

# Treatment and Sequelae of Panfacial Fractures in the Maxillofacial Surgery and Stomatology Department of the Hospital University of Treichville-Abidjan (Cote d'Ivoire)

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## Abstract

**Introduction:** The treatment of panfacial fractures is complex and constitutes a challenge for the maxillofacial surgeon, who, despite therapeutic progress, frequently suffers functional and aesthetic sequelae. This study aimed to describe the treatment and evaluate the functional and aesthetic sequelae of panfacial fractures in the stomatology and maxillofacial surgery department of the Treichville University Hospital. **Materials and Methods:** We conducted a retrospective study over a 6 years in the stomatology and maxillofacial surgery department of Treichville University Hospital. Forty-two patients with panfacial fractures were included in the study. **Results:** Forty-two patients were registered. The average time to osteosynthesis was 12.4 days. Nasotracheal intubation was used most often (88%), and in the majority of cases, mixed osteosynthesis combining a screwed plate and steel wire was performed (64.29%). The “Bottom-up and Outside-in” surgical sequence was the most commonly used (64.29%). All patients had at least one functional and/or cosmetic sequela after treatment. Functional sequelae were dominated by occlusal problems and aesthetic sequelae by nasal deformities. **Discussion:** Panfacial fractures are characterised by their complexity, presenting maxillo-facial surgeons with a therapeutic and evolutionary challenge. The quality of the initial, often multidisciplinary, management of panfacial fractures is an essential factor in both functional and aesthetic prognosis. **Conclusion:** The treatment of panfacial fractures, even if well managed, is sometimes a source of sequelae, requiring often complex secondary management.

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## Keywords

Aesthetic Sequelae, Functional Sequelae, Management Panfacial Fracture, Treatment

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## 1. Introduction

Panfacial fractures are multiple lesions located on one or more levels of the face, caused by severe trauma. These fractures are usually treated as delayed emergencies, under good technical conditions, and, at best, in a single operation [1]. The treatment of these complex facial traumas is a real challenge for the maxillo-facial surgeon [2]. Panfacial fractures are a source of functional and aesthetic sequelae. Permanent sequelae are frequent despite therapeutic progress [1] [3]. In our department, there are no previous studies on panfacial fractures in particular. Faced with the lack of local scientific data on this complex facial trauma, we decided to conduct this study in order to improve care. This study aimed to describe the treatment and evaluate the functional and aesthetic sequelae of panfacial fractures in the stomatology and maxillofacial surgery department of Treichville University Hospital.

## 2. Materials and Methods

We conducted a retrospective study over 6 years (2017-2022) in the Department of Stomatology and Maxillofacial Surgery at the Treichville University Hospital. All male and female patients of any age who suffered a panfacial fracture and whose postoperative follow-up was of at least 6 months and excluded those whose clinical records were unusable. Forty-two patients with panfacial fractures were identified. These patients were contacted by telephone call to assess the sequelae after an examination, recorded on an information sheet. A careful analysis of the variables was carried out for each patient record and the data were plotted on a survey sheet.

The variables studied were mainly of the following order:

- Therapeutics (initial management, time of treatment, type of intubation, equipment used, approach, osteosynthesis sequencing, fracture foci repaired)
- Evolution (complications, functional and aesthetic sequelae)

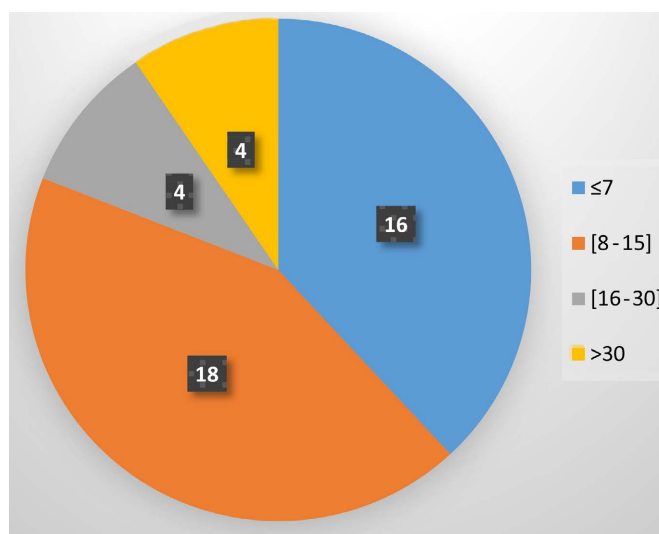
We used Microsoft Excel and Word software to compile and process the basic data, process the data and draw up the graphs.

