

Surgically Treated Maxillofacial Fractures in Dr. Franco Ravera Zunino Hospital in Chile: a Retrospective Study of 5 Years Experience

Fracturas Maxilofaciales Tratadas Quirúrgicamente en el Hospital
Dr. Franco Ravera Zunino en Chile: un Estudio Retrospectivo de 5 Años

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ABSTRACT: Maxillofacial trauma is one of the fields of surgical activity in our specialty and constitutes a relevant problem in highly complex hospitals, the presence of our specialists being essential within an interdisciplinary team for the resolution of this type of pathology. An adequate management and early treatment is essential from the moment the patient is admitted, without leaving aside the sequelae and the subsequent rehabilitation work for the work and daily reinsertion of the patients. The purpose of this work is to present the experience of the Maxillofacial Surgery team of the Rancagua Hospital in the surgical resolution of 320 maxillofacial fractures with a retrospective review of 5 years. A study was carried out with analysis of the surgical protocols of patients operated on for maxillofacial trauma, in the central pavilion, under general anesthesia, in a period of 5 years. The variables analyzed were diagnosis, age, sex, compromised facial third, type of fracture, approaches used, and type of rigid internal fixation. 368 surgical procedures were performed. The average age of the operated patients was 36 years, with a predominance of the male sex (80.4 %), the middle third was the most affected (49.1 %) followed by fractures of the lower third of the face (35.5 %). It is necessary to develop epidemiological investigations of these pathologies in order to obtain demographic conclusions and contribute to unifying diagnostic and treatment criteria, thus establishing efficient prevention and treatment policies in relation to each service and as a whole at the public health level.

KEY WORDS: maxillofacial injuries, maxillofacial trauma, risk factors.

INTRODUCTION

Maxillofacial injuries (TMF) are one of the main health problems worldwide (Rêgo *et al.*, 2020; Al-Hassani *et al.*, 2022; Barreto *et al.*, 2022), being able to cause facial deformation, loss of function of the stomatognathic system, emotional-social repercussions and high economic costs (Manodh *et al.*, 2016; Barreto *et al.*, 2022). Although TMFs are common worldwide, their incidence and pattern vary depending on the population, as they are related to social, cultural, and environmental factors (Al-Hassani

et al., 2022). Traffic accidents are the main cause of TMF (Rêgo *et al.*, 2020; Al-Qahtani *et al.*, 2021; Chalathadka *et al.*, 2021; Al-Hassani *et al.*, 2022), followed by assaults, sports, work accidents and falls (Alves *et al.*, 2014; Boffano *et al.*, 2015; Rêgo *et al.*, 2020; Al-Qahtani *et al.*, 2021; Chalathadka *et al.*, 2021; Su *et al.*, 2021; Al-Hassani *et al.*, 2022; Barreto *et al.*, 2022; Khan *et al.*, 2022). According to Al-Hassani *et al.* (2022), the majority of FMTs occur among men between the ages of 21 and 30 in a male-female ratio

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of 2:1 and 11:1. On the other hand, Werlinger *et al*, describe that in the developing countries of the Middle East and Africa, males predominate with more than 75 % of the cases and the ages range between 20 and 30 years, however in countries of Europe and North America, the proportion between men and women is reduced and the ages of presentation are between 30 and 40 years predominantly (Werlinger *et al.*, 2019). According to Al-Hassani *et al*, in different studies the mandible is the most preponderant facial bone in TMF (Al-Hassani *et al.*, 2022), which agrees with Al-Qahtani *et al*, commenting that fractures of the lower jaw are 1.78 times more likely to occur than those of the middle third of the face (Al-Qahtani *et al.*, 2021). However, Chalathadka *et al* describe that the most common facial fracture is the nasal, followed by the mandibular and the zygomatic arch (Chalathadka *et al.*, 2021). The treatment of lesions in the maxillofacial region represents one of the most difficult challenges for specialists around the world, both due to the inherent complexity and the treatment of sequelae (Manodh *et al.*, 2016; Wusiman *et al.*, 2020; Palmela Pereira *et al.* 2022).

The present study intends to investigate the prevalence of TMF in the Regional Hospital of

Rancagua, Chile, Dr. Franco Ravera Zunino Hospital contributing to the knowledge of facial fractures in our country, thereby helping to improve the quality of patient care, decision-making of therapeutic plans more and apply preventive mechanisms at the epidemiological level in health.

