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Epidemiological Analysis of the Sequelae of Orbital Trauma in the Mexican Population of a National Concentration Hospital; Traumatology Hospital "Dr. Victorio De La Fuente Narváez" IMSS

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ABSTRACT

Objective: To determine the epidemiological profile of the sequelae of orbital trauma in the Mexican population of a hospital of national concentration; in the period between January 1, 2013 and March 31, 2017.

Design: Observational, retrospective and transversal.

Methodology: Collection of data from clinical files of patients seen in Ophthalmology with diagnosis of orbital trauma (1002 patients); subsequently, they were recorded in a database and the information was emptied in SPSS for statistical analysis.

Results: The presence of sequelae was related to the type of trauma, the method of reconstruction and the approach employed. 60.38% of the cases presented sequelae. When evaluating the orbital sequelae associated with orbital fractures, it was observed that the most frequent sequels were Mechanical Strabismus, Diplopia, Anisocoria and Enophthalmos. In none of these associations was a significant p value obtained in the Chi-square test, however none exceeded the unit.

Conclusions: Patients with orbital trauma are increasing. It was observed that the most frequent fracture is the floor fracture and therefore in which more sequels are observed so we must be careful to prevent or minimize them intentionally. The most prevalent postoperative sequelae were

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diplopia and mechanical strabismus. In this study, important epidemiological data were obtained that can help to broaden knowledge and guide the personnel who treat orbital trauma to prevent and / or minimize sequelae, providing a better functional and aesthetic prognosis.

KEYWORDS: Orbital trauma; Sequelae; Orbital fractures; Diplopia; Enophthalmos; Mechanical Strabismus

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INTRODUCTION

Facial trauma represents more than 50% of the pathology treated in trauma emergency services and often involves the orbital skeleton, finding it in percentages ranging from 40% (Metger et al., 2011) to 90% (Vega et al., 2008), being considered one of the most important health problems worldwide. (1,2)

Due to its high severity and complexity, trauma to the facial territory is often associated with high morbidity, loss of function, and a high aesthetic, social, and economic cost. Currently its prevalence has increased considerably, probably due to the increase in the social and labor rhythm of our population (3).

The prevalence of facial trauma between genders has a ratio of 1:3 between women and men (4), but it is important to note that there has been an increase in the number of female patients in recent times, probably due to the greater social and sports activities of women today. (5)

There is also a difference in the prevalence of facial trauma according to age range, highlighting a higher number of facial bone fractures in adult patients, unlike in pediatric patients. This relationship is explained by the greater plasticity of a child's facial skeleton, which determines a
better absorption of traumatic forces and by the lower proportion in the size ratio between the bones of the face and those of the skull (6)

The etiology of orbital trauma is very varied. The most important can be mentioned as traffic, work and sports accidents, interpersonal aggressions, falls, among others.

Because the facial mass constitutes, contains and relates to vital structures and anatomical elements, many facial injuries are caused by high-energy trauma, determining that these traumatic conditions do not occur in isolation but that injuries can be observed, concomitantly, in other structures such as the central and peripheral nervous system. eyeballs, airways, etc., requiring management for this type of patient by a multidisciplinary team, in the context of a polytraumatized patient (7)

Orbital trauma can be related to intracranial injuries, the optic nerve, the lacrimal system, the eyelid and the globe and requires adequate treatment, taking into account the serious sequelae caused by mishandling and by the accident itself, which cause functional and cosmetic problems that are very difficult to correct (8)

The orbit is a pyramid-shaped structure with four walls; an upper wall or orbital roof, a lower wall or orbital floor and the medial and lateral walls that meet at the orbital apex. The superior orbital fissure, inferior orbital fissure, and optic nerve canal are present at this apex. The orbital rim is divided into four segments: upper or segmental supraorbitary; medial the nasoetmoidal segment; lateral, and lower the zigomatic segment. (9)

The orbit is made up of 7 bones of the face and skull that join together to constitute the walls, these are: the frontal bone, ethmoid, sphenoid, maxilla, zygomatic, lacrimal and palatine. The volume of the orbit is approximately 30ml of which 7ml are occupied by the eyeball, with some variations in relation to sex and race. (10)

Orbital fractures are those that affect the bone walls of the orbital cavity. Orbital fractures are the consequence of trauma to the upper and middle third of the face. They can be simple (this type includes blow-out and blow-in fractures, seen as isolated fractures of the orbital floor, medial wall, lateral or roof wall, these fractures can be classified as pure and impure, depending on whether or not the orbital rim is fractured.) or they can be complex (be associated with fractures of the zygomatic region (orbitozygomatic), naso-ethmoid (NOE), fractures of the frontal bone that involve or not the frontal sinus (fronto-orbital), high-impact maxillary fractures such as those of the Le Fort II and Le Fort III types, panfacial, etc.)

The identification of orbital apex fractures is also important, due to their association with injuries to neurovascular structures of the superior orbital fissure and optic canal, including traumatic optic neuropathies. (8, 11)

Clinical diagnosis is sometimes complicated, as obvious clinical signs are not always observed. These signs will depend on the walls that were affected. The surgical treatment of these fractures will be defined by the presence of clinical signs such as enophthalmo, diplopia or ophthalmoplegia due to muscle entrapment extrinsic ocular. He or she will also determine a surgical resolution of the fracture, if the magnitude of the bone defect in the orbital walls causes a displacement or herniation of periorbital structures to neighboring anatomical cavities, such as the maxillary sinus. This treatment will consist of recovering the displaced periorbital tissues, freeing the muscles and reconstructing the orbital walls involved with osteosynthesis elements (12).

The management of orbital trauma is aimed at early and correct restoration of fractures, through reduction and osteosynthesis of the fractured area before a malunion of the fragments occurs, with resorption and loss of the original

bone size. A correct reconstruction of the bone defect by alignment is performed, according to the anatomy and the three-dimensional shape of the orbit, giving adequate volume in order to prevent complications and sequelae, since the continent/content relationship is very sensitive. (9)

A large percentage of patients who suffer orbital fractures have long-term complications and sequelae, even after reconstructive surgery or surgical repair of the defect (visual disturbances, proptosis, persistent diplopia, enophthalmo, limitation of ocular mobility, ocular dystopia, orbital dystopia, permanent tearing, unsightly scar, hypoesthesia of the infraorbital nerve, etc.). This is of great magnitude because these sequelae are often associated with high morbidity, loss of function and a high aesthetic, social and economic cost either due to the costs of treatment, recovery and rehabilitation, or due to lost working days. (8)

According to the literature, enophthalmos is particularly resistant to secondary repair and is often caused by inadequate correction or excessive increase in intraorbital volume. Persistent diplopia may be observed after repair of fractures of the orbital floor; It is important that after repair, forced duction is checked to identify if there is interference with eye movements. Likewise, the most common sequelae of the repair of orbitozygomatic fractures is enophthalmos. Other sequelae that patients may present after repair of orbitozygomatic fractures are persistent hypoesthesia in the infraorbital nerve region and maxillary sinusitis.

The goals of orbital fracture treatment are to reconstruct the three-dimensional shape of the orbital walls, restore pre-trauma orbital volume, and restore eye function by three-dimensional restitution of orbital anatomy. Post-traumatic enophthalmos and diplopia caused by inappropriate reconstruction of orbital anatomy are still a sequel of these fractures. The most frequent cause of enophthalmos and alterations in ocular mobility is the increase in orbital volume with herniation of the orbital contents in the adjacent cavities and up to 8.5% of patients with orbital trauma treated with traditional methods are left with an increase in orbital volume. Therefore, in orbital reconstruction it is essential to restore the volume and shape of the orbital walls with precision. (13)

This is especially true for fractures affecting the orbit, which require precise volumetric and anatomical reconstruction to prevent late complications, first and foremost in terms of eye function. Sequelae such as diplopia, enophthalmos, hypophtalmos, and sensation disorders within the infraorbital nerve distribution are well known to all surgeons dealing with orbito-zygomatic fractures.

Despite early surgical intervention, the appearance of a permanent sequelae is still a fact for many patients. (14)

According to a study carried out in Göteborg, Sweden, between 1991 and 1995 with a sample of 107 patients in which the prevalence of sequelae in pure orbital fractures was compared with orbito-zygomatic fractures, a higher frequency of sequelae was observed in orbitozygomatic fractures. Regardless of the surgical method, the frequency of sequelae was high. Permanent sequelae were found in 83% of cases. The most frequent sequelae were alterations in sensitivity (55%), vision symptoms (48%) and cosmetic problems (44%). Of the 20 patients in whom support material was not used for reconstruction, 18 had sequelae. Patients in the 20-29 age group had relatively more cosmetic problems than the other age groups.

Sequelae in general and alterations in sensation in particular are more common in relation to orbitozygomatic fractures (62%) than with pure fractures (43%). Numbness within the ipsilateral infraorbital nerve distribution was a common symptom (40%). Sensitivity disorders usually include the ipsilateral cheek and lip, and in the

In the case of a few patients, the disorders of tooth sensitivity have become permanent. Four patients (5%) had pain in the area. Some have noted that cold and/or windy weather accentuates symptoms. Of the patients who did not undergo surgery, it is known that some are still affected by dysesthesia 4 to 5 years after the trauma. Nearly half of the patients reported visual defects or other eye symptoms such as blurred vision, diplopia, increased tear flow, and increased sensitivity to light. Three patients became blind in direct connection with the trauma, but there were no cases of blindness caused by the surgery. Permanently blurred vision was mentioned by 27% of patients. 40% of patients had preoperative diplopia that was verified by an ophthalmologist. 17% of patients had permanent postoperative diplopia of varying degrees of which they had no such symptoms before the operation. 7% of patients reported increased tear flow, but none of them had an orbital fracture that included the medial wall including the tear duct or had postoperative ectropion. Some patients had increased sensitivity to light, although none of them were known to have post-traumatic mydriasis or a tonic pupil caused by ciliary ganglion injury. Enophthalmos was present in 7% of the patients. In many cases, enophthalmos is reported as a difference between the 2 eyes of more than 2 mm (measured with the Hertel exophthalmometer). Enophthalmos is most often the result of a failure to restore the exact volume of the orbit rather than fibrosis and loss of soft tissue volume. A cosmetically disturbing scar after incision subciliary was present in 19%, and permanent ectropion was present in 4%.

Some symptoms may seem less important, such as numbness in the cheek and teeth. However, in many cases sensational disorders are a considerable problem for the patient, and our goal should be to fully restore function, which is why it has been discussed whether or not loss of sensation after orbital trauma should be an indication for surgery. It should be noted that there are probably a number of cases with permanent scleral show that are not reported here, because patients may not be fully aware of the symptom and its possible connection to trauma (14).

Isolated fractures of the medial wall of the orbit account for up to 55% of orbital wall fractures. Combined with floor fractures, the incidence increases to 84%.

Anatomically, the lacrimal sac is adjacent to the medial wall. It can be expected that orbital fractures of the medial wall and surgical interventions for this type of fracture can affect the lacrimal system.

Patients present with permanent epiphora and several recurrent episodes of dacryocystitis. Both permanent tearing and recurrent symptoms of dacryocystitis are indications for dacryocystorhinostomy (DCR) or conjunctive dacryocystorhinostomy. (15)

According to Hammer, a late complication or sequelae of orbital trauma can be considered to be one that is observed after 4 weeks of the traumatic event or 4 weeks after surgical treatment in the case of those patients who required surgery. Minor deformities are associated with orbital traumas without fractures or with simple fractures or isolated wall fractures, and major deformities always occur as sequelae of complex fractures. (16)

Orbital trauma requires a clinical diagnosis and adequate and timely treatment by a competent professional, capable of providing adequate management from the functional and structural point of view and thus minimizing the sequelae of this pathology (17).

Although orbital trauma is not a priority in itself in the initial approach to a polytraumatized patient, an exhaustive assessment of the risk of orbital structure involvement should be included in the evaluation after hemodynamic compensation. In this sense, computed tomography (CT) study, due to its high sensitivity, is considered the imaging modality of choice for the diagnosis of midfacial fractures.

In addition, knowledge of the epidemiological characteristics of cases of facial and orbital trauma may constitute a relevant tool for medical suspicion and targeted investigation of orbital lesions (18).

Finally, it is important to always take into account an appropriate choice for the correction of sequelae of minimal and aesthetic approaches that make it possible to restore the bone contour and orbital function (19).

JUSTIFICATION AND STATEMENT OF THE PROBLEM

Facial trauma accounts for more than 50% of the pathology treated in trauma emergency departments and often involves the orbital skeleton. The importance of orbital trauma is that it is found with percentages ranging from 40% (Metger et al., 2011) to 90% (Vega et al., 2008), being considered one of the most important health problems worldwide.

A large percentage of patients who suffer orbital fractures have long-term complications and sequelae, even after reconstructive surgery or surgical repair of the defect (visual disturbances, proptosis, persistent diplopia, enophthalmo, limitation of ocular mobility, ocular dystopia, permanent tearing, unsightly scar, hypoesthesia of the infraorbital nerve, etc.). (Rodríguez et al., 2004). This is of great magnitude because these sequelae are often associated with high morbidity, loss of function and a high aesthetic, social and economic cost either due to the costs of treatment, recovery and rehabilitation, or due to lost working days. Therefore, we consider that this pathology is a relevant health problem that requires investigation, even more so considering the scarce information that exists on this subject in our country.

Currently the prevalence of orbital trauma has increased considerably, probably due to the increase in the social and work rhythm of our population. Orbital trauma requires a clinical diagnosis and adequate and timely treatment by a competent professional, capable of providing adequate management from the functional and structural point of view and thus minimizing the sequelae of this pathology. (Salej et al., 2003)

With this study, we try to provide more information about orbital trauma and its sequelae in the Mexican population, since there is no epidemiological data in our country in the literature, and knowledge of this topic will guide us about the precise and comprehensive management of these patients. It is very important to know the clinical course, the most frequent type of orbital fracture according to the fracture of its components, whether it is the orbital rim with its segments or the midsection of the orbit, associated mid-third fractures, the mechanism of trauma and complications, in order to prevent orbital sequelae. which are very difficult to correct.

OBJECTIVES

To determine the epidemiological profile of the sequelae of orbital trauma in the Mexican population of a national hospital; "Dr. Victorio de la Fuente Narváez" Traumatology Hospital IMSS in the period between January 1, 2013 and March 31, 2017.

Specific objectives:

1.- To determine the population affected by orbital trauma according to age, sex and mechanism of injury in the Traumatological Hospital.

2.- To determine orbital fractures according to anatomical distribution and the oculoorbital involvement associated with fractures.

3.- To know the types of sequelae of orbital trauma and their frequency in the Trauma Hospital.

4.- Associate the type of fracture with late complications or sequelae.

5.- To publicise the most optimal treatments used in the Traumatology hospital, to minimise the sequelae.

MATERIAL AND METHODS

Design: An observational, descriptive, retrospective and cross-sectional study will be carried out

Location: Ophthalmology Service of the Traumatology Hospital "Dr. Victorio de la Fuente Narváez" IMSS. Mexico City.

Period: During the period between January 1, 2013 and March 31, 2017.

Inclusion criteria:

Patients treated at the Traumatology hospital who present a diagnosis of orbital trauma with or without orbital fractures.

