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Post-Traumatic Defects And Face Deformations: Features Of Diagnostics And Treatment

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ABSTRACT

The high growth of injuries, the absence in the country of a unified approach to the treatment of victims with pathology of the bones of the face and skull leads to a sharp increase in the number of patients with post-traumatic deformities, defects, often to their disability and death. This problem has recently acquired the greatest importance in connection with the increase in the number of victims in areas of natural disasters and road traffic accidents. Severe multiple fractures of the bones of the middle zone of the facial skeleton, accompanied by craniocerebral trauma of varying degrees, bleeding and liquorrhea, are often outwardly unnoticeable, since they are hidden by pronounced edema, hemorrhages in soft tissues, and can only be determined with a targeted specialized examination. These types of examinations and the provision of specialized medical care are possible only in multidisciplinary centers. Therefore, these types of injuries are not always diagnosed in a timely manner, especially in severely injured with the presence of pronounced injuries of other localizations.

KEYWORDS

Craniofacial injuries, facial aesthetics, jaw asymmetry, orbit.

INTRODUCTION

According to the World Health Organization (WHO) as of March 2013, craniofacial injuries account for about 40% of all types of injuries [1]. Moreover, in 60% of cases, the age of the victims does not exceed 40 years [2]. Currently, the frequency of traumatic injuries to the bones of the facial skeleton does not tend to decrease [3]. The increase in injuries, which is currently noted due to intensive urbanization, increased mechanization, is reflected in the increase in the frequency of combined craniocerebral injuries, primarily cranio-facial, from year to year in all countries of the world [4]. Most often, damage to the maxillofacial region is observed in people of working age from 18 to 45 years old - in 91% of cases [5].

The seasonality of injuries is also noted: in the summer and autumn months, the number of patients with facial injuries increases, which is explained by an increase in the frequency of transport and street injuries - according to the traffic police website for 2012. Currently, there is no unified tactics in the examination of patients with midface injuries, a clear algorithm for diagnosing and planning treatment for this category of patients has not been formulated, as a result of which surgical treatment is often carried out in several stages, restoring functional disorders, but not leading to the desired aesthetic results [6]. Untimely or incomplete provision of both primary and specialized care is the most important reason for the formation of persistent post-traumatic deformities and defects in the midface zone [7].

Thus, all of the above confirms the need to develop a clear diagnostic algorithm, including an accurate analysis of facial changes, indicators of changes in the volume of the orbit on the side of the injury, taking into account the asymmetry index, and planning treatment for patients with post-traumatic deformities and defects of the midface. Asymmetries of the face and anomalies of the dentoalveolar system are among the most common diseases in which violations of the chewing function and facial aesthetics are closely related [8].

In the development and formation of congenital and acquired deformities of the jaws, according to the literature, the tone of the masticatory and facial muscles of the maxillofacial region, bad habits, birth trauma, changes in the function of the temporomandibular joint play a role [9]. Facial asymmetry has a negative effect on the appearance, facial expressions of patients and, as a result, on the psycho-emotional state [10]. In childhood, only a part of the skeletal anomalies of the jaws and occlusion disorders can be corrected by orthodontic treatment. After the termination of the growth of the jaws, conservative methods of treatment do not give the desired effect [11]. In the treatment and correction of occlusion, the anatomical and pathogenetic features of the facial skull are often not taken into account. Etiological factors, functional features, the ratio of the dentition, the state of the temporomandibular joint and the difficulties of diagnosis negatively affect the outcome and outcome of treatment [12]. This approach to treatment in the literature is called "camouflage", since, most often, it is not possible to correct the significant deformity underlying the occlusion anomaly and asymmetry of the jaws. A certain degree of compromise must be made between orthodontists and surgeons. A significant number of adult patients with jaw deformities have indications for a comprehensive planning of surgical and orthodontic treatment [13].

MAIN PART

Knowledge of the morphological and functional features of the asymmetries of the facial skull and dentoalveolar system helps to improve diagnostic methods, make a more accurate diagnosis, make an optimal plan and choose an effective treatment method, as well as prevent the possibility of relapse and postoperative complications.

