

Aesthetic restoration in maxillo-mandibular malformations: the role of genioplasty

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Summary

Aim. The aim of this study was to determinate how orthognathic surgery aids to cure many skull and face abnormalities and to help re-establishing the correct occlusive relation thanks to the repositioning of the maxillo-mandibular skeleton basis.

Methods. The study included 183 male patients and 338 female patients, with an average age of 23 years. The sample series was divided according to specific pathologies. All patients underwent surgical procedures and the therapeutic strategy was determined based on the anomalies presented.

Results. 113 patients had a II class dental skeletal occlusion, 180 patients had a III class dental-skeletal occlusion and 222 patients had skull-facial abnormalities. 5 patients underwent only a genioplasty, 82 patients underwent a genioplasty associated with BSSO, 175 patients underwent a genioplasty associated with Le Fort I osteotomy and the remaining 253 patients underwent a genioplasty associated with BSSO and Le Fort I osteotomy.

Conclusion. The experience shows that genioplasty has been successfully introduced in orthognathic surgical therapeutic procedures, for dental-skeleton abnormalities and mandibular asymmetries treatment. In recent years, the evolution of computer systems has allowed an accurate assessment and programming, by means of the

three-dimensional display, which are of great help in the course of diagnosis and evaluation of the displacements to be carried out, in order to obtain optimal aesthetic results.

Key words: orthognathic surgery, plastic surgery, genioplasty, maxillo-mandibular malformations, facial profile change.

Introduction

Many adult patients consult an orthodontist and/or maxillofacial surgeon wanting to improve their facial and dental aesthetics because beauty has great social power and results in more social contacts (1). Orthognathic surgery was performed in order to correct several skull and face abnormalities. It aims to restoring a correct occlusive relation, though the repositioning of the maxillo-mandibular skeleton basis, to increase in balance the stomatognathic system with neuro-muscular and articular components. Furthermore, while restoring the dental-skeletal relation and the occlusive ratio, it significantly helps to harmonize the face contour, achieving great cosmetic results (2).

Nowadays, orthognathic surgery can be associated to other surgical treatments, such as either reductive and augmentative genioplasty (3). In 1942, Hofer first reported the use of genioplasty as surgical intervention, performing an anterior horizontal mandibular osteotomy; later on, in 1947, Sir Harold Gillies performed a sliding genioplasty on a patient affected by the Treacher-Collins syndrome. Finally, in 1964 Convers and Wood-Smith published their first significative literature. In 1948, for the first time, Rubin introduced the use of alloplastic implants, whose practice, however, was going to be limited to augmentative genioplasty cases of minor entity (4). During the 1950s, there has been a significant improvement in implants and materials quality, that leads to the creation of implants extremely close to the natural anatomic shape.

Genioplasty as a cosmetic procedure is performed when skull and face malformations occur, causing an alteration of size and chin abnormalities in all three dimensions. Among this group of abnormal morbidities, there are dental-skeleton malformations and mandibular asymmetries (5).

The type of abnormality that needs to be addressed determines the technique to be used and the type of displacement that needs to be performed. In fact, sliding genioplasty can both be performed, according to the nature of the case, through osteotomies or alloplastic implants.

This study wants to describe the experience acquired by the Authors concerning genioplasty planning, results and surgical methods.

Materials and methods

From January 2009 to December 2014, 515 genioplasties were performed, in association with orthognathic surgery at the Department of Odontostomatology and Maxillofacial Surgery, Policlinico Umberto I, "Sapienza" University of Rome, Italy.

Among the most frequent pathologies addressed, there were dental-skeleton malformations and mandibular asymmetries.

Patients, 183 males and 338 females, were aged 23 years average. The sample series was divided according to specific pathologies: 22% (113 patients) with II class dental skeletal occlusion, 35% (180 patients) with III class dental-skeletal occlusion and 43% (222 patients) with skull-facial abnormalities.

All patients underwent surgical procedures after completing the following diagnostic tests: orthopantomogram X-rays, skull telerradiography in laterolateral and postero-anterior projection, statigraphy of articulations and, in recent years, magnetic resonance imaging to visualize the temporomandibular joint. Surgical procedures and movement to perform was determined according to the abnormality that had to be addressed. Patients underwent various types of surgery: 1% (5 patients) only genioplasty, 16% (82 patients) genioplasty associated with BSSO, 34% (175 patients) genioplasty associated with Le Fort I osteotomy, 49% (253 patients) genioplasty associated with BSSO and Le Fort I osteotomy. While preparing surgical intervention, either morpho-structural features of stomatognathic system and specific parameters for chin evaluation have to be considered.

In our Department we exploit an integration of data obtain from a profile-metric exam and the Legan's angle exam. Lega's angle is an ideal angle created by the line projected through the sub-nasal and the projected through the sub-nasal and the pogonion point, and it helps in evaluating morpho-structural features on the sagittal plane (6). On the vertical plane we use a profile-metric exam implementing the thirds rule.

Results

Between January 2009 to December 2014, 515 patients with maxillo-mandibular malformations were submitted to an intervention of genioplasty.

