SUMMARY: Mentoplasty or genioplasty is a common operation to enhance function and appearance of the chin, which has major impact on character impressions and facial beauty. With the advent of new 3D technologies, the technique can be performed using customized guides and plates (with 3D planning and printing), addressing the drawbacks of the procedure, making it minimally invasive, safe, very accurate, and predictable. In this article, we describe a surgical technique using customized surgical guides and plates and performed under local anesthesia and oral sedation, with a surgical time of approximately 45 minutes. The video includes a 3D animation of customized mentoplasty and a recording of real procedures for chin augmentation using customized guides and plates, with use of a minimally invasive approach.

CHALLENGES

Mentoplasty is a procedure that has great potential to transform facial profiles.1,2

At present, the technique using customized guides and plates to address the drawbacks of the procedure makes it minimally invasive, safe, very accurate, and predictable. Moreover, because it can be performed using local anesthesia, customized mentoplasty has become the technique of choice for chin surgery.3

SURGICAL TECHNIQUE

After the patient is evaluated, a CT scan in DICOM format is performed, which allows assessment of the chin morphology and determination of the facial midline, as well as the location of the vital structures (mental nerve). The contour of the chin and its movement are designed using specific software, such as Mimics Innovation Suite 20.0 software for medical image processing (Materialise, Belgium), a toolkit for engineering on anatomy which allows to solve the most difficult challenges in 3D customized mentoplasty. This information is used to create a tooth-supported surgical guide that defines the osteotomy line and the position of the screws on which the customized plate will be fastened, ensuring its position in the 3 planes of space (See Video, [online]), which displays 3D animation of customized mentoplasty and recording of a real procedure for chin augmentation using a customized guide and plate, with use of a minimally invasive approach that ensures the continuity of the mentalis muscle.

The surgeon is responsible for choosing the osteotomy site, both medially and at the level of the mandibular rim, in accordance with the surgeon’s preferences and esthetic objectives. This information is submitted to Avinent (Avinent Implant System S.L.U., Santpedor, Barcelona, Spain) where the team of Biomedical Engineers is responsible for planning the osteotomy, via remote connection with the clinical team, which will be supervised by the surgeon.

The procedure is performed using a local anesthetic and oral sedation. An incision is made through the alveolar mucosa of the first premolar at the junction with the vestibular mucosa, at least a couple of millimeters below the attached gingiva. The periosteum is then elevated from the chin bone and the exit of the mental nerve is identified and dissected (See Video [online]), which displays 3D animation of customized mentoplasty and recording of a real procedure for chin augmentation using a customized guide and plate, with use of a minimally invasive approach that ensures the continuity of the mentalis muscle.

Depending on the surgeon’s preference and patient comfort, the osteotomy is performed with either a microsaw or piezoelectric scalpel, and the customized plate is fastened over the holes made with the cutting guide. This ensures placement of the fragment in the 3 planes of the space as planned, and the procedure is performed with absolute precision. After complete hemostasis is achieved, the incision is closed in 2 planes to ensure proper muscular adaptation.

IDEAS AND INNOVATIONS

With the development of protocols using customized cutting guides and plates,4,5 mentoplasty, compared to the conventional technique, results in a safer (the cutting guide ensures no damage to the mental nerve), less in-
Invasive, and much more precise procedure (because the guide and the plate secure the position of the osteotomized fragment). In our opinion, we present the most advanced and improved procedure for mentoplasty, due to the innovative and optimized design of the surgical guide, which has the following characteristics: tooth-supported, 1 mm thick, with sufficient rigidity to avoid being deformed during placement. In comparison with the conventional technique using prostheses, mentoplasty, due to the traction exerted on the musculature, results in a more marked mandibular rim and elongation and a tension at the neck level.

Furthermore, this technique enables performance of more complex mentoplasties (eg, reduction mentoplasty), and allows revision mentoplasty to be tackled with success. Likewise, as illustrated in the video, we are able to perform mentoplasty more safely using minimally invasive approaches that ensure the continuity of the mentalis muscle. Moreover, in our experience, this procedure minimizes the risk of possible positioning complications and possible planning mistakes. Three-dimensional planning and the use of customized guides and plates avoid common mistakes, in aspects such as osteotomy symmetry or centering of the midline, allowing the placement of the osteotomized fragment in the correct position in all 3 planes. All these contribute to a reduction in surgical time, decrease the postoperative recovery time, and allow the use of local anesthesia and oral or intravenous sedation. These advantages have been recently demonstrated in a series of 23 cases in which the use of customized surgical guides and plates provided greater accuracy and safety in the surgery and more predictable results.

In this way, mentoplasty with customized guides and plates is in a position to replace implant placement as the technique of choice. More natural results are achieved, both surgical technique and postoperative recovery are comparable, without the drawbacks associated with implant placement.

CONCLUSIONS
Mentoplasty procedures performed with customized guides and plates generated with 3D planning and printing are easy, rapid, accurate, and safe, giving excellent aesthetic results and minimal complications.

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