Based on the features of the anatomical structure, the study of the structure of injuries to the MAP, a large number of classifications were created [14]. At the same time, the selection of features that must be taken into account presents a significant difficulty. The classification of injuries to a particular area of the body usually reflects the possibilities of diagnosis and the means available to doctors, methods of treatment, as well as the possibilities of the existing system of organizing assistance to victims at one or another stage of development of medicine.

A large number of classifications were created, from which one can distinguish the classification of fractures of the bottom of the orbit according to Manson, which was proposed, and made it possible to determine the tactics of treating patients: Grade 1: fracture of the anterior part of the bottom of the orbit; Grade 2: fracture of the anterior part of the bottom of the orbit and medial wall; Grade 3: fracture of the bottom of the orbit with posterior extension and fracture of the medial wall; Grade 4: one large fracture involving the anterior and posterior parts of the day of the orbit and a fracture of the medial wall. Doctors Rohrich R., Watumull D. presented the classification of fractures of the zygomatic bone in connection with the significant changes observed in its fractures from the point of view of the clinical data of the hypophthalmos. Indeed, up to 40% of fractures of the zygomatic bone can be associated with the eyeball [15].

Fractures were classified both by the type and direction of displacement, and by the location of the displacement of the fragments. This classification is often used in determining the characteristic clinical data, as well as in order to determine the required amount of surgical intervention:

Type I fracture of the zygomatic bone does not have significant displacement of bone fragments, the zygomatic bone remains attached along the zygomatic-maxillary and zygomatic-frontal sutures, the zygomatic arch. Patients in this group usually do not have significant cosmetic deformities or functional disorders; these fractures can often be treated conservatively.

Type II fracture is associated more with blunt trauma, often affecting the lower edge of the orbit. These fractures are associated with incomplete movement of fragments downward and laterally (rupture of the zygomatic-maxillary suture), while maintaining integrity in the zygomatic-frontal suture region. These fractures are often associated with significant masticatory discomfort, anophthalmos, or diplopia. In this case, there may be a displacement of the lower eyelid due to the displacement of the lower edge of the orbit. Treatment for this type of fracture is considered based on the degree and symptoms of cosmetic deformity.

Type III fractures are associated with blunt trauma of significant force from the bottom up. These fractures are associated with incomplete displacement of bone fragments downward and laterally. The fracture is associated with rupture of the zygomatic-maxillary and zygomatic frontal sutures and incomplete separation of the zygomatic bone. Patients often have a downward displacement of the lateral canthal ligament, a displacement of the infraorbital nerve, and skin hyposthesia. Limitation of the mobility of the muscles of the eyeball (and, therefore, the occurrence of diplopia) is rare, as is the omission of the lower eyelid. Depending on the degree of displacement, there may be trismus and a noticeable deformation in the zygomatic suture area. These fractures must be repaired surgically to avoid deformity.

Type IV fractures are associated with powerful blunt trauma and are directed to the zygomatic bone. Bone fragments in these complete fractures are moved downward with internal rotation of the lower edge of the orbit. With a fracture of the zygomatic bone, its medial displacement is most often observed. In this case, usually there is a fracture of the bottom of the orbit with the formation of a significant length of its defect.

Clinically, these patients complain of flattening of the zygomatic region. By palpation, a bone defect is determined along the lower edge of the orbit, often in the area of the zygomatic-frontal suture, along with drooping of the lower eyelid and lateral canthal ligament. In addition, skin hyposthesia is noted due to trauma to the infraorbital nerve.

These fractures most often require surgical treatment. Lauer S.A. et al. also proposed a classification of orbital fundus fractures depending on their prevalence relative to the infraorbital nerve. They noted that orbital fractures involving the infraorbital margin usually involve the fundus of the orbit and a fracture either on one side or on both sides of the infraorbital nerve.

