals independently and quickly; after 4 months from this the donor site can re-pick up the graft; does not give growth hair.

2. A split Blaur – Brown graft (0.5–0.6 mm) takes root somewhat worse than a thin one; does not give hair growth; subject to less wrinkling than thin; the wound of the donor site heals independently; in 4–6 months graft can be re-taken from this donor site.

3. Paget's graft is three-quarters of skin thickness (0.6– 0.7 mm) survives worse than thin and split; can give single hair growth; prone to less shrinking than thin and split; the wound of the donor site heals on its own, but longer than the previous ones; after 6 months graft can be re-taken from this donor site.

4. A transplant consisting entirely of all layers of the skin without fiber (0.8–1 mm) survives the worst of all and is therefore limited in size; gives hair growth; retains the original color; subject to the least wrinkling; donor site wound does not heal on its own and requires plastic closure.

Biological basics of free skin grafting

Freely transplanted skin autografts occur regular restructuring processes in which three period:

– **the adaptation period**, which lasts two days; it has place avascular food autograft; epidermis and partially papillary dermis necrotic;

– **the beginning of the period of regeneration** coincides with the beginning of transplant revascularization, which is observed already from the 3rd day and lasts until the end of the 2nd, and sometimes the 3rd month. The regeneration period ends with the restoration (in general) of the structures characteristic of the skin. Most active regeneration processes take place between the 5th and 10th day;

– **the period of stabilization** of the autograft begins from the 3rd month after transplantation and is characterized by slow processes improve-

ment of the organ features of the skin, as a result transplantation regeneration has not yet achieved the full restoration of all its organ-specific structures.

Functionally, the skin becomes a complete coat only after reinnervation, which in most cases of transplantation of full-layer and split flaps first appears on the periphery of the flap.

The first is restored pain, then tactile, later — temperature sensitivity; sometimes pain and tactile sensations are restored at the same time. Thinner skin grafts take root better than thick ones; with their transplantation less frequently observed complications.

Operational and technical rules for skin transplantation in maxillofacial surgery:

1. Conducting a general strengthening treatment of the patient in the preoperative period.

2. Careful preparation of the wound surface, which is supposed to transplant the skin: excision of scar tissue, hemostasis and leveling the surface without the formation of cavities and protrusions.

3. Removal from a full-layer autodermal graft subcutaneous fatty tissue, which prevents the skin from sticking to the wound and delays their healing.

4. Skin grafts transplanted into the oral cavity should to be, as a rule, thinner, i.e. without connective tissue. Such grafts take root much faster and stronger; if the transplanted skin graft will subsequently experience pressure (for example, a prosthesis), it is necessary that it be thicker (split).

5. The transplanted skin graft should be of the same thickness, i.e. it should be cut off in one layer. This is important for obtaining an even shade of skin graft after it has been engraved on the face.

6. When grafting skin into the oral cavity, on the nose or forehead, the possibility of hair growth on it should be considered. It is necessary to apply thin split or epidermal transplants.

7. When transplanting several grafts should not be left there are gaps between them, because after their engraftment, the skin takes on a marble look.

8. Transplanted skin graft must be provided conditions of complete rest for 10–12 days with the creation of adequate (physiological) pressure on it.

Operational techniques and stages of dermotransplantation in maxillofacial surgery:

1. First, anesthesia is performed on the zone of the recipient region in the maxillofacial region, after which the recipient region is prepared: refresh the edges and bottom of the defect or deformity with careful hemostasis wound surface of the perceiving bed. Further, following the rules asepsis, the size and shape of the wound surface of the recipient site transferred to cellophane or washed celluloid film (stencil).

2. Putting the stencil on the donor area of the skin (from the point of view of organotype such most acceptable areas are: region; the inner surface of the shoulder or thigh), delineate stencil contours.

3. Anesthesia of the donor site is performed (infiltration or general anesthesia).

4. Then a skin graft is collected from the donor site small sizes (by hand using a scalpel or using a special dermatomatic knife), large and small sizes (using glue or electro- or pneumodermatomas). After that on the wound the surface of a large donor site is applied with antibiotic ointment and a dressing of two layers of gauze for a day. The next day, the upper layer is changed, and in the future, gauze is lifted and trimmed edges as wound epithelialization. Small wounds of donor sites, as well as wounds after the collection of full-layer dermotransplants can sew or by bringing together their mobilized edges, or other local plastic surgery procedures.

5. Then the skin graft from the donor soil is transferred to the recipient wound surface using thin ligature tapes stitched through the edges of the graft, and hemmed to the edges of the wound of the perceiving bed along its perimeter in the physiological position tension of graft tissue. After impose tiled bandage of gauze beads and napkins, providing pressure on transplant, which is changed the next day and completely removed not earlier than 10–12 days after surgery.

6. When transplanting a skin graft into the oral cavity to ensure physiological pressure rollers are made of stencil wrapped a layer of gauze soaked in iodoform.

7. To increase the likelihood of free autograft grafting in the first 1–2 days after surgery, local hypothermia and oxygenation of tissues, soaking the dressings over the graft with 3 % or 6 % solutions of hydrogen peroxide with glycerin.

To prevent complications in skin graft transplantation, the following conditions must be observed:

– thorough preparation of the receiving bed;
– atraumatic technique of graft sampling;
– its fast transfer to the wound recipient bed;
– good physiological fixation of the graft to the edges and the wound bed;
– thorough postoperative care and active antibacterial therapy for 7–10 days after surgery.

Free bone graft in maxillofacial surgery

The first mention of free bone graft in the maxillofacial area dates back to 1900, when a Russian surgeon V. M. Zykov to replace a defect in the anterior part of the lower jaw used bone graft taken from the anterior section transplanted to the area of the defect. Ends grafts were placed in grooves made in fragments lower jaw indications for osteoplasty in maxillofacial.

Surgery is as follows:

1) a defect of the maxillary (most often the mandibular) bone in violation of its contours or continuity;

2) functionally significant defects and deformations of the zygomatic bones, nasal bones, hard palate;

3) pronounced atrophy or defects of the alveolar processes of the jaws, which do not allow for adequate orthopedic prosthetics without prior surgical increase in their height (augmentation) and thickness.

Currently, the most common bone grafting is carried out in the lower jaw.

Depending on the timing of the distinguish primary (bone the defect is replaced immediately after its formation due to severe injury, removal of the tumor or tumor-like formation of the lower jaw) and secondary bone grafting (the bone defect is replaced no earlier than 6–8 months after its formation, while in the area of the ends the defect is already forming a locking cortical plate).

In modern oral and maxillofacial surgery to replace bone defects using the following types of transplants:

– **autografts** — transplantation of own bone tissue, taken from donor areas of the patient's body or based on bionanotechnology based on the cloning of autococci;

– **allografts** — bone graft from one person to another (including orthotopic, that is, from a similar organ donor);

– **implants** — use to replace bone defects organic, inorganic and composite materials with physicochemical properties close to the facial tissues of the face (bioinert metals, plastics, ceramics, etc.).

Biological basis of bone graft

Engraftment of the bone graft occurs as a result of its remodeling and resorption processes. The rate and volume of such a resorption may depend on the size, quality, biomechanical properties and reliability of fixation of bone graft to the bone of the perceiver bed. Transplanted bone graft causes irritation tissue cells of the perceiving bed, thus the bone graft adapts to new conditions.

Bone graft replacement is also closely related to the process its revascularization. At the same time, increased vascularization is observed in the area around the graft. In the early stages of the transplant angioblast proliferation and capillary growth also occur. Growth Vessels occur within the first week after bone grafting. Together with the vessels, cells and substances penetrate the transplant necessary for the formation of new bone and replacement of resorbed. Osteoclasts detected in early stages resorb bone from the periphery of the transplant, which is gradually being replaced, and new bone is formed both on its periphery and inside. After complete replacement of the graft (within 3–6 months) of the newly formed bone hypervascularization disappears.

Three mechanisms are involved in the restructuring of the bone graft: osteogenesis, osteoinduction and osteoconduction. The value of each of them is depends a lot on the type of bone material and conditions in the host bed.

Osteogenic is a bone material that has viable osteoblasts (osteogenic cells) that are the source new bone. Some bone grafts are known (for example, the iliac crest) with a relatively high bone marrow content has more pronounced osteogenic properties it due to a significant number of undifferentiated cells. **Osteoinduction** is the property of bone material to activate the surrounding tissues by acting on them by signaling factors that stimulate osteoclast activity and the formation of new bone. **Osteoinduction** is believed to be characteristic of fresh bone grafts. Relatively recently, human recombinant was synthesized bone morphogenetic protein (pe-KMP; rh-BMP), inducing bone formation. **Osteoconduction** refers to the property of bone material to serve as a kind of scaffold or physical matrix for undifferentiated mesenchymal cells that penetrate into graft and form a new bone. Thus after 15 days after transplantation the process of partial resorption of the graft that reaches its maximum by the end of the second month. At the same time, the cells that create the new bone, including in the structure of the transplant. There is a regeneration of the bone with its remodeling (after about 6 months).

