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Profile of Fractures of the Zygomatic Bone at the Ibn Tofail Hospital of the Mohammed VI Hospital Of Marrakech (Marocco)

Garango A*, Mabika Brédel, Zakaria A, Ibnouelghazi N, El bouihi M, Mansouri Nadia Hattab
Service of Maxillofacial Surgery and Stomatology department of Mohammed VI University Hospital of Marrakech, Morocco

Original Research Article

***Corresponding author**
Garango A

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Abstract: Zygomatic bone fractures are common in maxillofacial surgery, leading to functional and aesthetic morphological repercussions. The aim of this work is to study the epidemiological, therapeutic and evolutionary profile of fractures of the zygomatic bone at the maxillofacial surgery department of the Ibn Tofail hospital of the Mohammed VI CHU in Marrakech. We conducted a descriptive prospective study over a period of 3 years (March 17, 2015 to April 16, 2018), on the management of fractures of the zygomatic bone. In this study, we used Zingg and al's classification to distinguish the different types of fractures from the zygomatic bone. Our sample consisted of 200 patients treated for fracture of the zygomatic bone. The average age of patients was 27 years old, with a male predominance. The road accident was the dominant etiology, 145 cases (72.5%). The fracture disjunction of zygoma was the most common clinical form (79 cases)**.** Orthopedic treatment was performed in 111 cases (53.5%), surgical treatment (osteosynthesis) was used in 81 cases (40.5%) and for 8 patients (4%) we opted for a therapeutical abstention. Fractures of the zygomatic bone are common in maxillofacial surgery. They are mainly dominated by road accidents. This fracture occurs very often to young male subject. Orthopedic treatment is the mostly used as therapeutic management in our case series.
Keywords: Fracture, zygomatic bone, osteosynthesis, orthopedic, therapeutic abstention.

INTRODUCTION

Representing the cheekbone's relief, the zygomatic bone constitutes the lateral bumper of the face. For this reason the zygomatic bone is particularly exposed to the direct traumatisms of the face, and also the frequency of his fracture in maxillofacial traumatology.

Fractures of the zygomatic bone can cause aesthetic, functional and morphological repercussions on one hand and, on the other hand, pose difficulties of treatment, especially in the consequences, justifying initial, early and complete management. The diagnosis relies on clinic; it is based on the medical imaging and requires coverage.

The purpose of this work is to study the epidemiological profile, the Clinic, etiologyl and the treatment of fractures of the zygomatic bone at the maxillofacial surgery department of the Ibn Tofail Hospital of the Mohammed VI of Marrakech.

MATERIALS AND METHODS

This is a descriptive prospective study over a period of 3 years (March 16, 2015 to April 17, 2018) realized in the Department of Maxillofacial Surgery Stomatology and Aesthetics for fracture of the zygomatic bone.

We studied the following data: epidemiological, clinical, etiology, type of treatment, screening and monitoring of the patient. In this study, were excluded the craniofacial disjunctive fractures and Centro facial fractures.

All patients benefited from facial scanner CT (CT) in bone penetration (axial and coronal section) in orbital floor fractures (coronal CT) and three-dimensional reconstruction in complex fractures of the zygomatic bone and in the cases of associated facial smarts; the Hess Lancaster test asked for any oculomotor disorder (diplopia) detected in the clinical examination.

Control imaging (Blondeau incidence, lateralized Hirtz incidence) was consistently requested