Fractures of only the fundus of the orbit were located either medially or on both sides of the infraorbital nerve. This group of authors described 3 types of fractures:

Type I - associated with a fracture of the bottom of the orbit medial to the infraorbital nerve. These fractures are usually not associated with the infraorbital edge of the orbit and can extend from the ethmoid bone to the infraorbital nerve region. Fractures are usually not associated with enophthalmos.

Type II - fractures are limited in the lateral segment from the infraorbital nerve. These fractures are often associated with fractures of the zygomatic bones, arcs with displacement. They are, as a rule, insignificantly associated with infringement of the soft tissues of the orbit and impaired mobility of the eyeball associated with the formation of enophthalmos.

Type III - includes fractures of the bottom of the orbit on both sides of the infraorbital nerve. They can be associated with fractures of the zygomatic bones, arch and are often associated with a large increase in the volume of the orbit and the occurrence of enophthalmos, but they are less associated with infringement of the soft tissues of the orbit and the occurrence of limitation of the mobility of the eyeball.

Based on this anatomical classification, the authors suggest that it is possible to predict the onset of enophthalmos and limited mobility of the eyeball after injury to determine the need for surgery. At present, taking into account the modern level of computer technology, which makes it possible to enter the maximum number of signs for analysis, the generally accepted International Classification of Dental Diseases based on ICD-10 [16] has been created, in which the following types of fractures are distinguished in block S02 ("fracture of the skull and facial bones "): S02 - fracture of the facial bones; S02.3 - fracture of the bottom of the orbit; S02.4 - fracture of the zygomatic bone and upper jaw; S02.41 - fracture of the zygomatic bone (arch); S02.42 - fracture of the upper jaw; S02.43 - Multiple fractures of the zygomatic bone and upper jaw; S02.7 - Multiple fractures of the bones of the skull and facial bones; S02.8 —Fractures of other facial bones and skull bones.

Karayan A.S. a classification of bone deformities was created depending on the timing of the injury:

1. Emerging (acute) - up to 30 days from the moment of injury.
2. Forming - 30 days to Serpentine after damage.
3. Formed - more than 3 months after injury.

According to the author, within 2-3 weeks after traumatic injury, in the absence of osteosynthesis, bone and fibrous adhesions occur between the fragments. From this period, the process of resorption of displaced bone fragments of the walls of the orbit begins, and in their place, rough scar tissue is formed, which is not able to perform the function of a bone frame. By the end of the third month, the deformity that arose after trauma in the absence of treatment is considered to be formed, that is, pathological processes in the affected area fully manifested themselves with the emergence of persistent aesthetic and functional disorders. Resorption of small bone fragments occurs, as a rule, in the area of the bottom of the orbit and the zygomatic alveolar ridge [17].

Thus, it can be concluded that different authors use a number of approaches to the construction of a diagnosis of the consequences and complications of injuries of SZL: topographic, pathophysiological, morphological, etc. An orbital fracture is the most common type of orbital wall fracture. Due to the fact that the bottom of the orbit and the medial wall are thin bony structures and, accordingly, the most vulnerable, the most common location for a fracture of the bottom of the orbit is the thin part, which is located medial to the neurovascular bundle.

The bone thickness in this area is only 0.5mm. The other walls of the orbit are much thicker and often remain intact in fractures of the orbital bottom. A blow-out fracture refers directly to the fracture of the bottom of the orbit while maintaining the integrity of the rest of its walls. According to our data, most orbital fundus fractures occur medial to the infraorbital canal [18].

The fracture line passing through the canal can lead to damage to the infraorbital nerve, which leads to hyposthesia of the skin of the infraorbital, buccal regions, the wing of the nose, the alveolar ridge of the upper jaw, teeth in the upper jaw. Surgical treatment is performed under general anesthesia. The access to the lower wall of the orbit is subciliary or transconjunctival. The dissection plane is located between the circular muscle of the eye and the orbital septum, then descends down to the lower edge of the orbit. The periosteum is dissected along the lower edge of the orbit and is passed in a semi-blunt way to the fracture line. Soft tissues trapped in the fracture line are carefully released.