Morphological changes in lyophilized allo-and autografts are similar. The difference lies in the speed and usefulness of replacing the graft with a newly formed bone. Much faster and more complete restructuring occurs in autogenous bone tissue, where by the 16^{th} week after transplantation, mainly completing the process of its replacement and regeneration is underway. In lyophilized bone assimilation is slower and less complete: only by the 24^{th} a week in it there are such reparative processes, which are observed in autosocity already on the 16^{th} week.

When a defect is replaced by an orthotopic lyophilized allograft by the 12th week, it is partially replaced by a newly formed lamellar bone appearing along the dilated vascular canals and on old boneless stems. Through 26–35 weeks after surgery, the graft is almost completely replaced regenerator, and after 44–52 weeks the structure of the latter is similar the structure of the recipient's jaw (A. A. Nikitin, Yu. B. Zolotareva, 1979).

Along with this, it has been established that the shelf life of freeze-dried allograft has no effect on restructuring processes.

Operational and technical principles and stages of osteoplasty of the lower jaw using autografts

It is most advisable to perform the operation by two teams of surgeons (2–3 people each). In this case, one team prepares a receptive bed in the zone of the mandible defect, and the second carries out transplant intake, after which the wound is sutured in the area of the donor site (зшс 1–9).

Proper formation of the perceiving box. This stage implies the absence of dead and coarse cicatricial tissues in the area of the bone defect, sclerotic bone tissue at the ends of the fragments and the presence of a sufficient

number of well-supplied soft tissues to cover (wrap) bone graft. From the correctness of the formation of the perceiving box in which it will be placed transplant, depends largely on the success of the operation. In addition, the receptive bed (and therefore the graft itself) must be carefully isolated from the oral cavity. For this impose one row stitches on the wound of the oral mucosa and at least one more a row — on submucous soft tissues. An important condition for the successful outcome of bone grafting is adequate treatment of the end sections of the jaw defect: with the help of a drill and bone cutters, they are refreshed with the exposure spongy substance and create a congruent surface for subsequent contact with the graft on the type of lock-case butt or pad. The jaw fragments are fixed in the correct position and the ruler determines the size of the defect, they are reported to the second brigade, which this time should provide access to the bone in the donor site.

Selection of the donor site and the collection of bone autograft.

This operation is carried out on the basis of the size and shape of the eliminated defect of the jaw bone. With a defect in the chin area, it is recommended to use a graft from the iliac crest (usuallyon the left), which is better in thickness than the rib graft. For plastics in the area of the defect of the body of the mandible or its branches you can use the bone fragment of the rib (V, VI or VII more often on the right), iliac crest or fragment of the fibula. For the contour plastic of the zygomatic bones, the bones of the nose and the hard palate today use split bone autografts from the parietal and temporal bones of the skull. For replenishment of relatively small cavity bone defects of the jaws or to increase the volume of the alveolar process, split cortical or cortical-spongy autografts from the outer surface of a branch or chin of the mandible concerning. Operative access for bone autograft is performed taking into account the selected donor site, followed by suturing wounds of the donor area.

Graft fixation. Favorable outcome of osteoplastic surgery will be ensured by correct fixation in the area of the receptive bed to the ends of the jaw defect. Now with this the goal is to use the method of trans-focal osteosynthesis with a system of miniplates from monolithic or composite titanium, which ensures stable rigid fixation of the entire transplantation zone and bone fragments for a long period of time (according to indications and extrafocal instrumental osteosynthesis method).

Additionally, it is possible to immobilize the osteoplasty zone i tires with maxillary traction (if there is sufficient the number of teeth on the bone fragments of the jaw), the teeth-supragingival (Vankevich tire) or supragingival tires (Port tire) with partial or full edentulous jaws.

Feeding stored periosteum, cavity floor muscles the mouth, wrapping them with a graft, to a fixed bone graft.

This stage improves nutrition and increases the degree of engraft his new conditions. Subsequently, the external wound in layers sewn up.

Postoperative treatment of a patient undergoing autoplasty mandible, includes the necessary activities aimed at prevention of various kinds of complications (hematoma, pneumonia, peritonitis, suppuration, osteomyelitis, graft disease, etc.) in the recipient and donor areas.

Features of the bone of the lower jaw plastics using allografts

At the present stage, the prevalence among the population of such infections like HIV, hepatitis C with the potential for infection of donor transplantation material imposes certain restrictions on the use of allografts, including and in maxillofacial surgery. They are replaced by the current direction of modern genetic engineering for the creation of cloned auto-tissue biotissues (in perspective, and tissues of other organs and systems, including the maxillofacial region), the achievements in which contribute to the further development of transplantation of organs and tissues of the human body. However, in some situations, the use of bone allografts in maxillofacial surgery remains valid for allosteoplasty in the maxillofacial region can be used fresh frozen or canned donor (formalinized or lyophilized — frozen and dried in vacuum) lower jaw, iliac crest, rib, femoral or tibia. At the same time, strict legal requirements must be observed. Of the Republic of Belarus on the transplantation and use of donor organs and tissues, laboratory diagnostics to identify potentially contaminated donor material and its rejection, conservation and storage of donor material, its documentary marking and further use in practical surgery.

N. A. Plotnikov (1967) used the method of bone grafting by the so-called lyophilized bone (Desfor, Blackstein), in which applied is the mandibular or femur bone, frozen to –70 °C and dried in vacuum at –20 °C, taken from a donor. Cold significantly reduces the antigenic properties of the graft bone ampoules can be stored at room temperature for prolonged periods time.

Cadaver bone preserved with 0.5 % formalin solution is also used. Different ways of preserving cadaveric bones give the ability to use orthotopic transplants, i.e. parts of the bone, identical in anatomical structure absent, including orthotopic mandibular graft.

N. A. Plotnikov and A. A. Nikitin (1987) also developed orthotopic transplants taken from the temporomandibular joint. They allow you to simultaneously restore not only the lower jaw, but also the joint.

Reconstructive and reconstructive osteoplastic operations on the mandible and temporomandibular joint using bone allografts are shown for the following injuries and their consequences (N. A. Plotnikov, 1986):

1. Arthroplasty of the temporomandibular joint orthotopic allograft with the head of the mandibular bone with the restoration of the elements of the joint (articular capsule and lateral pterygoid muscle):

– condylectomy (post-traumatic arthrosis or fracture of the condylar process);

– comminuted fracture of the head of the mandible;

– fracture of condylar process (intraarticular, high, oblique and old) with dislocation of the head.

2. Arthroplasty of the temporomandibular joint during removal altered condylar processes:

– fibrous ankylosis (half-joint replacement — lower floor joint);

– bone ankylosis (transplantation of a complete allogeneic joint).

3. Primary single-stage bone alloplasty:

– comminuted fracture of the lower jaw with a bone defect;

– fracture in the cyst;

– incorrectly accreted fracture of the lower jaw;

– removal of extensive sequestration in post-traumatic osteomyelitis.

4. Secondary bone grafting:

– non-accrete fractures (false joints);

– defects of the mandible no more than 5 cm in the absence of marked cicatricial changes in the soft tissues of the perceiving bone bed.

5. Combined plastics (orthotopic allograft in combination with spongy autograft) or autoplasty:

– defects from 5 cm to total.

Today non-biological materials (implants) are used, from which endoprostheses of the lower jaw and the condylar process are made: sapphire (V. I. Kutsevlyak, E. N. Ryabokon, 1995); glass, crystalline material "Biocitall" (E. U. Makhkamov et al., 1995); kergap (A. A. Timofeev, 1998); pure titanium and titanium coated with oxide aluminum (A. A. Timofeev et al., 1997, 1998); porous titanium nickelide (Yu. A. Medvedev, 1995); biocompatible osteoconductive polymers (A. I. Nerobeev et al., 1995) and others.

The positive results of the use of endoprostheses from non-biological materials allow them to be widely introduced into the maxillofacial surgery for bone plastic surgery.

Free tissue grafting using microvascular anastomosis

The era of modern plastic and reconstructive microsurgery started in 1960, when J. Jacobson and E. Suarez, using a microscope with a 25-fold increase, proved that suturing under an optical zoom does not cause a narrowing of the vessel lumen (diameter of stitched vessels — 1.5–3.2 mm).With the accumulation of experience of replantation of fingers, the development of new microsurgical instruments and the improvement of operational technology, the reliability of microanastomoses of vessels 1 mm in diameter or less has increased.

The widespread clinical use of transplants of free revascularized tissue complexes began in 1973, when an embryonic-anatomical study of blood vessels, based on research laying the vessels, migrating them to different segments of the body along with the muscles and bones formed, allowed to change the

previous ideas about the architectonics of blood circulation in the surface tissues and create a new, scientifically based concept of the distribution of arteries (R. Daniel, 1975; N. Nakajiama et al., 1986; G. Taylor and J. Pulmer, 1987).

According to the identified patterns, the route of the dermal perforating arteries depends on the ratio of the main supply stem and the deep fascia.