Data collection was carried out with respect for confidentiality, and images were used only with iconographies used after prior informed consent.

## 3. Results

A total of 42 patients were included in the study, 69% of whom were male (Table 1). The mean age of the patients treated was 33.28 years.

All patients were treated with osteosynthesis. The mean time to osteosynthesis was 12.4 days, with extremes of 3 and 40 days (Figure 1).



**Figure 1.** Distribution of patients according to time to osteosynthesis.

**Table 1.** Distribution of socio-demographic characteristics.

Socio-demographic characteristics		Number	Percentage (%)
<b>Age</b>	[0 - 20 years[	4	09.52
	[21 - 30 years[	16	38.10
	[31 - 40 years[	11	26.19
	[31 - 50 years[	07	16.67
	>50 years	04	09.52
<b>Sex</b>	Masculine	29	69.05
	Feminine	13	30.95

Nasotracheal intubation was used in 88.1% of patients operated on, and submental intubation was performed in 2 patients (04.76%). Mixed osteosynthesis combining screw plates and steel wire was used in 64.29% of cases (**Table 2**). Orthopaedic methods were used, in particular maxillo-mandibular fixation in 11 patients (26.19%). The average duration of maxillo-mandibular fixation was 9 days.

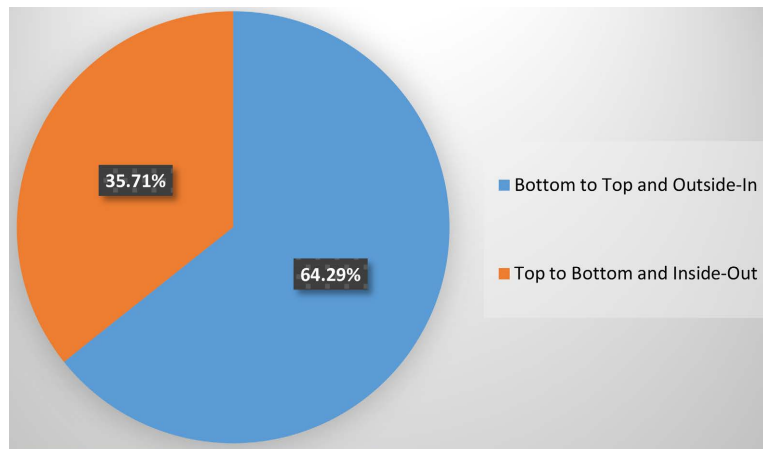
Osteosynthesis of panfacial fractures was performed in an ascending fashion, using a lateromedial approach “Bottom to Top and Outside-in” in 27 patients, *i.e.* 64.29% (**Figure 2**).

Two cases of surgical site suppuration were identified as immediate postoperative complications.

The average length of hospitalisation was 10 days, with extremes of 3 days and 30 days.

In the long term, all patients had aesthetic and/or functional sequelae. Functional damage accounted for 63.64% of the sequelae (**Table 3**).

Functional sequelae were dominated by occlusal and dental problems (**Figure 3**), such as tooth loss (57.14%) and problems with dental articulation (37.71%).



