

Soft tissue genioplasty

New modality of chin surgery utilizing mentalis muscle only

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ABSTRACT

أهداف: تقديم طريقة جديدة ومعدلة ومطورة وغير معقدة من الناحية الجراحية حفي رُأب الذقن حيث قمنا بتحسين الشكل المظهري لعضلات الذقن مع مجموعة من المرضى المختارين.

الطريقة: أُجريت هذه التقنية الجديدة في قسم جراحة الفم وال الفك العلوي والوجه، مدينة الأمير سلطان الطبية العسكرية، الرياض، المملكة العربية السعودية وذلك خلال الفترة من يناير 2009م إلى ديسمبر 2011م. شملت الدراسة 20 مريضاً ممن كانت تنطبق عليهم الشروط التالية من المنظر الجانبي للوجه، وتفاوت العمر من 18-25 عاماً حيث قمنا بتحسين مظهر الذقن حوالي 3-5 مم اعتماداً على مرتسم قياسات الرأس من جهة واحدة وشد عضلات الذقن.

النتائج: أشارت نتائج هذه التقنية إلى زيادة تحليل الأنسجة الرخوة للشفة السفلية والذقن وذلك في مرتسم قياسات الرأس من جهة واحدة وعلى الأبعاد الطولية والأفقية معاً. وتشير مثل هذه الزيادة إلى تحسن إيجابي في المظهر بعد إجراء العملية، بالإضافة إلى مدى رضا المرضى عن مثل هذه التقنية خلال فترة المتابعة بعد مرور عام واحد.

خاتمة: أظهرت الدراسة بأن رُأب الذقن عن طريق الأنسجة الرخوة يؤدي إلى إتقان العملية الجراحية لتحسين شكل الذقن وخصوصاً في الأبعاد الأفقية وذلك باستخدام عضلات الذقن ومن دون اللجوء إلى أي أجزاء ميكانيكية أو كهربائية. كما أن هذه التقنية تحفظ الوقت ويخضع المريض لها تحت التخدير الموضعي. وتحافظ مثل هذه الجراحة على المركز العضلي الذقني من دون استئصال العصب الذقني.

Objectives: To introduce a unique newly modified non-invasive surgical technique of genioplasty, where the mentalis muscle is advanced surgically for some selected indicated patients.

Methods: This technique was carried out at the Department of Oral and Maxillofacial Surgery, Prince

Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia. From January 2009 to December 2011, 20 medically fit patients with acceptable facial profile, and age range from 18-25 years were selected as candidates for chin advancement, approximately 3-5 mm based on their lateral cephalometric tracings followed by mentalis muscle tightening.

Result: In all patients, soft tissue analysis of the lower lip and chin in lateral cephalogram were increased in horizontal and vertical dimensions demonstrating a good post-operative improvement and patient satisfaction within one-year follow up.

Conclusion: Soft tissue genioplasty provides superior versatility in surgical alteration of the chin morphology, mostly in horizontal dimension, utilizing mentalis muscle only without any hardwares. It is a time saving procedure obtained under local anesthesia. It preserves mentalis muscle attachment without dissection of the mentalis nerve.

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Osseous genioplasty (chin bone advancement) is a well-known technique in the surgical alteration of the chin,^{1,2} with some risks of complications^{3,4} mostly mental nerve injury. Somehow, osseous genioplasty has been overshadowed by the availability and versatility of multiple techniques of chin surgery.^{5,6} The main objective of this study is to introduce a modified, new non invasive surgical techniques of genioplasty with no risk of mental nerve injury called "soft tissue genioplasty (mentalis muscle tightening)", where the mentalis muscle advanced surgically without dissecting the mental nerve for some selected indicated patients who indicate minor chin advancement with acceptable facial profile. The distinct advantages of this technique includes time saving procedure obtained under local anesthesia, preserve mentalis muscle attachment with favorable cervico-mental angle, dissection of mental nerve is prohibited, hardwares are not needed, and the fact that the procedure is somehow less technically demanding when compared to osseous genioplasty, and it can be utilized with other surgical procedure as osseous genioplasty, or submental liposuction, as with all esthetic surgical procedures, the designed results, wishes of the patient, and associated risks of the procedure will drive the surgical treatment plan.

