THE ROLE OF ORTHODONTIC TREATMENT AND PROSTHETICS DURING THE RECOVERY PERIOD AFTER SURGICAL TREATMENT

Abstract

The present paper considers the role of orthodontic treatment and prosthetics in the recovery period after surgical treatment of an injury to the maxillofacial area. Analyzing the sources within the framework of the research topic, the author comes to the conclusion that surgical treatment of maxillofacial trauma and postoperative rehabilitation often requires an interdisciplinary approach, which makes it a difficult task. This is due to the fact that these injuries usually affect several structures of the oral cavity and face, including hard and soft tissues, often causing malocclusion. Thus, the clinical picture and the appropriate treatment strategy may vary greatly from one person to another. Therefore, before drawing up a final treatment plan, a thorough and thoughtful multidisciplinary assessment of each patient is necessary.

Keywords: orthodontic treatment, prosthetics, recovery period, surgical treatment

Introduction. Maxillofacial injury is considered an important health problem worldwide. Such injuries most often have significant financial consequences and lead to deformation of the aesthetics of the face, loss of function and an increase in the number of other health problems. In addition, another problem that the patient faces due to injuries of the maxillofacial area is psychological trauma[1].

Head injuries can manifest themselves in several forms. Fractures of the lower jaw, such as fractures of the condyle, the angle of the lower jaw and the parasymphysis, are more common than injuries to the middle part of the face. Compared to adults, children are more vulnerable to such fractures.

Surgeons strive to prevent any situation that may worsen the patient's health by restoring facial aesthetics, muscle functions and anatomy. Frequently, such injuries are of a combined nature, in particular, at the same time the patient may have maxillofacial, orthopedic and neurological injuries. This factor may prevent immediate surgical correction. Such a delay exposes affected people to an extremely high risk of developing many problems, such as infections, non-fusion and malocclusion [2].

Patients returning for further correction of their secondary problems, such as malocclusion, after initial healing are a common occurrence. The greatest problems encountered in patients are asymmetric teeth and occlusal dysfunction. Although secondary malocclusion that occurs after treatment is quite common. This complication can be detected both in the anterior and posterior parts of the upper or lower jaw.

Prosthetics, orthodontic treatment, surgical correction of fractures, surgical restoration of soft tissues and orthognathic surgery are among the many available approaches to correct the resulting malocclusion. Before the operation, you should consider and get dental images, X-ray and photographic images. Usually, three-dimensional stereolithographic models are used in the treatment of such injuries to develop an appropriate treatment plan and precise surgical intervention.

Treatment of head and facial injuries is divided into surgical and non-surgical. Many common treatment approaches include tooth extraction, occlusion correction, functional therapy, or a combination of both. The appropriate treatment plan, as a rule, should include orthodontic treatment, since it can prevent operations on the upper jaw consisting of several segments and stabilize the arches by coordinating and aligning them [3].

In addition, prosthetics are usually required to restore missing teeth after surgery. In view of the above, there is no study summarizing of data on the role of prosthetics, orthodontic treatment and rehabilitation based on implants for the treatment of secondary malocclusion after an injury to the maxillofacial area. To this end, a number of studies were studied to summarize the available data on the role of various treatment approaches, such as prosthetics, orthodontic treatment and rehabilitation based on implants, for the treatment of secondary malocclusion after an injury to the maxillofacial area.

Materials and methods. To achieve the purpose of the study, a number of special works were analyzed in the framework of highlighting the approaches to rehabilitation of patients in the recovery period after surgical treatment of an injury to the maxillofacial area in the light of orthodontic treatment.

Theoretical and practical material in this field was studied, in particular, works were taken for analysis, in which children and adult patients with maxillofacial trauma who were treated for a fracture of the maxillofacial area and secondary malocclusion were used as objects of research [4].

Various approaches to the treatment of secondary malocclusion associated with a fracture of the maxillofacial area were considered, as well as the results of this treatment, the expression of which was the effect of prosthetics, orthodontic treatment or rehabilitation based on implants for the treatment of secondary malocclusion associated with a fracture of the maxillofacial area. Retrospective or prospective studies were considered in patients with a diagnosis of "maxillofacial fracture" based on patient complaints and clinical examinations, which were confirmed by X-ray data and data during surgery [5].

The data were summarized within the framework of the research topic from various specialized medical journals for the period from 1998 to 2020.

Results. According to the results of the study of the materials, the following information was obtained. One study reported that ten patients had injuries such as MacLennan type III bilateral condyle fractures, bilateral mandibular condyle fractures, multiple comminuted fractures of the middle part of the face, comminuted fractures of the mandibular symphysis and bilateral intracapsular fractures of the mandibular condyles [6].

The age of the patients ranged from 19 to 50 years, the ratio of men and women was equal. The injuries were caused by incidents such as an attack, a car accident, a suicide attempt, a falling car, a grenade explosion and an unspecified cause.