G. Taylor and J. Palmer, comparing the territories fed by a large artery in the superficial and deep tissues of humans, found their frequent coincidence. Tissue block (segment), including the skin, underlying deep tissues and receiving blood from a single large vessel, the authors called **angiosomes.**

All tissues removed from this body segment with preservation of the main vessel can be transferred to a new place without disturbing them blood circulation. Depending on the tasks within the angiosomal area, you can get as separate skin and fascial, skin-muscular and multicomponent skin-musculo-bone tissue. The technical equipment of microsurgical operations over the past 30 years has changed significantly, resulting in increased safety and reliability of this method of treatment.

However, not all types of complex grafts with axial blood circulation are equally acceptable for plastic surgery in head and neck.

The most common in maxillofacial surgery received the following types of grafts on **the microvascular anastomosis:**

1. Skin and fascial autografts with revascularization:
– deltoid;
– about the scapular;
– radiation;
– inguinal;
– the rear of the foot;
– temporal fascia;
– the lateral surface of the thigh.
2. Skin and muscular autografts with revascularization:
– with the broadest muscle of the back;
– thin muscle;
– big gluteus muscle;
– straight and oblique abdominal muscles;
– small pectoral muscle.

Such skin-fascial or skin-musculo-bone tissue by angiosomes can be moved to the head and neck while maintaining as a nourishing legs (i.e., in the form of flaps), and also as autografts depending on the distance between the donor area and the defect.

Such transplants may include:
– rib with the inclusion of fragments of large and small pectoral muscles;
– scapula with trapeziform fragment muscles;
– the fibula with skin-fascial area;
– the collarbone with the inclusion of sternocleidomastoid muscle;

– rib on the intercostal arteries;
– radial bone with skin-fascial flap with the forearm;
– iliac crest;
– scapular bone without muscle.

When planning a surgery with a transplant of free revascularized tissue complexes, the defect is evaluated according to the general provisions of plastic surgery. The decisive condition in favor of such method of operation is the state of the vessels near the defect. Intact arterial and venous systems of the face make it possible to perform anastomoses on virtually all branches of the external carotid artery, facial and mandibular veins. Patient's vessels must be evaluated before operation, since it is important to know the state of local blood flow in the area defect to be reconstructed. With selective angiography of the carotid artery, the level of vessel obliteration is established, the presence and suitability for anastomosing the remaining branches. Lack of suitable recipient vessels is an absolute contraindication to free transplantation of revascularized tissues. Therefore, especially care should be taken to examine patients with peripheral diseases vessels. In such cases, doppler sonography may also be indicated. With significant atherosclerotic vascular changes should be avoided the imposition of vascular anastomoses in the area of atherosclerotic plaque, and possibly even abandon this type of surgery.

Necessary equipment for microsurgical operations with transplantation of free revascularized tissue complexes

Microsurgical operations require the use of an operating microscope, special surgical instruments and sutures.

For microsurgical operations, microscopes should provide a sufficient overview of the surgical field, high contrast, a significant increase with the possibility of changing the magnification (preferably a smooth change from 4 to 40 times). It is advisable to have a microscope with a zoom control, which guarantees the accuracy of the required magnification.

There are various types of operating microscopes: monoscopes, diploscopes and triploscopes.

For microsurgical reconstructive surgeries, the most diplo-and triplesskopy, which allow adequate visual control over the course of the microsurgical phase of the operation, are convenient. In modern diplo-and triploskop has an optical divider — a device that separates the luminous flux. Part of the light flux set aside for additional eyepieces, allows the assistant to see the same as the surgeon. If possible, the microscopes are equipped with video equipment that allows you to display a picture of the surgical field on a color monitor.

Operative chairs for the surgeon and assistant are a mandatory attribute of the microsurgical operating room. Since the operation lasts several hours, the chair should be comfortable, with an obligatory emphasis for the back. The height

of the chair should be adjusted. Wheels or rollers on which the chair moves should be fixed with locking devices in order to maintain its stable position. Most microsurgeons prefer chairs with supports for the forearm and hand.

The length of the instruments may vary depending on the field of surgery in which they are used (for reconstructive plastic microsurgery — 160–180 mm). The shape of the handles should facilitate the easy movement of tools from one position to other and not to complicate the manipulation, not to close the surgical field. All microsurgical instruments should be of a matte color in order to avoid the appearance of light highlights from their surface.

The length and rigidity of the spring-loaded microtools with the acquisition of work experience must be selected individually. The main tools in the microsurgeon set are: tweezers, microneedle holders, microscissors, single and double microvascular clamps.

Important in microsurgery is the selection of suture material in the ideal case, each surgeon would like to have atraumatic needles at his disposal, which do not become blunt from re-passing through the tissue, do not bend or break. The thread should be firmly attached to the needle. For microstitches it should be of the same diameter that thread itself. In reconstructive and plastic microsurgery, it is advisable to use a thread of the smallest diameter, capable of holding the still not healed damaged tissue. It minimizes injury to the tissue during the passage of the thread during suturing. The most common sutures currently used in reconstructive and plastic surgery are produced by the following companies: Ethicon (Scotland), USSC (United States), Davis & Geck (USA), Sharpoint (USA). For the seam of a vessel with a diameter of 1 to 3.5 mm, threads 10 / 0–8 / 0 are used.

During surgery, it is advisable to monitor the patient's body temperature. A comfortable temperature should be provided in the operating room, if necessary, the patient should be actively warmed (for this, a special operating table equipped with a water-heated mattress can be used). Fluids administered to the patient intravenously also need to be preheated, since even a very small decrease in the temperature of the tissues in the area of operation can cause a significant decrease in blood flow in the revascularized tissues, up to its cessation.

Reducing the volume of circulating fluid in the patient's body can lead to reflex vasoconstriction due to irritation of the vasoreceptors of the large veins. Therefore, it is necessary to prevent and compensate for any loss of fluid during the operation before the onset of reflex vasoconstriction. To maintain water balance, it is necessary to constantly monitor the central venous pressure and diuresis in a patient. It is advisable to conduct hemodilution to maintain high volume pulsating blood flow (Gnezdilov et al., 1989).

Operational and technical principles and stages of tissue transplantation operations in the maxillofacial region using microvascular anastomoses

Plastic surgery using microvascular anastomoses is technically difficult and includes four steps:

1) preparation of the recipient bed for the transplant;
2) the formation of a graft and moving it to the area of the defect;
3) the imposition of microvascular anastomoses in the recipient area;
4) stitching the wound of the donor area, the recipient area and the edges transplant.

The steps are performed sequentially if one team of surgeons is working. If possible, use the second brigade, instructing her graft formation and stitching of the donor wound. Work in two teams significantly reduces the time of surgery, however, it is possible if the donor area is located at a significant distance from the defect — the groin area, shin, rear foot, forearm. The position of the patient on the table is also important, in which both teams can work at the same time.

Preparation of the recipient bed for the transplant. With the provision of adequate anesthesia in the area of the defect or deformity of the maxillofacial region, the receptive vessels are isolated. Evaluate the strong pressure of blood in the artery, sufficient to supply the future tissue graft. Sclerotic seals of the wall, detachment of the inner shell and friability of the middle, sometimes observed in elderly people, complicate the technique of anastomosis. The ends of the vessels excised before the appearance of intact areas. The receptive vessels are repaired by 2–3 cm, which facilitates their movement during operation with the use of optical equipment.

The first part of the operation, as a rule, takes place under visual control. The microscope is used only for coarse cicatricial changes that extend up to the vascular wall. After completing the preliminary selection of recipient vessels, prepare the perceiving wound surface, then simulate the stencil of the film according to the shape of the eliminated defect or deformation.

Formation of the graft and moving it to the area defect. During graft formation in the donor area, more attention is paid to the condition of its vascular pedicle. Insufficient length of the vessels complicate the subsequent imposition of anastomoses, so their preparation should be continued to the main vascular trunk.

Sometimes, to increase the lumen, a fragment of the main artery wall is excised at the place of discharge of the feeding branch (in some cases it is necessary to carry out plastic lengthening of the vascular pedicle with a transplant from autovenes). During the formation of the graft, capillary bleeding is controlled at its edges. At the end of the selection choose vessels suitable for stitching. If there are two arteries and the ability to use only one for the anastomosis, a large one is chosen. You can pre-conduct a functional test: clamp micro-clips

one of the trunks and after 10–15 minutes to check the change in the blood supply to the flap. On vessels, scheduled for anastomosis, impose differently shaped microclips on the artery and vein. With a long vascular pedicle, clips or a clip are placed only on the central ends of the vessels.

Clips are required for short vascular pedicle, as there are difficulties in identifying spastic vessels. The formed graft is cut, transferred to the defect or wrapped in wet napkin and placed on the table of the operating sister. Culti vessels in the donor area stitch.

If the position of the patient on the operating table does not allow to go directly to the microvascular stage of the operation in the area of the defect or deformity of the maxillofacial area, then the donor wound is sewn up, closed with a sterile dressing, give the patient the necessary position to continue working in the recipient zone. In other cases, the imposition of microvascular anastomoses in the recipient zone is carried out simultaneously with the stitching of the wound in the area of the donor site.

The imposition of microvascular anastomoses in the recipient area.