Methods. Pre-operative consideration and treatment planning. The most critical consideration in the surgical alteration of the chin is the pre-operative assessment of the patient.^{7,8} This technique was carried out in the Department of Oral and Maxillofacial Surgery in Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia. The treatment plan of soft tissue genioplasty includes full clinical assessment of patient expectation and objectives, pre-operative photographs including frontal, lateral and submental views, as well as appropriate imaging studies with lateral cephalometric evaluation. From January 2009 to December 2011, 20 medically fit patients with acceptable facial profile, with age range from 18-25 years were selected as candidates for chin advancement approximately 3-5 mm based on their lateral cephalometric tracings (5 mm is the maximum we could advance the mentalis muscle intraoperatively) followed by mentalis muscle tightening (intramuscular tightening). Any patient that requires and keen to carry out bimaxillary orthognathic surgery, chin advancement more than 5 mm, or has unacceptable facial profile was excluded from this procedure. This procedure is not an experimental study, it is only a modification of a well-known technique where all the patients were contacted with informed consents.

Clinical and radiological examinations. Alteration of the profile to achieve appropriate esthetic balance is generally a major objective of the genioplasty procedure, and usually offers the largest magnitude of contributions to the facial balance's clinical and radiological assessment (lateral cephalometric tracing), particularly the lower facial height in proportion to the face, as well as the width, shape, and orientation of the chin in the frontal view. The menton to stomion should be two-thirds the vertical height of the subnasale to menton.^{9,10} The esthetic zone of the labiomental fold and the consequences of altering this anatomical relationship should be considered when performing genioplasty procedure. The depth of the labiomental fold, projection of the chin, as well as lower incisor angulation in relationship to the plane of inferior border of mandible all are measured on lateral cephalogram. The most projected point on the anterior chin (pogonion and pogonion's point in lateral cephalogram) according to zero Gonzales should not exceed more than 5 mm, otherwise osseous genioplasty is the proper choice. Other orthognathic abnormalities needs to be documented, such as mandibular hypoplasia should alert the clinician to consider the necessity of mandibular advancement procedure. Camouflage type procedure are only indicated in the event that the patient does not wish to consider orthognathic surgery.¹¹ A conservative approach regarding the magnitude of advancement should be adapted.

Operative technique. Genioplasty procedure may be performed within office based local anesthesia or intravenous sedation technique, or with general anesthesia. In either case, the administration of local anesthesia with vasoconstrictor is critical to provide hemostasis, as well as postoperative analgesia. Local infiltration of vestibular region between the mental foramen as well as the attachment of the mentalis muscle will significantly improve the surgical field during the dissection. After administration of local anesthesia, vestibular incision is made extending from the distal aspect of the canine tooth to the distal aspect of the contralateral canine. The incision should be placed approximately 5-7 millimeters below the level of the attached gingiva, within the free gingiva (which can be determined by pulling the lower lip outward).¹¹ The incision should be placed perpendicular to the bony surface of the mandible and oblique incisions are to be avoided. Sub-periosteal dissection should be performed to expose mentalis muscle, it is important to avoid transecting the belly of the mentalis muscle as this will result in unwanted hemorrhage, and will make the



Figure 1 - Intraoperative mentalis muscle tightening.

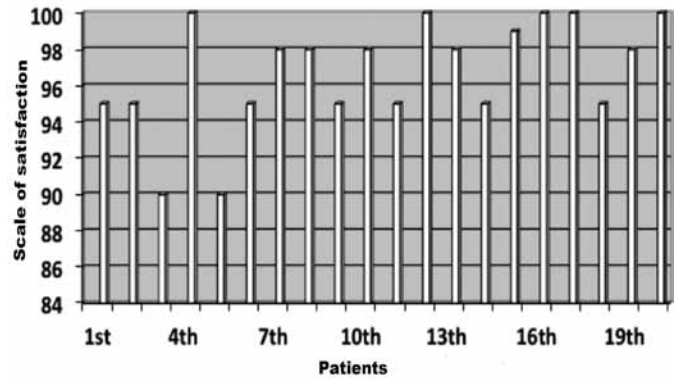


Figure 2 - Measurement scale of satisfaction of patients included in a study at the Department of Oral and Maxillofacial Surgery in Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia.