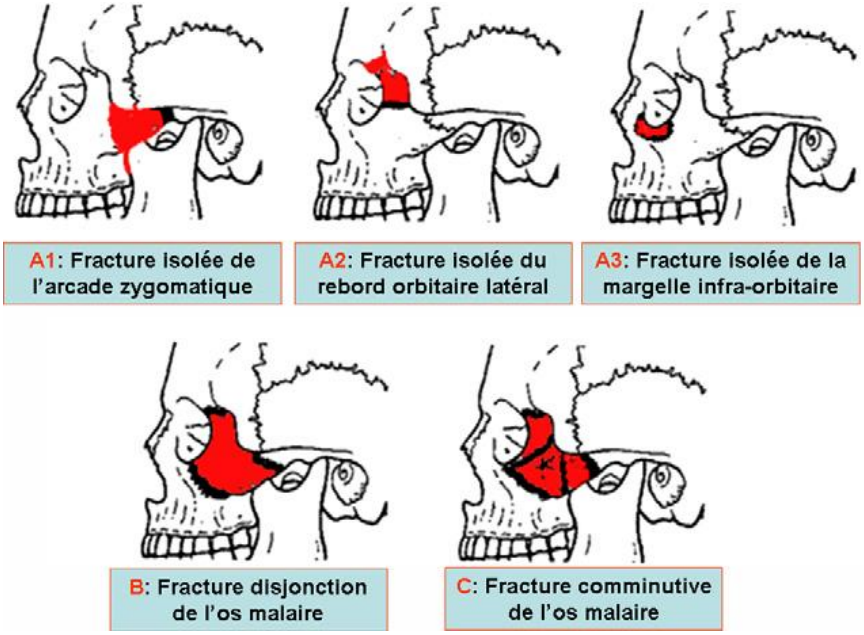
among all patients (see Table IV). We used the classification described by Markus Zingg *et al*. [1, 2] in our study based on the anatomy of the zygomatic bone (Schema 1).

Category A: isolated fracture of one of the three processes of the zygomatic bone:

- A1: the temporal process forming the zygomatic arch: the zygomatic arch is
- A2: the frontal process forming the lateral orbital rim;
- A3: the maxillary process forming the infra-orbital margin

Category B: fracture-disjunction of the zygomatic bone with rupture of these attachments.

Category C: comminuted fracture associating a zygoma smash with category B lesions.



Schema 1: Classification of Zingg *et al*. [1,2]

Orthopedic treatment was performed in fractures of the zygomatic bone isolating one of the processes of the zygomatic bone and in fractures disjunctions of the zygomatic bone with a stability obtained on the operating table in the majority of the cases.

We adopted the surgical treatment (osteosynthesis by titanium target mimi plates) in case of failure of the orthopedic treatment (unstable fracture, fractures zygomatic bone disjunctions and in the zygoma smash).

Therapeutic abstention observed in less displaced fractures without morphological and functional repercussions. The classification of the fractures is then used to codify the protocol of the management but also to have an idea of the prognosis.

RESULTS

Epidemiology

We noted a predominance of male (93%) cases especially young people with an average age of 27 years, the age of patients ranges from nine to 60 years, the peak frequency of trauma marked especially during l summer (July, August and September).

The etiology was dominated by road accidents (AVP), (Figure: 1).