Patients with fractures of any segment of the orbit including the diagnoses of: orbito-frontal, naso-orbital-ethmoid, orbital-zygomatic, orbital roof, orbital floor, medial wall and lateral wall of the orbit, Le Fort II and Le Fort III, panfacial.

Exclusion criteria:

Patients treated in Ophthalmology for a diagnosis other than orbital trauma

Elimination criteria:

Patients with clinical records with incomplete data

Sampling technique:

Non-probabilistic sampling of consecutive cases

Sample size calculation:

Approximately 30 first-time patients are treated per month in the Ophthalmology service. Considering the study period, which will be between January 1, 2013 and March 31, 2017, as well as the exclusion and elimination criteria, a study population of approximately 1000 patients is calculated.

METHODOLOGY

It consists of the review and collection of data from the clinical records of patients treated in the Ophthalmology service with a diagnosis of orbital trauma during the period between January 1, 2013 and March 31, 2017, all the data being collected and recorded in a Microsoft Excel database from where the results will later be taken for interpretation and statistical analysis in SPSS.

STATISTICAL ANALYSIS OF THE RESULTS

Once all the data is collected and recorded in a database in Microsoft Excel, the information will then be emptied into SPSS. For the quantitative variables, measures of central tendency (Mean) and dispersion (SD) will be used. For the qualitative variables, absolute and relative frequencies will be used.

ETHICAL CONSIDERATIONS

Due to the design of the study, as it is an observational, retrospective and cross-sectional study, no patient is interfered with or affected as it is considered to be of minimal risk.

The ethical recommendations in force in health matters are complied with, IMSS, SSA, the principles of autonomy, justice and beneficence are not violated; of the Declaration of Helsinki of the World Medical Association and for ethical principles for medical research on human subjects, at the 59th General Assembly in Seoul, South Korea, in October 2008.

Since scientific research for health is a determining factor to improve actions aimed at protecting, promoting and restoring the health of the individual and society in general; to develop technology and clinical instruments in health services and thus increase their productivity.

According to the established bases, the development of research must address the ethical aspects that guarantee the freedom, dignity and well-being of the person subject to research, which in turn, requires establishments with technical criteria, to regulate the application of procedures related to the correct use of the resources allocated to it; that without restricting the freedom of researchers, allows research on human beings, on new prophylactic, diagnostic, therapeutic and rehabilitation resources; subject to a security control, in order to obtain greater efficiency and avoid risks to people's health.

Therefore, this study will be carried out in an observational manner in the published world medical literature, which will be carried out based on the regulations of the General Health Law, in terms of health research and which is currently in force in the territory of the United Mexican States.

Title Two: Ethical Aspects of Research on Human Beings, Chapter I. General Provisions. In Articles 13 and 27.

RESULTS

The records of all patients treated in the Ophthalmology service of the Traumatology Hospital "Dr. Victorio de la Fuente Narváez" IMSS in the period between January 1, 2013 and March 31, 2017 were reviewed, finding a total of 1185 patients for further analysis. Those patients whose records were found to be incomplete were excluded and those who did not have an ophthalmological diagnosis of oculo-orbital trauma were eliminated, leaving a total of 1002 patients.

Of the 1002 patients who met the inclusion criteria, 804 (80%) were male and 198 (20%) female. (Table 1. Gender.) (Figure 1. Gender.)

Of the 1002 patients reviewed with a diagnosis of oculoorbital trauma, there was an average age of 38.60 years, with the oldest patient 94 years and the youngest patient 1 year. The age that was repeated the most was 39 years old. The median was 37 years (94-1). Figure 2. Age

It was observed that of the 1,002 patients included in the study, 38.32% (384 patients) had right orbit involvement, 41.02% (411 patients) had left orbit involvement, and 20.66% (207 patients) had both orbit involvement. (Table 2. Affected orbit

and Graph 3. Orbit affected)

According to the mechanism of injury, the first place was obtained by traffic accidents with 425 patients that corresponded to 42.42%, the second place was aggressions with 285 patients that corresponded to 28.44% and in third place the falls with 179 patients representing 17.86%. Table 3. Mechanism of injury

Among the traffic accidents in which we had a total of 425 patients; 298 patients were due to car accidents, 77 patients due to motorcycle accidents, 8 patients due to bicycle accidents and 42 patients due to being run over.

Within the aggressions by third parties in which we had a total of 285 patients; 150 patients corresponded to direct aggression by blunt blows, 100 patients to assault with a knife and 35 patients to assault by firearm (HPAF).

Within the falls where there were 179 patients, 71 patients were due to falls from their own height and 108 patients due to free falls.

In the category of Others where there were a total of 48 patients, mechanisms of occupational injury were included such as pressing where there were 11 patients, trauma with emery 15 patients, crushing by compressors 2 patients, accidents with saws 2 patients, blow with wood 1 patient, blow with rod 1 patient, blow with glass 2 patients, trauma by whipping with cables 2 patients, blow with pressurized air 2 patients, trauma with sharp objects 8, blows with doors and furniture 2 patients.

Within the burns where there were a total of 43 patients, 4 patients corresponded to chemical burns, 3 patients to thermal burns (hot liquids), 28 patients to direct fire burns and 8 patients to electrical burns.

Figure 4. Mechanism of injury

According to the place of the accident, it was found that the majority occurred on public roads with 626 patients (62.48%), second place was at home with 194 patients (19.36%) and third place at work with 134 patients (13.37%). Table 4. Accident Site and Graph 5. Accident Location

Of the 1002 patients with orbital trauma, 48.10% were found with orbital fractures (482 patients). 51.90% did not report orbital fractures associated with trauma (520 patients). Table 5. Presence of Orbital Fractures and Graph 6. Presence of Orbital Fractures

Of the 482 patients with orbital fractures, 32.36% (156 patients) had simple, linear, non-displaced fractures that did not require ORIF, and 67.64%

(326 patients) had complex fractures that required surgical treatment of ORIF with osteosynthesis material. Table 6. Type of Simple or Complex Fracture and Graphic 7. Type of Simple or Complex Fracture

Of the 482 patients with orbital fractures, the following was found according to their anatomical distribution: The most frequent fracture was the orbital floor fracture and the medial wall secondly. Table 7. Type of fracture according to anatomical distribution and Graph 8. Type of fracture according to anatomical distribution

NOTE:

OF THE PATIENTS WHO HAD A ROOF FRACTURE, 127 WERE REPORTED WITHOUT FRONTAL SINUS INVOLVEMENT AND 19 WITH FRONTAL SINUS INVOLVEMENT.

OF THE FLOOR FRACTURES, 9 WERE REPORTED BLOW-IN, 98 BLOW-OUT, PURE (WITHOUT ORBITAL RIM INVOLVEMENT) 45, IMPURE (WITH ORBITAL RIM INVOLVEMENT) 7.

OF THE 38 NOE FRACTURES THAT WERE REPORTED, 23 CORRESPONDED TO NOE I, 12 TO NOE II AND 3 TO NOE III.

OF THE 56 ORBITOZYGOMATIC FRACTURES THAT WERE REPORTED, 29 CORRESPOND TO TYPE I ORBITOZYGOMATIC, 16 TO TYPE II, 5 TO TYPE III AND 6 TO TYPE IV OF THE HAMMER CLASSIFICATION.

OF THE 17 FRACTURES THAT WERE LE-FORT, 2 CORRESPOND TO LE-FORT I, 7 TO LE-FORT II AND 8 TO LE-FORT TYPE III

TYPES OF SEQUELAE OF ORBITAL TRAUMA AND THEIR FREQUENCY

In relation to the reported sequelae, a total of 605 patients were found with some type of sequelae out of the 1002 patients diagnosed with oculo-orbital trauma, which is equivalent to 60.38%. Of these patients who presented sequelae, it was found that a large majority of them had 2 or more types of sequelae at the same time.

28 types of sequelae were grouped, of which the 10 most important found in the study according to their frequency were the following: The sequelae that was most frequently reported was diplopia with a total of 195 patients representing 32.23%. In second place, Mechanical Oculomotor Dysfunction was reported with a total of 192 patients representing 31.73%, in third place was the decrease in Visual Acuity with a total of 119 patients representing 19.66%. In fourth place we find anisocoria with 118 patients (19.50%), in fifth place paralytic strabismus with 90 cases that represented 14.87%, in sixth place Optical-traumatic Neuropathy with 86 patients (14.21%), in seventh place Enophthalmos with 85 patients that represented 14.04%. In eighth place was the diagnosis of ptosis in 77 patients (12.72%), the ninth place was occupied by keratitis with 63 patients (10.41%) which is within the category of other types of sequelae and in tenth place we find Neuro-ophthalmological Syndromes with 52 patients (8.60%). The rest of the sequelae and their frequency are shown in the following table. Table 8. Types of sequelae and Graph 9. Sequelae of orbital trauma.

It was found that of the diplopias there were 191 patients with binocular diplopia and 4 with monocular diplopia. Of the binocular diplopias, 135 patients had vertical diplopia and 56 had horizontal diplopia. Only 24 patients with compensatory position were reported.

Of the 119 patients in whom a decrease in their visual acuity was reported, 67 reported blindness in one eye. Campimetric defects were reported in 45 patients.

Within the paralytic strabismus (90 patients), paralysis of 2 or more cranial nerves was reported simultaneously. Paralysis of the third unilateral NC was reported in 53 patients, in 49 patients paralysis of the IV unilateral NC, in 48 patients paralysis of the VI unilateral NC, in 3 patients paralysis of the third bilateral NC, in 1 patient paralysis of the bilateral IV NC and in 4 patients paralysis of the bilateral VI NC.

Of the patients who presented anisocoria (118) 19.50%, 117 had anisocoria at the expense of mydriasis and 1 at the expense of miosis. Of the patients with mydriasis, 38 patients reported rupture of the pupillary sphincter and a total of 86 patients reported afferent pupillary defect.

In the neuro-ophthalmological syndromes, 34 patients with vertex syndrome, 13 patients with ceiling syndrome and 5 with sphenoid cleft syndrome were found.

Finally, in the category of Others, specifically ocular sequelae are included:

Keratitis 63 patients, Maculopathies 21 patients, leukoma 19 patients, Ametropia 17 patients, Dry eye in 7 patients, Retinal detachment in 5 patients, Traumatic cataract in 4 patients, Glaucoma in 3 patients, lens dislocation in 3 patients, endophthalmitis in 1 patient and 0 patients in sympathetic ophthalmia.

PRESENCE OF 2 OR MORE SEQUELAE IN PATIENTS

Of the 605 patients who presented sequelae, 161 patients (26.61%) only had a single sequelae, of which the most frequent was diplopia. It was found that the rest of the patients who presented sequelae corresponded to 444 patients; presented 2 or more sequelae due to the same event (73.39%). 192 patients had 2 sequelae at the time of examination, which most frequently corresponded to diplopia with decreased visual acuity or diplopia with mechanical or paralytic strabismus. 97 patients presented 3 types of sequelae at the time of examination, the most frequent were diplopia with mechanical strabismus and compensatory position, and also enophthalmos with facial asymmetry and orbital dystopia. With 4 sequelae there were 53 patients, the most frequent sequelae in these patients were diplopia, mechanical or paralytic strabismus, compensatory position, decreased visual acuity. Another frequent combination was neuro-ophthalmological syndrome and/or traumatic optic neuropathy, mydriasis, decreased visual acuity, and diplopia. With 5 sequelae there were 54 patients. The most frequent sequelae in these patients were eyelid retraction, lagophthalmos, facial paralysis, keloid scar, facial asymmetry. Other combinations that were seen were neuro-ophthalmological syndrome and/or traumatic optic neuropathy, mydriasis, decreased visual acuity, field defects and diplopia.

With 6 sequelae there were 20 patients. The most frequent sequelae were neuro-ophthalmological syndrome and/or optic neuropathy

Traumatic syndrome, mydriasis, decreased visual acuity, field defects, paralytic strabismus and facial paralysis or Neuro-ophthalmological syndrome with facial paralysis, enophthalmos, orbital dystopia, paralytic strabismus and mydriasis.

With 7 sequelae there were 16 patients, the combinations that were most frequently found were keloid scar, facial paralysis, lagophthalmos, enophthalmos, facial asymmetry, diplopia, mechanical strabismus or paralytic.

With 8 sequelae there were 9 patients. The most frequent combinations were neuro-ophthalmological syndrome, ptosis, mydriasis, amaurosis, decreased visual acuity, field defects, orbital dystopias and paralytic strabismus.

With 9 sequelae, there was one patient who presented eyelid retraction, facial asymmetry, enophthalmos, mechanical strabismus, orbital dystopia, diplopia, decreased visual acuity, dry eye, compensatory position.

With 10 sequelae, one patient presented with eyelid retraction, paresthesias, lagophthalmos, facial paralysis, keloid scar, decreased visual acuity, field defects, ectropion, keratitis, and leukoma.

With 11 sequelae, there was one patient who presented neuro-ophthalmological syndrome and/or traumatic optic neuropathy, retinal detachment, anophthalmos, ptosis, lens dislocation, amaurosis, mydriasis, decreased visual acuity, orbital dystopia, enophthalmos and mechanical strabismus.

Table 9. Number of sequelae and Graph 10. Number of sequelae

ORBITAL FRACTURES AND TYPES OF SEQUELAE FOUND ACCORDING TO THE ANATOMICAL AREA OF THE FRACTURE BY FREQUENCY

Of the patients who presented orbital fracture with sequelae, the following was found according to the affected anatomical area of the fracture.

Diplopia was most often found in floor fractures followed by medial wall fractures. Table 10. DIPLOPIA and Graph 11. Diplopia

Facial asymmetry was most often found in floor fractures followed by medial wall fractures. Table 11. FACIAL ASYMMETRY and Graph 12. Facial asymmetry

Paralytic strabismus was most often found in roof fractures followed by floor fractures. Table 12. PARALYTIC STRACISM and Graph 13. Paralytic strabismus

Mechanical strabismus was most often found in floor fractures followed by medial wall fractures. Table 13. MECHANICAL STRACISM and Graph 14. Mechanical strabismus

The compensatory position was most frequently found in medial wall fractures followed by floor fractures. Table 14. COMPENSATING POSITION and Graph 15. Compensating Position

Enophthalmos was reported most frequently in floor fractures followed by medial wall fractures. Table 15. ENOPHTHALMOS
and Graph 16. Enophthalmos
Decreased Visual Acuity was reported most frequently in floor fractures followed by medial wall fractures. Table 16. DECREASE IN VISUAL ACUITY and Graph 17. Decreased Visual Acuity
Ptosis was most often found in roof fractures followed by floor fractures. Table 17. PTOSIS and Graph 18. Ptosis
Eyelid retraction was most often found in floor fractures followed by sidewall fractures. Table 18. PALPEBRAL RETRACTION and Graph 19. Eyelid retraction
Orbital dystopia was reported most frequently in floor fractures followed by medial wall fractures. Table 19. ORBITAL DYSTOPIA and Graph 20. Orbital dystopia
Keloid scar was most frequently reported in floor fractures followed by sidewall fractures. Table 20. KELOID SCAR and Graph 21. Keloid scar
Lagophthalmos was most often found in sidewall fractures followed by floor fractures. Table 21. LAGOPHTHALMOS and Graph 22. Lagophthalmos
Ectropion was most often found in floor fractures followed by medial wall fractures. Table 22. ECTROPION
and Graph 23. Ectropion
Facial paralysis was most often found in floor fractures followed by combined orbital wall fractures. Table 23. FACIAL PARALYSIS and Graph 24. Facial Paralysis
Loss of eyeball or anophthalmos was most frequently reported in floor fractures followed by medial wall fractures. Table 24. ANOPHTHALMOS and Graph 25. Anophthalmos
Proptosis was most often found in roof fractures followed by sidewall fractures. Table 25. PROPTOSIS
and Graph 26. Proptosis
Entropion was most often found in floor fractures followed by sidewall fractures. Table 26. ENTROPION and Graph 27. Entropion
Paresthesias were most frequently reported in floor fractures followed by medial wall fractures. Table 27. PARESTESIAS and Graph 28. Paresthesias
Trapdoor was most often found in floor fractures followed by sidewall fractures. Table 28. TRAPDOOR
and Graph 29. Trapdoor
Ocular dystopia was found with the same proportion in both sidewall fractures and combined wall fractures. Table 29. OCULAR DYSTOPIA and Graph 30. Ocular dystopia
There were no reported cases of simblefaron associated with orbital fractures.
Telecanthus was most frequently found in Naso-orbito-ethmoid (NOE) fractures followed by medial wall fractures. Table 30. TELECANTO and Gráfica 31. Telecanto
There were no reported cases of hemifacial spasm associated with orbital fractures.
Dystrichiasis was most often found in floor fractures followed by panfacial fractures. Table 31. DISTRICIASIS and Graph 32. Dystrichiasis
Neuro-Ophthalmologic Syndromes were most often found in roof fractures followed by sidewall fractures. Table 32.

