

The Intraoral Approach to Lateral Osteotomy: The Role of a Diamond Burr

Alireza Ghassemi · Dieter Riediger ·
Frank Hölzle · Marcus Gerressen



Received: 27 June 2012 / Accepted: 16 October 2012 / Published online: 8 January 2013
© Springer Science+Business Media New York and International Society of Aesthetic Plastic Surgery 2013

Abstract Lateral osteotomy is one of the most traumatic but critical steps in rhinoplasty and can dictate the aesthetic and functional outcomes. Many techniques and instruments to perform it have been suggested, with the objectives of increasing predictability, reliability, and easiness of this invasive approach. We used a 1.5-mm diamond burr via an intraoral approach to thin out the base of the nasal wall along the nasofacial crease in 24 patients. This technique was performed in patients seeking primary rhinoplasty ($n = 6$), correction of cleft nose deformities ($n = 4$), deformities due to trauma ($n = 9$), and secondary nose correction ($n = 5$). A high mucosal incision paranasally allowed easy access to the osteotomy line. The digital in-fracturing could be performed with light pressure and without extensive manipulation at any time during the rhinoplasty. The osteotomy took on average of 14.5 min (range = 11.00–19.80) and endoscopic examination showed no mucosal tearing. Postoperative swelling and hematoma were comparable to those of other techniques. Using a diamond burr via an intraoral approach is an easy, safe, and reliable method leading to predictable outcomes.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors <http://www.springer.com/00266>.

Keywords Lateral osteotomy · Intraoral approach · Diamond burr

The osteotomy of the lateral nasal wall is one of the essential steps in rhinoplasty. It is performed to reshape the nose, combat an open roof deformity, realign the nasal dorsum, or narrow a wide nasal base [1, 2]. A variety of approaches [3–6] and instruments [7–10] have been developed to make this step more reliable, reproducible, less traumatic, and easier to perform [11–13]. All these methods claim to be safer, predictable, and controllable [14, 15]. Nevertheless, most techniques commonly include blind manipulation, which makes the outcome heavily dependent on the surgeon's experience. Although it is a delicate procedure, depending on wall thickness [16, 17] it occasionally requires the application of extensive force to perforate the thick bone of the nasal wall. Perforating with an osteotome may lead to laceration of the nasal mucosa or can cause irregular fracture lines, which in turn may result in challenges positioning the lateral wall and, hence, an aesthetically suboptimal result.

We changed the sequence of the osteotomy, depending on the size of the nasal hump, to maintain a stable nasal wall while perforating the nasal bone [18]. Nevertheless, we still believe further refinement of the available techniques is required. The optimal procedure should provide predictable control and precision on one hand and be reproducible and cause fewer complications on the other

A. Ghassemi · D. Riediger · F. Hölzle
Department of Oral, Maxillofacial Plastic and Reconstructive
Surgery, University Hospital, RWTH-Aachen, Pauwelsstr. 30,
52074 Aachen, Germany

A. Ghassemi (✉)
Klinik und Poliklinik für Mund-, Kiefer- und Gesichtschirurgie,
Universitätsklinikum RWTH-Aachen, Pauwelsstr. 30, 52074
Aachen, Germany
e-mail: aghassemi@ukaachen.de

M. Gerressen
Department of Oral, Maxillofacial and Plastic Facial Surgery,
Heinrich-Braun-Klinikum, Karl-Keil-Str. 35, 08060 Zwickau,
Germany

hand. We started using a technique performed with sinus floor elevation, which is a common procedure in preprosthodontic surgery [19]. In this procedure the maxillary sinus is approached through a window, which we prepare with a diamond burr on the facial bony wall. An exact window is cut in any size needed without injuring the delicate mucosa of the sinus. We planned to use the same technique to thin out the lateral nasal bony wall exactly along the osteotomy path without the danger of undesired fracture lines and leaving the mucosa intact.

Patients and Methods

Since 2010 we have been using an intraoral approach to perform lateral osteotomy. Twenty-four patients (age = 16–36 years, mean age = 26.6 years, 9 males, 15 females) were selected for this approach. All patients recruited for the study were seeking primary rhinoplasty ($n = 6$), correction of cleft nose deformity ($n = 4$), nose deformity due to trauma ($n = 9$), and secondary nose correction ($n = 5$). The osteotomy was performed bilaterally.

Surgical Technique

We marked the path of the osteotomy line as desired on the skin (Fig. 1). We incised the mobile mucosa in the anterior area of the upper jaw vestibule for about 2 cm. A periosteal elevator was used to create a subperiosteal tunnel around the piriform aperture along the path of the proposed lateral osteotomy as marked on the skin. A 1.5-mm diamond burr was used to thin out the lateral nasal wall along the osteotomy line (Fig. 2). The periosteal elevator protected the



Fig. 1 Lateral osteotomy line

Fig. 2 Spherical diamond burr



soft tissue during the procedure. We left a thin blade of bone to protect the nasal mucosa.

In six patients who had a small hump, we additionally performed an oblique medial osteotomy via the intranasal approach. An endoscopic examination was undertaken to preclude any intranasal mucosal tears. Postoperative follow-up examinations were performed on the 3rd, 6th, and 14th day and additionally after at least 1 year.