The primary procedures included a soft diet, fixation with a mini-plate and screws, fixation of the upper jaw and lower jaw, reconstruction of the fundus of the eye and reducing the height of the ramus. However, patients did experience postoperative complications such as anterior open bite, limited mouth opening, cross bite, and occlusion mismatch.

The final procedures included minor occlusion correction, implant fixation, bone augmentation, osteotomy of the lower jaw body, bilateral osteotomy of the lower jaw body, bilateral sagittal osteotomy and bone grafting. As a result of the treatment, a stable occlusion was obtained [7].

Another study included 12 patients, of whom 7 had fractures of the lower jaw, such as cracks in the body, ramus and condyles. The age of the patients ranged from 18 to 56 years, the ratio of men and women was also the same [8].

At the time of the injury, all patients had fractures of teeth, dislocations, dislocations and fractures of the alveolar bones. These patients received neither preoperative nor postoperative dental treatment. The malocclusion was corrected by installing bone grafts using orthognastic surgery methods.

Common postoperative complications reported in this study included malocclusion, tooth loss, toothache, and temporomandibular disorders (TMJ).

Six out of nine patients who complained of moderate occlusal abnormalities and TMJ, such as limited mouth opening, underwent occlusal treatment with prosthetics and treatment of the temporomandibular joint as an alternative to surgical treatment. The final treatment included tooth extraction, prosthetics, implant fixation and TMJ treatment. The result of the treatment was the resolution of complications.

Especially interesting were the cases considering the treatment and recovery of a patient after gunshot wounds of the maxillofacial area. It was noted that gunshot wounds of the maxillofacial area may not lead to life-threatening injuries, but in most cases, they are associated with problems of aesthetic configuration, chewing dysfunction, speech or swallowing, which affects the quality of life of the patient. In addition, patients may have difficulty controlling saliva and difficulty moving the tongue. Rehabilitation of such patients can be a complex and challenging task [9].

The use of surgical or prosthetic-reconstructive methods for the restoration of mandibular defects depends on the quality and quantity of the remaining soft and hard tissues, loss of the integrity of the mandible, the number and distribution of the remaining teeth, adjacent vital structures, vestibular obliteration, the possibility of a donor site and the incidence of bone graft, cost, availability of an experienced maxillofacial surgeon, the patient's age, health status and preferences.

The protocol for the treatment of tear-off wounds, including gunshot wounds, consists of three stages. The first stage includes an urgent assessment of the ABC life support parameters, wound cleaning, debride extraction, removal and sequestration of infectious tissues, as well as stabilization of bone fractures, accompanied by primary wound closure and drawing up a final treatment plan. Phase 2 is the final reconstructive phase. Phase 3 includes the final cosmetic and functional revision of the reconstructive prosthesis [10].

A one-stage treatment protocol was also investigated, including wound rehabilitation and the use of a composite tissue flap as a method of immediate reconstruction.

The main goals of reconstruction are to maintain the integrity of hard and soft tissues and replace missing structures, while fractures can be corrected using open or closed reposition methods.

With dentures on dental implants, the restoration of the patient's aesthetics, chewing and phonation has significantly improved. On the contrary, implants require bone fixation on the remaining bone structures after resection or bone grafting. Taking into account the complications associated with the transplant procedure and the implant, there is a need for an additional treatment option with fewer complications [11].

Basal implants are usually used in cases with weakened bone support, since they can be deeply fixed in the basal bone with the help of their horizontal plates. Usually, implants connected to a metal frame for better force distribution increase the possibility of immediate loading and allow the use of both ceramic and acrylic base materials for prostheses. The great advantage of this implant system is that all the forces are transmitted through the vertical rod deep into the strongest basal bone. These features make it possible to use this system in patients with extensive mandibular defect [12].

The researchers also pointed out that in the case of orthodontic rehabilitation after surgical treatment of maxillofacial trauma, biomaterials that are necessary for increasing the bone tissue of a dental implant are used. Clinicians who are trying to regenerate tissue and restore its function and aesthetics due to injuries, pathology or birth defects face a serious problem.

The concept of using carcass in bone tissue engineering is a key factor in the restoration of bone defects of critical size. The cells attach and grow on the porous surfaces of the implanted scaffolds [13].

The structural morphology and mechanical strength are provided by the surface of the frames, on which the adhering cells can grow. The presence of scaffolds causes cells to generate biological structural components of the extracellular matrix.

Specialists have studied a lot of biomaterials to find the ideal material for frames. The frameworks used must be bioactive, biocompatible and biodegradable, as well as have a porous morphology and mechanical strength. Frameworks with a square pore morphology have a higher compressive strength, they are characterized by a higher elastic modulus and a greater weight loss rate.

There are various biomaterials, such as inorganic ceramics or glass, that are used in the manufacture of skeletons for bone tissue engineering. Tissue engineering technologies that include bone reconstruction or regeneration to replace defects in the oral cavity and maxillofacial area require a temporary porous frame [14].