NEURO-OPHTHALMOLOGICAL SYNDROMES and Graph 33. Neuro-ophthalmological Syndromes
Optical-traumatic neuropathies were most often found in roof fractures followed by sidewall fractures. Table 33. TRAUMATIC OPTIC NEUROPATHY and Graph 34. Optical-traumatic neuropathy
Anisocoria was most frequently reported in floor fractures followed by roof and combined fractures. Table 34. ANISOCORIA and Graph 35. Anisocoria
Finally, it was found that epiphora was reported more frequently in medial wall fractures, followed by floor fractures. Table 35. EPIPHORA and Graph 36. Epiphora

ASSOCIATION BETWEEN FRACTURES AND THE MOST FREQUENT ORBITAL SEQUELAE

When evaluating the orbital sequelae associated with orbital fractures, it was observed that the most frequent sequelae in patients who had some type of orbital fracture were 4 types of sequelae: mechanical strabismus with a total of 354 patients and diplopia that occurred in a total of 348 patients. These sequelae were followed by mydriasis, which occurred in 200 patients, and enophthalmos, in 170 patients.
A total of 354 cases of mechanical strabismus were obtained, associated more with orbital floor fractures in the first place and in the second with fractures of the medial wall, in this association it was found that the P values were not significant, however
they do not exceed unity. p-value = .269 Chi-square test. Table 36. Chi-square test. Mechanical strabismus. Table 37. Contingency Table. Mechanical strabismus.
A total of 348 cases of diplopia were obtained, more associated with orbital floor fractures in the first place and in the second place with fractures of the medial wall. In this association it was found that the P values were not significant, however they did not exceed unity. p-value = .294 Chi-square test. Table 38. Chi-square test. Diplopia. Table 39. Contingency Table. Diplopia
200 cases were obtained with mydriasis associated more with orbital floor fractures in the first place and in the second with combined fractures of the orbital walls, in this association it was found that the P values were not significant, however they did not exceed unity. p-value = .277 Chi-square test. Table 40. Chi-square test. Mydriasis Table 41. Contingency Table. Mydriasis
Finally, 170 cases of enophthalmos were obtained, more associated with orbital floor fractures in the first place and in the second place with fractures of the medial wall, in this association it was found that the P values were not significant,

however they did not exceed unity. p-value = .294 Chi-square test. Table 42. Chi-square test. Enophthalmos and Table 43. Contingency Table. Enophthalmos

MOST COMMONLY USED TREATMENTS AT THE MAGDALENA DE LAS SALINAS TRAUMATOLOGY HOSPITAL IN THE OPHTHALMOLOGY SERVICE TO MINIMISE SEQUELAE

It was observed that of the total number of patients we had with sequelae (605), non-surgical medical procedures were used in 285 of them and surgical procedures were used in 586 patients. Some patients who had surgical procedures also had some additional nonsurgical procedures. Table 44. Non-Surgical Procedures and Graph 37. Non-surgical procedures. Table 45. Surgical Procedures and Graph 38. Surgical Procedures.

X. DISCUSSION

There is a lot of research on facial trauma in various hospitals and specialized care centers around the world, however, there is currently a special emphasis on the study of orbital trauma and its fractures since they are considered to be of sensitive management and their inadequate treatment can cause sequelae as important and limiting as permanent diplopia and enophthalmos (Salej et al., 2003).

In Mexico, only two studies are known that address the incidence of orbital fractures and the management of sequelae. The first was carried out in the Otorhinolaryngology Service of the Central Military Hospital in Mexico City with a series of 176 patients diagnosed with craniofacial trauma in which they described the prevalence of orbital fractures and surgical management as well as complications or postoperative sequelae (Rodríguez-Perales et al. 2004) and another performed in the Reconstructive Surgery Service of the ISSEMyM Medical Center

Metepec, Mexico, in which they describe 5 cases with post-traumatic enophthalmos as a sequel of orbitozygomatic fractures. (Malagón Hidalgo, H et al. 2011).

In the present work, the population of a trauma concentration hospital was evaluated; The Traumatology Hospital "Dr. Victorio de la Fuente Narváez" IMSS obtained in a period of 5 years a series of 1002 patients with Diagnosis of Orbital Trauma (2013-2017). This is equivalent to 85.5% prevalence, which coincides with what has been reported in the literature in which they describe that facial trauma frequently involves the orbital skeleton, finding it in percentages ranging from 40% to 90%, being considered one of the most important health problems worldwide. (Metger et al., 2011 and Vega et al., 2008)

We also agree that its prevalence has increased considerably, probably due to the increase in the social and labor rhythm of our population (Ferreira B et al. 2006).

The prevalence of facial trauma between genders in our series was 1:4 between women and men, 20 % were female and 80 % male. The percentage distribution of patients according to gender as well as the 1:4 ratio was similar to that reported in some studies (Juan Marcelo Reyes et al. 2013, Telfer M, Jones G et al. 1991). However, the male/female ratio did not coincide with the study conducted at the Central Military Hospital of Mexico (Rodríguez et al., 2004), where this ratio was higher, with values of 1:9, which can be explained by the size of its sample.

Regarding the average age in our series, it was found to be 38.60 years, showing a higher prevalence in the fourth decade of life, coinciding with values provided by other previous studies, where in many cases the average age value was 36 years (Salej et al., 2003, Mauricio Sandoval Tobar et al. 2013) and 33 years (Rodríguez-Perales, Marcos Antonio et al. 2004). This is based on the fact that this age range is more active and prone to violent behavior, car accidents, and the practice of dangerous exercises and sports.

It was observed that of the 1,002 patients included in the study, 38.32% (384 patients) had right orbit involvement, 41.02% (411 patients) had left orbit involvement, and 20.66% (207 patients) had both orbit involvement. As seen, most of the orbital fractures in the sample studied were on the left side. These data are similar to those presented by previous studies (Salej et al., 2003; Mauricio Sandoval Tobar, 2013). This can be explained by the fact that in most interpersonal aggressions against a right-handed aggressor it will generate an impact on the left side of the face, it is also related to the impact that a driver receives when crashing, considering the left position of the driver in the vehicle resulting in an impact with the interior of the vehicle on the left side of the face. It is also important to note that in the event of a fall or blow against a surface, the zygomatic arch is the most prominent area of the width of the face, so it is one of the first areas to receive an anterolateral impact, generating the fracture and disinsertion of this bone from the adjacent orbital portions. (Mauricio Sandoval Tobar, 2013)

The etiology of orbital trauma is very varied, in our work the first place was obtained by traffic accidents with 425 patients that corresponded to 42.42%, the second place was aggressions with 285 patients that corresponded to 28.44% and in third place the falls with 179 patients representing 17.86%. this is fully in line with the current global trend that indicates that the most prevalent cause is traffic accidents followed by interpersonal aggressions or assaults (Salej et al., 2003; Brasileiro B, Passeri L 2006). It should also be considered that this may vary according to the level of aggressiveness among the people in the study population because in general violence has increased in recent years in the world, which begins to tip the balance towards this factor as the first etiological line as reported in other studies (Rodríguez et al., 2004 and Mauricio Sandoval Tobar et al. 2013).

In our study, it was found that of our series of patients with orbital trauma, 48.10% had orbital fractures, which is also

reported in the literature with a similar frequency (Rodríguez et al., 2004). The most frequent fracture was the orbital floor fracture in 65.52% and the medial wall fracture in 38.42%. This was consistent with the casuistry of other reports in which the most affected fractures of the middle third are in the first place floor fractures, followed by fractures of the medial wall of the orbit (Rodríguez-Perales 2004, Nilay Yuksel 2016, Juan Marcelo Reyes et al., 2013), something that would be associated with their greater anatomical weakness. Floor fracture is quite common because the lower wall of the orbit can be fractured by an increase in intraorbital pressure due to

a direct trauma to the eyeball. This type of fracture can also be generated by fracture or trauma in the maxillary zygomatic complex and its consequent disinsertion and displacement at the infraorbital level.

In relation to the sequelae reported in our series, a total of 605 patients were found with some type of orbital sequelae, which is equivalent to 60.38%. Of these patients who presented sequelae, it was found that a large majority of them had 2 or more types of sequelae at the same time since orbital trauma can be related to intracranial lesions, optic nerve, lacrimal system, eyelid and eyeball that cause functional and cosmetic problems. (Rodríguez-Perales, Marcos Antonio, 2004).

In our study, 28 types of sequelae were grouped, of which the most important found in the study according to their frequency were the following: persistent diplopia (32.23%). In second place was Mechanical Oculomotor Dysfunction (31.73%), in third place the decrease in Visual Acuity (19.66%). In fourth place we find anisocoria (19.50%), in fifth place paralytic strabismus (14.87%), in sixth place Optical-traumatic neuropathy (14.21%), in seventh place enophthalmos (14.04%). In eighth place was the diagnosis of ptosis (12.72%), the ninth place was occupied by keratitis (10.41%), which is within the category of other types of sequelae and in tenth place we find Neuro-ophthalmological Syndromes (8.60%). This also coincides with the report of Rodríguez-Perales Marcos Antonio and Pou-López Víctor Carlos who in 2004 reported sequelae even after reconstructive surgery or surgical repair of the defect in the following order: visual alterations, proptosis, persistent diplopia,

enophthalmos, limitation of ocular mobility, ocular dystopia, orbital dystopia, permanent tearing, unsightly scar, hypoesthesia of the infraorbital nerve, etc.

In our study, diplopia was most often found in floor fractures followed by medial wall fractures. Facial asymmetry was most often found in floor fractures followed by medial wall fractures. Paralytic strabismus was most often found in roof fractures followed by floor fractures. Mechanical strabismus was most often found in floor fractures followed by medial wall fractures. The compensatory position was most frequently found in medial wall fractures followed by floor fractures. Enophthalmos was reported most frequently in floor fractures followed by medial wall fractures. Decreased Visual Acuity was reported most frequently in floor fractures followed by medial wall fractures. Ptosis was most often found in roof fractures followed by floor fractures. Eyelid retraction was most often found in floor fractures followed by sidewall fractures. Orbital dystopia was reported most frequently in floor fractures followed by medial wall fractures. Keloid scar was most frequently reported in floor fractures followed by sidewall fractures. Lagophthalmos was most often found in sidewall fractures followed by floor fractures. Ectropion was most often found in floor fractures followed by medial wall fractures. Facial paralysis was most often found in floor fractures followed by combined orbital wall fractures. Eyeball loss or anophthalmos were reported more frequently in

floor fractures followed by medial wall fractures. Proptosis was most often found in roof fractures followed by sidewall fractures. Entropion was most often found in floor fractures followed by sidewall fractures. Paresthesias were most frequently reported in floor fractures followed by medial wall fractures. Trapdoor was most often found in floor fractures followed by sidewall fractures. Ocular dystopia was found with the same proportion in both sidewall fractures and combined wall fractures. Telecanthus was most frequently found in Naso-orbito-ethmoid (NOE) fractures followed by medial wall fractures. Dystrichiasis was most often found in floor fractures followed by panfacial fractures. Neuro-Ophthalmologic Syndromes were most often found in roof fractures followed by sidewall fractures. Optical-traumatic neuropathies were most often found in roof fractures followed by sidewall fractures. Anisocoria was most frequently reported in floor fractures followed by roof and combined fractures. Finally, it was found that epiphora was reported more frequently in medial wall fractures, followed by floor fractures.

The data mentioned above that were collected from our study show that there is a high risk of having a higher frequency of sequelae in patients who suffer fractures of the floor of the orbit, whether isolated fractures of the floor or combined that involve the lower wall of the orbit. This coincides with a study carried out in Göteborg, Sweden, between 1991 and 1995 with a sample of 107 patients in which a higher frequency of sequelae was observed in

the orbitozygomatic fractures involving the floor of the orbit. Regardless of the surgical method, the frequency of sequelae in this study was high with permanent sequelae in 83% of cases. The most frequent sequelae of this casuistry were alterations in sensitivity, vision symptoms (blurred vision and diplopia), cosmetic problems and enophthalmos. (Lena Folkestad 2006)

In our study, it was observed that sensitivity disorders did not have a high frequency nor do they occupy the first places of sequelae, which does not coincide with some reports in the literature where sensitivity alterations occupy an important

position of frequency (Rodríguez-Perales, Marcos Antonio and Pou-López, Víctor Carlos, 2004, Lena Folkestad 2006). We believe that this is due to the fact that paresthesias are a symptom that is not always explored or reported. Some symptoms may seem less important such as numbness of the cheek and teeth, however, in many cases sensitivity disorders are a considerable problem for the patient and our goal should be to fully restore function, which is why it is important that sensitivity disorders are taken into account after orbital trauma. that they be interrogated and reported and in this way when they are detected to be able to offer some rehabilitation therapy.

Finally, it was confirmed that minor deformities are indeed associated with orbital traumas without fractures or with simple fractures or isolated wall fractures and major deformities always occur as sequelae of complex fractures, which coincides with what has been reported in the literature for many years. (B. Hammer, 1951).

Regarding treatments, it was observed that in the ophthalmology service of the "Dr. Victorio de la Fuente Narváez" traumatology hospital IMSS, both surgical treatments and non-surgical medical procedures are used to help prevent or minimize the sequelae of orbital trauma. Among the non-surgical medical procedures are, among others, steroid injections, either intralesional or orbital, the placement of botulinum toxin and the placement of prisms with excellent results. As for surgical procedures, most of the reduction and osteosynthesis of the fractured area was observed aimed at a correct reconstruction of the bone defect with titanium meshes, which is an effective material that allows an appropriate adaptation and low complications. The objectives of the surgical treatment of orbital fractures should always be kept in mind, which are to reconstruct the three-dimensional shape of the orbital walls, restore the orbital volume prior to the trauma and restore ocular function through the three-dimensional restitution of the orbital anatomy carried out by a competent professional and carrying out these objectives it is possible to prevent or minimize complications and sequelae as mentioned in the literature. (Alicia Dean, 2015 and Salej S., 2003)

XI. CONCLUSIONS

Through this study, it was observed that the prevalence of orbital fractures and their sequelae are very similar to what has been reported in the world literature, regardless of the demographic characteristics of the different cases.