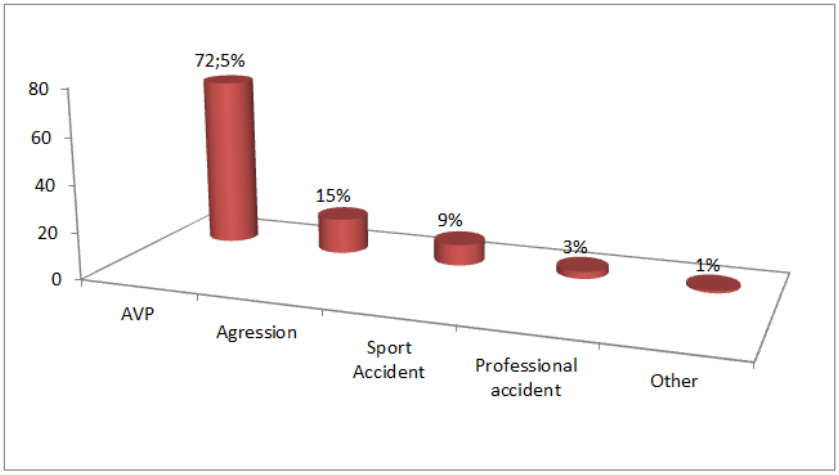


Fig-1: Distribution of patients by etiology

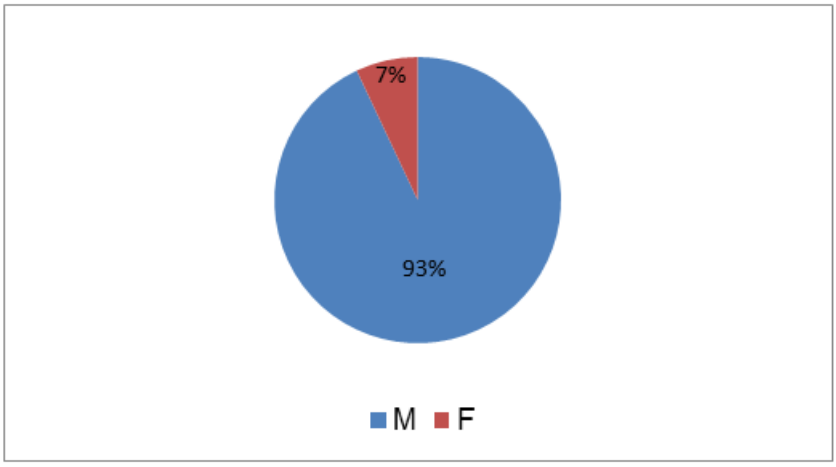


Fig-2: Distribution of patients by gender

The consultation time of our patients occurs within the hours following the trauma; consulted in boxing emergencies (95% of cases) for facial trauma with an average of 2 hours; The consultation happens from (1h to 24 h) except in the case of poly trauma seen with urgency and the associated lesions.

The nurse moves and examines the patient in the department where he is hospitalized in 5% of cases, due to the edema and associated lesions the patient is reevaluated 5 days after the trauma in order to appreciate the morphological and functional impact in order to judge the therapeutic indication.

At the clinical examination: (See Figure3)

Inspection

Were found wounds in one of the processes of the zygomatic bone (1.5%), subperi-orbital edema (22.5%) which is sometimes severe and impacts on the vision that sometimes makes ophthalmic examination difficult, palpebral ecchymosis (28%) observed within 24 hours after the trauma, subconjunctival hemorrhage, collapse of the cheekbone (72.5%), pathognomonic sign of zygoma fracture, limitation of mouth opening (25%, an enophthalmia found in (2%).

Palpation

Excessive pain on palpation in all patients next to the fracture zone (100%); stair step at the level of the infraorbital margin (97%), Intra-orbital hypoesthesia of V2 (17.5%), mainly due to compression or attrition of the V2 nerve, hence the interest to seek in all cases of zygomatic (medico-legal) bone fracture the significant impact of the trauma,of diplopia (2%).

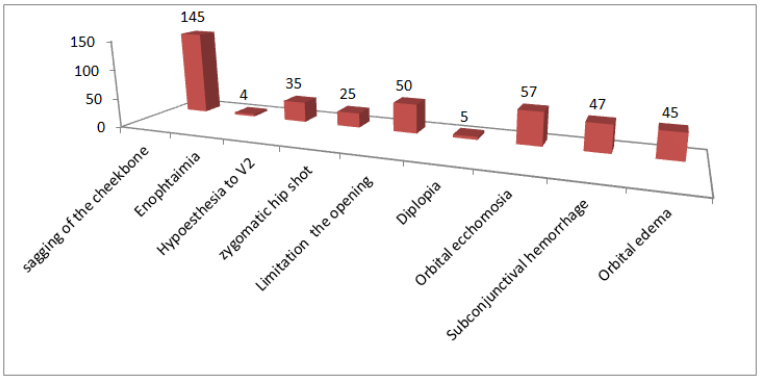


Fig-3: Distribution according to patient's clinical signs

Fig-4: clinical sign of fracture of the zygomatic bone. A: Sagging the left cheek; B: Limiting the mouth opening; C: Limitation of the opening (20mm); D: Left orbital enophthalmia

Diagnostic

The diagnosis is clinical, based on the imaging and imposed a treatment that is codified (orthopedic, surgical and therapeutic abstention).