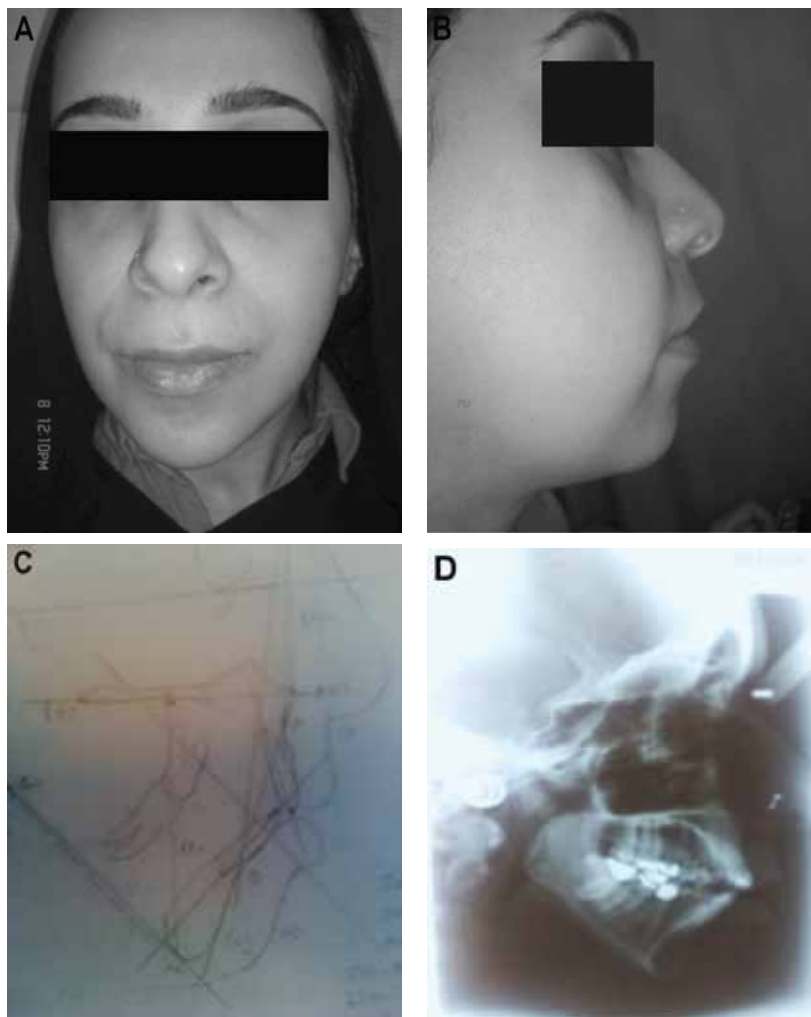


Figure 3 - An 18 year-old Saudi female, medically fit, complaining from small chin with acceptable facial profile, underwent soft tissue genioplasty. An imaging showing: A) pre-operative frontal profile; B) pre-operative right lateral profile; C) pre-operative lateral cephalometric tracing; and D) pre-operative lateral cephalometric x-ray.