We consider it very important to provide more information about orbital trauma and its sequelae in the Mexican population since a

The most precise epidemiological analysis of this topic will guide us to have a better approach and management of this type of patient. It was observed that patients with orbital trauma are increasing because violence has increased in recent years not only in Mexico but throughout the world, which begins to tip the balance towards this factor of interpersonal violence (aggression by third parties) that is also mostly associated with people of the male sex; as the first etiological line in orbital trauma which forces us to be increasingly more prepared.

It was observed that the most frequent fracture was the floor fracture and therefore in which the greatest type of sequelae are observed, so we must know them and be attentive to prevent or minimize them intentionally.

The most commonly used surgical treatment for the treatment of orbital fractures was fracture reduction and osteosynthesis, and the most prevalent postoperative complication or sequelae was diplopia and mechanical strabismus, so it is important to place greater emphasis on duction tests after fracture reduction so as not to cause sequelae of this type.

Although a detailed description of surgical approaches was not made in cases of orbital fracture reductions, it was observed that the type of surgical approach can significantly influence the presence of complications such as trapdoor, entropion, ectropion and postoperative scar retraction, among others, so it is also important to properly manage the ocular adnexa to reduce the prevalence of this type of sequelae.

Finally, this study obtained important epidemiological data that will help to expand knowledge and guide the personnel in charge of to care for patients with orbital trauma, in order to offer timely and adequate treatment to prevent or minimize sequelae, providing a better functional and aesthetic prognosis.

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Annexes:

Table 1. Gender.

SEX	NODE OF CASES	RELATIVE FREQUENCY	PERCENTAGE
MALE	804	.80	80%
FEMALE	198	.20	20%

Table 2. Affected orbit

AFFECTED ORBIT	NODE OF CASES	PERCENTAGE
RIGHT	384	38.32%
LEFT	411	41.02%
BILATERAL	207	20.66%

Table 3. Mechanism of injury

MECHANISM OF INJURY	NODE OF CASES	PERCENTAGE
TRAFFIC ACCIDENT	425	42.42%
AGGRESSION	285	28.44%
CAIDAS	179	17.86%
OTHERS (OCCUPATIONAL ACCIDENT)	48	4.79%
BURNS	43	4.29%
EXPLOSION	13	1.30%
BITE (ANIMAL)	9	0.90%

Table 4. Accident Site

PLACE	NO. OF CASES	PERCENTAGE
HOME	194	19.36%
WORK	134	13.37%
PUBLIC ROUTE	626	62.48%
RECREATION	33	3.29%
SCHOOL	15	1.50%

Table 5. Presence of Orbital Fractures

ORBITAL FRACTURES	PERCENTAGE
With orbital fractures	48.10%
No orbital fractures	51.90%

Table 6. Type of Simple or Complex Fracture

TYPE OF FRACTURE	IN CASES	PERCENTAGE
SIMPLE FRACTURE	156	32.36%
COMPLEX FRACTURE	326	67.64%

Table 7. Type of fracture according to anatomical distribution

DISTRIBUTION ANATOMICAL	NODE OF CASES	PERCENTAGE
FX CEILING	146	35.96%
FX PARED LATERAL	100	24.63%
FX PARED MEDIAL	156	38.42%
FX FLOOR	266	65.52%
COMBINED FX	137	33.74%
COMPLEX FX	15	3.69%
SOMETHING	38	9.36%
ORBITOCYGOMATICS	56	13.79%
THE FORT	17	4.19%
PANFACIAL	26	6.40%

Table 8. Types of sequelae

SEQUEL	IN CASES	PERCENTAGE
DIPLOPIA	195	32.23%
MECHANICAL OCULOMOTOR DYSFUNCTION	192	31.73%
CENTRAL OCULOMOTOR DYSFUNCTION	14	2.31%
PARALITIC STABISMUS	90	14.87%
DECREASED VISUAL ACUITY	119	19.66%

ENOPHTHALMOS	85	14.04%
PTOSIS	77	12.72%
EYELID RETRACTION	46	7.60%
ORBITAL DYSTOPIA	42	6.94%
CICATRIZ QUELOIDE	34	5.61%
LAGOPHTHALMOS	32	5.28%
ECTROPION	31	5.12%
FACIAL PARALYSIS	29	4.79%
ANOPHTHALMOS	29	4.79%
PROPTOSIS	15	2.47%
ENTROPION	10	1.65%
PARESTHESIA	9	1.48%
TRAPDOOR	9	1.48%
OCULAR DYSTOPIA	5	0.82%
SIMBLEFARON	3	0.49%
TELECANTO	3	0.49%
HEMIFACIAL SPASM	2	0.33%
DISTRIQUIASIS	5	0.82%
NEURO-OPHTHALMOLOGICAL SYNDROMES	52	8.60%
OPTICAL-TRAUMATIC NEUROPATHY	86	14.21%
ANISOCORIA	118	19.50%
EPIPHORA	17	2.80%
OTHER	143	23.63%

Table 9. Number of sequelae

No. of sequelae	No. of patients
1	161
2	192
3	97
4	53
5	54
6	20
7	16
8	9
9	1
10	1
11	1

Table 10. DIPLOPIA

FRACTURE	PERCENTAGE
FLOOR	33.04%
MEDIAL WALL	16.95%
COMBINED	14.94%
PARED LATERAL	11.20%

ROOF	10.05%
SOMETHING	4.03%
COM	6.04%
THE FORT	1.73%
COMPLEX	0.87%
PANFACIAL	1.15%

Table 11. FACIAL ASYMMETRY

FRACTURE	PERCENTAGE
FLOOR	19.71%
MEDIAL WALL	12.41%
COMBINED	11.68%
ROOF	10.95%
PARED LATERAL	10.22%
SOMETHING	10.22%
COM	15.33%
THE FORT	4.38%
COMPLEX	2.19%
PANFACIAL	2.91%

Table 12. PARALYTIC STRACISM

FRACTURE	PERCENTAGE
ROOF	23.46%
FLOOR	20.99%
PARED LATERAL	16.05%
MEDIAL WALL	16.05%
COMBINED	13.58%
SOMETHING	2.47%
COM	6.17%
COMPLEX	1.23%

Table 13. MECHANICAL STRABISM

FRACTURE	PERCENTAGE
FLOOR	33.33%
MEDIAL WALL	18.64%
COMBINED	14.13%
PARED LATERAL	12.71%
ROOF	10.17%
SOMETHING	2.83%
COM	5.08%
THE FORT	0.85%
COMPLEX	0.85%
PANFACIAL	1.41%

Table 14. COMPENSATING POSITION

FRACTURE	PERCENTAGE
MEDIAL WALL	34.38%
FLOOR	25%
COMBINED	18.75%
PARED LATERAL	12.50%
ROOF	6.25%
SOMETHING	3.12%

Table 15. ENOPHTHALMOS

FRACTURE	PERCENTAGE
FLOOR	30%
MEDIAL WALL	24.12%
COMBINED	17.65%
PARED LATERAL	10%
ROOF	8.82%
SOMETHING	2.93%
COM	4.12%
THE FORT	1.18%
COMPLEX	1.18%

Table 16. DECREASED VISUAL ACUITY

FRACTURE	PERCENTAGE
FLOOR	23.27%
MEDIAL WALL	15.09%
COMBINED	14.49%
PARED LATERAL	14.49%
ROOF	13.22%
SOMETHING	5.04%
COM	8.19%
THE FORT	1.17%
COMPLEX	3.15%
PANFACIAL	1.89%

Tabla 17. PTOSIS

FRACTURE	PERCENTAGE
ROOF	29.60%
FLOOR	18.40%
COMBINED	15.20%
MEDIAL WALL	13.60%

PARED LATERAL	10.40%
SOMETHING	5.60%
COM	4%
COMPLEX	1.60%
PANFACIAL	1.60%

Table 18. EYELID RETRACTION

FRACTURE	PERCENTAGE
FLOOR	36.84%
PARED LATERAL	18.42%
MEDIAL WALL	13.16%
COMBINED	13.16%
PANFACIAL	10.52%
COM	5.26%
COMPLEX	2.64%

Table 19. ORBITAL DYSTOPIA

FRACTURE	PERCENTAGE
FLOOR	23.58%
MEDIAL WALL	19.82%
COMBINED	17.92%
PARED LATERAL	13.21%
ROOF	12.26%
SOMETHING	4.73%
COM	6.60%
COMPLEX	0.94%
PANFACIAL	0.94%

Table 20. KELOID SCAR

FRACTURE	PERCENTAGE
FLOOR	23.33%
PARED LATERAL	20%
COMBINED	13.33%
ROOF	10%
PANFACIAL	10%
MEDIAL	6.67%
SOMETHING	6.67%
COM	6.67%
THE FORT	3.33%

Table 21. LAGOPHTHALMOS

FRACTURE	PERCENTAGE
PARED LATERAL	25%
FLOOR	21.88%
COMBINED	21.88%
ROOF	15.62%

MEDIAL WALL	**6.25%**
COM	**6.25%**
PANFACIAL	**3.12%**

Table 22. ECTROPION

FRACTURE	PERCENTAGE
FLOOR	**46.16%**
MEDIAL WALL	**15.39%**
COMBINED	**7.69%**
ROOF	**7.69%**
COM	**7.69%**
COMPLEX	**7.69%**
PANFACIAL	**7.69%**

Table 23. FACIAL PARALYSIS

FRACTURE	PERCENTAGE
FLOOR	**24%**
COMBINED	**20%**
ROOF	**20%**
PARED LATERAL	**12%**
MEDIAL WALL	**8%**
COM	**8%**
SOMETHING	**4%**
PANFACIAL	**4%**

Table 24. ANOPHTHALMOS

FRACTURE	PERCENTAGE
FLOOR	**23.33%**
MEDIAL WALL	**20%**
ROOF	**20%**
COMBINED	**13.33%**
PARED LATERAL	**10%**
COMPLEX	**3.34%**
COM	**3.34%**
PANFACIAL	**6.66%**

Table 25. PROPTOSIS

FRACTURE	PERCENTAGE
ROOF	**44%**
PARED LATERAL	**20%**
FLOOR	**12%**
MEDIAL WALL	**8%**
COMBINED	**8%**
COMPLEX	**4%**
PANFACIAL	**4%**

Table 26. ENTROPION

FRACTURE	PERCENTAGE
FLOOR	**45%**
PARED LATERAL	**15%**

COMBINED	15%
MEDIAL WALL	10%
ROOF	10%
PANFACIAL	5%

Table 27. PARESTESIAS

FRACTURE	PERCENTAGE
FLOOR	30.77%
MEDIAL WALL	23.09%
PARED LATERAL	15.38%
ROOF	7.69%
COMBINED	7.69%
COM	7.69%
PANFACIAL	7.69%

Table 28. TRAPDOOR

FRACTURE	PERCENTAGE
FLOOR	41.67%
PARED LATERAL	16.67%
PANFACIAL	16.67%
MEDIAL WALL	8.33%
ROOF	8.33%
COM	8.33%

Table 29. OCULAR DYSTOPIA

FRACTURE	PERCENTAGE
COMBINED	22.22%
PARED LATERAL	22.22%
FLOOR	16.67%
MEDIAL	16.67%
ROOF	11.10%
COM	5.56%
COMPLEX	5.56%

Table 30. TELESINGING

FRACTURE	PERCENTAGE
MEDIAL WALL	20%
SOMETHING	60%
PARED LATERAL	10%
COMBINED	10%

Table 31. DYSSTRICHIASIS

FRACTURE	PERCENTAGE
FLOOR	80%
PANFACIAL	20%

Table 32. NEURO-OPHTHALMOLOGICAL SYNDROMES

FRACTURE	PERCENTAGE
ROOF	36.84%

PARED LATERAL	**34.21%**
COMBINED	**28.95%**

Table 33. TRAUMATIC OPTIC NEUROPATHY

FRACTURE	PERCENTAGE
ROOF	**38.18%**
PARED LATERAL	**32.73%**
COMBINED	**29.09%**

Table 34. ANISOCORIA

FRACTURE	PERCENTAGE
FLOOR	**20%**
ROOF	**16%**
COMBINED	**16%**
PARED LATERAL	**15%**
MEDIAL WALL	**14%**
NOE	**5.50%**
COM	**5.50%**
LE FORT	**3%**
COMPLEX	**2.50%**
PANFACIAL	**2.50%**

Table 35. EPIPHORA

FRACTURE	PERCENTAGE
MEDIAL WALL	**44.45%**
FLOOR	**33.33%**
NOE	**11.11%**
PARED LATERAL	**11.11%**

Table 36. Chi-square test. Mechanical strabismus.

Pruebas de chi-cuadrado

	Valor	gl	Sig. asintótica (bilateral)	Sig. de Monte Carlo (bilateral)		
				Sig.	95% Límite inferior	95% Límite superior
Chi-cuadrado de	216.000 [a]	204	.269	1.000 [b]	1.000	1.000
Razón de verosimilitudes	89.144	204	1.000	1.000 [b]	1.000	1.000
Estadístico exacto de Fisher	309.551			1.000 [b]	1.000	1.000
N de casos válidos	18					

Table 37. Contingency Table. Mechanical strabismus.

Tabla de contingencia

Recuento

		ESTRABISMO MECANICO													
		.00	1.00	2.00	3.00	4.00	5.00	7.00	8.00	32.00	45.00	50.00	66.00	118.00	Total
FRACTURAS	PISO	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	COMBINADA	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	COMPLEJA	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	FX TECHO CON SENO	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	FX TECHO SIN SENO	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	LEFORT	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	LEFORT2	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	LEFORT3	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	NOE	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	NOE2	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	NOE3	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	OCM	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	OCM2	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	OCM3	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	OCM4	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	PANFACIAL	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	PARED LATERAL	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	PARED MEDIAL	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total		3	1	2	2	1	1	1	2	1	1	1	1	1	18

Table 38. Chi-square test. Diplopia.