One of the consequences of a fracture of the bottom of the orbit with the formation of a defect is the presence of hypophthalmos and enophthalmos in patients. Clinical manifestations of enophthalmos are characterized by a posterior displacement of the eyeball, while the hypophthalmos is characterized by a downward displacement of the eyeball. Post-traumatic hypo- and enophthalmos reflect the discrepancy between the bone volume of the orbit and its contents. Correct treatment of post-traumatic hypo- and enophthalmos requires an understanding of the anatomical features of the orbital structure and the pathophysiology of the injury. Depending on the nature of the fracture, prevention of hypo- and enophthalmos requires restoration of the normal volume of the orbit with complete reposition of displaced bone fragments, replacement of the orbital bottom defect.

Fractures arising from pattern 1 due to a lateral impact to the zygomatic bone result in displacement of bone structures through dissipation of force energy by suture joints such as the zygomaticomaxillary, frontozygomatic, zygomaticosphenoid, and zygomaticotemporal. Scheme 2 fractures involve the orbital wall, often referred to as "blow-out" fractures. The energy of the force is transmitted along the perimeter of the orbit circumference, it is not enough to form a rupture of the suture joint, the energy is dissipated towards the thin bottom of the orbit, which leads to its fracture.

Thus, the most important part of adequate surgical treatment of type 1 fractures with correction of post-traumatic hypo- and enophthalmos is to ensure complete reduction of the zygomatic bone not only in the zygomatic suture region, but also along the lower edge of the orbit and the anterior wall of the maxillary sinus. Osteotomy of the zygomatic bone (with forming and formed deformities), complete reduction and fixation is performed. In addition, fixation at three points is necessary to prevent postoperative rotation of the lateral wall of the orbit outward under the force of the masticatory muscle.

The most common cause of postoperative enophthalmos is insufficient reduction of the zygomatic bone fracture during surgery. By examining the anterior support after the initial reduction of the zygomatic bone, the surgeon can avoid this complication. In some cases, an extended subciliary incision in combination with an intraoral approach ensures its adequate reduction, however, reduction can also be performed with a bicoronary approach using a bone autograft from the parietal region to replace the bone defect (if any). After reposition of the zygomatic bone, the two eyeballs are compared in the anteroposterior position and in the vertical direction. Residual hypo- and enophthalmos mean that either the zygomatic bone needs additional reduction or that the volume inside the orbit needs to be replenished. This often requires a reduction of the lateral canthus on the side of the injury to create symmetry with the opposite side.

Localization of type 2 fractures dictates the treatment tactics necessary to prevent the formation of post-traumatic hypo- and enophthalmos: it is necessary that soft tissues be moved into the orbital cavity and bone defects are replaced. If there is an infringement of the inferior rectus muscle along the bottom of the orbit, it must be removed from the fracture line. The blow-out surgical correction of hypo- and enophthalmos requires a different approach. Under anesthesia and infiltration anesthesia, soft tissue preparation was performed in the parietal region, a Z-shaped incision was made, the skin and periosteum were dissected, a flap with an area of about 10 cm2 was folded back, the parietal bone was skeletonized in the area of the tubercle, an autotransplant of the corresponding size was taken using an ultrasonic piezo tip and chisels orbits.

In the region of the lower eyelid, a subciliary or transconjunctival incision was made, layer-by-layer passed to the inferior orbital edge of the orbit, a defect of the orbital bottom was visualized. The autograft was adapted to the receiving bed, the defect was replaced, the autograft was fixed using a resorbable system of plates and pins or a titanium miniplate and miniscrews.

The autograft restores the structural integrity of the orbital bottom, replaces the defect and excludes the possibility of prolapse of the orbital contents into the maxillary sinus. To achieve this goal, the autograft was fixed to a stable, immobile adjacent bone site. At the same time, the position of the autograft excluded the possibility of limiting the mobility of the eyeball by minimizing the adhesion of the scar tissue to the contents of the orbit and muscles, the reconstruction of the bottom is performed with slight hypercorrection (up to 2 mm) due to partial resorption of the autograft.