Of the 515 patients, 113 patients (22% of the sample) had a II class dental skeletal occlusion, 180 patients (35% of the sample) had a III class dental-skeletal occlusion and 222 patients (43% of the sample) had skull-facial abnormalities. 183 patients were males and 338 were females with a ratio M:F of 1:2, with an average age of 23 year.

The therapeutic strategy was determined based on the anomalies presented: 5 patients (1% of the sam-

ple) underwent only a genioplasty, 82 patients (16% of the sample) underwent a genioplasty associated with BSSO, 175 patients (34% of the sample) underwent a genioplasty associated with Le Fort I osteotomy and the remaining 253 patients (49% of the sample) underwent a genioplasty associated with BSSO and Le Fort I osteotomy.

Only 50 patients of the study group have experienced a postoperative complication. 4 patients (0,7% of the sample) reported anesthesia of the lower lip, 10 patients (2% of the sample) reported alloplastic implants migration, followed by a second treatment for repositioning, 36 patients (7% of the sample) reported an infection, with abscess in the site of implant.

Discussion

The experience acquired, confirmed by the International Literature (7-10), shows that genioplasty has been successfully introduced in orthognathic surgical therapeutic procedures, for dental-skeleton abnormalities and mandibular asymmetries treatment. There are a few dental-skeleton abnormalities, such as II class ipo-diverging with tight mandibular angle, that usually require advancement, set back or drop genioplasty. II class hyper-diverging with wide mandibular angle usually requires advancement or drop genioplasty. III class ipo-diverging with tight mandibular angle usually requires set back and drop genioplasty. On the other side, III class hyper-divergin with wide angle may need advancement, set back or even rise genioplasty (10-13).

For some mandibular asymmetries (both inborn or acquired), such as microsomia, anchilosis and others, surgical treatment includes the restoration of chin proportions and often the return to vertical and transversal diameters of the mandibular angle. Therefore, it is mandatory to achieve the complete restoration of the mandibular profile. Superior repositioning and advancement of the chin and myocutaneous structures produce both functional and aesthetic benefits for the patient (8).

While preparing surgical intervention, either morpho-structural features of stomatognathic system and specific parameters for chin evaluation have to be considered. Surgical methods, in addition to entity and direction of surgical movements, will be determined integrating data obtained from the above mentioned parameters. According to our experience, before 1989, 65% of patients, after their first maxillo-mandibular re-positioning surgery, needed extra complementary cosmetic procedures. Nowadays, thanks to the improvements made in the technology of securing tools (RIF), and in surgical and anesthetic techniques, it is now possible to perform at the same time combined treatments.

In most cases, dental-skeletal abnormalities can be assessed during a single intervention (10). The planning of surgical treatment for inborn mandibular asymmetries, such as microsomia, is more complicated, due to soft-tissues deficit involvement. In these cases, surgery must be performed, in our opinion, on a two-time approach basis.

At the same time, as for acquired mandibular asymmetries, such as TMJ ankylosis, the planning of surgical treatment is again complicated, as the real position of the chin cannot be determined, due to the horizontal rotation of the mandible (14-18). During the first surgical approach, skeletal basis will be repositioned, while surgical assessment will perform both genioplasty and a remodeling of the body and mandibular angle. The only postoperative complications, we detected, that may occur include:

- alloplastic implants migration after augmenting implant genioplasty, that eventually will require a second treatment for re-positioning;
- possible rise of infections, with abscess formations, that may be due to patient's clinical conditions, materials used, implants site, vascularization of the pouch that receives the implants, surgical technique, bacteria ability to stick and colonize the implants, and to the implants peculiar features;
- downfall of plates and stick used for securing the segment that was repositioned;
- anesthesia of the lower lip deficit for the third branch of the trigeminal nerve.

All the complications that occurred during our experience were related to: 0,7% (4 patients) with anesthesia of the lower lip, 2% (10 patients) with alloplastic implants migration, followed by a second treatment for repositioning, 7% (36 patients) rise of infections, with abscess in formation in the site of implant. Occurrence of complications was not related to a particular movement of the chin or to the surgeon's experience.

Conclusions

The possible effects of orthodontic/surgical treatment on facial aesthetics will influence treatment planning, so the following discussion gives special emphasis to soft tissue changes (19). Genioplasty is a procedure of support that helps to maximize the aesthetic results of orthognathic surgery. It aims to resetting a perfect profile-metric balance and general facial harmony, that is determined by the structural balance of various anatomic areas.

Osteotomy is considered the first choice technique, as it is easy to perform, has few complications, can be associated with orthognathic surgery and has very short postoperative course.

Alloplastic implants usage is limited to mild genioplastic augmentations.

In patients affected by severe asymmetries, based on our experience, genioplasty or angle reshaping are recommended only at a second surgical approach (20).

In recent years, the evolution of computer systems has allowed an accurate assessment and programming, by means of the three-dimensional display, which are of great help in the course of diagnosis and evaluation of the displacements to be carried out, in order to obtain optimal aesthetic results.

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