Pruebas de chi-cuadrado

	Valor	gl	Sig. asintótica (bilateral)	Sig. de Monte Carlo (bilateral)		
				Sig.	95% Límite inferior	95% Límite superior
Chi-cuadrado de	162.000 [a]	153	.294	1.000 [b]	1.000	1.000
Razón de verosimilitudes	77.007	153	1.000	1.000 [b]	1.000	1.000
Estadístico exacto de Fisher	221.359			1.000 [b]	1.000	1.000
N de casos válidos	18					

Table 39. Contingency Table. Diplopia

Tabla de contingencia

Recuento

		DIPLOPIA										
		1.00	2.00	3.00	4.00	9.00	31.00	39.00	52.00	59.00	115.00	Total
FRACTURAS	PISO	0	0	0	0	0	0	0	0	0	1	1
	COMBINAD	0	0	0	0	0	0	0	1	0	0	1
	COMPLEJA	0	0	1	0	0	0	0	0	0	0	1
	FX TECHO CON SENO	0	0	0	0	0	1	0	0	0	0	1
	FX TECHO SIN SENO	0	0	0	1	0	0	0	0	0	0	1
	LEFORT	0	1	0	0	0	0	0	0	0	0	1
	LEFORT2	0	1	0	0	0	0	0	0	0	0	1
	LEFORT3	0	1	0	0	0	0	0	0	0	0	1
	NOE	0	0	0	0	1	0	0	0	0	0	1
	NOE2	0	0	0	1	0	0	0	0	0	0	1
	NOE3	1	0	0	0	0	0	0	0	0	0	1
	OCM	0	0	0	0	1	0	0	0	0	0	1
	OCM2	0	0	0	0	1	0	0	0	0	0	1
	OCM3	0	1	0	0	0	0	0	0	0	0	1
	OCM4	1	0	0	0	0	0	0	0	0	0	1
	PANFACIAL	0	0	0	1	0	0	0	0	0	0	1
	PARED LATERAL	0	0	0	0	0	0	1	0	0	0	1
	PARED MEDIAL	0	0	0	0	0	0	0	0	1	0	1
Total		2	4	1	3	3	1	1	1	1	1	18

Table 40. Chi-square test. Mydriasis

Pruebas de chi-cuadrado

	Valor	gl	Sig. asintótica (bilateral)	Sig. de Monte Carlo (bilateral)		
				Sig.	95% Límite inferior	95% Límite superior
Chi-cuadrado de	198.000 [a]	187	.277	1.000 [b]	1.000	1.000
Razón de verosimilitudes	83.599	187	1.000	1.000 [b]	1.000	1.000
Estadístico exacto de Fisher	285.185			1.000 [b]	1.000	1.000
N de casos válidos	18					

Table 41. Contingency Table. Mydriasis

Tabla de contingencia

Recuento

		MIDRIASIS												Total
		.00	1.00	3.00	4.00	5.00	6.00	8.00	28.00	29.00	30.00	32.00	40.00	
FRACTURAS	COMBINAD...	0	0	0	0	0	0	0	0	0	0	1	0	1
	COMPLEJA	0	0	0	0	1	0	0	0	0	0	0	0	1
	FX TECHO CON SENO	0	0	0	0	0	0	0	0	1	0	0	0	1
	FX TECHO SIN SENO	0	0	1	0	0	0	0	0	0	0	0	0	1
	LEFORT	1	0	0	0	0	0	0	0	0	0	0	0	1
	LEFORT2	0	0	1	0	0	0	0	0	0	0	0	0	1
	LEFORT3	0	0	1	0	0	0	0	0	0	0	0	0	1
	NOE	0	0	0	0	0	0	1	0	0	0	0	0	1
	NOE2	0	0	1	0	0	0	0	0	0	0	0	0	1
	NOE3	1	0	0	0	0	0	0	0	0	0	0	0	1
	OCM	0	0	0	0	0	1	0	0	0	0	0	0	1
	OCM2	0	0	0	1	0	0	0	0	0	0	0	0	1
	OCM3	1	0	0	0	0	0	0	0	0	0	0	0	1
	OCM4	0	1	0	0	0	0	0	0	0	0	0	0	1
	PANFACIAL	0	0	0	0	1	0	0	0	0	0	0	0	1
	PARED LATERAL	0	0	0	0	0	0	0	0	0	1	0	0	1
	PARED MEDIAL	0	0	0	0	0	0	0	1	0	0	0	0	1
	PISO	0	0	0	0	0	0	0	0	0	0	0	1	1
Total		3	1	4	1	2	1	1	1	1	1	1	1	18

Table 42. Chi-square test. Enophthalmos

Pruebas de chi-cuadrado

	Valor	gl	Sig. asintótica (bilateral)	Sig. de Monte Carlo (bilateral)		
				Sig.	95% Límite inferior	95% Límite superior
Chi-cuadrado de	162.000 [a]	153	.294	1.000 [b]	1.000	1.000
Razón de verosimilitudes	73.188	153	1.000	1.000 [b]	1.000	1.000
Estadístico exacto de Fisher	229.924			1.000 [b]	1.000	1.000
N de casos válidos	18					

Table 43. Contingency Table. Enophthalmos

Tabla de contingencia

Recuento

		ENOFTALMOS										
		.00	1.00	2.00	3.00	5.00	15.00	17.00	30.00	41.00	51.00	Total
FRACTURAS	PISO	0	0	0	0	0	0	0	0	0	1	1
	COMBINAD	0	0	0	0	0	0	0	1	0	0	1
	COMPLEJA	0	0	1	0	0	0	0	0	0	0	1
	FX TECHO CON SENO	0	0	0	0	0	1	0	0	0	0	1
	FX TECHO SIN SENO	1	0	0	0	0	0	0	0	0	0	1
	LEFORT	1	0	0	0	0	0	0	0	0	0	1
	LEFORT2	0	0	1	0	0	0	0	0	0	0	1
	LEFORT3	1	0	0	0	0	0	0	0	0	0	1
	NOE	0	0	0	1	0	0	0	0	0	0	1
	NOE2	0	1	0	0	0	0	0	0	0	0	1
	NOE3	0	1	0	0	0	0	0	0	0	0	1
	OCM	0	0	0	0	1	0	0	0	0	0	1
	OCM2	1	0	0	0	0	0	0	0	0	0	1
	OCM3	0	0	1	0	0	0	0	0	0	0	1
	OCM4	1	0	0	0	0	0	0	0	0	0	1
	PANFACIAL	1	0	0	0	0	0	0	0	0	0	1
	PARED LATERAL	0	0	0	0	0	0	1	0	0	0	1
	PARED MEDIAL	0	0	0	0	0	0	0	0	1	0	1
Total		6	2	3	1	1	1	1	1	1	1	18

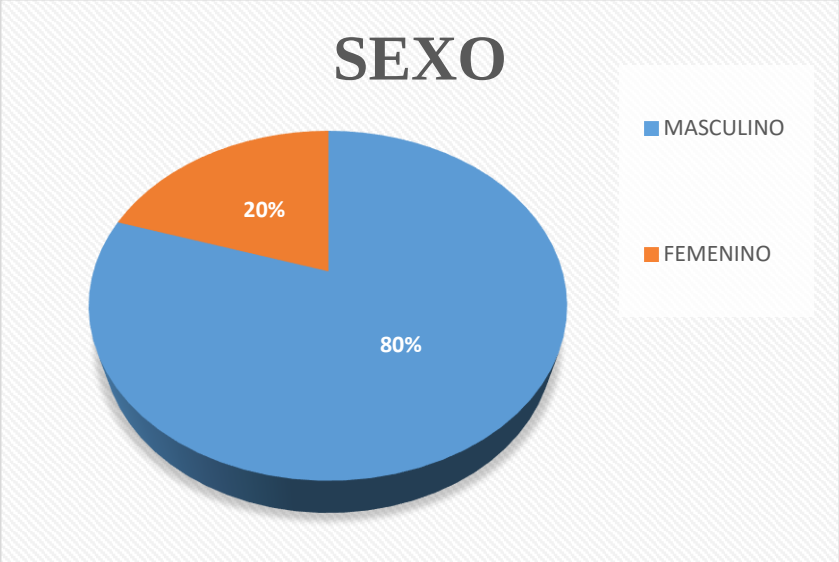
Table 44. Non-Surgical Procedures

NON-SURGICAL PROCEDURE	IN CASES	PERCENTAGE
PRISMS	44	15.44%
ESTEROIDE TRANSEPTAL	150	52.63%
INTRALESIONAL STEROID	24	8.42%
BOTULINUM TOXIN	37	12.98%
SHAPER	29	10.18%
TRANSEPTAL ANTIBIOTICS	1	0.35%

Table 45. Surgical Procedures.

OPERATION	IN CASES	PERCENTAGE
CHANNELING OF TEAR DUCTS	31	5.29%
ORBITAL CAVITY PLASTY	67	11.43%
EVISCERATION	29	4.95%
STRABISM SURGERY	7	1.20%
INTRAOCULAR SURGERY	5	0.85%
ORBIT RAPHI	288	49.15%
ORBITAL DECOMPRESSION	6	1.02%
EYELID PLASTY	131	22.35%
TARSORRAPHIAS	18	3.07%
OTHER	4	0.69%

GRAPHIC



Graphics 1. Género.