All our patients benefited from a bone-penetrating facial scanner with axial and coronal slices, three-dimensional reconstruction in zygomatic bone smash or other associated fractures from a therapeutic approach.

Board I: Distribution according to the topography of the fracture lines

Category	Frequency
A1	32
A2	30
A3	54
B	79
C	1

Treatment

In our series, the therapeutic indication depends on the clinical morphological and functional impact, the fracture line, the localization and the displacement revealed by imaging.

The treatment consisted of a percutaneous orthopedic reduction of the fracture by the Ginestet hook or a fixed field which was realized in 111 cases, no matter what the topography of the fracture line is, with a stability obtained in 55.5%.

In case of failure of orthopedic treatment; the patient is intubated and we adopt a blood reduction (osteosynthesis by titanium mini-plates) of the unstable suture.

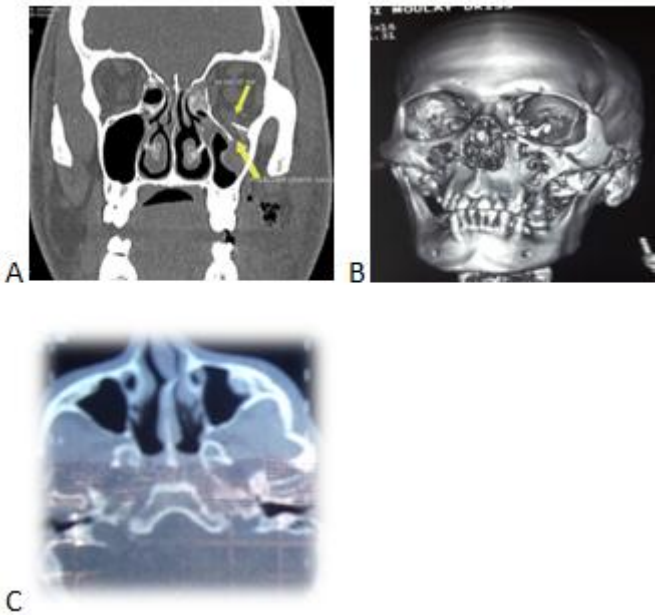


Fig-4: Scan imaging. A: Coronal section CT scan showing fracture of the floor of the left orbit with fatty incarceration; B: Facial computed tomography in three-dimensional reconstruction showing fracture disjunction of the left malar with rupture of these fasteners; C: Facial tomography in axial section showing angulation fracture of the left zygomatic arch (service iconography)

Whatever the choice of topography of the fracture line, an attempt at orthopedic reduction of the fracture is always desirable, which may reduce the operative time, the cost of anesthesia and the length of hospitalization of the patient.

The forced duct test was performed systematically in all patients on the operating table, no case of muscle incarceration was recorded.

The average postoperative hospital stay of our patients is 24 hours

Fig-5: Orthopedic reduction to Ginestet's hook (iconography of the service)

Our therapeutic attitude in the orthopedic reduction of malar fractures is essential before:

Absence of dynamic disorder

- Diplopia
- Decreased visual acuity
- Oculomotricity disorder
- Orbital hypoesthesia +/-

No static disorder: Enophthalmia

Osteosynthesis was especially indicated:

- Failure of orthopedic treatment
- Contraindication to the management of orthopedic treatment
- Broken fracture of the malar
- Comminuted fracture of the malar
- Fracture and loss of stuff from the floor of the orbit.