Initially, final processing of recipient vessels is carried out with microvascular surgical techniques. If there are doubts as to the suitability of the artery for adequate blood supply to the massive graft, direct observation of the force of the outflow of blood after crossing the recipient artery is performed. Sometimes the pulsation of the artery is well expressed, but the blood stream is weak or quickly stops after 1–2 s. In such a situation, it is necessary to take appropriate measures against arterial spasm: mechanical dilatation, drug exposure (use of antispasmodics, such as solutions of papaverine, no-spi, praxylene) or attach directly to the vessels of a solution of verapamil-hydrochloride.

If after the measures taken, the activity of the blood flow does not increase, it is necessary to continue the exposure of the recipient artery in the proximal direction.

Then under 8–10-fold magnification, they carefully inspect the lumen of the vessels, remove the damaged ends, and wash with saline with the addition of heparin to remove the fibrin filaments and blood cells. The vessels require very careful handling — tweezers can capture only periadventual the cloth. The adventitia itself is not removed, and the periadventrial tissue is carefully shifted and excised so that it does not interfere with the imposition of a vascular anastomosis.

The recipient arteries and veins prepared in this way are micro-clips, the previously formed graft is transferred to the area of the defect or deformity of the maxillofacial area and fixed in the correct position with several sutures by the skin or subcutaneous fat. The ends of the vessels of the graft and recipient bed as close as possible, sometimes use a bipolar clip for this purpose.

The imposition of anastomoses between the vessels of the graft and the recipient bed, as a rule, is carried out under magnification from 5 to 20 times and is carried out by a standard technique with an atraumatic round needle

with a thread 8 / 0–10 / 0 with separate knotted sutures. Per vessel with a diameter of 0.6–1.5 mm impose 8–10 seams (vessels sew with intact intima).

To ensure the restoration of adequate hemodynamics in revascularized graft tissues, overlapping end-to-end anastomosis is more advantageous; however, it is only suitable for vessels of the same diameter. If the diameter of the vessels differs by no more than 1.5–2 times, then the smaller vessel should be cut obliquely at an angle. In other cases, use an autovenous insert, reducing differences in diameter, or impose an anastomosis "end to side."

First sew vessels located more deeply, then superficial. After applying the anastomoses, the clips are removed from the artery, and after a few seconds — from the vein. The functioning of the anastomoses is determined by pulsation of the artery distal from the suture line, by the venous the outflow is also outside the sutures, by the appearing bleeding of the graft tissues and by capillary filling with pressure on the skin of the graft. The area of blanching of the graft surface, disappearing within 3 seconds, indicates a good blood supply in transplanted revascularized tissues. The absence of these signs indicates a vascular spasm or technical error. Monitoring the temperature of the skin graft also helps to assess the viability of its tissues. With adequate blood supply to a revascularized graft, the difference in its temperature compared with that of normal skin should not exceed 2 °C.

Possible complications with the imposition of a vascular anastomosis:

1. The danger of thrombosis in the anastomosis zone (most often develops during the first 20 minutes after the restoration of blood flow through the anastomosed vessels).

2. The slowed down capillary reaction of the tissue of the transplanted flap is the inadequacy of the blood flow, its cyanosis indicates the difficulty of the venous outflow. If these symptoms do not disappear in a short time, it is necessary to resect the thrombosed area of the vessels and re-anastomize.

3. Thrombosis in the anastomosis zone indicates either a gross technical error in the application of microvascular sutures, or obstruction of the inflow or outflow of blood due to bending or twisting of the vessels, squeezing them with graft tissues.

4. When applying microvascular sutures, various errors can occur:

– wrong choice of suture material;

– insufficient access to vessels and inadequate mobilization of them;

– excessive seizure of the edges of the vessel when applying a seam, which leads to a narrowing of the anastomosis zone;

– rare seams, the consequence of which is the leakage of the anastomosis;

– strong tightening of knots, which leads to the eruption of vessel walls;

– the tension of the stitched vessels also leads to the eruption of the suture and narrowing of the anastomosis line.

Sewing up the wound of the donor area, the recipient area and the edges transplant. The wound defect in the donor area is closed by the ap-

proaching and layer-by-layer suturing of the edges of the tissues mobilized after their wide dissection, or by moving the cut-off rotary leather-skin grafts, as well as by a single-step free transplant of the split dermatome autotransplant.

When hemming a revascularized graft to the edges of the wound of the recipient bed, tension or twisting of the vascular pedicle should be avoided. Under the graft, several rubber graduates are injected and an aseptic bandage is applied to the suture lines, providing physiological pressure on the tissue. It is advisable to leave the central zone of the graft surface free of a dressing for dynamic monitoring of the state of revascularized tissues.

Postoperative period

Postoperative monitoring should be as closely watched as operational monitoring. It is necessary to maintain the physiological body temperature of the patient and to ensure a balanced homeostasis of blood parameters. The first 24–48 hours after surgery, patients are in the intensive care unit or ward, where they are prescribed adequate doses of painkillers and sedatives. In addition to monitoring the patient, it is necessary to carefully monitor the condition of the graft. The surgeon or nurse on duty should constantly monitor the capillary response in the tissues of the revascularized graft. After transferring the patient to a specialized microsurgery unit, the attending physician and the team of medical personnel, who evaluate the blood circulation, will continue to monitor it and the condition of the graft temperature, capillary reaction, color and turgora of its tissues compared with similar indicators of identical tissue on the opposite side of the maxillofacial region.

Clinical observations should be supplemented by monitoring instruments operating on the basis of photoplethysmography or based on the Doppler effect.

If a thrombosis of an arterial or venous anastomosis is suspected, an urgent operation is necessary: revision of the vascular anastomosis with thrombectomy. The resulting complications need to be corrected as soon as possible while the viability of the graft tissue is still preserved. The likelihood of such complications increases in cases where difficulties are observed in the application of vascular anastomoses. Today the modern level of development of microvascular surgery not only allows for the free transplantation of revascularized auto-tissue complexes in the maxillofacial area, but also makes it possible to transplant allogeneic donor orthotopic organ and tissue complexes in the form of complex anatomically whole areas and areas of the face (France, China, USA). But not always the long-term results of such operations are successful, since their achievement requires adherence to a careful lifestyle regime, a lifelong and expensive pharmacological support for the patient.

Free transplantation of cartilage in maxillofacial region

Currently, free cartilage transplantation as a reference material is used in reconstructive maxillofacial surgery for rhinoplasty, otoplasty, facial contour surgery.

In 1890, Mangoldt first transplanted free costal cartilage during laryngeal surgery, which was a major event in plastic surgery.

Cartilage as a reference material is widespread, including during plastic operations in the maxillofacial region, since it is better to simulate it due to the characteristics of the structure and nutrition. It also survives more successfully in the recipient zone compared to previously used bone grafts.

Taking into account the principle of organotypical character of the restored tissues, the main indications for free cartilage transplantation are:

1) saddle congenital and acquired defects or deformities of the bone or cartilage sections of the dorsum of the external nose;
2) congenital and acquired through and non-through total and subtotal defects of the cartilage and skin of the tip, wings and nasal septum;
3) congenital deformity of the large prytal cartilage of the nose with their hypoplasia;
4) congenital and acquired through total and subtotal auricle defects;
5) congenital deformities of the auricle with hypoplasia of its cartilage;
6) arthroplasty of the temporomandibular joint.

The biological features of cartilage tissue in humans, which are important for its transplantation, are primarily related to the morphological structure of cartilage structure and its nutrition.

All cartilage tissues are made up of cells (chondroblasts, chondrocytes, chondroclasts) and extracellular substance. The extracellular substance is formed by the main amorphous substance and fibers. Taking into account the features of the intercellular substance, there are three types of cartilage tissue: **hyaline, elastic and fibrous.** Cartilage tissue contains 70–80 % water, 10–15 % organic matter, 4–7 % salt. Up to 70 % of the dry matter of cartilage tissue is collagen. Cartilage tissue does not contain blood vessels, its nutrition is carried out from the perchondrium. The growth of cartilage from the periphery (apposition growth) occurs due to the perchondrium. Chondrocytes located inside the cartilage are capable of division, differentiation and synthesis of the intercellular substance. Due to this, cartilage can grow from the inside (interstitial growth).

Hyaline cartilage is located at the junctions of the ribs with the sternum, in the larynx, trachea, large-caliber bronchi, on the articular surfaces; the skeleton of an embryo is formed from it. Hyaline cartilaginous tissue of various organs has a general structure, but at the same time it is different in organ specificity. This is manifested in the location of the cells and the structure of the intercellular substance. The supporting function of such cartilage is provided by the

presence of hydrophilic proteoglycans with a high level of hydration (65–85 %). At the same time, the diffusion of nutrient substances, salts, metabolites and gases.

Elastic cartilage is found in organs subjected to bending (auricle, laryngeal cartilage). Its structure is similar to hyaline, but unlike it, in the intercellular substance, in addition to hyaline fibers, there are thin elastic fibers up to 5 microns thick, going in different directions. Lipids, glycogen and chondroitin sulfates in elastic cartilage are less than in hyaline cartilage.