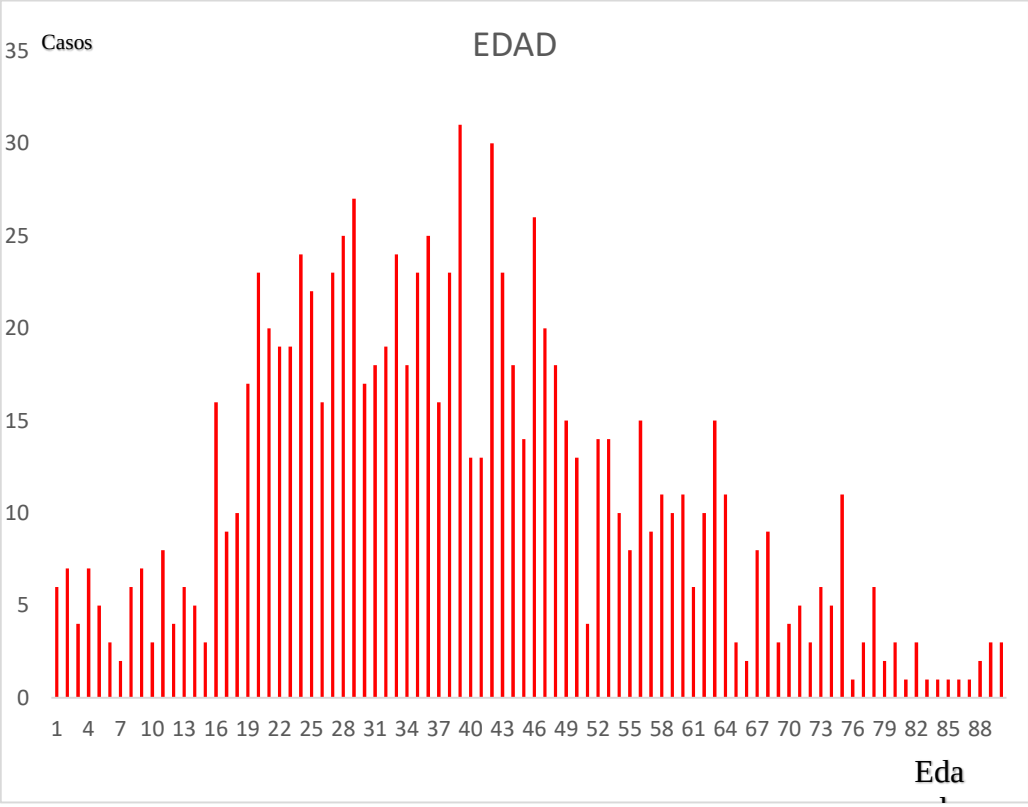


Figure 2. Age

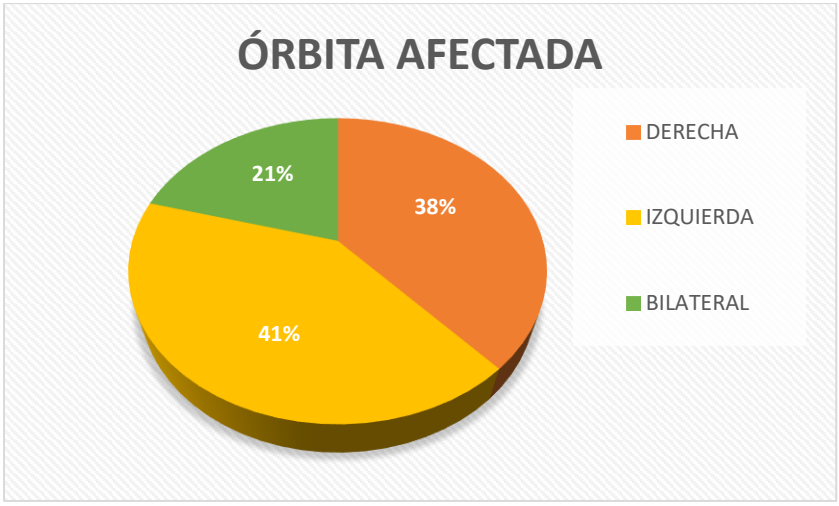


Figure 3. Affected orbit

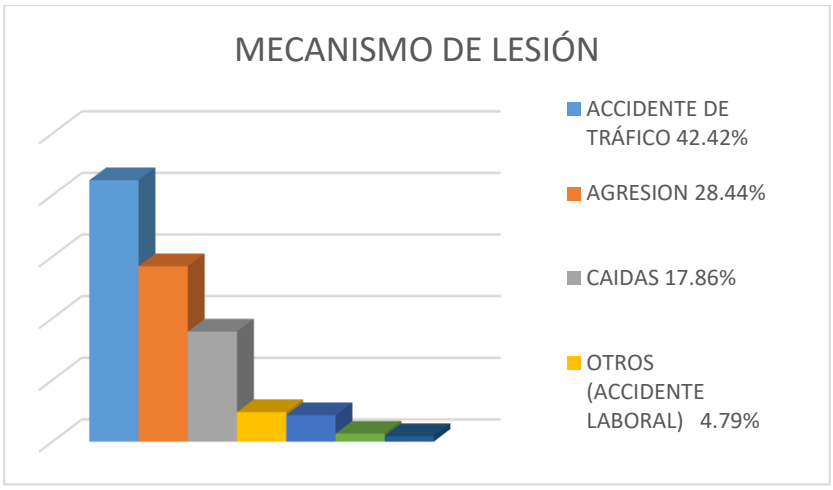


Figure 4. Mechanism of injury

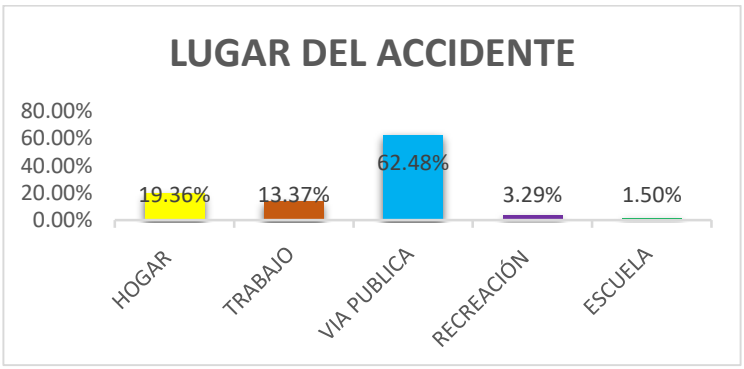


Figure 5. Accident Location

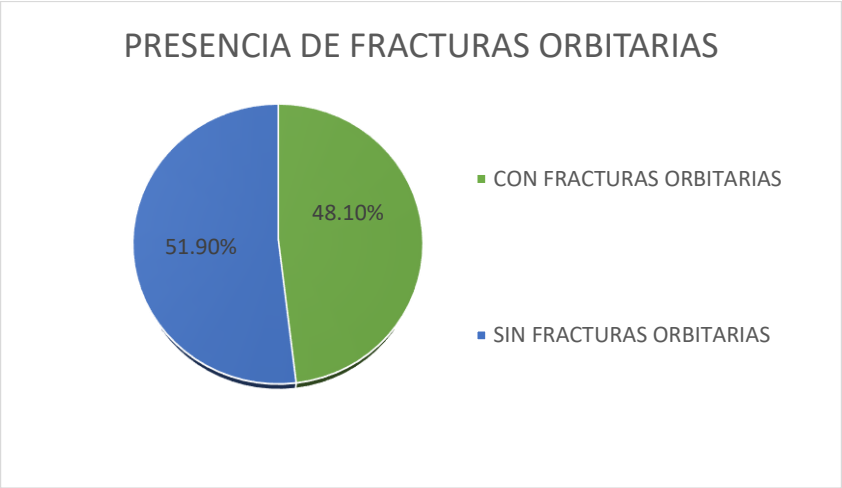


Figure 6. Presence of Orbital Fractures

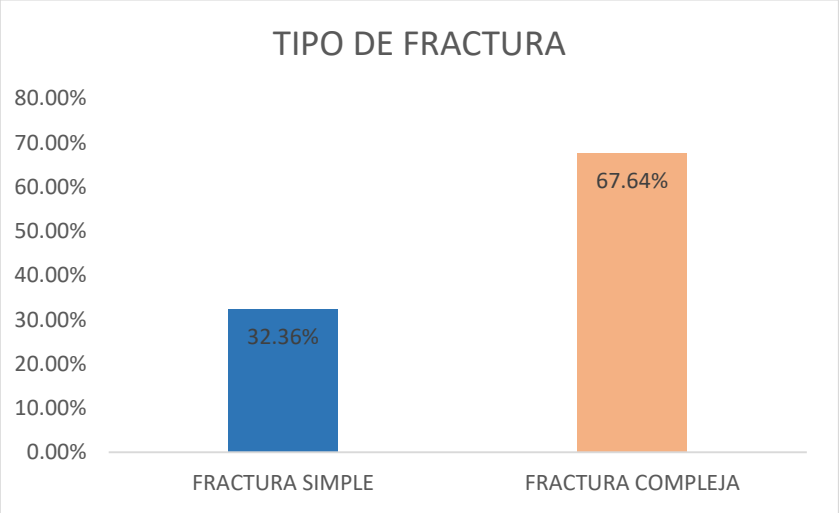


Figure 7. Type of Simple or Complex Fracture

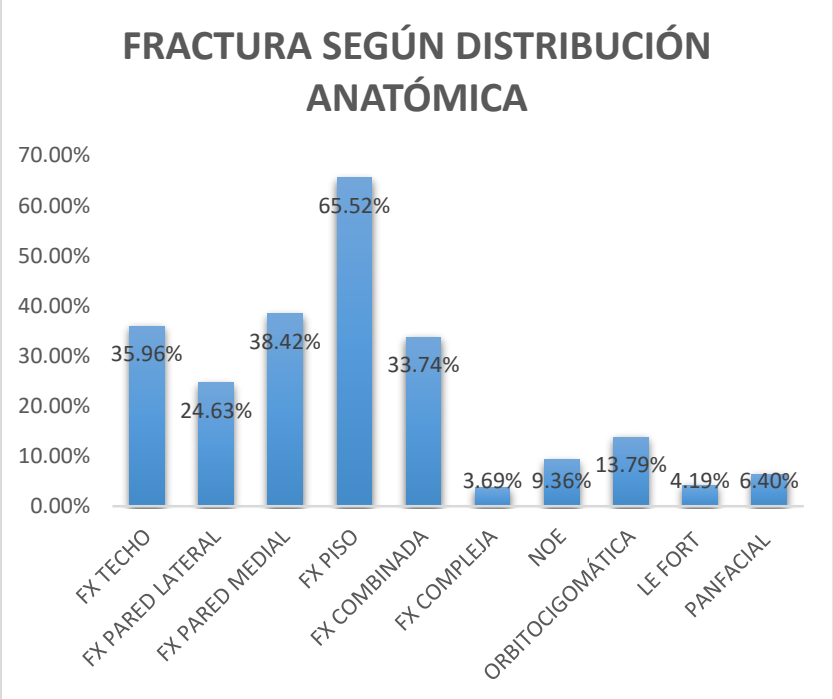
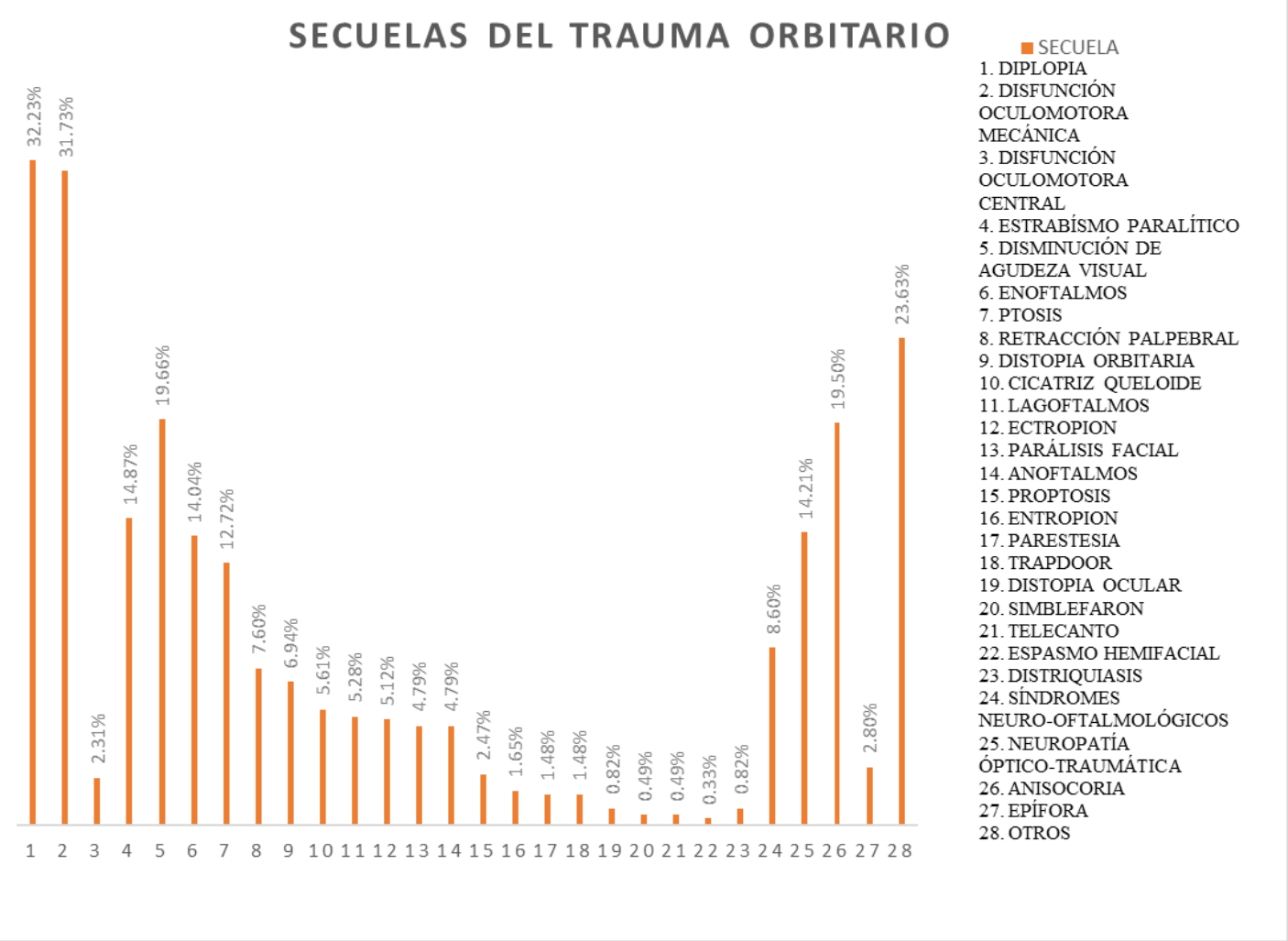