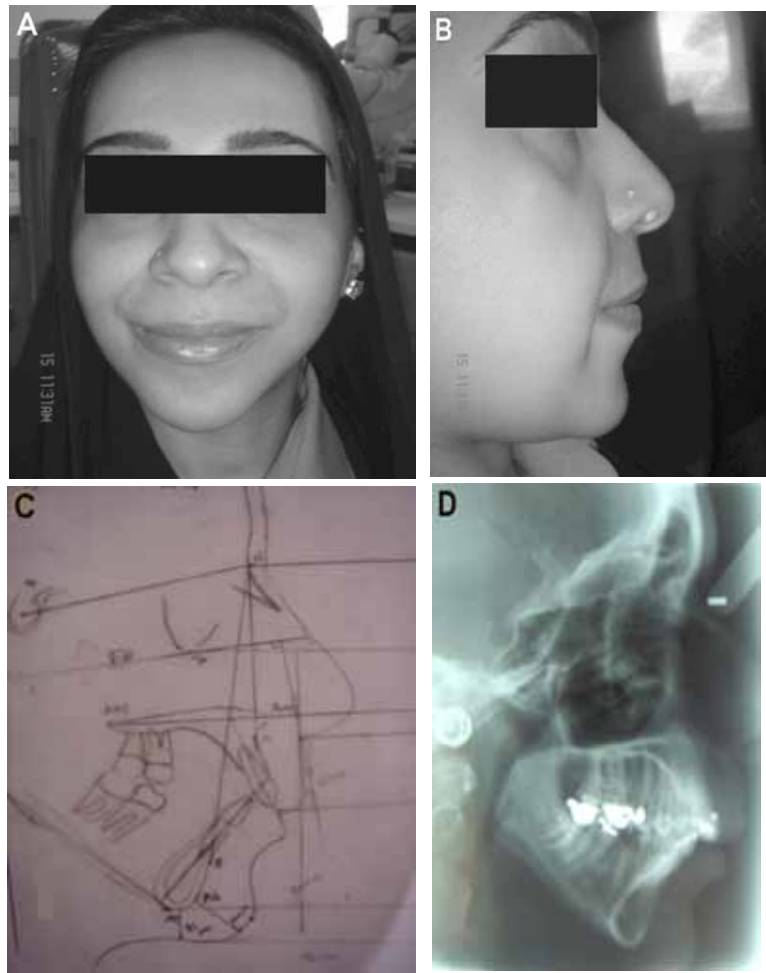


Figure 4 - Post-operative work up of the same 18 year-old Saudi female, medically fit, complaining from small chin with acceptable facial profile, underwent soft tissue genioplasty. An imaging showing: A) post-operative frontal profile after one year; B) post-operative right lateral profile after one year; C) post-operative lateral cephalometric tracing after one year; and D) post-operative lateral cephalometric x-rays after one year.

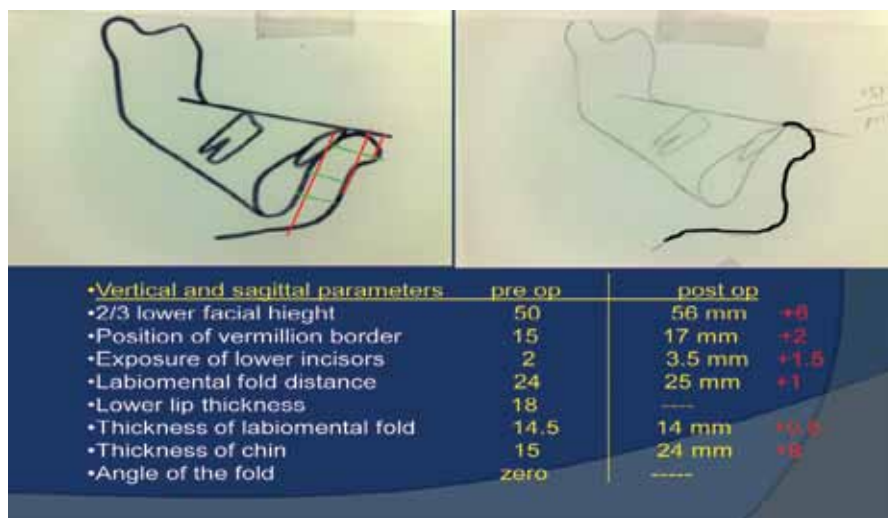


Figure 5 - Pre- and post- operative parameters after one year of the 18-year-old Saudi female.

dissection problematic.^{12,13} Intra muscular tightening of mentalis muscle is performed as 4-sided symmetrical knot and raised superiorly for re-attachment using 1/0 Dexon (Figure 1). The mucosa is then approximated with interrupted, or 3/0 Vicryl suture.

