



Impact of Minimally Invasive Surgery on the Management of Maxillomandibular Dymorphologies: Our Experience with 4 Cases

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Abstract: Minimally invasive surgery has revolutionized the treatment of maxillomandibular disorders, particularly those involving maxillomandibular dymorphology, offering significantly improved clinical, aesthetic, and psychological outcomes. In a retrospective study including 4 cases of maxillomandibular disharmonies collected from the Maxillofacial and Aesthetic Surgery Department at Mohamed VI University Hospital in Marrakech over a 16-month period from January 2022 to April 2023, we present the effectiveness and advantages of minimally invasive surgery in managing this dymorphology. Maxillomandibular disharmonies represent a true surgical challenge, and the range of treatments proposed in the literature does not always align with the severity of the dymorphologies in our context.

Keywords: Maxillomandibular Dymorphology - Minimally Invasive Surgery - Osteotomy - Orthodontic Treatment.

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INTRODUCTION

Maxillomandibular dymorphology primarily results from unbalanced and uncoordinated growth of the maxilla and/or mandible, leading to occlusal disorders, functional deficiencies, aesthetic disharmony of the face, and psychosocial disabilities [1]. Various etiologies can be responsible for maxillomandibular dymorphology. These can be acquired (traumatic, infectious, or tumor-related pathologies) or congenital (genetic and functional factors, craniofacial malformation syndromes) [2]. Dymorphologies include both asymmetries or lateral dymorphoses, as well as sagittal anomalies such as Class II with maxillary protrusion and Class III with mandibular protrusion and/or prognathism. All associations are possible, with the dymorphology resulting from temporomandibular ankylosis representing a distinct

entity, considering its complexity Lesional and therapeutic. Numerous terminologies and clinical classifications have been described to refer to several different anomalies.

Classification of Dymorphologies

1. Asymmetries or Lateral Dymorphologies

- ✓ Lateral deviations or lateral shifts
- ✓ Les latérogathies

2. Sagittal Anomalies

- ✓ Class II / Maxillary protrusion
- ✓ Class III / Mandibular protrusion, prognathism

3. Mixed, Complex Malformations

The management of these anomalies is multidisciplinary. It relies on minimally invasive

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surgery (precise orthognathic surgical repositioning) combined with pre- and post-surgical orthodontic treatment, in order to achieve a more harmonious aesthetic, functional, and psychological outcome. This retrospective study aims to examine the impact of minimally invasive surgery on the treatment of maxillomandibular disharmonies, providing insights into the effectiveness, benefits, and limitations of this minimally invasive surgery, with the goal of optimizing treatments and better addressing the needs of patients suffering from these complex conditions.

MATERIALS AND METHODS

This is a retrospective study involving 4 cases of maxillomandibular dysmorphologies, including sagittal or transverse anomalies such as maxillary protrusion, maxillary retrognathism, mandibular protrusion, mandibular retrognathism, as well as lateral gnathism of either congenital or acquired origin, all collected from the Maxillofacial Surgery Department at the University Hospital of Marrakech, over a 16-month period (from January 2022 to April 2023). Data collection was carried out from patient records and registers. Epidemiological, clinical, evolutionary, and therapeutic data were gathered using a standardized form. We included all types of dysmorphologies in this study and arbitrarily excluded any craniofacial dysmorphology of the fronto-orbital region not included in our series. All patients underwent bony base remodeling, following

orthodontic preparation and minimally invasive surgery, primarily using segmental maxillary and mandibular osteotomies or remodeling of a single level.

RESULTS

First Case

A 31-year-old female patient, with no notable medical history, presented to the Maxillofacial Surgery Department for a dental malocclusion. The maxillofacial examination revealed facial asymmetry, with mandibular protrusion and aplasia of the middle third of the face. Intraoral examination showed a bilateral Class III Angle malocclusion and an anterior open bite. Bilateral Class III molar and canine relationships were observed. The posteroanterior cephalometric analysis showed a hyperdivergent face. This patient underwent preoperative orthodontic treatment followed by a 9mm maxillary advancement osteotomy (Le Fort I type), with titanium miniplates placed for fixation. Postoperative recovery was uneventful. The patient had a smooth recovery, and a soft diet was maintained for the first two weeks. Orthodontic treatment was resumed after the surgery. The correction was successfully achieved, with a straight facial profile and an ideal skeletal occlusion. The patient was very satisfied with both the aesthetic and functional outcomes. She is a candidate for a chin reduction surgery (genioplasty).



