

Plication of the Suprahyoid Muscles Concomitant with Genioplasty to Improve the Aesthetics of the Submandibular Region

Plicatura de los Músculos Suprahioideos Concomitante con Genioplastia para Mejorar la Estética de la Región Submandibular

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BACHESK, A. B.; LEAL, M. O. C. D.; TEIXEIRA, R. G. & JODAS, C. R. P. Plication of the suprahyoid muscles concomitant with genioplasty to improve the aesthetics of the submandibular region. *Int. J. Odontostomat.*, 17(3):251-254, 2023.

ABSTRACT: In addition to functionally correcting skeletal facial deformities, orthognathic surgery also has a great impact on aesthetics and facial proportions. However, patients who have soft tissue changes, such as tissue flaccidity, may not achieve an ideal result, and require complementary surgical techniques that promote aesthetic refinement. The literature on less invasive techniques is limited, and therefore, this work aims to report a surgical technique performed concomitantly with genioplasty to refine the harmony of the submandibular region, in a simple and effective way. Patient with skeletal class II deformity, with lack of mandibular definition and submandibular flaccidity, underwent bimaxillary advancement orthognathic surgery with advancement genioplasty to correct chin retrusion. Due to limited results with bone repositioning alone, plication of the suprahyoid musculature was performed in association with the same approach used in the genioplasty. As a result, there was traction in the cervical region, with a consequent decrease in the submental-cervical angle and improvement in submandibular aesthetics. Furthermore, there was no need for extensive surgical intervention and no impairment of the functional results of the orthognathic surgery itself. Therefore, it can be concluded that plication of the suprahyoid musculature concomitantly with genioplasty is a technique that promotes aesthetic gains in the cervical region.

KEY WORDS: aesthetics, dentofacial deformities, genioplasty, orthognathic surgery.

INTRODUCTION

The correction of dentofacial deformities through orthognathic surgery promotes a significant change in facial harmony (Mugnier *et al.*, 2020). For this reason, despite its functional objective, many patients seek orthognathic surgery for aesthetic reasons (Consorti *et al.*, 2023). The cervical/submandibular region is an area of great concern for surgeons (Gulsever *et al.*, 2022).

Because the repositioning of soft tissues is indirect regarding the movements performed on bone tissues, in some cases, orthognathic surgery performed alone may not be sufficient to obtain an ideal aesthetic

result. Factors such as submandibular lipomatosis, tissue flaccidity, muscle laxity and anteroinferior positioning of the hyoid bone may prevent satisfactory aesthetics (Collins & Epker, 1983; Soydan *et al.*, 2014). For this reason, the simultaneous association of complementary techniques is increasingly frequent. Submental liposuction, rhytidoplasty and platysmaplasty procedures are described as treatment options for these cases (Moreno *et al.*, 1994; Olivieri *et al.*, 2019; Consorti *et al.*, 2023). Nevertheless, despite promoting a significant improvement in the definition of the cervical contour, they are invasive surgeries that require a longer surgical time.

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The literature on less invasive surgical options is limited. Turvey & Epker (1994) have suggested that posterosuperior repositioning of the geniohyoid and anterior digastric muscles may improve the submental-cervical angle. To the authors' knowledge, there is only one article published on the technique, in which Collins & Epker (1983) describe the repositioning of the suprahyoid musculature in genioplasty, obtained by means of suspension sutures fixed to the lower second molar teeth. There is, however, no paper in the current literature that describes muscle plication directly through the surgical access of genioplasty.

Therefore, this paper describes an innovative and unique technique, in which, unlike the approach of Collins & Ekper (1983), the muscle suture is performed directly in the surgical access of the genioplasty, promoting improvement in the submandibular aesthetics without the need for extensive surgical intervention, and without compromising the functional results of orthognathic surgery.

CASE REPORT

A 23-year-old female patient sought care with an aesthetic complaint regarding her facial profile. After clinical and imaging examination, the patient was diagnosed with a pattern II, class II facial deformity, associated with tissue flaccidity and a "double chin." She received guidance on the possibilities for treatment. The initial choice was orthognathic surgery for bimaxillary advancement, with advancement genioplasty associated with suprahyoid musculature plication. The bone movements were composed of 5 mm of maxillary advancement with 4 mm of impaction, 8 mm of mandibular advancement, and 7 mm of chin advancement, with 4 mm of impaction. The patient was operated on at Hospital Santa Casa de Araras, Brazil, in accordance with Good Clinical Practice guidelines and the principles of the Declaration of Helsinki.