Board-II: Distribution according to the operative indications

Sites	Orthopédic	Ostéosynthèsis
Fronto-malar (FM)	10	18
Infra-orbital border (IOB)	30	24
FM+IOB	40	39
Zygomatic Arcade	31	00
Body of the Malaire	0	1
Total	111	81

In the case of category C (1cas), malar osteosynthesis has been systematic in this category C (see Board I). The floor of the orbit was reconstructed in 4 patients (2%) by titanium grid (3 cases), conch of the auricle (1 case), which on clinical examination had an enophthalmia with loss of substance from the floor of the orbit greater than 1/3 at imaging.

Approaches

The frontal process of the zygoma is approached by a cutaneous incision in the tail of the eyebrow and was used in 19% of cases; the medio eyelid used in 21.5%, the upper vestibular route is used in other cases requiring restraints at the level of the canine pillar and maxillary zygomatic arch. The translesional route was performed in a patient with a wound as a result of fracture examination (tail of the eyebrow).

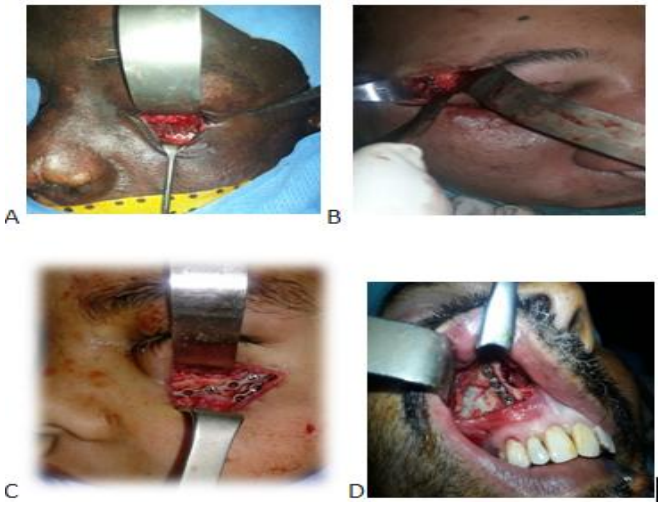


Fig-6: osteosynthésis A: Orbital floor reconstructed by a titanium grid; B: Osteosynthesis by targeted miniplaque of the fronto-malar suture; C: Targeted miniplaque osteosynthesis of infraorbital margin; D: Osteosynthesis by targeted miniplaque of the canine pillar (service iconography)

Complications

The immediate after-effects were mainly marked by orbital hypoesthesia (38 cases), orbital edema (65 cases). In the long term the complications are marked by enophthalmia which benefited later from a secondary repair by a reconstruction of the floor of the orbit by a titanium grid (1 case), much less improvement hence the interest of an earlier initial, and complete care of fractures of the zygomatic bone before after-effects' settlement.

Board-III: Sequelae of fracture of the zygomatic bone and their evolution

Period / Clinical sign	Immediate follow-up	3 months	6 months	1 year
edema	65	0	0	0
Infraorbital hypoaesthesia	38	21	17	7
Infection	0	0	0	0
Thread Release	0	0	0	0
Enophtalmos	0	6	3	2
Diplopia	3	3	2	1
Malar projection defect	5	12	10	6
palpebral ectropion	0	3	2	2
Total	111	45	34	18

Board-IV: Patient Control Imaging

Imaging	Number	Percentage
Blondeau Incidence	169	84,4%
Hirtz Incidence	31	15,5%
Total	200	100%

Fig-7: Control Blondeau X-ray (service iconography)

DISCUSSION

Our study results are similar to the usual rules of maxillofacial traumatology found in the literature: Young Male Male Appanage [3] in Japan [4,5] The Age Group Most Affected by Facial Injuries is between ten and 20 years old.