Osteotomy, fixation with miniplates, Class I occlusion



Figure 1: Photos of the first case before and after surgery

Second Case

A 26-year-old patient, with no notable medical history, presented to the Maxillofacial Surgery Department for maxillomandibular dysmorphism. The maxillofacial examination revealed facial asymmetry with mandibular protrusion, aplasia of the middle third of the face,

laterognathism, a pinched upper lip, and an everted lower lip. Intraoral examination showed a Class III bite. The patient underwent preoperative orthodontic preparation, a Le Fort I osteotomy, and a mandibular osteotomy with sagittal splitting according to the Obwegeser-Dalpont technique (Figure 2).



Le Fort I advancement osteotomy + Fixation with miniplates



Mandibular osteotomy with sagittal split according to the Obwegeser-Dalpont technique



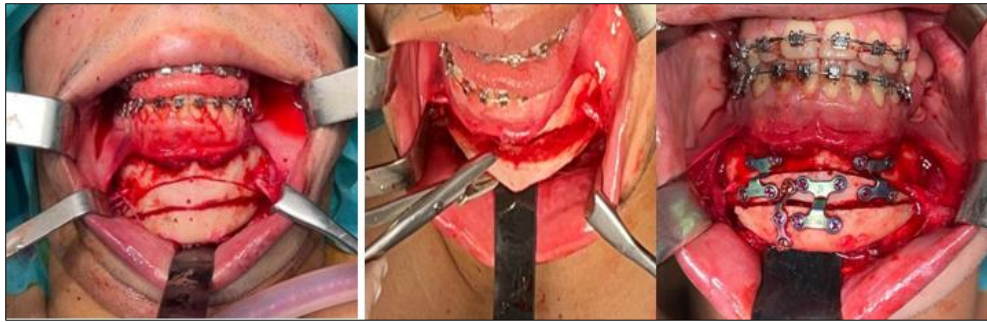
Figure 2: Photos of the 2nd case before and after surgery

Third Case

A 26-year-old patient, with no notable medical history, presented to the Maxillofacial Surgery Department for maxillofacial dysmorphism. The maxillofacial examination revealed maxillary protrusion, mandibular retrognathism, and a bird-like profile. Intraoral examination showed a good bite. The patient

underwent preoperative orthodontic preparation and a two-stage genioplasty. Postoperative recovery was uncomplicated. The patient is very satisfied with the more balanced and harmonious result after the procedure, which is likely to have a positive impact on his social interactions and psychological well-being.





Two-stage advancement genioplasty



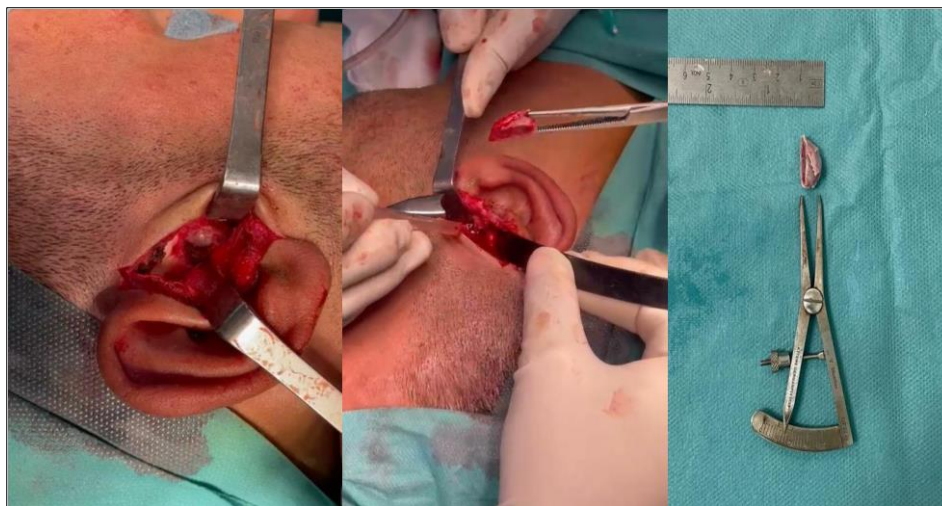
Figure 3: Photos of the third case before and after surgery

Fourth Case

A 22-year-old patient, with no notable medical history, presented to the Maxillofacial Surgery Department for maxillomandibular dysmorphism. The maxillofacial examination revealed facial asymmetry with laterognathism, a chin deviation to the right, and an increase in the height of the mandibular ramus. Intraoral

examination showed a limitation of mouth opening to 1 cm, without any dental occlusion issues. The patient underwent a right condylectomy without joint interposition. Postoperatively, mouth opening improved from 1 cm to 3.5 cm. The result was satisfactory for the patient, with a positive impact on his social interactions and psychological well-being.