Fibrous cartilage is located in the intervertebral discs, semi-movable joints, tendon and ligament transition sites into hyaline cartilage. The intercellular substance of such cartilage contains parallel collagen bundles, gradually loosening and turning into hyaline cartilage. Downstream from hyaline cartilage to tendon fibrous cartilage becomes like a tendon.

The regeneration of cartilaginous tissues that have a supragrass is due to the reproduction and differentiation of chondrogenic cells and their formation of an intercellular substance. The articular cartilage does not have a pericarpus, so their regenerative abilities are reduced to the production of chondrocytes only intercellular substance.

Thus during the transplantation of cartilage tissue due to the low permeability of its matrix and the absence of blood vessels, cartilage is inaccessible to cells and factors of the immune system in the recipient zone and therefore has an low activity in the immunological aspect. You can transplant both your own cartilage (autoplasty) and donor (alloplasty). The donor zones with the highest organotypic properties for the reproducible cartilaginous tissues of the maxillofacial region are costal cartilages, quadrangular nasal septum cartilage and auricle cartilage.

Basic operational and technical principles and stages of costal cartilage autotransplantation in the maxillofacial region

Preparation of the recipient bed for cartilage autograft. The operation is carried out under adequate anesthesia with the observance of all the rules of asepsis and antisepsis where it is necessary to prepare and lift a portion of tissue for subsequent administration cartilage graft. For example, to eliminate the saddle-shaped deformity of the nasal dorsum (in this pathology, the rib cartilage transplantation is most often performed) it is necessary on it subcutaneously make a tunnel of fabrics. For this, several alternatives of the operative approach can be used, depending on the size of the deformity, the severity of cicatricial changes in the surrounding tissues: a figured incision in the tip of the nose or an endonasal incision in the upper arch of the vestibule of the nasal cavity or its partition. Through this incision using tissue preparation, a mosquito clamp or surgical scissors form a recipient bed in the form of a tissue tunnel of the required length for a future cartilage graft (the main dimensions and

shape of the graft are assessed), eliminating saddle deformation. When preparing the skin in the back of the nose, care must be taken not to perforate it, which can easily be done where it is necessary to separate the scars soldered to the bone.

The tunnel is formed as free as possible so that the graft can be easily inserted. The skin over it should not be tightly stretched, as pressure sores with tissue necrosis may appear.

Ribbed cartilaginous autograft. The cartilage is usually taken from the rib on the right side of the chest of the patient. After preparation of the surgical field, the rib cartilage collection site is planned.

Usually palpate the edge of the costal arch at the level of the nipple line. The point of intersection of two lines corresponds to the location of the cartilaginous part of the 7th and 8th ribs, which are most often taken for the transplant. Cartilage should always be taken with a certain margin so that, after subsequent modeling, the size of the graft is not less than required.

The operation begins with the exposure of the edge. To do this, make a cut above the projection of the cartilaginous part of the ribs, cut through the skin, subcutaneous tissue, aponeurosis, muscles. Then the wound is expanded with hooks; a portion of the costal cartilage intended to collect the graft is isolated from surrounding tissue with the necessary precautions for the prevention of pleural damage during subsequent excision of costal cartilage. Most surgeons prefer to take rib thickness across the entire thickness, but when a less thin layer of cartilage is required, it is possible to limit oneself to the collection of a superficially located plate of cartilage, without completely cutting it out.

After the costal cartilage is excised, the wound of the donor site is sutured in layers, and the cartilage is transferred to a separate operating table and processed, preliminarily simulating the graft (graft) required in size and shape. By several test injections into the recipient zone, cartilage is gradually finally modeled, giving it an optimal shape and size, achieving the maximum immediate functional and aesthetic result.

After modeling the cartilage autograft (grafts), it is introduced into the created tissue tunnel of the perceiving bed and, if possible, fixed to the tissues using ligature sutures. Then the wound is sutured tightly with the imposition of external fixative aseptic dressing, providing physiological rest of the graft for the entire period of its initial engraftment and adaptation.

For the successful engraftment of cartilage autograft, the general condition of the body, the absence of concomitant somatic pathology and foci of acute infection in the nasal area, the aseptic nature of the surgery, the sterility of the graft and the extent of infection during the treatment and injection under the skin, the surgeon's experience are of great importance.

Complications with a free transplant of an autocart can be observed both in the recipient zone and in the area of the donor wound in the form of inflam-

mation or suppuration. In order to prevent such complications, prophylactic antibiotic therapy is prescribed.

Wounding of the pleura can be the most serious complication during the intake of the costal autocart graft, which can be immediately recognized by the sound of air suction in the donor wound. In this case, the zone of damage to the pleura is covered with a fragment of the intercostal muscles and it is pressed against the aponeurosis sewn above it. Air suction immediately stops as the air entering the pleural space is quickly absorbed.

Modeled auto- or allohryaschevye rib grafts also should be used in otoplasty to create cartilage skeleton in eliminating total and subtotal defects of the ear.

To eliminate small defects or deformities of the cartilaginous part of the nose or auricle, the ear canal is an alternative donor site for organotypic transplant sink, size, thickness and elasticity of the cartilage graft which is sufficient for the simulation.

At the same time, in some situations, the use of donor allohryashchevyh transplants, taking into account the organotype of the restored tissues in the maxillofacial area, remains permissible. To this end, donor fresh frozen or canned (formalinized or lyophilized — frozen and vacuum-dried) rib cartilage, auricular cartilage can be used. At the same time, strict and stringent requirements for compliance with the legislation of the Republic of Belarus on transplantation and the use of donor organs and tissues, laboratory diagnostics should be observed to identify potentially contaminated donor material and its rejection, preservation and storage of donor material, its documentary labeling and further use in practical surgery.

After transplantation of donor cartilage, its adaptation in the new conditions in the recipient zone is accompanied by a gradual restructuring of allocartilage tissue with destruction of the cellular elements of cartilage, which is completed only after a year.

Free transplantation of adipose tissue in maxillofacial region

In modern restorative plastic surgery of the maxillofacial region, free adipose tissue transplantation is used to flatten facial depressions (**contour grafting**) under any conditions characterized by atrophy or post-traumatic defect of subcutaneous soft tissues after gunshot wounds, scar excision, when restoring lost facial areas, such as the submental wounds, cheeks, etc. Fat tissue transplantation is also carried out according to aesthetic indications: to eliminate age-related changes skin and subcutaneous fat, and, if desired, to change the patient's soft tissue contour of a particular part of the face. Adipose tissue is sometimes used in the surgical treatment of ankylosis of the temporomandibular joint as a spacer between osteotomized fragments of the mandibular bone during the formation of a false joint.

For the first time in world practice, transplantation of adipose tissue in the form of a holistic anatomical preparation (graft) was made by Cherni in 1896 to restore the mammary gland after its removal.

Biological features of adipose tissue used as a transplant material. Adipose tissue, as a material for plastics, is very unstable to infection and can itself be a source of suppuration, it does not tolerate injuries, it has a low viability; in the process of engraftment may be subject to undesirable changes, such as resorption, wrinkling, pronounced scarring and, consequently, a change in volume (it is necessary to take an autotransplant with an excess in excess of the eliminated tissue defect depth persons 2–3 times; the final result of such a contour correction is estimated no earlier than one year after the operation).

Therefore, in the process of transplantation of adipose tissue, it is necessary to observe the strictest aseptic, antiseptic and careful handling of such a graft: minimize its injury, do not squeeze, try not to touch it with your hands to avoid infection (to keep it in modeling, it is better to use ligature handles and tools), do not crush the graft, but transplant it with a whole layer or fragment with the adjacent fascia of the muscle or with its own layer of dermis.

In this regard, the most suitable donor zones for the collection of large masses of adipose tissue in the form of an autograft for facial contour surgery are the front wall of the abdomen and the inner surface of the thigh.

BASIC OPERATIONAL TECHNICAL PRINCIPLES AND STAGES
Free transplantation of adipose autografts
In the maxillofacial region

Surgery is carried out, as a rule, under general anesthesia. After the antiseptic treatment of the surgical field in the recipient area of the face, a small incision is started to form the subcutaneous tunnel of the perceiving wound bed to the edges of the contours of the soft tissue defect to be removed to accommodate the future fat graft. During preparation tissues should be carefully hemostasis of the wound surface of the perceiving bed in order to avoid the formation of postoperative hematomas and prevent their suppuration. Then a stencil is simulated from a transparent film, corresponding to the shape and size of the soft tissue defect to be eliminated in the maxillofacial area.

After the antiseptic preparation of the surgical field, the contours of the fabricated stencil are transferred to the surface of the skin in the donor area using a 1 % brilliant green solution. Using a scalpel, epidermization of the outer surface of the future skin-fat graft is performed (with a large area, epidermization can be performed with an electric dermatome). At the same time on the transplant there remains basically only the reticular layer of the dermis, which allows you to save the shape of the tissue array of transplanted adipose tissue as a single anatomical preparation. Then, using a scalpel along the contours, the subcutaneous fatty tissue is cut in depth and, thus, an epidermized skin-

fatty autograft is formed with the necessary thickness excess 2–3 times taking into account the inevitable partial resorption of the graft fatty tissue in the recipient zone in the process of adaptation and engraftment. To preserve the shape of the fat graft, it can be taken (through a linear skin incision in the donor area) only with the corresponding section of the wide fascia of the thigh. In this case, the outer surface of the fascial-fatty autograft formed is separated from the skin by tissue preparation.