Surgery was performed under general anesthesia and nasotracheal intubation. Local anesthesia was applied with lidocaine with epinephrine 1:100,000, infiltrated in the region of the bilateral mental nerve. We proceeded with the surgical incision for genioplasty with a scalpel blade in the bottom of the mandibular sulcus from canine to canine. The mentalis muscle was then completely detached from the

mandibular symphysis until adequate exposure was obtained for the horizontal osteotomy, which was performed with the aid of reciprocating saws. The lower segment was then fractured and pulled downwards, exposing the anterior digastric and geniohyoid muscles.

While the second surgeon kept the lower segment as low as possible, the main surgeon sutured the suprahyoid muscles as deeply as possible in order to maintain sufficient soft tissue traction. To do this, nylon 2.0 suture thread was used with a 3 cm-long circular needle, as the use of short needles could limit the depth of muscle plication.

The suprahyoid muscles were sutured bilaterally, the muscle was tied as far back as possible and independently, that is, using separate threads, with one for each side (Fig. 1). Next, the muscles were pulled forward in order to promote a more marked mandibular contour. After that, the surgeon tested and identified which ends of the thread were part of the same suture, pulling them gently. After bilateral traction, the wires were maintained in an active position and the chin was fixed in its new forward position. This movement slightly pulled the floor of the mouth upwards, and the same process was repeated in the second plication on the other side, to finalize the traction upwards in the submandibular region. Next, the Stable Internal Fixation (SIF) Paulus plate itself, with six holes and four screws, was used to support the surgical knot of the nylon threads, to maintain muscle traction (Fig. 2). The knots were positioned below the new bone limit of the chin, so as not to be palpable or cause any discomfort to the patient.

Cleaning and suturing were then performed in the tissue planes of the surgical site, without intercurrences. In the immediate postoperative period, a satisfactory aesthetic and functional result could be observed, with a significant improvement in cervical aesthetics (Fig. 3).

Ethical approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This publication was approved by the Research Ethics Committee with registration n^o 65542422.3.0000.5374.

Informed Consent. It was obtained and signed by the patient.

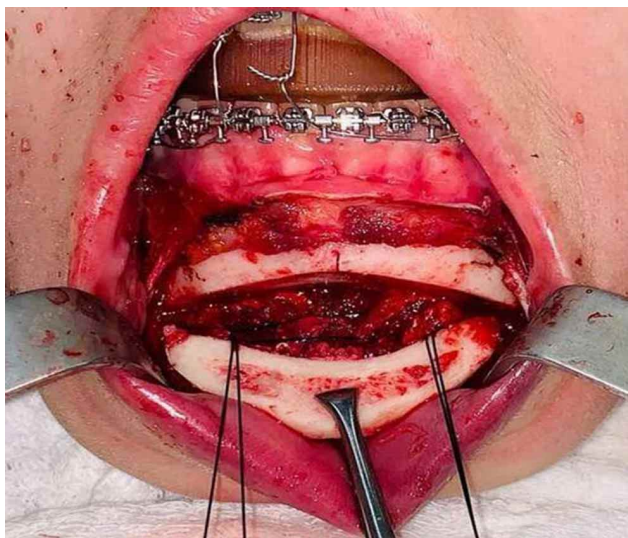


Fig. 1. Horizontal osteotomy completed and sutures in position.

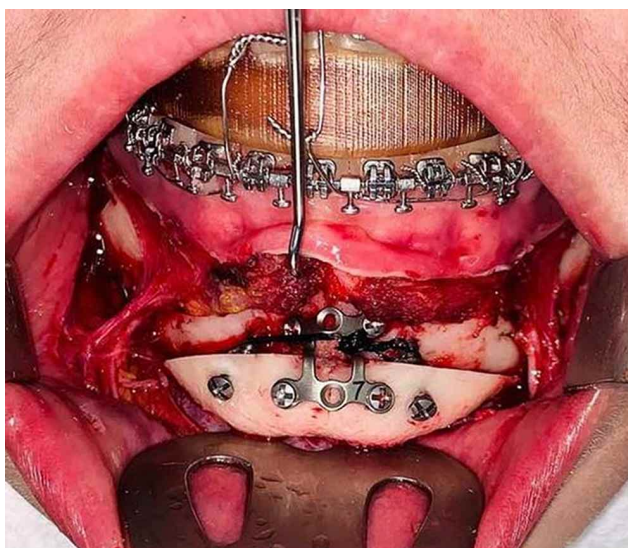


Fig. 2. Paulus plate fixing the bone segments with nylon thread from the muscle plication attached to the plate.



