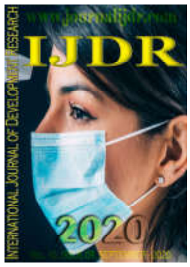
Available online at http://www.journalijdr.com

IJDR

ISSN: 2230-9926

International Journal of Development Research
Vol. 10, Issue, 09, pp. 40803-40805, September, 2020
https://doi.org/10.37118/ijdr.20047.09.2020



RESEARCH ARTICLE OPEN ACCESS

SURGICAL APPROACH IN ORBITAL BLOW-OUT FRACTURES

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ARTICLE INFO

Article History:

Received 21st June 2020
Received in revised form
08th July 2020
Accepted 17th August 2020
Published online 30th September 2020

Key Words:

Orbital Fractures. Orbit. Facial Injuries.Therapeutics.

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ABSTRACT

Introduction: In a direct trauma to the eyeball, the orbital content is pressed against the surrounding walls and the transmission of this force can lead to bone fracture and herniation of the periorbital content to the maxillary sinus. **Objective:** This study aims to perform a bibliographic review on the surgical approach in orbital blow-out fractures. **Methodology:** A literary review was carried out by crossing the selected descriptors in electronic search between 2010 and 2020, found in the journals of the databases SCIELO, LILACS and MEDLINE. **Discussion:** The need for surgical treatment for orbital blow-out fractures is highly controversial since sequelae do not always present if these fractures are not surgically treated. General indications for surgical intervention include signs and symptoms such as diplopia, enophthalmia greater than 2-3 mm, exophthalmos, impaired eye mobility, association with fracture of the medial wall and evidence of entrapment of orbital tissue. After adequate surgical reconstruction of the fractured, displaced or destroyed orbital walls, prevention of complications is observed, allowing the majority of patients to have a relatively satisfactory. **Conclusion:** The need for surgical treatment for blow-out fractures is controversial, and the maxillofacial surgeon must be attentive to the indications of surgical therapy.

Citation: ***Carolina Pereira da Silva, Heitor Tavares de Araújo, Maria Emanuella Letícia da Silva, Iasmin Fares Menezes de Lima, Luana dos Santos Fonseca Peixoto, Eduarda Leal de Figueiredo, Carolina Chaves Gama Aires and Eugênia Leal de Figueiredo. 2020.*** "Surgical approach in orbital blow-out fractures*", International Journal of Development Research*, 10, (09), 40803-40805.

INTRODUCTION

The number of patients with orbital fractures caused by traffic accidents, physical assaults, sports injuries and other accidents has steadily increased in recent years, representing approximately 40% of craniofacial trauma[1,2]. This is because the nasal bones and the zygomatic-orbital region are anatomical structures with a prominent position in the facial skeleton, which implies greater exposure to external trauma[3]. The orbit region is composed of seven bones that intertwine to form a cavity composed of four walls (medial, lateral, floor and roof), and when a periorbital trauma occurs, the most frequent injury occurs on the orbit floor[3]. In a direct trauma to the eyeball and upper eyelid, the orbital content is pressed against these surrounding walls. The transmission of this force, by increasing hydrostatic pressure to areas of less bone thickness and with a concave shape (more vulnerable to fractures) such as the floor and the medial wall of the orbit, can lead to bone fracture and herniation of the periorbital content to the maxillary sinus, causing an increase in orbital volume[4]. When this occurs, these fractures are called orbital blow-out fractures, and can occur in isolation or in association with another bone structure[2]. The diagnosis of orbital fractures is performed by the conjunction of clinical and imaging findings[4]. However, the clinical presentation of orbital fractures is rarely uniform and it can be difficult for an inexperienced examiner to detect discrete clinical signs indicative of the presence of a more complex injury. For this reason, a complete clinical examination is necessary to make a correct treatment decision[3]. The clinical signs and symptoms associated with this type of fracture include: loss of visual acuity, bleforoptosis, hypoesthesia, dysesthesia or hyperalgesia related to the infraorbital nerve. Diplopia, ophthalmoplegia (caused by the incarceration of the muscles and extraocular content that restricts eye movements), edema, periorbital ecchymosis, subconjunctival hemorrhage and periorbital emphysema may also be present due to communication with the maxillary sinus[4]. Also, large fractures can result in lower and posterior displacement of the globe, causing an unpleasant enophthalmos. This sign is indicative that the orbital content has invaded the maxillary sinus, with a decrease in ocular volume and that a surgical approach needs to be performed[5]. Also, for the correct diagnosis and treatment planning, imaging tests must be performed[3]. X-rays in posteroanterior and occipitomental views may be indicated. However, the gold standard is computed tomography (CT), especially in coronal and sagittal sections, due to the possibility of easily defining the extent of trauma and the fracture pattern, which helps to clarify the need for early treatment[6,7]. Aesthetic and functional defects are frequent when orbital floor fractures are neglected or treated improperly and, therefore, the treatment of these injuries is constantly an evolving field. Depending on the size of the defect, a surgical approach may be necessary to achieve effective results and provide better recovery[8,6]. Thus, this paper aims to conduct a literature review of surgical approach in the treatment of orbital blow-out fractures.