**Figure 2.** Distribution of patients according to osteosynthesis sequencing.



**Figure 3.** Left anterolateral open bite.

**Table 2.** Distribution of patients by type of osteosynthesis.

Type of osteosynthesis	Number	Percentage (%)
Screwed plate	14	33.33
Steel wire	01	02.38
Screwed plate + Steel wire	27	64.29

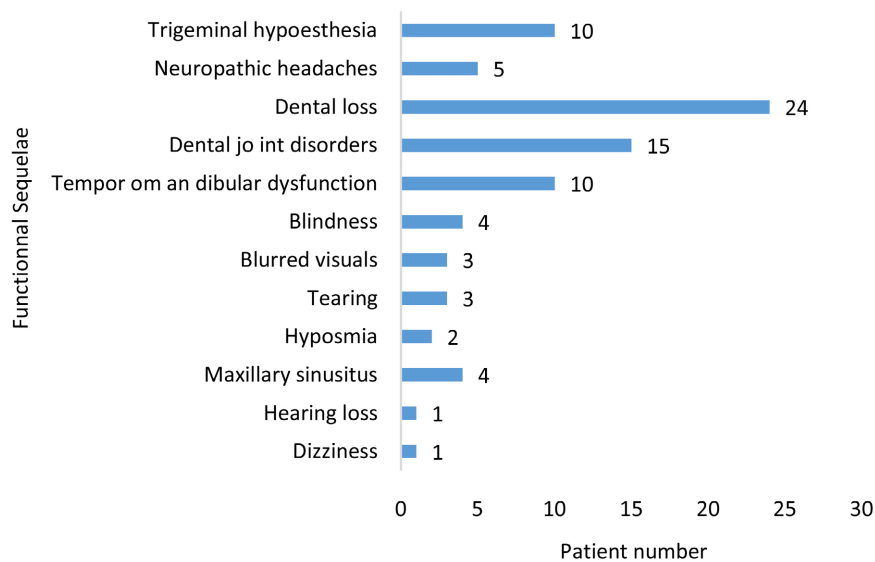
**Table 3.** Distribution of types of sequelae.

Sequelae	Number	Percentage (%)
Aesthetics	16	36.36
Functional	28	63.64
Total	44	100

Ophthalmological sequelae were also reported, with unilateral blindness predominating in 9.52% of cases. There were also neurological sequelae, mainly trigeminal hypoesthesia (23.81%). Cases of maxillary sinusitis were also noted as major otorhinolaryngological sequelae. The functional sequelae are detailed in **Figure 4**.

From an aesthetic point of view, nasal saddle, unsightly scars (**Figure 5**) and enophthalmos were the major sequelae.

Other aesthetic sequelae such as nasal deviation (**Figure 6**) are presented in **Table 4**.



**Figure 4.** Distribution of patients by functional sequelae.



**Figure 5.** Unsightly scar + nasal saddle.



**Figure 6.** Nasal deviation + ocular dystopia.

**Table 4.** Distribution of patients according to cosmetic sequelae.

Aesthetic sequelae	Number	Percentage (%)
Enophthalmos	3	7.14
Orbital dystopia	1	2.38
Nasal saddle	4	9.52
Nasal deviation	2	4.76
Unsightly scars	4	9.52
Maxillary recession	1	2.38
Frontal depression	1	2.38

Our evaluation concluded that the aesthetic result was satisfactory (52.38%), while 61.90% of patients were satisfied with the final aesthetic result. In our study, only one patient underwent surgery to correct his sequelae. This was a Le Fort I osteotomy, performed 3 months after the first operation. The other patients with functional and aesthetic sequelae did not undergo secondary surgery.

#### 4. Discussion

The treatment of panfacial fractures was essentially based on osteosynthesis. In our context, these osteosyntheses encountered several difficulties, including the limited availability of osteosynthesis material in hospitals, the cost of the material and the operations. These various problems delayed the management of patients, which was already complex and justified the long delay in osteosynthesis (12.4 days), also reported by Elmarzouki [4]. Osteosynthesis was carried out in a shorter period. The situation is different elsewhere, particularly in Germany and India, where the average time for osteosynthesis was short [5] [6].

One of the main concerns regarding the osteosynthesis of panfacial fractures is airway management. Three modes of intubation were used in our patients: oral intubation, nasal intubation and submental intubation. Management of the airway during surgery requires perfect collaboration between the anaesthetist and the maxillo-facial surgeon [4] [7]. Nasal intubation was the most commonly used method (88%), but presents risks of aggravated injury in the case of centro-facial fractures with basi-cranial involvement. However, this hypothesis has not been confirmed [8] [9]. To guarantee the comfort of the surgeon and anaesthetist

Sub-mental intubation has proved to be a safe approach, and many studies have judged this technique to be satisfactory [10] [11]. It was rarely used in our patients (4.76%) due to a lack of experience and information on the part of anaesthetists and a lack of pre-operative coordination with surgeons.