After the epidermized skin-fatty autograft, at the edges, they are stitched onto ligature handles, transferred to the recipient area of the face, inserted into the created tissue tunnel of the perceiving bed.

Then the graft is fixed along the contours of the eliminated facial tissue defect using the same ligature tapes held transdermally on gauze rolls impregnated with iodoform composition. Such fixation is maintained for 10–11 days.

Wounds in the area of the donor site and face sew up, leaving rubber graduates for 2–3 days. They also impose aseptic dressings and prescribe a course of preventive antibiotic therapy for 7–10 days.

Lipofilling

The idea of injecting transplanted adipose tissue (**lipofilling**) in 1883 was first suggested by Neuber to replace the volume of subcutaneous soft tissue. For this, he used the fat of the back of the shoulder to correct the cosmetic defect of the face. Lexer has applied this method for correcting falling scars. In 1953, Bames proposed to enlarge the mammary glands, using the patient's own adipose tissue as a filler.

In the early stages, lipofilling was rarely used because of the unpredictability of a decrease in the amount of fat injected until it was completely resorbed. However, clinical experience and experimental data allowed us to obtain stable results.

On the basis of the obtained scientific data, an optimal technique for the collection and administration of fat was developed. In 1994, Carpaneta published data on the dependence of resorption (resorption) of transplanted fat on the volume of injected tissue. His research showed that the thickness of the fat graft should not exceed 3 mm. In the late 1990s, Aiache and other authors presented some positive results of lipofilling. Nechaev pointed out the need to wash the adipose tissue so that there was no blood on it. He reported a 40–50 % adipocyte survival rate.

In this regard, starting from the 90s of the twentieth century, this method of autodermal transplantation of adipose tissue has found wide application in aesthetic purposes not only for correcting facial wrinkles, aging hands, etc., but also for correcting contour deformations along with other radical reconstructive surgery after extensive resections in oncological practice and gross atrophic changes in traumatology and orthopedics.

The main indications for the use of lipofilling in the maxillofacial region:

– correction of nasolacrimal sulci;

– correction of nasolabial folds and deep wrinkles of the face;

– an increase in the volume of the lips, zygomatic and chin areas;

– correction of congenital, post-traumatic and postoperative defects of soft tissues of the maxillofacial region;

– use of the method in combination with other aesthetic operations in the maxillofacial region.

BASIC OPERATIONAL TECHNICAL PRINCIPLES AND STAGES
Lipofilling in the maxillofacial region

Lipofilling can be performed both on an outpatient basis, in a surgeon's office, and in a specialized in-patient department using sedatives or (if indicated) under general anesthesia.

All stages of lipofilling must be carried out strictly following the rules of asepsis and antiseptics.

Gentle fat intake in the deep fat layer. At this stage using liposuction from the donor area of the buttocks, abdomen or thighs fatty tissue is pumped out. To ensure a gentle treatment, this is done by a special cannula with a diameter of 3 mm connected to a syringe with a volume of up to 50 ml, in which a negative pressure is created with the help of a piston delay. Fat intake in the deep fat layer requires less effort, which contributes to less damage to adipocytes and less blood admixture. Preservation at the intake of tissue structure ensures the safety of both cells and extracellular mesenchymal layers responsible for the subsequent vascularization and carrying precursor cells — pre-adipocytes. The destruction of adipose tissue during normal aggressive liposuction means the release of fat (emulsion), unable to settle in the transplant zone, moreover, harmful (oil cysts, emboli). It also means the release of intracellular lytic enzymes and the launch of “self-digestion” processes in the extracted material.

Theoretically it does not matter where the adipose tissue is taken, but liposuction in the deep layer does without physical effort, as opposed to superficial.

Pre-injection treatment of adipose tissue. After the adipose tissue is pumped out by the cannula, the surgeon processes and cleans it in a special way: repeatedly rinses the adipose tissue collected with physiological solution NaCL in conditions close to anaerobic (without oxygen). Its task is to eliminate blood impurities, non-cellular fat and lytic enzymes with maximum isolation from exposure to fatty transplant of external physical factors. Sometimes adipose tissue is centrifuged before transplantation, so that it becomes liquid and is easily injected with a syringe.

Injection fat graft. This injection is performed using a cannula with a diameter of 3 mm, separate fat columns 2–4 cm long, separated by a well vascularized tissue. After surgery, an aseptic dressing is usually applied to the transplant site.

Possible complications of lipofilling:

– infection;
– an allergic reaction to anesthesia;
– bleeding;
– formation of uneven skin relief, abscess or scar formation.

If fatty tissue injections are made in several places, asymmetry may occur, resulting in unevenness in different areas of the skin. Depending on the type of complication, medical or surgical treatment may be required.

Careful adherence to the recommendations of the doctor helps to reduce the risk of their occurrence, which increases in violation of the methodological principles of lipofilling and is more often caused by:

– aggressive lipoaspiration, aimed at accelerated removal of adipose tissue, and not at the maximum atraumatic of this procedure;
– destructive methods of cleaning adipose tissue;
– ignoring the cleaning of the fat graft from damaging agents or using methods that cause its exogenous damage;
– exceeding the limits of the vascularizing capacity of the tissues of the recipient zone, massive injection of adipose tissue.

The more fully the limitations of lipofilling (the anatomical features of the transplant zone), the more effective the method.

Transplantation of the fascia in the maxillofacial region

For the first time in clinical practice, the fascia transplanted in 1909 Kirchner. In general surgery, fascia transplantation was successfully used to reinforce the suture line, hernial ring, muscle and tendon defects, and sphincter when the rectum prolapse.

In modern restorative plastic surgery of the maxillofacial region, **free fascia transplantation** may be indicated for leveling depressions on the face in any conditions characterized by atrophy or defect (congenital or acquired genesis) of a soft-tissue array; in the presence of formed atrophic scars; the combined method of dynamic myoplasty or static suspension of pendant facial tissues (eyelids, cheeks, lower lip) while eliminating the effects of paralyzed facial muscles; as well as in the surgical treatment of ankylosis of the temporomandibular joint as a fascial lining between osteotomized fragments of the mandibular bone during the formation of a false joint.

Along with autogenous, allogeneic (fresh frozen or lyophilized) fascia is used in modern plastic maxillofacial surgery.

Biological features of fascial tissue used as a transplant material. Fascial transplants, autologous and allogeneic, with free transplantation retain their original strength. The specific nature of the anatomical structure of fascial tissue, the low degree of blood supply and its innervation increase the stability of fascial grafts in the process of their adaptation to the new conditions of the recipient zone in the maxillofacial region. Immunogenic properties of fascial tissue are poorly expressed, which is important when using allogeneic transplants.

Changes in the transplanted fascia depend on the location, purpose of the transplant and the method of preserving allogenic material.

Fascial transplants transplanted into the subcutaneous fatty tissue in a state of physiological tension, slowly rearranged, being replaced by connective and adipose tissue. In the surgical treatment of ankylosis, the temporal-mandibular joint fascial grafts, used as a spacer between osteotomized fragments of the mandibular bone to form a false joint, are rebuilt slowly and are replaced by subsequent scar tissue.

Depending on the purpose of surgical treatment, autogenic fascial grafts can be used in the form of strips or fragments, while fascial fat grafts are more often used for the formation of a false joint and for facial plasty.

Allogeneic fascial grafts (facial contour correction) are used without a layer of subcutaneous fatty tissue.

BASIC OPERATIONAL TECHNICAL PRINCIPLES AND STAGES
Free transplantation of fascial autograft
In the maxillofacial region (contour plastics)

Surgery is carried out, as a rule, under general anesthesia. After the antiseptic treatment of the surgical field in the recipient area of the face, a small incision is made and a subcutaneous tunnel of the perceiving wound bed is formed to the edges of the contours of the soft tissue defect to be removed to accommodate it future fascial transplant. During tissue preparation, careful hemostasis of the wound surface of the perceiving bed is necessary to avoid the formation of postoperative hematomas and prevent their suppuration. After the formation of a receptive bed from a transparent film, a stencil is simulated that corresponds to the shape and size of the soft tissue defect to be eliminated in the maxillofacial region.

The fascia sampling for plastic surgery in the maxillofacial area is most often carried out from the front-outer surface of the patient's wide fascia of the thigh, since in this area it is more accessible, has considerable strength and an extensive supply of necessary material.

After the antiseptic preparation of the operative field of the donor area, depending on the size of the fascial transplant to be excised, an incision is made in the middle third of the thigh along its front-outer surface. When only

fascial graft is collected, an incision is made through the skin and subcutaneous fatty tissue to a wide fascia thigh. Having diluted the edges of the wound with hooks, they carry out a thorough hemostasis of the wound surface and dissect the subcutaneous fatty tissue from the fascia. Then, the boundaries of the transplant to be excised according to the shape of the prepared stencil are outlined, dissecting the fascia with two longitudinal cuts connected in the upper section by a transverse incision. The upper end of the fascia is grasped with two clips and, pulling it in the direction of the lower part of the thigh, is separated from the muscles and cut off at the lower end of the wound. Then hemostasis of the bleeding muscle vessels is performed. The edges of the fascia as much as possible bring together and sew in order to avoid the formation of muscle hernia.