Figure 8. Type of fracture according to anatomical distribution



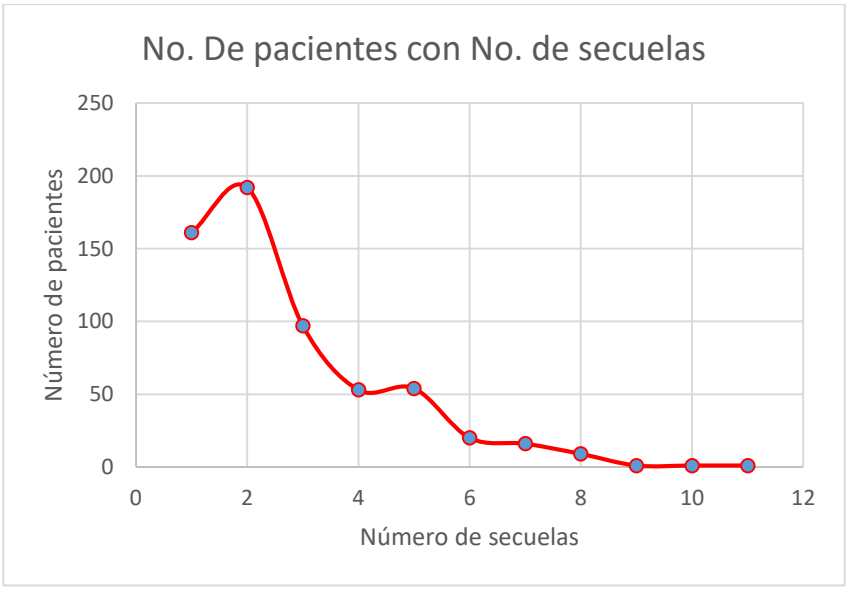


Figure 10. Number of sequelae

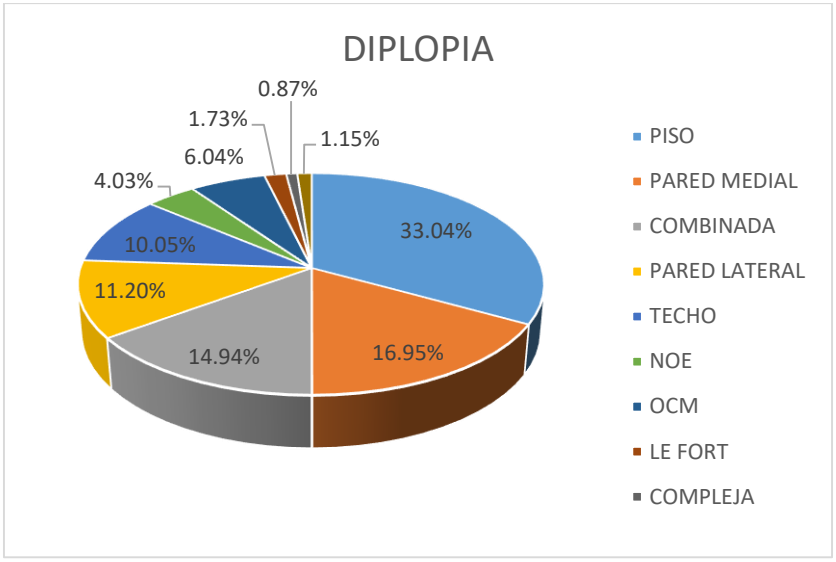


Figure 11. Diplopia

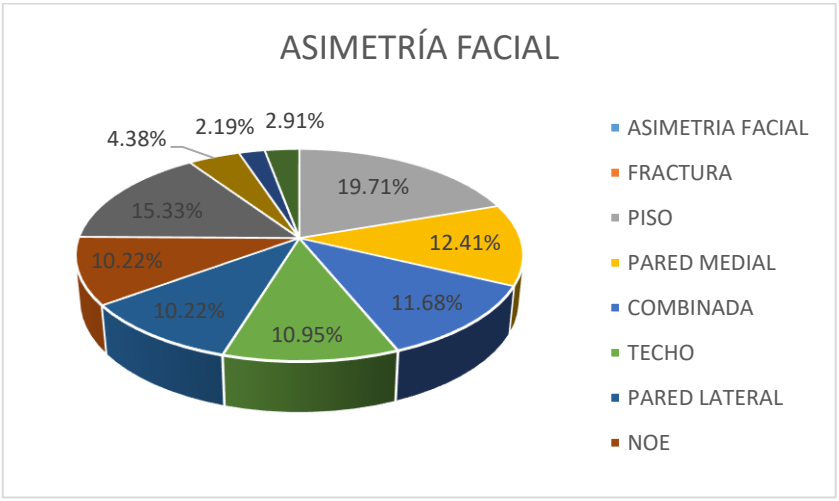


Figure 12. Facial asymmetry

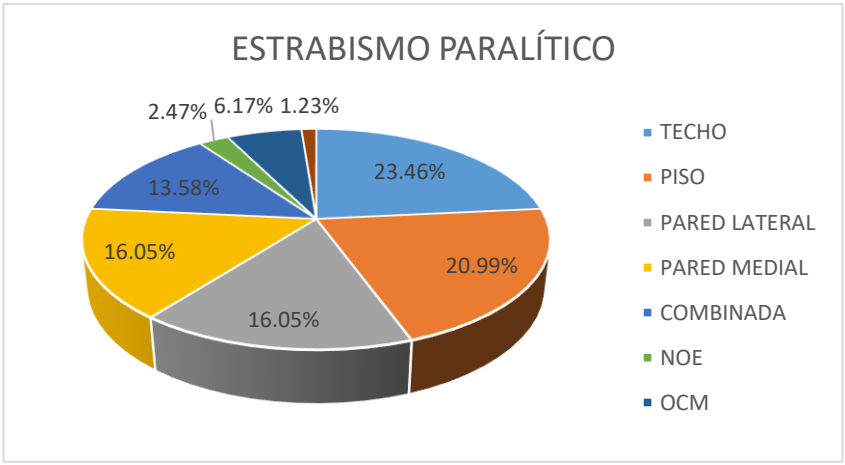


Figure 13. Paralytic strabismus

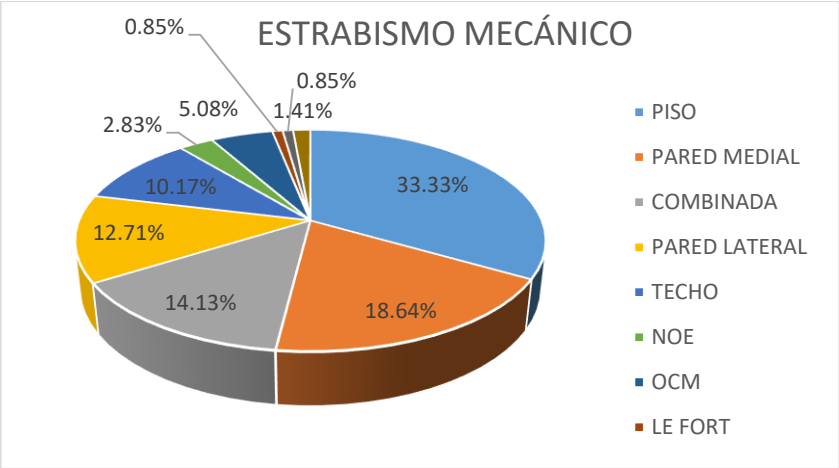


Figure 14. Mechanical strabismus

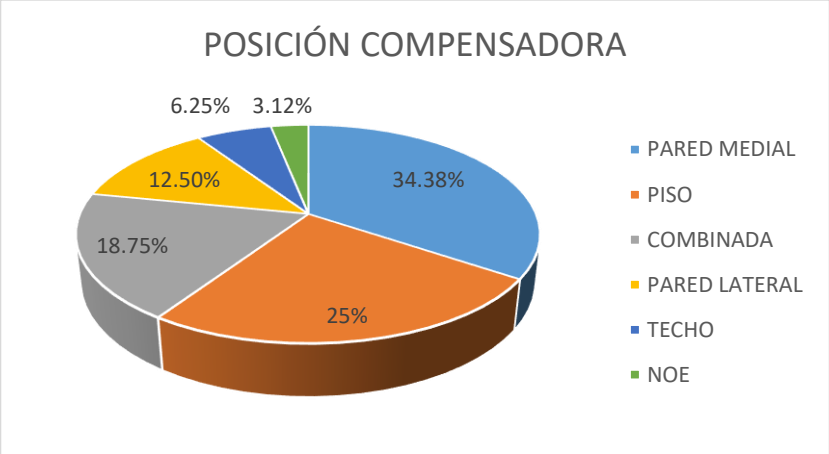


Figure 15. Compensating Position

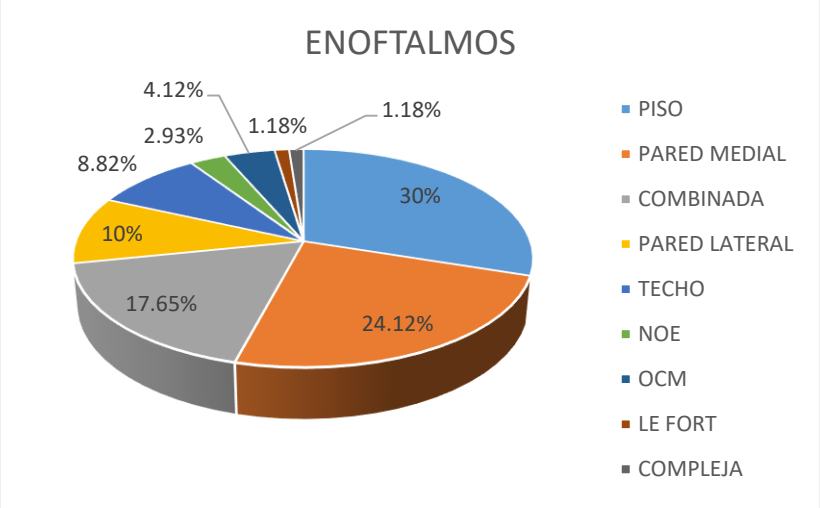


Figure 16. Enophthalmos

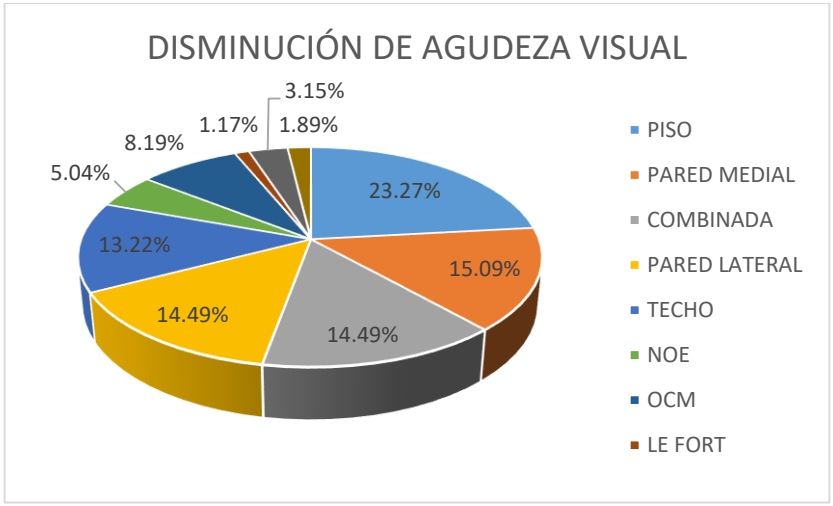


Figure 17. Decreased Visual Acuity

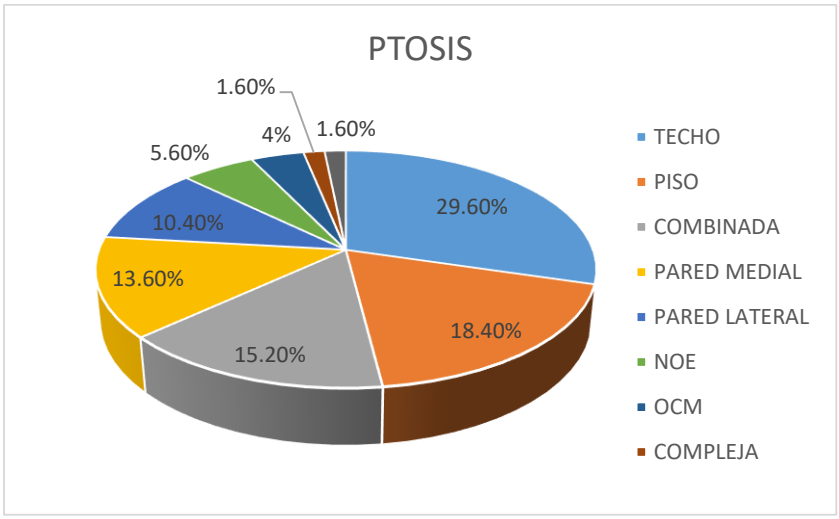


Figure 18. Ptosis

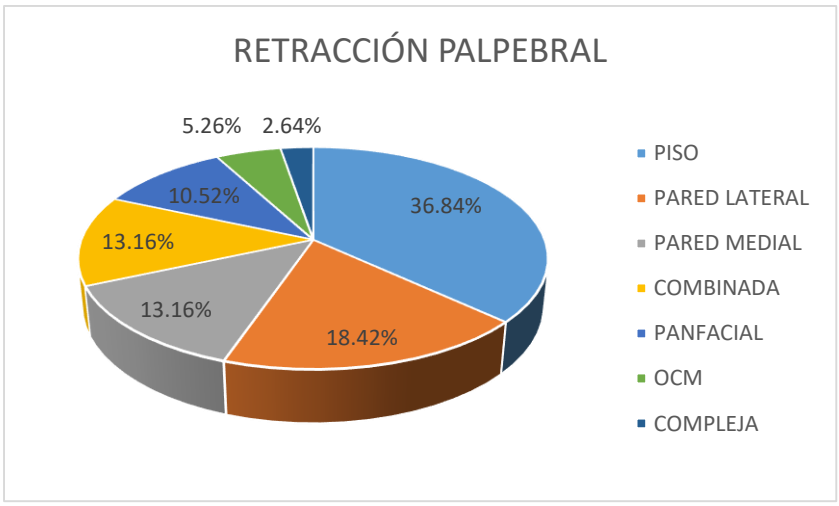


Figure 19. Eyelid retraction

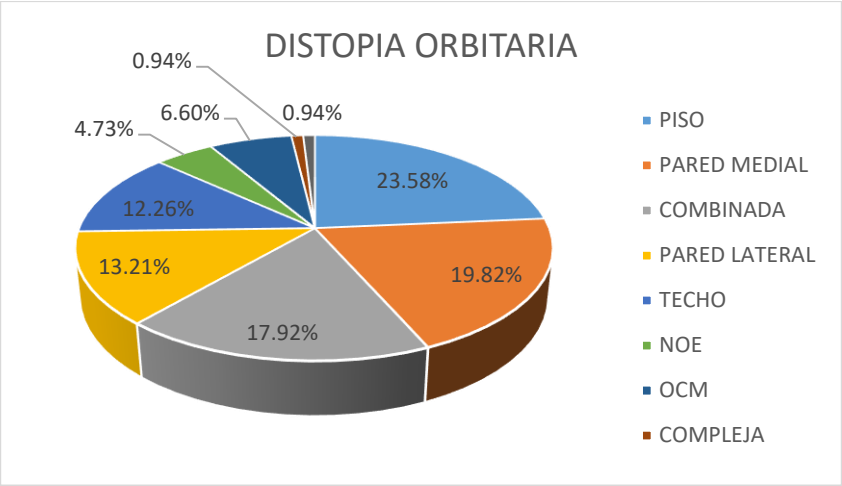
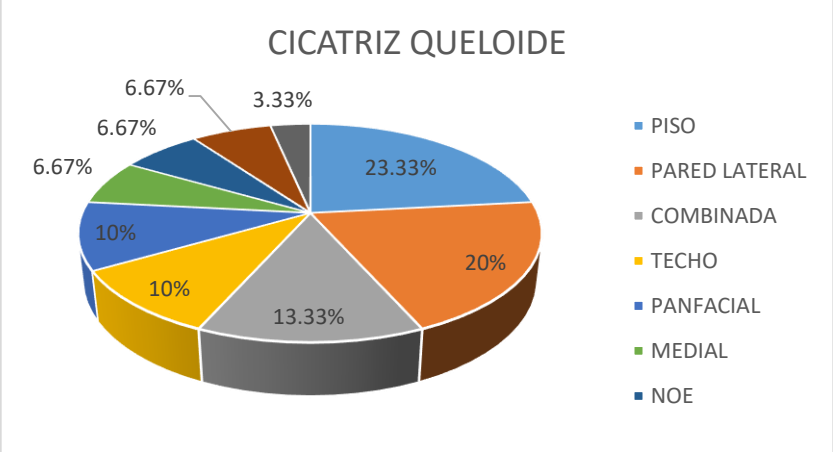