Panfacial fractures were treated with mixed osteosynthesis in 27 patients (64.29%).

Mixed osteosynthesis (screw plate + steel wire) has been used for the most part, and still plays an important role in the repair of panfacial fractures [4].

Steel wire is still used in the osteosynthesis of panfacial fractures for two reasons: economic (affordable cost) and surgical comfort (Joining of numerous bone fragments). Osteosynthesis was combined with maxillo-mandibular blocking in 26.19% of cases. It improves the stability of the osteosynthesis and the dental articulation, as patients are sometimes ill-disciplined. Osteosynthesis of panfacial fractures was carried out in an ascending fashion with a latero-medial “Bottom to Top and Outside-in” approach in 27 patients (64.29%). Several studies comparing the sequences show that there is no significant difference in clinical results, intra- and postoperative complications or sequelae between the two sequences: “Bottom to Top and Outside-in”/“Top to Bottom and Inside out” [12] [13] [14]. These studies suggest that the most stable fractures should be reduced first, serving as a basis for the reconstruction of the other fractures [13] [14]. Despite the variety of sequencing used in our study, the theory of reducing the most stable fractures first remains the basis of our osteosyntheses protocol.

Immediate postoperative complications in our series were surgical site suppuration (04.76%). The long delay in patient management for the trimming of decaying wounds exposing multiple bone splinters and the multiple osteosynthesis with steel wire on numerous fragments that were probably deperiostealized could explain these suppurations.

In the long term, panfacial fractures are responsible for a large number of functional and/or aesthetic sequelae. The patients in our study had at least one sequela, as in the Brignol study in France [1]. Complaints are not always spontaneously evoked by the patient. Indeed, given the context of the injury and the many post-traumatic aesthetic and functional problems, patients are generally satisfied with the postoperative result. A meticulous and informed clinical examination can detect the sequelae.

Functional sequelae were more frequent (63.64%), and dominated by occlusal and dental disorders. These sequelae were also found in the studies carried out by Brignol in France and Elmarzouki in Morocco, but with relatively low frequencies compared with ours [1] [4].

Neurological sequelae have been observed in our patients as well as in certain studies [15] [16]. Sensory sequelae such as hypoesthesia, anosmia, etc., resulting from well-known pathophysiological mechanisms (section, crushing, contusion) are difficult to prevent and treat. Ophthalmological sequelae such as blindness (4/42), visual blur (4/42) and lacrimation (3/42) have been noted. These sequelae can be avoided by treatment involving the ophthalmologist, but this is sometimes difficult to apply in our context due to a lack of coordination.

Aesthetic sequelae were less frequent than functional sequelae (36.36%). There were 3 orbital sequelae (7.1%). This proportion was close to that of Abouchadi (6.5% [17]). Brignol found higher proportions at 50% [1].

Secondary surgery is complex and does not always give satisfactory results. Sequelae of the nasal pyramid (saddle, deviations) were found in 14.29% of cases, a proportion close to that of Brignol [1]. Elmarzouki, on the other hand, reported a high frequency of these sequelae [4], which are the result of ineffective

or inadequate treatment of these nasal deformities.

The psychological sequelae are all the more serious as the aesthetic and functional sequelae are significant. However, psychological damage does not depend solely on the severity of the after-effects, but also on the patient's ability to overcome the ordeal and accept his or her new identity.

The retrospective aspect of the study limited the acquisition of complete information on clinical records including the experience of the surgical team and the impact of the type of osteosynthesis equipment, the operative protocol, the post-operative follow-up. This study nevertheless made it possible to evaluate the management of panfacial fractures despite the limitations mentioned. It will make it possible to carry out prospective work with a better control of certain parameters.

## 5. Conclusion

Even well-managed panfacial fractures can sometimes result in sequelae requiring complex secondary treatment. The quality of the initial management of panfacial fractures will determine the patient's functional and aesthetic prognosis.

## Conflicts of Interest

No conflicts of interest in this article.

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