The collected fascial autograft is finally modeled according to the shape of the eliminated tissue defect in the maxillofacial area, stitched to the ligature handles at the edges, transferred to the recipient area of the face, injected into the created tissue tunnel of the sensory bed.

After the transplant is fixed along the contours of the eliminated facial tissue defect using the same ligature tapes held percutaneously on gauze rolls impregnated with iodoform composition. Such fixation is maintained for 10–11 days.

Wounds in the area of the donor site and face sewn up, leaving the rubber graduates for 2–3 days; Aseptic dressings are applied. Also prescribed a course of prophylactic antibiotic therapy for 7–10 days.

In **dynamic combined myoplasty or static suspension of certain areas** of the paralyzed face, autografts are used in the form of fascial strips. Also for this purpose, in clinical practice, grafts made from the wide fascia of the thigh are most often used, since its dimensions make it possible to hang the angle of the mouth, eyebrow and lower eyelid at the same time.

With a static suspension of the angle of the mouth and the tissues of the lips, two incisions are made: in the pre-amoral region and in the nasolabial fold area. One end of the fascia is fixed to the periosteum of the zygomatic arch, and the other is split into two parts and fixed to the tissues of the angle of the mouth and lips under the desired tension. Excess tissue at the level of the nasolabial folds, in the temporal body and prednye areas are removed.

When the lower eyelid is suspended, two incisions with a length of 0.5–1 cm are made at the level of the outer edge of the orbit and the lateral surface of the base of the nose. Then form a subcutaneous tunnel along the edge of the lower eyelid and connect the incisions. The fascia is placed in the tunnel and its ends are fixed to the periosteum under the desired tension.

The eyebrow is suspended through an incision at its upper border.

Then fix 2–3 fascial strips to the periosteum of the frontal bone at the level of the eyebrow and forehead mound.

In a dynamic combination myoplasty, fascial autografts can be used in the form of strips that extend the aponeurosis of the temporal muscle towards the corner of the mouth.

The department of maxillofacial surgery of the Belarusian State Medical University has developed a technique for using allogenic collagen-fascial graft as a plastic material for treating patients with deformities of the maxillofacial area. Based on clinical experience and experimental data on the course of the wound process after contour plastic surgery for complex deformities of a person with a soft tissue volume deficit, an allogeneic collagen-fascial graft can be used. Such a graft is used for deformation and violation of the contours of the face with an area of at least 50 cm2 and thickness absent tissues up to 1.0 cm. In addition, the allogeneic collagenfascial graft can be used to eliminate the pronounced visible transition at the graft healthy tissue border after bone grafting of the mandible, as well as to correct the deformities of the face after patchwork of the face (F. A. Gorbachev, 2006).

Self-mastering the topic

1. The place of graft collection in plastic reconstructive surgery of the maxillofacial area and neck is called:

1) maternal soil;
2) donor site;
3) the recipient site;
4) mother's bed.

2. Soft tissues that are not used for free transplantation in modern maxillofacial plastic reconstructive surgery:

1) skin;
2) fatty tissue;
3) fascia;
4) hair follicles;
5) oral mucosa;
6) nerves;
7) blood vessels;
8) all the answers are wrong.

3. Anatomical structures in modern plastic maxillofacial surgery, used for free transplantation in order to recreate the main duct of the major salivary glands:

1) the ureter;
2) bile ducts;
3) blood vessels;
4) duct of the minor salivary gland.

4. Layers of the dermis included in thin skin grafts:

1) epidermis;
2) subcutaneous fat;
3) the mesh layer of the dermis;
4) papillary dermis;
5) fascia.

5. The layers of the dermis included in the split skin grafts:

1) the epidermis;
2) subcutaneous fat;
3) the reticular layer of the dermis;
4) papillary dermis;
5) fascia.

6. Independent epithelialization of the wound surface is possible after the autograft of the skin is taken:

1) thin;
2) split;
3) full layer;
4) combined.

7. Types of autodermal transplants, the most suitable for reconstructing the oral mucosa with vestibuloplasty:

1) combined;
2) split;
3) full layer;
4) thin.

8. Methods of taking skin grafts used in modern plastic surgery:

1) fence using a milling cutter;
2) manual glue dermatome;
3) mechanical dermatome;
4) electrodermatome;
5) plasma scalpel;
6) absorption;
7) surgical scalpel.

9. Areas of donor sites for the collection of autodermal transplants, the most similar to the structure of the skin of the face:

1) the ear;
2) the gluteal region;
3) front inner thigh;
4) the front surface of the abdomen;
5) the front surface of the chest;
6) the inner surface of the shoulder;
7) the back surface of the foot;
8) interscapular area.

10. When conducting contour plastics in maxillofacial areas of skin-fatty autograft must be taken in a single unit with an epidermized skin area adjacent to it:

1) to save the modeled form of the graft;
2) prevention of infection of the graft;
3) providing more favorable conditions for transplant engraftment;
4) providing more favorable conditions for stitching the wound donor site.

11. Formed array of tissues (soft or supporting) or body that has lost its feeding relationship with a region or place blanks, called ...

12. Transplantation of the patient's own tissues or organs the same individual is called ....

13. In plastic reconstructive surgery of the maxillofacial region and neck, the place where the graft is transferred is called:

1) maternal soil;
2) donor site;
3) the recipient site;
4) mother's bed.

14. Transplantation of tissues or organs from one genetically identical twin to another is called ....

15. Transplantation of tissues or organs from an organism from one genetically different individual to another individual of the same biological species is called ....

16. Transplantation of tissues or organs from the body of an individual of one biological species to an individual of another biological species called ...

17. Type of autodermal graft, best planted:

1) thin;
2) split;
3) full layer;
4) combined.

18. Periods of biological tissue restructuring in a free-transplanted autodermal graft:

1) alteration;
2) adaptation;
3) exudation;
4) regeneration;
5) epithelialization;
6) stabilization.

19. The procedure for restoring sensitivity in transplanted autodermal graft:

1) tactile;
2) pain;
3) temperature.

20. The presence of subcutaneous fat on full-bed autodermal graft:

1) promotes adhesion of the skin to the wound;
2) prevents the skin from sticking to the wound;
3) delays the healing of the skin against the wound;
4) promotes accretion of the skin to the wound.

21. The transplanted skin graft must be:

1) the same length;
2) the same width;
3) of equal thickness;
4) these parameters are not significant.

22. On transplanted autodermal graft impose bandage, which should provide:

1) increased pressure;
2) low blood pressure;
3) physiological pressure;
4) this condition is not significant.

23. To increase the likelihood of free autograft grafting in the first 1-2 days after surgery, use:

1) warming compresses;
2) local hypothermia;
3) applications with a 3 % solution of H2O2;
4) applications of a 6 % H2O2 solution with glycerin;
5) applications of a 1 % KMnO4 solution;
6) applications with 0.1 % chlorhexidine solution.

24. Conduct a correspondence between the types of autodermotransplants and their properties:

1) thin;
2) splitaccording to Blair – Brown;
3) by Paget;
4) full layer;

a) can give growth of single hair;
b) the donor wound does not heal itself;
c) does not give hair growth;
d) takes root better than anyone.

25. Conduct a correspondence between the types of autodermotransplants and their properties:

1) thin;	a) takes root worst of all;
2) splitting according to Blair – Brown;	b) wrinkles the most;
3) by Paget;	c) does not give hair growth;
4) full layer;	d) contains 3/4 layers of the dermis.

26. Conduct a correspondence between the types of autodermal grafts and their thickness:

1) according to Blair – Brown;	a) 0.6–0.7 mm;
2) by Tirsh;	b) 0.8–1 mm;
3) full layer;	c) 0.2–0.4 mm;
4) by Paget;	d) 0.5–0.6 mm.

27. Specify the correct surgical sequence stages of dermotransplantation in the maxillofacial region:

1) anesthesia of the recipient area;
2) dermatologic filing to the edges of the perceiver's wound bed;
3) the manufacture of the stencil in the form of dermotransplantation;
4) anesthesia of the donor site;
5) the imposition of a tile bandage;
6) transfer of the dermatotransplant to the recipient site;
7) preparation of the recipient site;
8) the collection of dermotransplanta.

28. The indications for bone grafting in the maxillofacial region are:

1) subtotal defect of the wing of the nose;
2) post-traumatic defect of the body of the mandible;
3) congenital underdeveloped auricle;
4) severe atrophy of the alveolar process of the upper jaw;
5) through defect of the lower lip;
6) Popov – Godon phenomenon in the region of upper right molars.

29. Secondary osteoplasty of the lower jaw:

1) immediately after the formation of a bone defect;
2) 1 week after the formation of a bone defect;
3) 1 month after the formation of a bone defect;
4) not earlier than 6–8 months after the formation of a bone defect.

