

Customized Lateral Nasal Osteotomy Guide: Three-Dimensional Printer Assisted Fabrication

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Lateral osteotomy is a necessity in several rhinoplasty cases. However, it can be challenging for inexperienced surgeons to perform external osteotomy due to difficulties such as lack of control, inconsistent results and technical complications. The present article presents a simplified approach for external lateral nasal osteotomy by using a customized lateral nasal osteotomy guide fabricated with three-dimensional printer. This technique may assist novice surgeons to perform external lateral nasal osteotomy more safely and with reduced operation time and consistent outcomes.

Keywords: Osteotomy; Rhinoplasty; Three-dimensional printing

Introduction

Comparing to other facial plastic surgeries, rhinoplasty may be one of the most challenging ones (1, 2). Lateral nasal osteotomy is the key to the success of rhinoplasty (3). Also, rhinoplasty, which is performed to reshape the lateral nasal contour, narrows the nasal base, realigns the nasal dorsum, and corrects an open roof deformity (4-7), is performed by lateral nasal osteotomy. External (percutaneous) perforated and internal (endonasal) continuous techniques are two most frequently used nasal osteotomies (5). Although nasal osteotomy is a necessary element of cosmetic rhinoplasty, it may be challenging for novice surgeons to perform external osteotomy (8). Using three-dimensional (3-D) printed models, this article describes a simplified approach for external lateral nasal osteotomy. The technique may assist inexperienced surgeons to perform external lateral nasal osteotomy more safely and efficiently.

Technical note

Following the surgical treatment planning, computed tomography (CT) images, including axial and coronal views were obtained and 3-D reconstruction of the face was

performed and processed in an image module. Then, the 3-D model from the midface and lower face of the patient was reconstructed using a 3-D printer (Smart Machin Third Millennium SM3M, Model Padida, Tehran, Iran). The planned osteotomy lines were drawn with a skin marker on the model. A 2-mm thick wax was used to compensate the thickness of the soft tissue lining of the nose (Figure 1). Then, a sterile (Aquaplast GmbH, Bayreuth, Germany) splint was placed in a sterile hot water bath to become soft and pliable. The softened splint was molded on the nasal area and then trimmed with a scissor according to the osteotomy lines. This custom splint was used during the operation on the patient's nose 2-mm osteotomy was performed according to the splint's borders (Figure 2).

Discussion

Lateral osteotomy is necessary in several rhinoplasty cases. However, since the procedure is traumatic and less controllable, consistent results are hardly obtained. Also, regardless of performing a careful procedure, it is accompanied with several technical complexities (3, 9, 10). During rhinoplasty, surgeons have least control over lateral osteotomy as potentially associated with hemorrhage and subsequent edema (11). Other

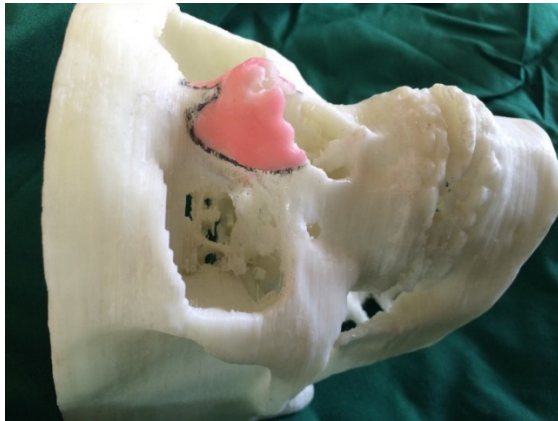


Figure 1. Planned osteotomy lines are drawn with a skin marker on the 3-D model



Figure 2. Performing the lateral nasal osteotomy in line with the surgical plan

possible complications are undesired asymmetrical osteotomy and step-off deformities (8). Given this, novice surgeons may find it challenging to perform the procedure, as accurately as it is expected. In some cases novice surgeons may overextend the osteotomy for ideal results (8). 3-D printing models have contributed a lot to the contemporary oral and maxillofacial surgery. They may be utilized in various cases of surgery. They are useful tools for assessing traumatic and pathologic defects which require complicated surgeries and reconstruction (12). Some advantages of 3-D models include decreased surgical time, preoperative planning, prebending implants, surgical rehearsal, patient education, and finally more predictable surgical results (13). In conclusion, to have a reduced operation time and also to make surgeries more efficient with more predictable outcomes, the authors of the present article recommend utilization of 3-D printed models to inexperienced surgeons. Furthermore, it is recommend to perform clinical trial studies based on this technical note and also fabricating this template by computer aided designs.

Conflict of Interest: 'None declared'.

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