Table-V: Répartition selon le nombre de cas /auteurs

Authors	Case number	Period
Bouguila *et al*. (Tunis)	356 cas	1995-2004
Khalif *et al*.(Rabat)	276 cas	10 ans (Mars 1999 Avril 2009)
Our série (Marrakech)	200 cas	3 ans (Mars 2015 Avril 2018)

The peak of the frequency of the trauma in our series was marked especially during the summer (July, August, and September) which agrees with that realized in Tunisia [1].

The average age is 27 years, road accident was the dominant etiology, which is consistent with that achieved in Tunisia and Morocco [1, 2] monitoring the attacks, which differs from that achieved by Barbara [3] in France especially the brawls.

Clinically dominated in our study by a collapse of the cheekbone (145 cases) is consistent with that of Khalif [2], different from that of Bouguila [1] marked mainly by a hip stroke.

The fractures of the floor of the orbit are well known ever since 1957 following the work of the Lille school in France converse Smith and Regen in the United States America [7,8], in our series we noted a loss of 1/3 orbit floor substance in 2% of cases.

The enophthalmia found in (2%) due to mechanisms of displacement of the osseous walls of the orbital cavity are difficult to treat and must be prevented and treated during the initial care.

Enophthalmia may appear immediate or secondary following exophthalmia or orbital edema [9]. The management of bone defects in the framework of fracture of the floor of the orbit must be initial and early usually before the end of the first week following the date of the trauma outside an ophthalmological emergency (muscular incarceration, fat) to facilitate decarceration and prevent muscle fibrosis [10, 11].

Biesman found 86% of persistent diplopia among the cases associating a fracture of the floor of the orbit to a fracture of the orbital inner wall of the orbit, which explains the difficulties to restore the orbital contour in case of a combined fracture [12]. It was observed in 1.5% of our patients kept persistent diplopia sequelae.

The isolated medio-palpebral route was the majority in our study 21.5% of cases, a transesional approach of the tail of the eyebrow used in a patient had a wound opposite.

The ciliary tract, which is a great provider of eyelid ectropion in some series [13, 14, 15], was not the first route in our study, in our series, we observed 1.5% of cases.

The clinical signs (see Figure 3) dominated by a limitation of the mouth opening (50 cases), the hypoesthesia in orbital V2 (35 cases) due to compression or attrition of V2 should be sought in any

case of fracture of the patient. Zygomatic bone (medico-legal).

The fracture disjunctions malar (category B) are more predominant (79 cases) in our study which is similar to that Bouguila [1] Khalif [2] Barbara [6].

The treatment of fractures of the malar bone that consists of restoring the morpho-functional and aesthetic disturbance caused by the trauma that can be treated orthopedic (Ginestet hook, fixed field, other instruments), surgical (screwed mini screw plate osteosynthesis) or Therapeutic abstention in non-displaced fractures (8 patients).

In our study, orthopedic reduction was performed in 53.16% of cases and osteosynthesis in 40.5% of cases; this important rate was found in the studies of Bouguila [1] by Khalif [2] and Barbara [6]. The complications of fractures of the zygomatic bone can be an order of morphological sequelae; functional and aesthetic [13]. Functional after-effects that include: limitation of mouth opening, diplopia, limitation of oculomotricity of the eye, loss of visual acuity.

In our series, complications of the after-effects of fracture of the zygomatic bone (see Table III) are mainly dominated by: failure of projection of the malar (5.5%), neurological disorder (8.5%) of diplopia (1.5%). %), enophthalmia (2.5%). This type of sequential complication of zygomatic bone fractures was found in the realized series of Prassi (3.7%) [14], Bouguilla (8.7%) [1].

The monitored patients was over one year; the after-effects encountered were mainly (or even Table III) also observed in the Bouguila study [1].

CONCLUSION

Fractures of the zygomatic bone are common in maxillofacial trauma and it especially affects the young male population.

In our study, road accidents have been the dominant etiology encountered in most of the literature, the treatment of these fractures, which may range from therapeutic abstention, orthopedic reduction or even surgical treatment (osteosynthesis by surgery).titanium target plates) at the fracture line.

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