Condylectomy following hypercondyly



Figure 4: Photo of the 4th case before and after surgery

DISCUSSION

Maxillomandibular dysmorphologies encompass a range of varied and polymorphic maxillofacial disharmonies that can have major functional and aesthetic repercussions. In our study, we recorded 75% of constitutional skeletal dysmorphia and 25% post-traumatic causes. Mandibular skeletal anomalies were predominant, with 37.5% mandibular protrusion, 12.5% retrognathia, 12.5% laterodysmorphia represented by hypercondyly, and 50% Class III dental malocclusion. The study of the location of the disharmony showed that it was anterior in 25% of cases at the maxilla and 75% at the mandible. This could be explained by the significant aesthetic impact

in this area, motivating consultation. These data align with the study by Randrianarimanarivo HM *et al.*, All our patients underwent a profile study beforehand, including cephalometric radiographs, molds, and photos, along with pre- and post-surgical orthodontic treatment. These findings raise both nosological and therapeutic issues. Numerous surgical techniques are described, ranging from double-stage total osteotomies [1], for remodeling to segmental osteotomies with simple adjuncts. This benefits the progress of aesthetic medicine, which aims to restore occlusal function and facial morphology. Most authors recommend pre-surgical orthodontic treatment for dental alignment and compensation, allowing the surgeon to mobilize the bony bases with

ease [2, 3]. However, we opted for an approach similar to the literature, remodeling the bony bases through preoperative orthodontic preparation. Furthermore, we favor minimally invasive surgery, using segmental osteotomies at both the maxillary and mandibular levels or performing remodeling at a single level. The results of this retrospective study provide valuable insights into this minimally invasive surgery in the management of maxillomandibular dysmorphologies, highlighting both the challenges and successes associated with various surgical approaches. The clinical observations and interventions performed in our four [4], patients reflect a diversity of clinical presentations and therapeutic strategies, showcasing the complexity of these anomalies.

The management of these maxillomandibular dysmorphologies relies on LeFort I osteotomy, setback genioplasty, facial symmetry restoration, condylectomy, and mandibular osteotomy with sagittal splitting. In 2017, Reyneke emphasized that these procedures are effective in restoring facial symmetry and dental occlusion, although the results heavily depend on the accuracy of diagnosis and preoperative planning [7]. In our study, patients treated with LeFort I osteotomy and mandibular osteotomy with sagittal splitting showed significant improvements in terms of facial symmetry, dental occlusion, and 100% patient satisfaction. These results are consistent with those reported in the literature, where these techniques are described as the cornerstones of surgical treatment for maxillomandibular dysmorphologies.

Postoperative complications, although rare, can include infections, hemorrhages, and nerve damage. Bell and Collins report that rigorous postoperative follow-up is essential to minimize these risks and ensure optimal recovery. In our cohort, patients benefited from regular follow-up, allowing for early detection and effective management of potential complications [8, 9].

Technological advancements, such as computer-assisted surgical planning and the use of 3D models, have improved the precision of surgical interventions. According to Gateno *et al.*, in 2018, these innovations allow for better visualization of anatomical structures and more detailed planning of bone cuts, thereby reducing error margins and improving surgical outcomes [10]. In our study, although advanced technologies were not systematically used, complex cases would likely have benefited from these innovations. The future integration of these technologies into clinical practice could further improve outcomes for patients with maxillomandibular dysmorphologies.

CONCLUSION

The management of maxillomandibular dysmorphologies requires a multidisciplinary approach combining meticulous clinical evaluation and precise surgical interventions. The results of this retrospective study confirm the effectiveness of LeFort I osteotomies, mandibular sagittal splits, and condylectomy in correcting these anomalies, while emphasizing the importance of rigorous postoperative follow-up to minimize complications. Technological innovations promise to further enhance the precision and outcomes of future interventions, offering encouraging prospects for the optimization of patient management.

Minimally invasive surgery in the treatment of maxillomandibular dysmorphology represents a major advancement, as it addresses patient concerns regarding pain, recovery time, and safety, while offering superior functional and aesthetic outcomes. It marks a turning point in the field of maxillofacial surgery by providing more tailored and less traumatic solutions, which contribute to improving patients' quality of life and reducing overall treatment costs.

Conflict Interest: None.

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