MATERIAL AND METHOD

A retrospective analysis study was carried out that included the history of FMT recorded between July 2017 and June 2022, attended by the Maxillofacial Surgery service of the Dr. Franco Ravera Zunino Hospital in Rancagua, Chile. Patients of all ages who consulted for FMT by referral from emergency services of the sixth region or within the Dr. Franco Ravera Zunino Hospital system were included, covering the population of the sixth region of Chile. Patients with only dentoalveolar trauma, isolated bone fractures, and patients with FMT that did not include associated fractures were excluded. Data was collected from inspection of Dr. Franco Ravera Zunino Hospital registration forms electronically. The variables of age, sex (Table I), type of fracture (Table II), facial third involved (Table III, Figs. 1 - 3), approaches used and type of rigid internal fixation (RIF) were considered.

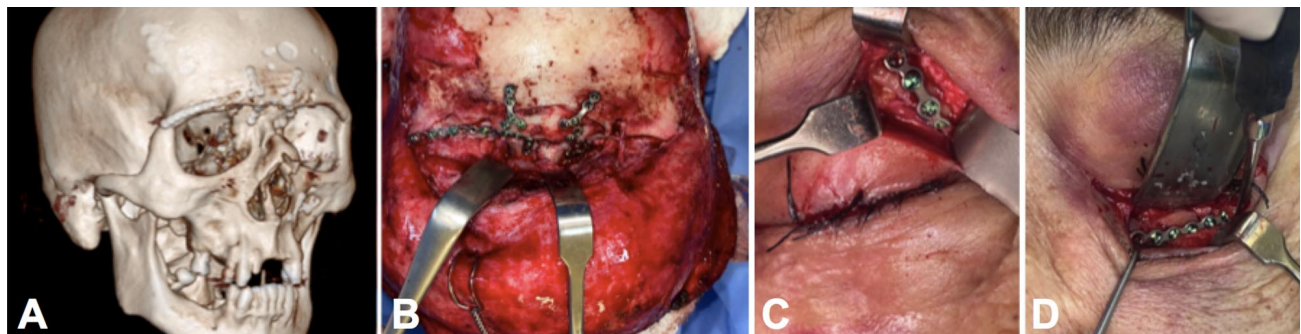


Fig. 1. Maxillofacial fractures in the upper facial third involved.

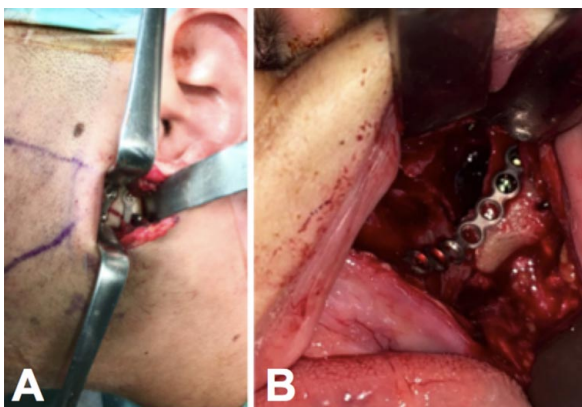


Fig. 2. Maxillofacial fractures in the upper facial third involved.

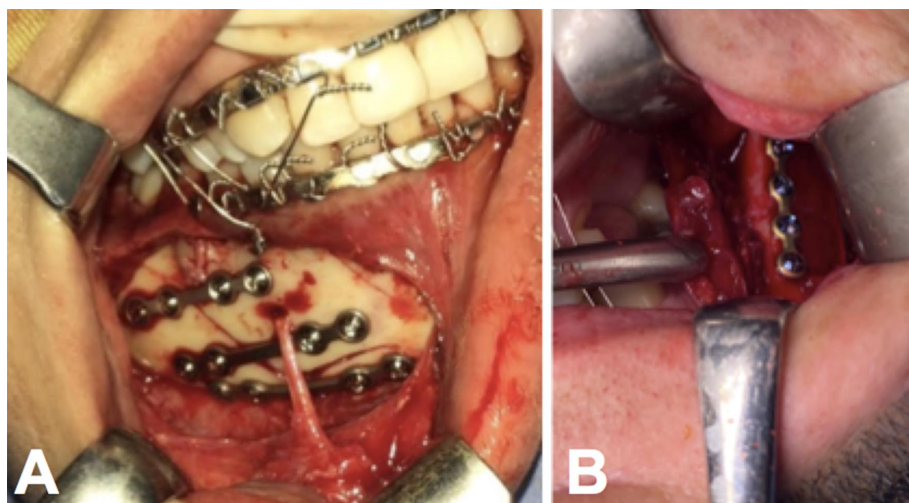


Fig. 3. Maxillofacial fractures in the upper facial third involved.