Fig. 3. Comparison between preoperative period (left) and postoperative period (right).

DISCUSSION

The most common reasons for poor submental-cervical esthetics are the presence of prominent submandibular lipomatosis, excessive or flabby skin, ptotic platysma, large submandibular glands, suprahyoid muscle anatomy, and mandibular retrognathia (Soydan *et al.*, 2014). Identification of the causal factor is essential to provide adequate treatment to the patient. While orthognathic surgery performs the adaptation of mandibular retrognathia in great advances, patients who undergo small mandibular repositioning may maintain unsatisfactory aesthetics (Soydan *et al.*, 2014; Mugnier *et al.*, 2020).

Studies show that discrete mandibular repositioning, whether advancing or receding, by up to 6 mm, does not promote changes in submental flaccidity and cervical angle (Soydan *et al.*, 2014). Nevertheless, large movements may generate significant aesthetic repercussions in this area. Patients with Angle class II dentofacial deformities generally present features of undefined mandibular contour, increased submental-cervical angle and palpable submental tissue, which tend to be corrected with mandibular advancement and/or advancement genioplasty (O’Ryan *et al.*, 1989; Bach *et al.*, 1991; Moreno *et al.*, 1994). Conversely, orthognathic mandibular setback surgery in class III patients may cause mild or moderate submandibular flaccidity and worsen neck aesthetics (Soydan *et al.*, 2014). In the reported case, despite the patient presenting an expected improvement in cervical aesthetics with orthognathic surgery, the isolated bone advances of 8 mm in the mandible and 7 mm in the chin were not sufficient to allow an ideal aesthetic result.

Additionally, other factors that demand soft tissue correction require other appropriate procedures. Surgeries such as platysmaplasty and rhytidoplasty (Moreno *et al.*, 1994; Olivieri *et al.*, 2019; Consorti *et al.*, 2023) are invasive procedures that involve higher costs and longer surgical times, as well as an increased risk of sequelae, such as visible scarring. In this way, the development of minimally invasive techniques, with less potential for complications, are important to allow the surgeon to achieve an aesthetic improvement of the cervical region in orthognathic surgeries (Collins & Epker, 1983).

The plication of the suprahyoid muscles was cited by Collins & Epker (1983), through suspension sutures trapped in the teeth. Nevertheless, there are no new studies enabling the use of this technique. Furthermore, there are no articles in the literature describing alternative techniques for muscle plication through the genioplasty access itself. Thus, this paper presents a possibility of suturing and suspending the suprahyoid muscles, which, as a result, promoted traction in the cervical region, with a subsequent decrease in the submental-cervical angle and improvement in the patient's submandibular aesthetics. Further research is needed to assess the feasibility of this technique. This paper, however, demonstrated that the plication of the suprahyoid muscles can be used by facial surgeons to refine their results in a simple way and without great risk of complications.

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RESUMEN: Además de corregir funcionalmente las deformidades faciales esqueléticas, la cirugía ortognática también tiene un gran impacto en la estética y las proporciones faciales. Sin embargo, los pacientes que tienen cambios en los tejidos blandos, como la flacidez, pueden no lograr un resultado ideal y requieren técnicas quirúrgicas complementarias que promuevan el refinamiento estético. La literatura sobre técnicas menos invasivas es limitada, por lo que este trabajo tiene como objetivo reportar una técnica quirúrgica realizada concomitantemente con la genioplastia para refinar la armonía de la región submandibular, de manera simple y efectiva. Se trató a un paciente con deformidad esquelética clase II, con falta de definición mandibular y flacidez submandibular, intervenida de cirugía ortognática de avance bimaxilar con genioplastia de avance para corregir la retrusión del mentón. Debido a los resultados limitados solo con el reposicionamiento óseo, se realizó la plicatura de la musculatura suprahioidea en asociación con el mismo abordaje utilizado en la genioplastia. Como resultado, hubo tracción en la región cervical, con la consiguiente disminución del ángulo submentoniano-cervical y mejoría en la estética submandibular. Además, no hubo necesidad de una intervención quirúrgica extensa ni deterioro de los resultados funcionales de la cirugía ortognática en sí. Por lo tanto, se puede concluir que la plicatura de la musculatura suprahioidea concomitantemente con la genioplastia es una técnica que promueve ganancias estéticas en la región cervical.

PALABRAS CLAVE: estética, deformidades dentofaciales, genioplastia, cirugía ortognática.

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