METHODOLOGY

The present study is a literature review, developed through sources indexed in the databases of the Scientific Eletronic Library Online (SCIELO), Latin American and Caribbean Literature in Health Sciences (LILACS) and Medical Literature Analysis and Retrival System Online (MEDLINE). We searched for studies published between 2010 and 2020, crossing the descriptors "Orbital fractures", "Blow-out fractures" and "Orbit". The articles were researched in Portuguese, English and Spanish and from full analysis, they were selected and contributed to the descriptive analysis of this work.

DISCUSSION

The goal of treatment is to protect ocular motility and correct placement of orbital contents, thus avoiding functional and aesthetic deficits. Temporary gaze restriction and diplopia may arise due to trauma-induced local edema, which may resolve spontaneously in many cases without surgical treatment[9]. This fact makes the need for surgical intervention in blow-out fractures quite controversial, as some do not have sequelae if they are not surgically treated, while others can result in an enophthalmus (sinking of the eyeball) aesthetically unacceptable and / or incapacitating diplopia . The main issue, therefore, is the identification of those patients who require open surgical treatment, the time of surgery and the choice of material to be used together with the surgical technique involved for the reconstruction of the orbital floor[7]. The type of treatment is adjusted to the imaging diagnoses and to the functional and motor pathological criteria[3]. Thus, general indications for surgical intervention include signs and symptoms such as diplopia, enophthalmia greater than 2-3 mm, exophthalmos, impaired eye mobility, evidence of extensive fractures of one or more walls of the orbital cavity involving more than half of its extension , association with fracture of the medial wall and evidence of orbital tissue entrapment. In patients with hyphema, retinal ruptures, eyeball perforation, fatal instability and vision only through the injured eye, surgery is contraindicated[10,11,7]. The timing of this repair is widely discussed, and fractures that appear late after the injury represent a dilemma for the surgeon and the decision to operate or seek conservative treatment can be particularly difficult.Late repair of orbital fractures is technically more challenging due to the orbital soft tissues scar at fracture site and surgical risks, such as blindness, mydriasis, worsening of diplopia, epiphora and implant infection[12]. However, regardless of the chosen surgery time, the initial treatment should include ice packs on site within 48 hours associated with the use of nasal decongestants[7].

As with any surgical procedure, the technique performed needs an appropriate three-dimensional knowledge of the four orbital walls, as well as their content, anatomy and adjacent structures, which is essential to reduce postoperative complications and achieve effective results, in addition to providing better symmetry , functionality to the orbital framework and recovery[8,4]. Thinking about it, after checking the passive motility of the eyeball using the forced duction test, there is a current trend for choosing the accesses performed as close as possible to the eyeball, providing proximity to the fracture site, while generating better aesthetic results, since the scars from the incisions remain hidden in different planes of the skin[10, 13]. The surgical access route varies among surgeons, with the subpalpebral, subciliary and transconjunctival routes being the most commonly used options[8]. The subpalpebral incision, as it is directly over the orbital margin, has the advantage of having quick and direct access to the fracture site, but it has a worse aesthetic result. The subciliary incision, on the other hand, provides excellent access to the infra-orbital border, lateral wall of the orbit and the entire orbital floor. It is performed 2-3 mm below the ciliary margin of the lower eyelid, making an option for transcutaneous access technically more complicated than the subpalpebral one. This is because, first, the lashes have to be carefully retracted to avoid incising them. Second, as the subciliary access is performed in stages, skin muscle, the thin skin of the eyelid has to be carefully and gently dissected under the eye orbicularis muscle. Third, closure may be more difficult because of the irregularities in levels that can arise from the step incision. However, it has an aesthetic advantage over other transcutaneous incisions, because the scar is practically imperceptible[14,8,11]. Access via the transconjunctival route is indicated for approaches in the infraorbital ridge, infraorbital floor, zygomatic and lateral cantotomy. It has as advantages the unnecessary skin incision, minimal scarring, good acceptance by the patient, low incidence of eyelid retraction or ectropion when compared with other accesses[13]. However, it is technically more complex than the previous two and often requires adjuvant lateral cantotomy for better access and exposure, especially in fractures of the orbital zygomatic complex and inferolateral orbital wall[8].