RESULTS

In this 5-year retrospective analysis (2017 - 2022), a total of 368 facial fractures were analyzed. According to the analysis of results, men (n=296) suffered more TMF than women (n = 72) in a ratio of 4.1:1 respectively. The most affected patients ranged from 2 to 84 years, with a predominance of the third decade of age (Table I).

The facial thirds involved were from highest to lowest incidence, middle third (n = 181), lower third (n = 131), panfacial 2 or more thirds (n = 53), upper third (n = 3) (Table III), while the Types of fracture from

highest to lowest predominance were: mandible (n = 131), orbito-zygomatic-maxillary (n = 112), panfacial 2 or more thirds (n = 48), maxilla (n = 28), zygomatic arch (n = 17), orbit floor (n = 15), Naso-orbito-ethmoidal (NOE) (n = 11), orbit medial wall (n = 3), frontal (n = 3) (Table II).

The types of approach used in the different types of facial fractures were: coronal approach, brow tail, upper eyelid, subciliary, transconjunctival with and without canthotomy, transcaruncular, transjugal, blair, retromandibular, endaural, intraoral vestibule, and facial wounds. While rigid internal fixation types depended of the fracture region, using systems 1.5, 2.0 and 2.4. The osteosynthesis materials used were all from the company Zimmer Biomet.

Table I. Demographics of the included patients.

Year	N° of patients	Sex		Age		
		Masculine	Feminine	Minimum	Maximum	Range
2017	60	16	45	10	84	35
2018	68	13	55	2	69	30
2019	63	5	58	8	70	37
2020	52	13	39	4	76	35
2021	79	16	63	7	81	38
2022	46	9	36	17	76	41
TOTAL	368	72	296	-	-	36

OCM: Orbit-Zygomatic-Maxillary; NOE: Naso-Orbit-Ethmoidal.

Table II. Incidence of Maxillofacial fractures by year and type.

Year	Frontal	OZM	Orbital floor	Medial wall	Zygomatic arch	Maxilla	Mandible	Panfacial	NOE
2017	1	21	1	1	6	4	14	11	1
2018	0	14	2	1	7	9	23	11	1
2019	1	15	4	0	1	4	27	8	3
2020	0	12	6	0	2	5	23	3	1
2021	1	32	1	1	1	3	30	8	2
2022	0	18	1	0	0	3	14	7	3
TOTAL	3	112	15	3	17	28	131	48	11

Table III. Distribution of Maxillofacial fractures by facial thirds involved.

Year	Upper third	Middle third	Lower third	Panfacial 2 or more thirds
2017	1	34	14	11
2018	0	32	23	13
2019	1	27	27	8
2020	0	26	23	3
2021	1	40	30	8
2022	0	22	14	10
TOTAL	3	181	131	53

DISCUSSION

This retrospective manages to determine the prevalence and describe the characteristics of 368 maxillofacial fractures in the Dr. Franco Ravera Zunino Hospital. Regarding sex and age, men between 30 and 40 years of age were the most preponderant compared to the female sex and other decades, which agrees with part of the published literature (Alves *et al.*, 2014; Zhou *et al.*, 2014; Boffano *et al.*, 2015), however the majority report that FMTs are more frequent in the age range of 21 to 30 years (Goulart *et al.*, 2015; Manodh *et al.*, 2016; Werlinger *et al.*, 2019; Al-Qahtani *et al.*, 2021; Al-Hassani *et al.*, 2022). This could be explained by the fact that young men participate more actively in social activities, being more susceptible to traffic accidents, interpersonal violence, and injuries related to work and sports (Boffano *et al.*, 2015; Al-Qahtani *et al.*, 2021; Porto *et al.*, 2021; Khan *et al.*, 2022). Although recent literature shows a more equal ratio between men and women in the last 30 years, men continue to outnumber women in our study population (Boffano *et al.*, 2015).

The most frequent location of the maxillofacial fractures analyzed in this study was the middle facial third with a 49.1% prevalence, which coincides with other researchers who point out that the middle part of the face is more frequently affected (Arslan *et al.*, 2014; Werlinger *et al.*, 2019). On the other hand, there are authors who describe in their studies that the lower third was the most affected (Boffano *et al.*, 2015; Goulart *et al.*, 2015; Manodh *et al.*, 2016; Wusiman *et al.*, 2020; Kanala *et al.*, 2021). In turn, certain authors report that the mandible, zygomatic-orbital and nasal bones are the most prevalent sites of facial fractures (Goulart *et al.*, 2015; Barreto *et al.*, 2022) which coincides with our population. This is due to the anatomical prominence of the mandible and the zygoma in the facial mass (Goulart *et al.*, 2015; Kanala *et al.*, 2021; Porto *et al.*, 2021). When the impact occurs in these prominent regions, the forces are transmitted through the arches and pillars towards the areas of least

resistance (Porto *et al.*, 2021). It should be considered in this analysis that the middle third involves a greater number of isolated bones involved, unlike the lower third, which, although it has fracture subclassifications, all correspond to the same bone structure.