Secondary reconstructions of post-traumatic hypo- and enophthalmos follow the same principles for proper fracture identification, location, and restoration of normal orbital volume. It should be noted that with the emerging and formed deformities, the elimination of enophthalmos seems to be more difficult than during the acute trauma. Persistent enophthalmos may occur despite surgical intervention due to the loss of volume of the soft tissue component of the orbital contents, primarily atrophy of retrobulbar tissue. A decrease in the volume of the orbit in the anterior region will not correct the posterior position of the eyeball. To advance the eyeball anteriorly, it is necessary to place an autograft in the region of the distal fundus of the orbit. Fractures of the medial wall of the orbit are caused by blunt facial trauma. The fracture can be isolated, but most often occurs in combination with fractures of other walls of the orbit, more often the bottom of the orbit due to the fact that, unlike the presence of boundaries between other walls of the orbit, there is no clear separation between the medial wall and the bottom of the orbit [19].

The indication for the operation is the presence of an early enophthalmos of more than 2 mm or a significant hypophthalmos, which indicates the formation of a significant defect in length, often combining a fracture of the medial wall and the bottom of the orbit. Also, treatment of orbital fractures is indicated by the presence of defects affecting more than 50% of the area of the medial wall or bottom of the orbit according to MSCT data: significant fractures of the medial wall, usually forming a bone tissue defect with an area of 1.5x1.5 cm or more and displacement of bone fragments by an average of Zmm. To assess the results of surgical treatment of patients with post-traumatic defects and deformities of the midface zone, two indicators were selected that characterize the vertical (height) and horizontal (width) dimensions of the orbit.

For skeletal anthropometric points to determine the altitude of the orbit, we have chosen: - point S: on the superior orbital edge of the orbit, located in its middle third, where it is interrupted by the supraorbital foramen, through which the neurovascular bundle emerges in approximately 2/3 of all orbits (link), in the other third of the orbits the foramen is located 3-4 mm higher ... In this case, the S point is located on the superior orbital edge of the orbit on the same line connecting the infraorbital foramen with the infraorbital foramen through which the infraorbital artery and nerve exit. - point I: on the inferior orbital edge of the orbit, located on the line connecting the supraorbital and infraorbital foramen. This point is located medial to the zygomatic-maxillary suture.

Due to the fact that often there is a rupture of the bones of the facial skeleton at the seams, it was this fact that served as a decisive factor in the choice of points for measurement. - segment S-I: thus, to determine the linear size of the orbit in the vertical direction (its height), the distance from point S to point I is measured. - point L: on the lateral wall of the orbit, selected at the junction of the frontal process of the zygomatic bone and the zygomatic process of the frontal bone - the zygomatic suture. This suture is weak and often ruptures after injury. In case of fractures with rupture of the zygomatic-maxillary and zygomatic-frontal sutures, the complex consisting of the zygomatic arch, the

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zygomatic bone with its frontal and temporal processes is displaced posteriorly and outwardly, which affects the linear dimensions of the orbit. - point M: on the medial wall of the orbit, the area of junction of the frontal process of the upper jaw and the nasal part of the frontal bone is selected. - segment M-L: thus, to determine the linear dimension of the orbit in the horizontal direction (its width), the distance from point M to point L is measured.

The SI indicator (the ratio of the orbit in the vertical direction on the trauma side to the healthy side) before surgery had an average value for patients of 1.24 and a standard deviation of 0.07, and after surgical treatment, the average value was 1.02 and a standard deviation of 0.04, the change in the indicator was 17%, which says about its high statistical significance. The ML parameter (the ratio of the orbit value in the horizontal direction on the injury side to the healthy side) before surgical treatment, the mean for patients was 1.02 and a standard deviation of 0.03; after surgery, the mean value was 1.00 and a standard deviation of 0.01, the change is 1%, which indicates the statistical significance of the indicator.