The main objective of the orbital floor reconstruction is to restore the volume of the pre-traumatic orbit, with the elevation of the eyeball to its original position and the release of the imprisoned soft tissue in the fracture area, leading to the return of its physiological functions.[4,6]. Therefore, the selection of the biological material to be used is very important and is related to several factors such as: the size of the defect, the walls involved, the adaptation of the internal contours, the restoration of the appropriate volume, the time of the trauma and the surgeonexperience[3]. The material must be biocompatible with human tissues and provide adequate structural support, restoring the periorbital region aesthetics and function, especially in the initial stages of healing. Still, it must be easy to adapt and fix to anatomical bone contours, osteoinductive and bioabsorbable, with minimal foreign body reaction[4]. The most used materials for the reconstruction of orbital blow-out fractures are autogenous grafts and alloplastic materials[3]. Among the autogenous materials, such as bone, cartilage, fascia and periosteum, the most commonly used in orbital floor are cartilage and bones. Cartilages, as they do not need direct contact to obtain nutrition, have greater viability and their sources are diverse compared to bones, and the nasal septum, ear shells and ribs can be used. These materials have the advantage of reduced infection rate and low cost, but there are disadvantages such as increased surgical time and morbidity due to donor areacomplications[8]. Among the alloplastic materials, the most used are titanium, porous polyethylene and polydioxanone[6], titanium mesh being one of the most used materials for the repair of large fractures (over 1cm²) of the orbital floor[2,4]. These screens can be fixed by screws, preventing their displacement and migration, thereby reducing the risk of extrusion and the need for removal, which is hampered by the incorporation of fibrous and bone tissue around them[15].

Due to its ease of use, with a wide variety of shapes and sizes available in different biomaterials and infinite availability, this technology ensures a precise anatomical correction, with very favorable results in the long run. In addition, postoperative morbidity is reduced, as there is no need for donor areas, reducing surgical and hospital time[4]. Despite the advantages presented by alloplastic materials, they should be used with caution, since they behave as permanent foreign bodies, being susceptible to complications such as infection or extrusion, even after years *in situ*[6]. And so, when a second intervention is necessary, its removal can be very difficult due to the strong adhesions of the periorbital tissue[15, 2]. After appropriate reconstructive surgery, most patients with orbital fractures achieve relatively satisfactory appearance, extension of exophthalmos and eye movements. However, if the appropriate treatment is not applied, complications can arise, such as restriction of eye movement by trapping intraorbital fat, extraocular muscles in fracture fragments or reconstruction material, paraesthesia of the infraorbital nerve, total or partial visual deficit, orbital dystopia , unsightly appearance, enophthalmia and diplopia, this being the most common complication caused by orbital defects[1]. Proper surgical reconstruction of fractured, displaced or destroyed orbital walls has been shown to prevent these complications and to restore the eyeball position satisfactorily[3].

Conclusion

The need for surgical treatment for orbital blow-out fractures is quite controversial, as there are authors who claim success in conservative treatment, and others who choose surgical therapy, depending on the circumstances and complexity of the fracture. The maxillofacial surgeon must be attentive to the indications of surgical therapy, especially to the clinical signs and symptoms that the patient may present so that the treatment is applied properly, in order to avoid possible postoperative complications. Still, care with the moment, the technique and the material to be used are essential to minimize surgical failure that can directly affect the patient's aesthetics and cause serious orbital defects.

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