Abstract:

Quite often, as a result of injuries of the area around the mouth, or at surgery for tumors and burns on the face, we see the narrowing of the mouth opening - *microstomia*. Scars of the soft tissues, (slits surrounding the mouth), prevent opening of the mouth and/or reduce the mouth opening, make treatment, removal and subsequent prosthetics very problematic.

This clinical case demonstrates some particularities of the denture fabrication for the mandible of a patient with this disease. Ways to solve the problems of adaptation and frequent breakdowns of the prosthesis by using a Quartz fiber reinforcing grid are also shown. **Keywords:** Maxillofacial prosthetics, microstomia, quartz reinforcing grid.

Facial deformities can cause dysfunctions of the dental system and lead to the disability of a person. The most common causes of formation of such defects are: removal of tumors (especially malignant), gunshot wounds and mechanical damage to various parts of the face; burns (thermal, electrical, chemical); birth defects, deformations of the facial area, and others.

Facial deformities lead to functional disorders. In the presence of the defects of cheek and soft tissues of the area around mouth, chewing and speech functions are compromised; there is organism dehydration because of a constant salivation, and there is a maceration of skin due to the allocated saliva. Defects in the soft tissues, surrounding the mouth opening, are causing loss of food during chewing and constant salivation. Long-existing keloid scars cause deformation of the tooth arches and disfigure the face of patients, which in turn has an impact on their psyche. Narrowing of the mouth slit also entails difficulties in eating and speech disorders.

The best result of orthopedic treatment is achieved after surgical expansion of the mouth slit. In patients with microstomia, when surgery is not indicated (patient age, health status, systemic scleroderma, lupus), conducting of orthopedic manipulations is very difficult.

Prosthetic patient “K.”, aged 62 years, presented at the Department of Prosthetic Dentistry of USMU

At the age of 2 years, she received burns of the whole face by the open flame, which led to the complete gross disfigurement and keloid scars formation. In addition to external changes, there was compromise of...
the mouth opening; 3 cm opening at a rate of 5-6 cm (Figure 1A-C).

This has contributed to difficulties in the eating, poor oral hygiene, problems in dental treatment and, as a result, of early tooth loss. At the time of the visit to our clinic, the patient has already had total loss of the teeth in the maxilla by about 15 years of age; and in the mandible only two teeth remain, covered by metal crowns.

The main complaints are the difficulties in getting used to the new prostheses (soreness), with frequent breakdowns and, as a consequence, the inability to use the lower removable prosthesis. Prostheses were made several times in different hospitals, but without a positive result.

The choice of removable denture design is determined by the degree of narrowing of the mouth opening. In cases of significant microstomia and defects of the alveolar area, sometimes collapsible or folding (hinged) prostheses are indicated. We managed to avoid such complex prostheses.

The treatment plan was to make the full removable prosthesis on the upper jaw and a partial laminar denture with a plastic base and cast retaining clasps on the lower jaw, respectively.

Due to loss of elasticity of the soft tissues and to narrowing of the mouth opening in patients with microstomia it is difficult to make the impressions with standard trays. Because of the lack of suitable standard tray, we had to form a wax individual tray for upper and lower jaws by the direct method (in the mouth). Then the wax was replaced with plastic for ability to make the impressions with hard trays 2.

After making the impressions we identified complex anatomical conditions on the lower jaw. There was found large irregular atrophy of the alveolar processes and expressed exostoses on the lingual side, which was the zone of mucosal injury by the edge of the prosthesis. These factors contributed to frequent breakdowns of the acrylic denture base (Figure 2A-B).

Surgical preparation was in the excision of exostoses, which could improve the prosthesis but, in this case, was problematic.

A significant decrease in the mouth opening “slit” makes it difficult to determine the central occlusion in the usual way; by means of wax bases with bite blocks. For the prevention of deformation of wax bases, we attached wax bite blocks on hard bases, and the blocks themselves were made narrower and shorter than as usual.

Keeping in mind the shortcomings of previous dentures, we used a number of manipulations to eliminate them. First, in order to avoid increased pressure of the prosthesis on bony prominences, we made plaster models for their isolation with 1-2 layers of adhesive tape (Fig. 3). Secondly, in order to avoid damages, we reinforced mandible removable prosthesis.