The index of the hypophthalmos before surgery (the hypophthalmos was observed in 100% of the cases observed by us) had an average value for patients of 10.05 and a standard deviation of 3.12, and after surgical treatment, the average value was 0.42 and a standard deviation of 0.68, the change in the indicator was 96%, which indicates its high statistical significance.

At the same time, the magnitude of the orbit in the vertical direction (height) on the healthy side, according to our measurements based on MSCT research, differs from the figures given by V.V. in 2008, which carried out its measurements on turtles with a caliper, using the corrosion method and histotopograms. According to the author, the low and long shape of the eye socket on the skulls of adults is characterized by the minimum dimensions of its height and ranges from 24 to 29 mm (26.9 + 0.14 mm). The other extreme shape of the orbit, namely, high and short, in her opinion, on the contrary, more often has the maximum dimensions of the height of the orbit, ranging from 36 to 43 mm (40.1 + 0.11 mm). According to our data, the height of the orbit on the healthy side differs from the above data: the upper limit went beyond the presented norms in 24 out of 38 people, which is 63% of all patients examined by us.

In this case, the value of the orbit height in our study lies in the range of 44.0 - 44.5 mm, the maximum value of the orbit height is presented in a male patient and reaches 52.4 mm, the lower value of the orbit height is observed in a female patient and is 38.2 mm. The difference in the numerical values of the orbital altitude in healthy patients according to the data of our study and the values of the author is possibly related to the different selected pivot points during the research. As for the magnitude of the orbit in the horizontal direction (width), it is not possible to compare our measurements with the author's data due to the absence of either this type of measurement in the work, or there is no clear description of it with specific numerical values. Computer planning of surgical intervention. Technological innovations in hardware software combined with modern tomographs have increased the popularity and availability of ZB imaging systems for planning surgical treatment. The highest accuracy of 3D images of the maxillofacial area is achieved when the CT slice step is no more than 3x millimeters. However, for the area of interest to us, such as the orbit, it is extremely important to obtain a step of 1.0-2.0 mm. The obtained sections were saved in DICOM (Digital Imaging

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and Communications in Medicine) format and burned onto a CD.

Considering the small scanning step (1.0-2.0mm) in the computer 3D modeling of the bones of the facial and cerebral parts of the skull, the images are devoid of artifact, the so-called "stepping" of the image, which can appear when performing MSCT studies with a larger scanning step due that the scan results are superimposed on the ZO-model in different projections, overlapping each other. Creation of three-dimensional ZO-models obtained from computed tomography data and computer analysis were carried out on the basis of the SurgiCase version 5.0 software developed by Materialize (Belgium) based on the Mimics 6.0 platform (Materialized Interactive Medical Image Control System).

The essence of the work of the computer program was to create a set of so-called "masks" of the image. For each mask, we can select the density of exactly those structures, the fabric of which we plan to obtain in three-dimensional display. With the help of the program, fragments that are not of clinical significance in each individual case can be cut off from the masks. So, for example, you can separate the orbit with all its walls, the area of the upper or lower jaws, fragments of the joint, etc.

In our study, we managed with high accuracy in the occurrence of orbital fractures to identify its thin bone structures, the degree of displacement of bone fragments, to reveal hidden injuries, to clarify the shape and size of the defect, prolapse of soft tissues into the cavity of the maxillary sinus, to determine the thickness of the cerebral section of the skull for the purpose of taking an autograft from the parietal region. The requirements for a transplant vary depending on the specific clinical case. The graft must correspond in shape and volume to the defect to be replaced in order to replenish the volume of the orbit. The hypophthalmos and enophthalmos are the most common residual deformities after reconstruction of the zygomatic-orbital complex. The size of the defect is the most important criterion when choosing a graft for orbital reconstruction. The purpose of the implants is to restore the structural integrity of the bone structures of the zygomatic-orbital complex. To achieve this, the implants must be anchored to stable adjacent bone sites. In this case, the implant replacing the defect in the bottom of the orbit should prevent limitation of the mobility of the eyeball due to the minimal adhesion of the scar tissue to the contents of the orbit and muscles. The grafts used in orbital reconstruction can be divided into two main groups: biological and non-biological origin. Materials of biological origin include bone autografts, which are the most suitable material for the reconstruction of defects and deformities of the zygomatic-orbital complex. They have proven their long-term effectiveness and reliability of use: the surface facing the sinus isolates the sinus from the contents of the orbit, the ability to vascularize the graft allows for application, ensuring its stability. The advantages of using autografts from the cranial vault: the deformation of the donor site is minimal, the bone in the area of the fence can completely regenerate, the presence of a minimal degree of their resorption, the postoperative scar is hidden in the hair. In the postoperative period, the degree of complications is low - minimal pain in the donor area and the absence of any functional disorders.