Figure 20. Orbital dystopia



Graph 21. - Cheloid scar

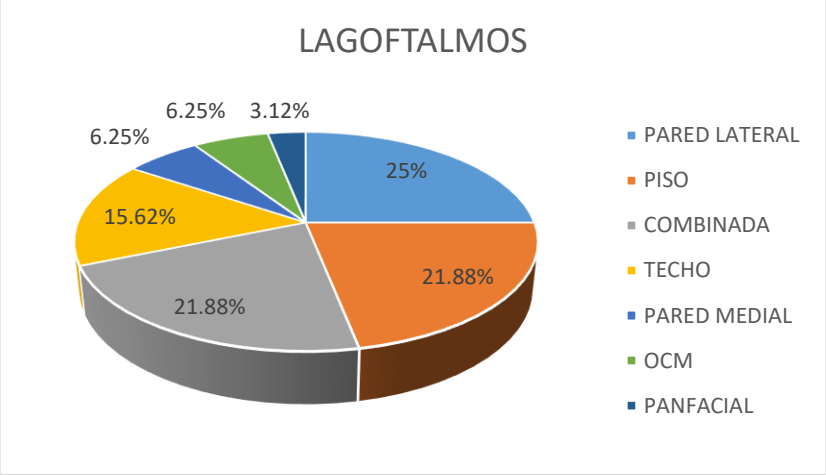


Figure 22. Lagophthalmos

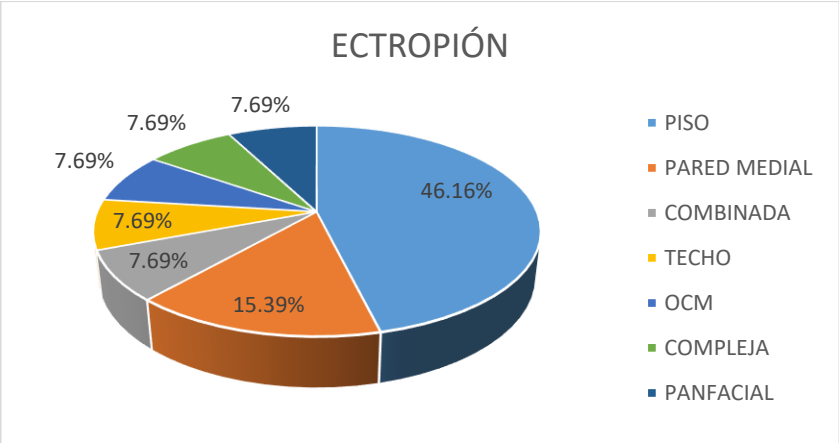


Figure 23. Ectropion

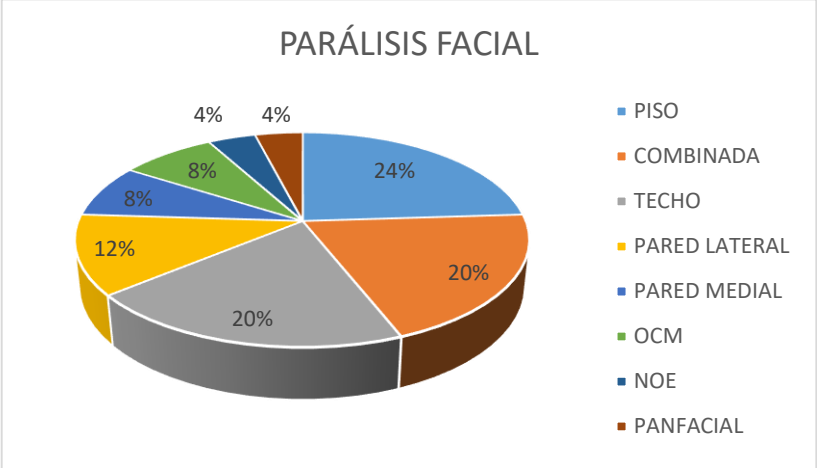


Figure 24. Facial Paralysis

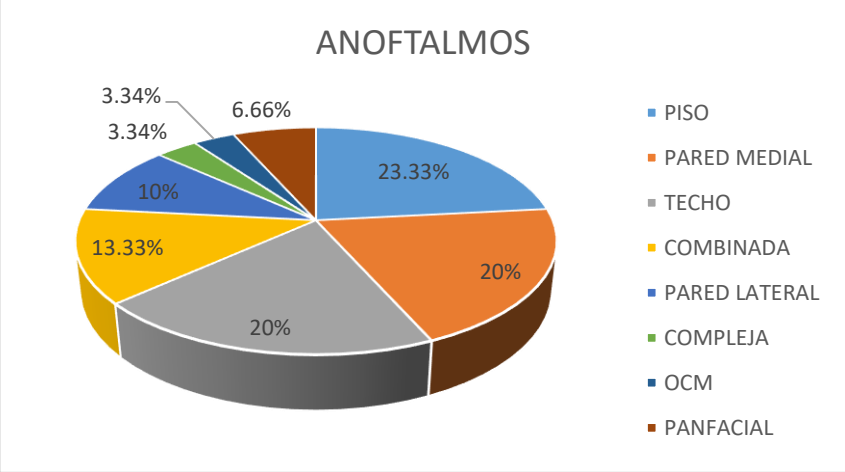


Figure 25. Anophthalmos

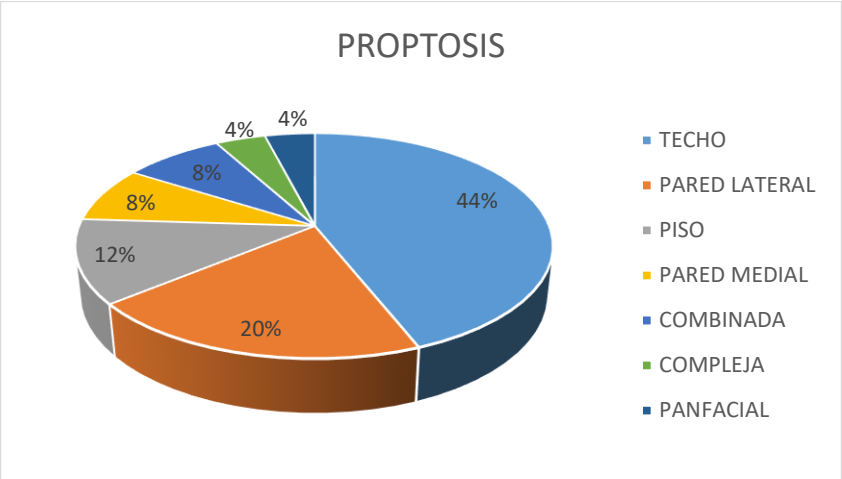


Figure 26. Proptosis

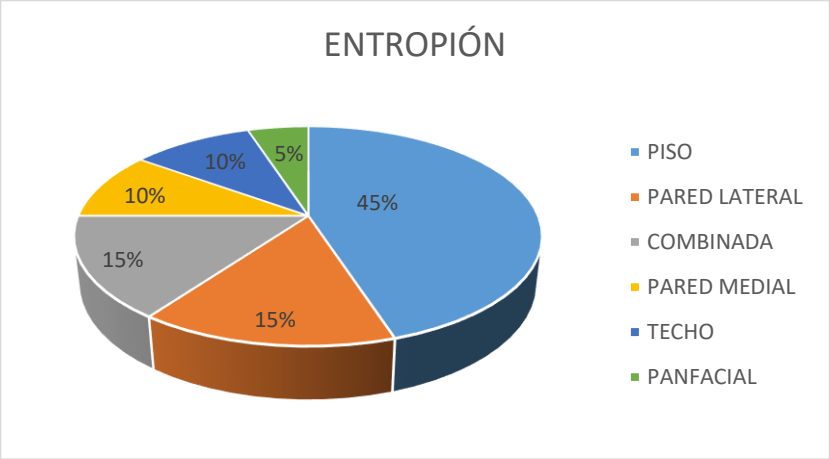
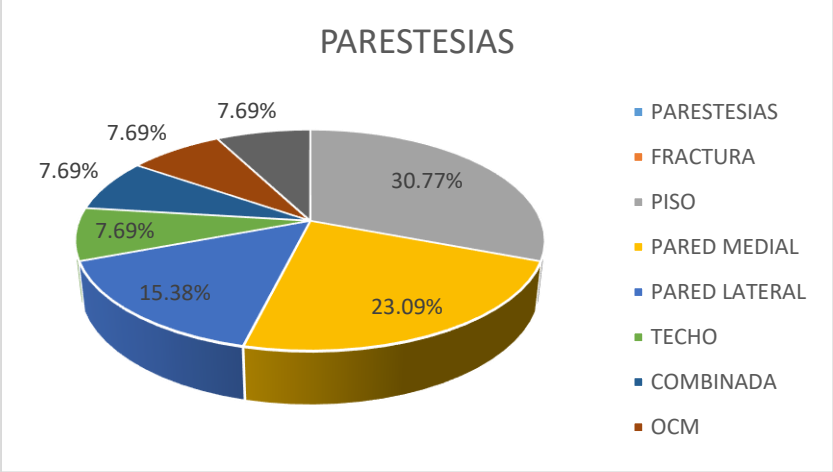


Figure 27. Entropion



Graphics 28. Paresthesia

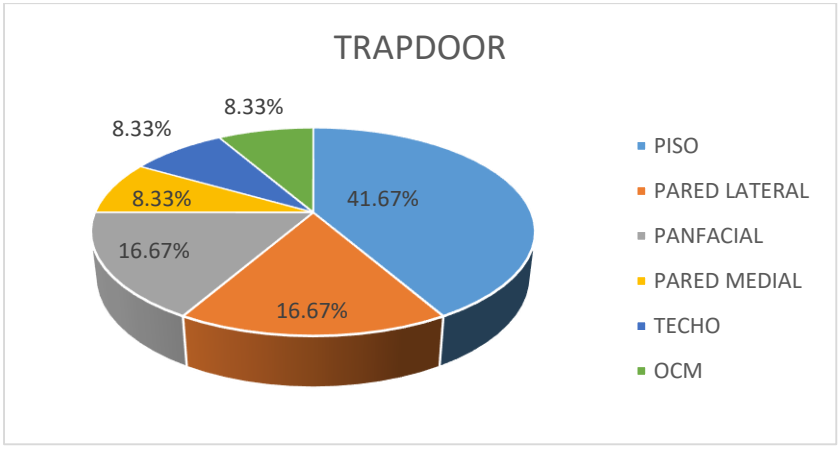


Figure 29. Trapdoor

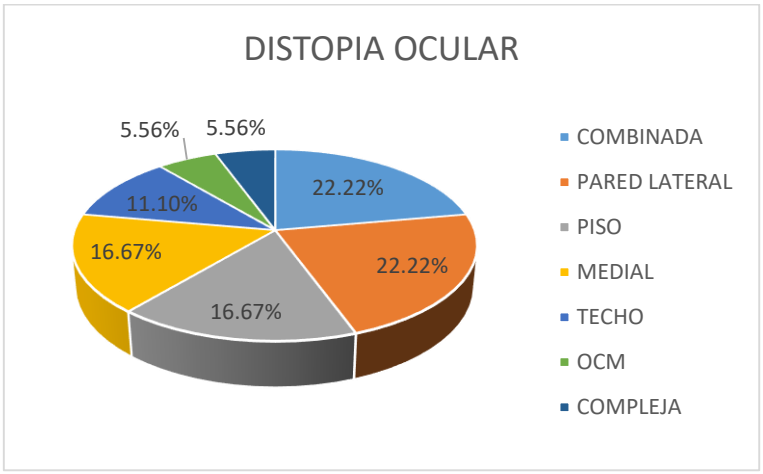


Figure 30. Ocular dystopia

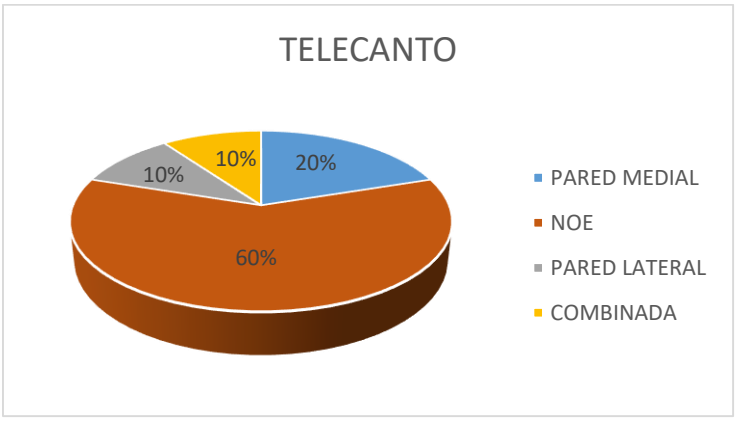


Figure 31. Telecanto

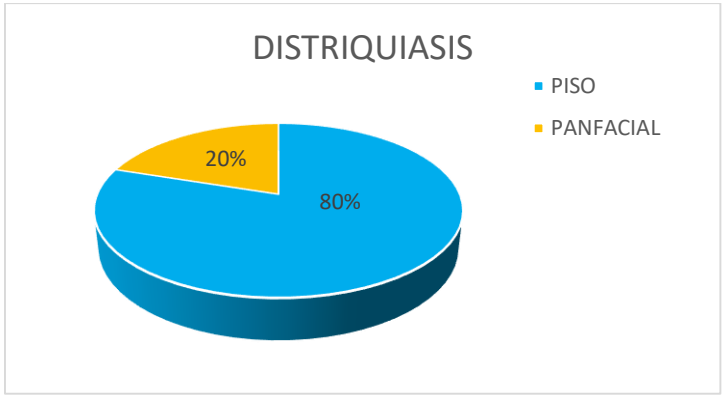


Figure 32. Dystrichiasis

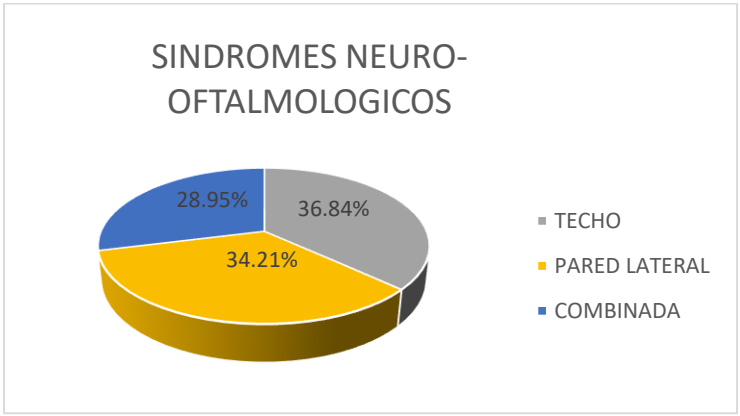


Figure 33. Neuro-ophthalmological Syndromes

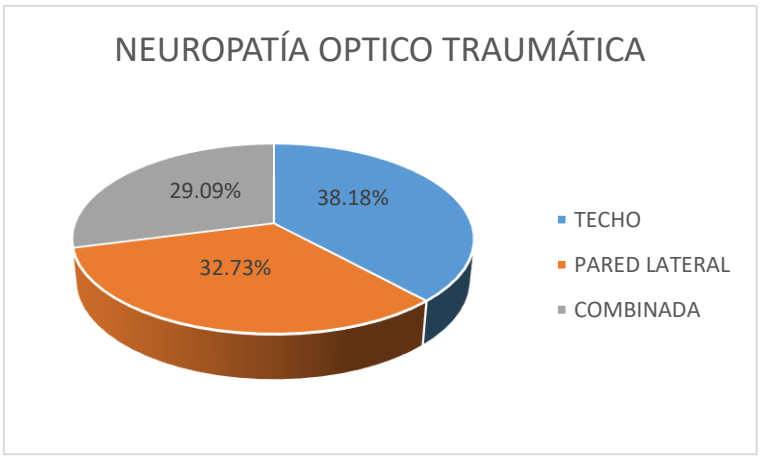
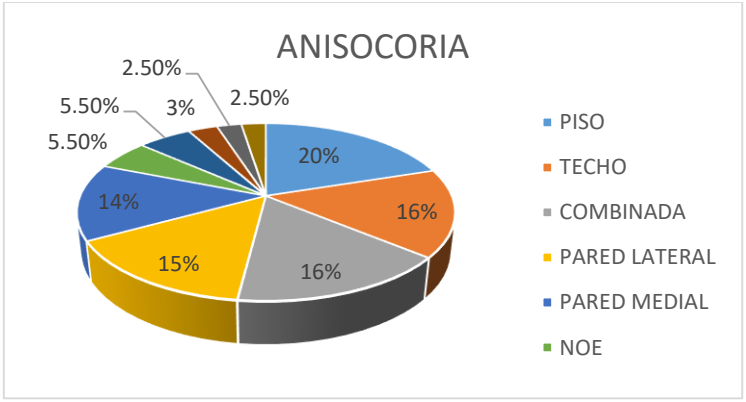


Figure 34. Optical-traumatic neuropathy



Graphics 35. Anisocoria

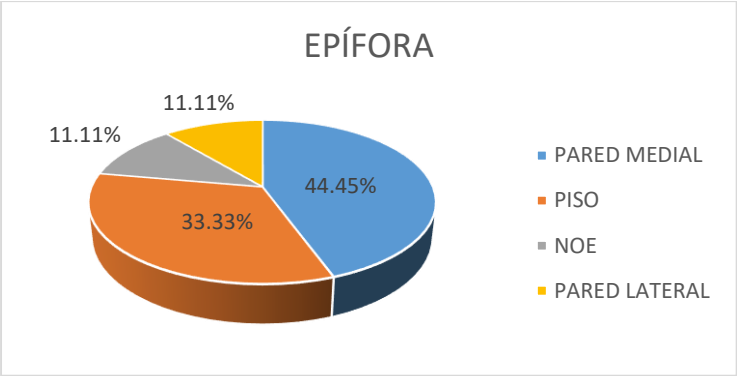


Figure 36. Epiphora

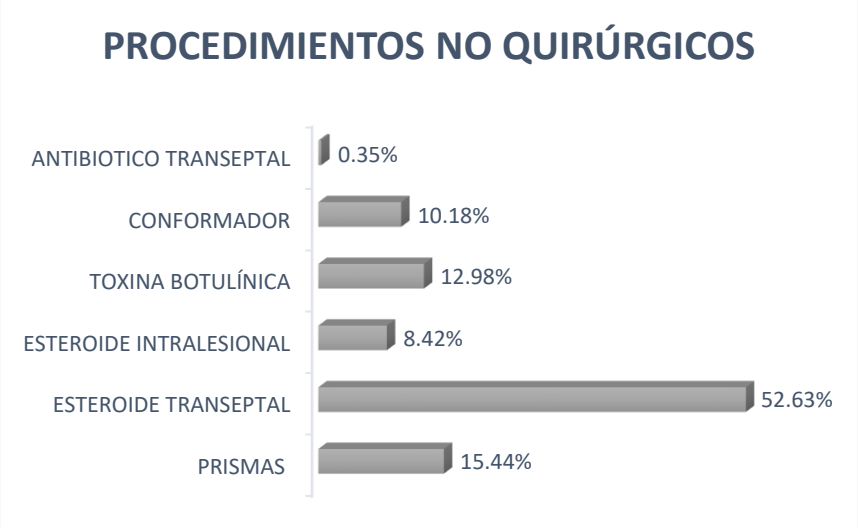


Figure 37. Non-surgical procedures.

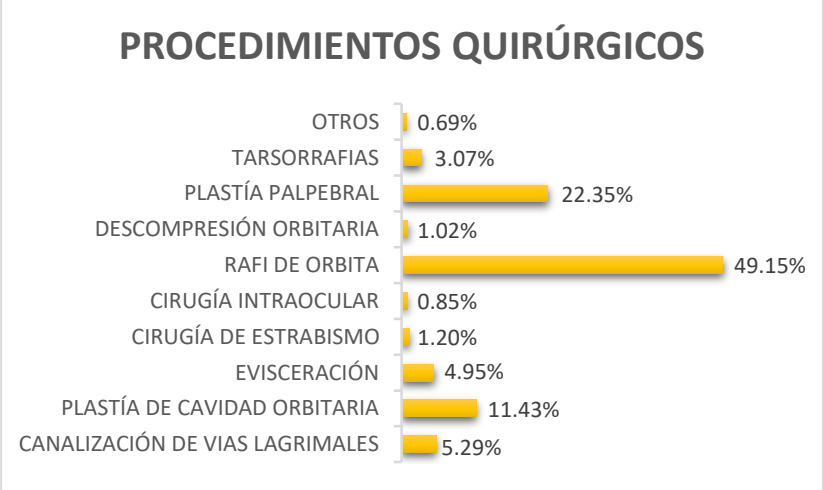


Figure 38. Surgical Procedures.