Common methods of strengthening the prostheses are manufacturing metal base or reinforcement of acrylic base with metal standard mesh. These methods have several disadvantages: they are visible, and may be subject to corrosion. But the most significant disadvantage is the lack of chemical bonding of metal to plastic; attachment is due only to mechanical retention 3,4. In such cases, the best, in our opinion, is the use of QUARTZ SPLINT MESH (RTD, St Egreve, France), which is specifically designed for the reinforcement of acrylic dentures. Its advantage is that it is impregnated with silane / methacrylate- based resin, which is capable to chemically bond with acrylics / plastics. It should be
noted that for the prostheses reinforcement are produced in various structures (and different sizes): QUARTZ SPLINT: WOVEN (woven tape), MESH (grid), ROPE or Unidirectional\textsuperscript{5,6}.

We opted for the Mesh (grid), because it allows individual, customized size-shaping according to the jaw parameters respectively.

Technically, reinforcement is done as follows: after plastering the model into the denture flask, and melting of the wax, we proceed to the preparation of reinforcing mesh. For this purpose the elastic blank of desired width and length is cut (Fig.4). Then, on the plaster model, the cut Mesh is custom-adapted (Fig. 5).

It is important to mark another positive property of the material; it has close to zero the shape / memory effect of different curvature, which is manifested in the fact that the material remains in the new form before the polymerization, without trying to return to the initial form. This significantly affects the quality and accuracy of reinforcement\textsuperscript{7}.

Thereafter, the model is placed in the curing light, wherein the curing of the grid takes place until it becomes hard (Figure 6), and then removed (Figure 7).

To put the grid into the thickness of the base, the “limiters” of grid immersion, or “stop-blocks”, are set onto the model (Figure 8).

The limiters are pressed to the grid (Figure 9) and by fingers gently, being careful not to dislodge the grid, the base acrylic is applied on and under the grid, as well as on the second half of the flask (Figure 10, 11).

After the acrylic is fully polymerized, the prosthesis is removed from the flask, ground and polished. The Quartz Splint Mesh perfectly integrates into the acrylic plastic, providing a great reinforcement and highly
Orthopedic treatment of this patient, through the use of modern technology allowed to solve the demanded tasks, to a significant degree. Fixing of fabricated prostheses, despite the small number of remaining teeth, is satisfactory. There is a lack of displacement of the prostheses and with a significantly improved opening of the mouth (Figure 13 B, C).

The patient is satisfied with the treatment. She notices the absence of pain, restoring of chewing, speech, and has a significant improvement in mood.

Through a careful study of complex anatomical conditions (microstomia, the presence of exostoses), of the application of methods to eliminate and prevent injury to the mucous membrane (insulation of exostoses) and of frequent breakdowns of the mandibular prosthesis (partial removable denture reinforcement with quartz mesh “QUARTZ SPLINT MESH”) we have generated positive results. So, this technique can be recommended for further use by practitioners.

References:


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Photographs
Fig. 1. Appearance of the patient K. 62 years. (at the time of treatment).
   The degree of opening of the mouth.

Fig. 2. The plaster model of the mandible of patient K. 62 years.
   (a - clinical picture, b – isolation of exostoses on the lingual side)

Fig. 3. Reverse plastering of the model in cuvette after melting the wax

Fig. 4. Cutting the "ribbon" from the quartz grid “QUARTZ SPLINT MESH”

Fig. 5. Bulging of the quartz grid “QUARTZ SPLINT MESH” on the model

Fig. 6. Polymerization of the “QUARTZ SPLINT MESH” in curing light

Fig. 7. Appearance of the hard grid “QUARTZ SPLINT MESH” after photopolymerization

Fig. 8. Setting the limits of immersion of the grid “QUARTZ SPLINT MESH”

Fig. 9. Fixing rigid grid “QUARTZ SPLINT MESH” on the model

Fig. 10. Initial stage of packing of the acrylic plastic of hot curing

Fig. 11. Adding an excess amount of plastic dough in both halves of the cuvette

Fig. 12. Appearance of the finished reinforced prosthesis on clearance (a) and in the rays of direct light (b).

Fig. 13. The appearance of the patient K. 62 years. (after prosthesis): a - a way of insertion of the prosthesis (through a healthy corner of the mouth), b – fixing the bite, c - check of fixing the dentures with wide mouth opening.