30. Primary osteoplasty of the lower jaw is performed:

1) immediately after the formation of a bone defect;
2) 1 week after the formation of a bone defect;
3) 1 month after the formation of a bone defect;
4) not earlier than 6–8 months after the formation of a bone defect.

31. Biological mechanisms involved in the restructuring bone autograft:

1) osteointegration; 4) fibrinintegratsiya;

2) osteogenesis;
3) osteoinduction;
5) osteoconduction;
6) fibrinolysis.

32. Graft bone regeneration and remodeling after autotransplantation is completed through:

1) 1 month;
2) 3 months;
3) 6 months;
4) 12 months;
5) 24 months.

33. Graft bone regeneration and remodeling after allotransplantation is completed through:

1) 1 month;
2) 3 months;
3) 6 months;
4) 12 months;
5) 24 months.

34. Specify the correct surgical sequence stages of bone marrow autograft transplantation in maxillofacial areas:

1) anesthesia of the recipient site;
2) anesthesia of the donor site;
3) hemming the periosteum and muscles to the bone graft;
4) formation of the receiving bed for the graft;
5) fixing the graft to the margins of the jaw bone defect;
6) transfer of bone graft to the area of the defect;
7) collection of bone autograft with suturing of donor wounds zones;
8) isolation of the perceiving bed from the mouth;
9) stitching the wound in the area of the eliminated defect of the face.

35. When plastics lower jaw orthotopic will to be allogeneic transplant:

1) from the iliac crest;
2) ribs;
3) parietal bone;
4) tibia;
5) the lower jaw.

36. Minimum temperature required for freezing and subsequent storage of the collected allogeneic bone graft:

1) –20 °C;
2) –40 °C;
4) –70 °C;
5) –100 °C.

37. Methods of preserving bone allogeneic grafts, used in maxillofacial surgery:

1) fresh freeze;
2) boiling;
3) lyophilization;
4) demineralization;
5) formalization.

38. The side tissues that receive blood from a single large vessel are called ....

39. Skin-fascial autografts, most suitable for plastic elimination of defects and deformities with tissue revascularization:

1) deltoid;
2) knee;
3) radiation;
4) inguinal;
5) the sole of the foot.

40. Skin and muscular autografts, most suitable for plastic elimination of defects and deformities with tissue revascularization:

1) with the broadest muscle of the back;
2) soleus muscle;
3) the gastrocnemius muscle;
4) straight and oblique abdominal muscles;
5) small pectoral muscle.

41. The decisive factor determining the choice of carrying out the operation of free tissue grafting on the vascular anastomosis while eliminating the defect of the maxillofacial region:

1) the state of the vessels near the defect;
2) the width of the defect;
3) the length of the defect;
4) the depth of the defect;
5) the structure of the defect.

42. Methods by which one can objectively assess the state of the vessels near the defect of the maxillofacial area for their suitability as a recipient when applying a vascular anastomosis:

1) selective angiography of the carotid artery;
2) Doppler sonography of the branches of the external carotid artery;
3) radiograph of the floor of the mouth;
4) electromyography facial muscles.

43. The absolute contraindication to free transplantation of revascularized tissues in the maxillofacial region is:

1) pronounced atherosclerotic changes of the branches of the outer;
2) the carotid artery;
3) arterial hypertension;
4) chronic odontogenic sinusitis of the maxillary sinus;
5) chronic arthrosis-arthritis of the TMJ;
6) chronic sialadenitis;
7) central ostoblastoclastoma of the body of the mandible.

44. Type of suture material used when applying a microvascular anastomosis:

1) cutting needle 8 / 0–10 / 0;
2) piercing needle 2 / 0–4 / 0;
3) atraumatic needle 2 / 0–4 / 0;
4) atraumatic needle 8 / 0–10 / 0.

45. Specify the correct surgical sequence stages of tissue transplantation in the maxillofacial region using microvascular anastomoses, performed by one brigade of surgeons:

1) preparation of the recipient bed for the transplant;
2) anesthetic manual;
3) the formation of a graft and moving it to the area of the defect;
4) stitching the wound of the recipient zone and the edges of the graft;

5) the imposition of microvascular anastomoses in the recipient area;
6) stitching the wound of the donor area.

46. If a thrombosis of arterial or venous anastomoses of revascularized transplanted tissues in the maxillofacial area, you must:

1) strengthen antibiotic therapy;
2) apply local hypothermia;
3) urgently conduct an audit of vascular anastomosis with thrombectomy;
4) increase the prescribed dose of heparin injected and evaluate effect after a day;
5) prescribe magnetic therapy.

47. When applying a microvascular anastomosis with a difference diameters of stitched vessels no more than 1.5 times necessary:

1) just sew the ends of the vessels;
2) obliquely cut at an angle the end of the vessel with a larger diameter;
3) obliquely cut at an angle the end of a vessel of smaller diameter;
4) use an autovenous insert.

48. When applying a microvascular anastomosis with a difference diameters of stitched vessels more than 2 times necessary:

1) just sew the ends of the vessels;
2) obliquely cut at an angle the end of the vessel with a larger diameter;
3) obliquely cut at an angle the end of a vessel of smaller diameter;
4) use an autovenous insert;
5) sew vessels on the type of "end to side."

49. With a normal blood supply of revascularized transplant the difference of its temperature compared with the temperature of normal skin should not exceed:

1) 1 °C; 2) 2 °C; 3) 3 °C ; 4) 4 °C.

50. The indications for free cartilage transplantation in maxillofacial surgery are:

1) saddle deformity of the nasal bridge;
2) through total defect of the lower lip;
3) post-traumatic through-subtotal defect of the wing of the nose;
4) post-tumoral defect of the body of the mandible;
5) congenital anotia;
6) post-burn scar deformity of the buccal region.

51. Based on the principle of organotype, to eliminate the defect of the great pterygoid cartilage of the nose, it is better to use transplant:

1) from the iliac crest;
2) costal cartilage;
3) auricle cartilage;
4) wide fascia of the thigh.

52. Specify the correct surgical sequence stages of eliminating saddle deformity of the nasal dorsum using autograft from costal cartilage:

1) stitching the wound of the donor area;

2) preparation of the recipient bed for cartilage autograft in the back of the nose;

3) rib cartilage graft collection;

4) stitching the wound in the nose;

5) simulation of auto-graft transplant;

6) the imposition of fixing dressings on the nose;

7) anesthetic manual;

8) the introduction of an auto-graft transplant in the recipient bed and its fixation.

53. Restructuring allohryaschevogo transplant, transplanted in the recipient area of the face, ends:

1) up to 3 months;
2) up to 6 months;
3) not earlier than 1 year;
4) not earlier than 3 years.

54. The indications for free transplantation of fatty autograft in the maxillofacial region are:

1) left-sided hemiatrophy of the soft tissues of the face;

2) saddle post-traumatic deformity of the nasal dorsum;

3) post-tumoral defect of the body of the mandible;

4) posttraumatic subtotal through defect of the auricle;

5) post-traumatic defect and deformation of the soft tissues of the buccal areas.

55. The most optimal donor zones for the collection of a single array of epidermized skin-fat autograft with the elimination of deformities in the maxillofacial region are:

1) interscapular region;
2) the front surface of the abdomen;
3) front inner thigh;
4) front inner surface of the neck;
5) the rear surface of the lower leg.

56. Specify the sequence of surgical steps when free epidermized skin-fat graft autotransplantation in the maxillofacial region:

1) the creation of a perceiving bed for the transplant;

2) antiseptic preparation of the operating field of the donor area;

3) anesthetic manual;

4) intake of epidermized skin and fat autograft;

5) antiseptic preparation of the surgical field in the maxillofacial region;

6) stitching the wounds of the donor and recipient zones;

7) the introduction of epidermized skin-fat autograft in the recipient area and its fixation;

8) modeling of skin-fat autograft.

57. Injecting Transplanted Adipose Tissue called ...

58. The indications for lipofilling in the maxillofacial region are:

1) correction of nasolacrimal sulci;

2) a defect in the mandible bone;

3) correction of nasolabial folds and deep wrinkles of the face;

4) saddle deformity of the nasal bridge;
5) total anotia.

59. Intake of a large fragment of fatty autograft with the adjacent layer of the dermis or fascia should be carried out:

1) to improve the nutrition of the fat graft;
2) saving the time of taking fat graft;
3) preserve the shape of the fat graft;
4) prevention of hematoma formation in the recipient zone.

60. Indications for free transplantation of autofascial grafts in the maxillo-facial region are:

1) left-sided hemiatrophy of the soft tissues of the face;
2) saddle post-traumatic deformity of the nasal dorsum;
3) post-tumoral defect of the body of the mandible;
4) posttraumatic subtotal through defect of the auricle;
5) post-traumatic defect and deformation of the soft tissues of the buccal areas.

61. The most optimal donor areas for collection the auto-fascial graft in eliminating deformities in the maxillofacial region are:

1) interscapular region;
2) the front surface of the abdomen;
3) front outer thigh surface;
4) front inner surface of the neck;
5) the area of the buttocks.

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