Among the results, the mandible appears as the isolated bone with the highest incidence with 35.5 % of the cases, followed by orbito-zygomatic-maxillary fractures with 30.4 % of the population studied. The least frequent fractures were of the medial wall of the isolated orbit and of the isolated frontal bone with 0.82 % for both bone structures. Most of the literature describes the mandibular bone as the most prevalent fracture (Ferreira *et al.*, 2014; Boffano *et al.*, 2015; Goulart *et al.*, 2015; Manodh *et al.*, 2016; Wusiman *et al.*, 2020; Al-Qahtani *et al.*, 2021; Kanala *et al.*, 2021; Khan *et al.*, 2022), which coincides with the percentages of this study, however, some authors in their authors differ from this, pointing out in their articles that the most frequent fractures were: fractures of the Naso-orbito-ethmoidal complex (Alves *et al.*, 2014), zygomatic (Rêgo *et al.*, 2020) and the bones of the nose (Werlinger *et al.*, 2019).

The approach to the lesions was carried out depending on the anatomical location of the fracture, using the most common ones reported in the literature and described in the results. Surgical treatment was performed by placing mini plates with 1.5, 2.0 or 2.4 mm titanium screws for rigid internal fixation (FIR), depending on the type of facial fracture presented by each patient. Most of the time for mandibular fractures the 2.0 mm system is used, except in cases of comminuted fractures, for which the 2.4 mm system is used (Barreto *et al.*, 2022). For fractures of the middle and upper third of the face, the 1.5 mm system is used (Barreto *et al.*, 2022). The preferential use of FIR is due to the technical and functional advantages of miniplate fixation over maxillomandibular fixation, which include ease of use, precise anatomical reduction, functional stability (Kanala *et al.*, 2021), in addition to its satisfactory postoperative results, such as an early increase in mouth opening and bite force, and lower patient morbidity (Manodh *et al.*, 2016).

CONCLUSION

FMT are frequent in our institution, with the mandible being the bone most affected due to trauma; however, the middle third of the face was the most affected due to the sum of the bones that constitute it. Young men continue to be the main ones affected, generally due to the sociocultural context. It is necessary

to develop epidemiological investigations of these pathologies in order to obtain demographic conclusions and contribute to unifying diagnostic and treatment criteria, thus establishing efficient prevention and treatment policies in relation to each service and as a whole at the public health level.

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RESUMEN: El trauma maxilofacial es uno de los campos de actividad quirúrgica en nuestra especialidad y constituye un problema relevante en hospitales de alta complejidad, siendo esencial la presencia de nuestros especialistas dentro de un equipo interdisciplinario para la resolución de este tipo de patología. Un manejo adecuado y un tratamiento temprano son esenciales desde el momento en que el paciente es admitido, sin dejar de lado las secuelas y el posterior trabajo de rehabilitación para la reinserción laboral y diaria de los pacientes. El propósito de este trabajo es presentar la experiencia del equipo de Cirugía Maxilofacial del Hospital Dr. Franco Ravera Zunino en la resolución quirúrgica de 320 fracturas maxilofaciales con una revisión retrospectiva de 5 años. Se realizó un estudio con análisis de los protocolos quirúrgicos de pacientes operados por trauma maxilofacial, en pabellón central, bajo anestesia general, en un período de 5 años. Las variables analizadas fueron diagnóstico, edad, sexo, tercio facial comprometido, tipo de fractura, enfoques utilizados y tipo de fijación interna rígida. Se realizaron 368 procedimientos quirúrgicos. La edad promedio de los pacientes operados fue de 36 años, con predominio del sexo masculino (80,4 %), el tercio medio fue el más afectado (49,1 %) seguido de las fracturas del tercio inferior de la cara (35,5 %). Es necesario desarrollar investigaciones epidemiológicas de estas patologías para obtener conclusiones demográficas y contribuir a la unificación de criterios diagnósticos y de tratamiento, estableciendo así políticas eficientes de prevención y tratamiento en relación a cada servicio y en conjunto a nivel de salud pública.

PALABRAS CLAVE: lesiones maxilofaciales, trauma maxilofacial, factores de riesgo.

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