Results. There was no edema immediate post operatively neither neurosensory disturbance in all patients and according to vertical and sagittal parameters, most important changes one day post-operatively are the two-thirds of the lower facial height increased approximately 4-6 mm, and the thickness of the chin increased approximately 4-7 mm (Table 1). All patients are under follow up for one year post-operatively with series of photos and lateral cephalometric tracings

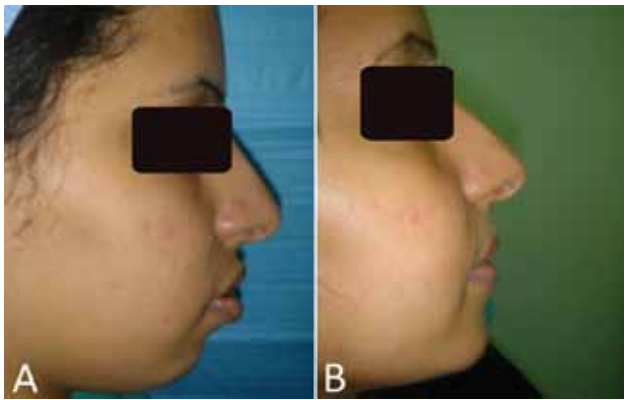


Figure 6 - A 22 year-old Saudi female, medically fit complaining from small chin with acceptable facial profile, underwent soft tissue genioplasty. An imaging showing: A) pre-operative photo; and B) post-operative photo after one year.

Table 1 - Vertical and horizontal parameters of patients included in a study at the Department of Oral and Maxillofacial Surgery at the Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia.

Vertical and sagittal parameters of lateral cephalometric tracing	Mean pre-operative	Mean post-operative one day post operatively mm	Differences
2/3 lower facial height	45	49	4
Position of vermillion border	12	13	1
Exposure of lower incisors	0	2	2
Labiomental fold distance	13	17	4
Lower lip thickness	13	13	0
Thickness of labiomental fold	10	14	4
Thickness of chin	12	15	3
Angle of the fold	0	0	0

revealing highly satisfied unchanged results. The scale of satisfaction was distributed to the patients and measured accordingly (Figure 2). It ranged from 0 (not satisfied) to 100 (satisfied) (Figures 3-6).

Discussion. Soft tissue genioplasty (mentalis muscle tightening) is a procedure where the mentalis muscle advanced surgically without dissecting the mental nerve for patients who indicate minor chin advancement, less than or equal 5 millimeters with acceptable facial profile. The distinct advantages of this techniques includes time saving procedure obtained under local anesthesia, preserve mentalis muscle attachment with favorable cervico-mental angle, dissection of mental nerve is prohibited therefore no neurosensory deficit post operatively, hardwares are not needed, and the fact that the procedure is somehow less technically demanding when compared to osseous genioplasty, and it can be utilized with other surgical procedure as osseous genioplasty or submental liposuction. In this technique the intramuscular tightening of mentalis muscle is performed and raised superiorly for re-attachment using 1/0 Dexon (Figure 1). Post operative follow up for one year showed a significant increase in both lower facial height and thickness of the chin with highly satisfied patients.

The limitation of this study was the scope of patients' selection such as young age, medical fitness, and acceptable facial profile. In the future, it is advisable to increase the number of database with a comparison study between soft tissue genioplasty and osseous genioplasty associated with prolonged follow up.

In conclusion, soft tissue genioplasty is a unique newly-modified, non-invasive surgical technique, and its clinical details is a simple procedure that can be performed in patients with acceptable facial profile, who needs chin advancement of not more than 5 millimeters, it provides superior versatility in surgical alteration of the chin morphology in horizontal and vertical dimensions utilizing mentalis muscle only without any hardware, which can be obtained under local anesthesia. It preserves mentalis muscle attachment and mental nerve without any neurosensory deficit.

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Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.