The scaffold usually regulates the growth of cells that either move from neighboring tissue or arise inside the porous structure of the scaffold. Synthetic frameworks are semi-crystalline materials, and due to their cost-effectiveness, high strength and biocompatibility, they are among the most widely used biodegradable polymers. The overall design, microstructure, material composition and mechanical properties play an important role in controlling the local environment and the growth of adherent cells on the frame.

Discussion. The study was conducted to determine the role of prosthetics, orthodontic treatment and rehabilitation based on implants for the treatment of secondary malocclusion after an injury to the maxillofacial area.

The results showed that the described treatment approaches provide good results by achieving stable occlusion (i.e., restoring occlusion before injury). The most common causes of injuries were assault and car accidents.

Different approaches to treatment were used for individual patients, depending on the characteristics of each patient and the requirements for achieving satisfactory occlusion. Thus, interventions to correct post-traumatic malocclusion included prosthetics and implant fixation.

Injuries of the maxillofacial area, especially fractures of the middle part of the face, often cause significant damage to the maxillary area and, as a result, the loss of one or more teeth. In such cases, to achieve a good result and restore the occlusion to the state that existed before the injury, it is often necessary to fix dental implants and fixed prostheses.

As for the role of orthodontics, one study evaluated the results of treatment after the use of Class III elastic mechanics to correct postoperative malocclusion after the reposition of the temporomandibular joint disc using the anchor technique, and it was found that the secondary malocclusion resolved within 1 week to 1.5 months [15].

The surgical approach to restoring the anatomy and function of the facial apparatus is usually used in both primary and secondary care. For example, condyle fractures were mainly treated with secondary surgical intervention to restore the bite; however, occlusion before the injury was achieved 1 year after the operation.

Moreover, some features of malocclusion that occur after primary surgery, such as anterior and lateral open bite, were eliminated using less invasive methods, such as correcting occlusion to reduce premature contact.

Rehabilitation of a patient with a gunshot resection of the lower jaw is a complex multi-stage medical procedure that requires a long time. A multidisciplinary team is required to ensure successful results, as this type of injury usually causes multifunctional problems affecting many dentists.

It was also found that for patients with gunshot resection of the lower jaw, several treatment options can be applied, including the use of prostheses supported by implants. Currently, the use of prostheses based on basal implants has several advantages, including eliminating the need for bone grafting and eliminating risk factors. In addition, prostheses with support can be fixed immediately, which is usually the first request of most patients, especially the youngest.

Accurate treatment planning is vital for the success of implantological treatment in advanced cases and should include the selection of the most appropriate reconstructive technique with a low level of complications and a high probability of success. The most preferred treatment option includes minimal surgical intervention, high success rates and restoration of its aesthetics, chewing and phonetics to the state before the injury. Thus, the installation of prostheses based on basal implants can be a priority [16].

Usually, in patients with a mandibular defect, serious ridge irregularities and inadequate soft tissue support can negatively affect the stability and retention of the prosthesis supported by implants. In addition, abnormal lateral forces increase the displacement force of the prosthesis, which leads to loosening during prolonged use. Therefore, the use of fixed hybrid prostheses is considered the best option for orthopedic treatment due to the ease of handling, fast duration of treatment and a metal frame that provides a better distribution of force and reduces the force on the implant.

In addition, the acrylic base of the prosthesis (hybrid design) compensates for the serious loss of soft and hard tissues and provides sufficient support for the lips, thereby providing very acceptable aesthetic and phonetic results.

The main biological and mechanical problems usually associated with fixed prostheses supported by implants include increased accumulation of plaque, gum hyperplasia and peri-implantitis. It is interesting to note that these complications do not occur with basal implants, since they have a smooth surface that prevents the above problems [17].

In addition, their small penetrating tips ensure rapid healing of the soft tissues around the implant and a healthy mucous membrane around it. In addition, the use of prostheses, which create a hygienic space under the flanges of the prostheses, ensures the washing of saliva and prevents the accumulation of food residues and plaque. Also, the use of acrylic resin significantly improved the frontal and lateral profile of the patient, thereby improving his satisfaction and quality of life [18].

Conclusion. Although postoperative complications in the treatment of maxillofacial trauma are inevitable, the results of the study show that both prosthetics and rehabilitation based on implants can restore secondary malocclusion after an injury to the maxillofacial area.

Surgical treatment of maxillofacial trauma and postoperative rehabilitation often requires an interdisciplinary approach, which makes it a difficult task. This is due to the fact that these injuries usually affect several structures of the oral cavity and face, including hard and soft tissues, often causing malocclusion. Thus, the clinical picture and the appropriate treatment strategy may vary greatly from one person to another. Therefore, before drawing up a final treatment plan, a thorough and thoughtful multidisciplinary evaluation of each patient is necessary.

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