In this case, it is possible to simulate the obtained fragments of autografts: to double the available volume by superimposing two bone fragments on top of each other ("sandwich technique"), to simulate the shape of the graft, to fix several bone fragments to each other in any ratio outside the surgical field with further fixation in the defect area. The parietal bone is the best place to collect the autograft. There is a possibility of sampling from the upper part of the frontal bone, which is quite thick. The temporal bone is too thin and should not be harvested in this area due to the high likelihood of damage to the middle meningeal artery. Also, do not harvest at the cranial suture line and midline to avoid injury to the sagittal sinus. At the stage of planning surgery, all patients with post-traumatic defects and deformities of the midface area underwent MSCT. According to our data, in adults, the thickness of the cranial vault in the region of the parietal tubercle is on average 6-7 mm, while the minimum value was found to be up to 4 mm and the maximum thickness was 13 mm. Then, using special computer programs, according to MSCT data, we calculated the size of the parietal autograft required to replace bone defects.

The bone autograft was collected by us monocortically. In most cases, we carried out sampling using a drill, an ultrasonic piezo handpiece and chisels. First, the marking was carried out in the area of the fence using a spherical bur, then we made a cut directly with an ultrasonic piezone within the spongy substance.

The advantages of using an ultrasonic piezo tip are: safety of autograft collection due to the location of the working attachment when working in the horizontal plane; the autograft does not chip (especially its corners) when it is taken with a chisel due to the creation of an adequate gap in the bone; controlled depth of immersion of the nozzle into the bone; directed cooling of the bone and, as a consequence, minimal heating of the tissue; the presence of a variety of attachments for the convenience of work. Due to the gradual resorption of the material, there is no induced osteoporosis at the fixation point, as with the use of titanium screws: the resorption of plates and pins promotes a gradual return of the physiological properties of bone tissue at the fixation points. The main advantage of bioresorbable rigid fixation is the fact that it is similar to fixation with metal plates: plates and pins provide the initial strength of fixation of bone fragments, but then they completely dissolve, leaving no foreign body in the fracture area. When the bone fragments grow together, the plate is resorbed within 9 months. up to 2 years, although they lose their mechanical strength long before that. Porous polyethylene implants are used both for primary reconstruction of the zygomatic-orbital complex and for secondary reconstruction. Implants are made for left and right sides and come in several shapes and sizes. The most common implants for replacing a defect in the bottom of the orbit are implants in the range from 0.4 to 3.0 mm in thickness and with dimensions of 30 mm x 50 mm. Inside the implants, there are small channels along the length of the implant. A linear metal plate passes through the canals, which is used to fix the implants.

CONCLUSION

The revealed features of the clinical picture of bone deformities and defects in the midface zone, depending on the type, location of damage, timing of injury, made it possible to develop an interdisciplinary algorithm for diagnosis and treatment planning (AlgDDK) for patients with post-traumatic deformities and defects in the midface zone using MSCT and specialized computer programs for calculating the volume of the orbit taking into account the asymmetry index (INASdk), which makes it possible to more accurately characterize the damage and determine the tactics of treating patients. Facial indicators (DDK) for the midface zone, with the help of which it is possible to objectively assess the result of treatment for this category of patients. Justified carrying out of a one-stage surgical intervention using a zigzag incision (Incision-DK) when performing bicoronary access and effective restoration of visual functions leads to good aesthetic and functional results.

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