Results

We performed lateral osteotomy in 24 patients according to the technique described. The incision in the mobile mucosa and the subperiosteal dissection allowed easy access from the piriform aperture to the nasal root. The line of osteotomy, which had been marked on the skin along the nasofacial crease, could be followed and controlled easily up to the nasal root. The in-fracturing of the thinned out lateral wall could be accomplished with gentle pressure (Fig. 3a, b). Endoscopic examination of the nose showed no signs of intranasal mucosal tears in all cases. The incision and preparation took on average 14.5 min (range = 11.00–19.80) (Fig. 4). In cleft patients, access to the lateral wall was more difficult. Comparable rates of hematoma and edema were observed postoperatively, which resolved after 2–4 weeks in all cases. The follow-up for at least 1 year postoperatively was uneventful in all operated patients. No

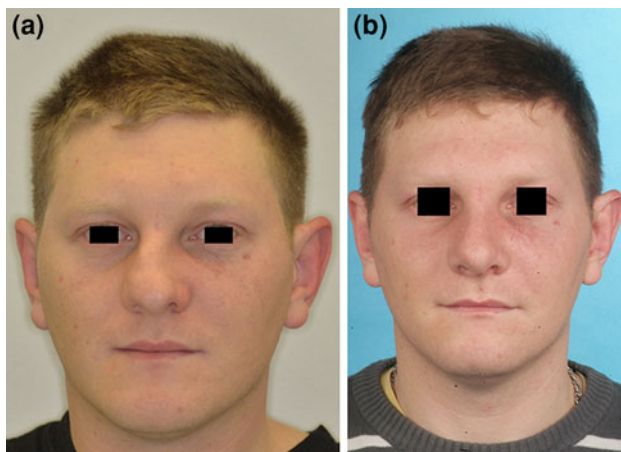


Fig. 3 a, b Pre- and postoperative frontal views after osteotomy using the diamond burr via the intraoral approach

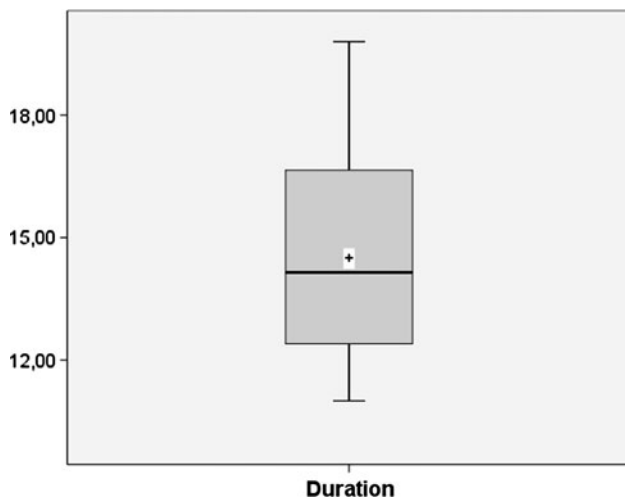


Fig. 4 Duration of the osteotomy procedure

residual bone spurs or other irregularities of the nasal wall were observed.

Discussion

Lateral osteotomy of the nose plays an important role in achieving the desired outcome in rhinoplasty [1, 2]. In all of the commonly used techniques, it is a blind and traumatic maneuver, and it is suggested that it be performed at the end of the operation to minimize hematoma. Many methods and instruments have evolved over the years to make this step easier, less traumatic, and better controlled in terms of a more predictable and consistent result [3–10]. All these methods can be performed in either a perforating or a continuous manner [3, 5, 12, 13] with different instruments [7–10]. However, independent of the method and instruments used, it often demands extensive

manipulation to perforate or cut continuously through the lateral nasal wall along the osteotomy line. The ongoing debate about duration [12–15], approach [3, 4, 6], type (perforated or continuous) [5, 12–14], and instruments used [7–10] in osteotomies is the reason to rethink and refine this procedure.

The perforated lateral osteotomy, performed percutaneously, allows good control of the osteotomy line, is easy to perform, and causes less soft tissue injury [5, 12–15]. However, the force needed to hammer the perforation may cause uncontrolled fracture lines, which can result in postoperative irregularities occurring in a certain proportion of patients [17, 20]. Furthermore, the perforated lateral osteotomy also may lead to visible scar formation.

The intranasal approach is performed without using any skin incision and thus avoids any scar formation. However, damage to the nasal mucosa is one of the disadvantages that cannot always be avoided, even in experienced hands [8, 10–14]. This has been one of the reasons for the design and development of different instruments [8, 10].

The piezosurgical approach is an alternative non-traumatic and more controllable approach [9]. However, it is not always available, is expensive, and the cutting attachments need comparatively too much space. Nevertheless, it can be used via the intraoral approach. However, the need for sufficient rinsing during the cutting procedure is a serious problem.

After observing irregularities of the nasal dorsum, we performed a cadaver study. Based on the finding of this study we changed the sequence of the rhinoplasty procedure to avoid the potential irregularity of the fracture pattern [18]. Although we could achieve a better result in many cases, we still felt the need for an easier controlled osteotomy, predictable positioning of the nasal wall, and consequently a better result. This is a major concern, especially in secondary rhinoplasty, cleft rhinoplasty, or correction of traumatic nose deformities. In these patients extensive force is needed to perforate the lateral nasal wall. The lesson learned from sinus floor elevation, where we thin out the facial bone of the maxilla to approach the maxillary sinus without injuring the mucosa of the sinus “Schneiderian membrane,” was the rationale behind our approach [19]. In this way a clear-cut window can be prepared in the bony facial wall. We used a 1.5-mm diamond burr to thin out the bone along the osteotomy path and encountered no significant difficulties. The method is performed under direct visualization, making an accurate line of osteotomy cut possible. Light pressure can break the nasal wall exactly along the osteotomized line. The method is well controlled, predictable, and less traumatic. This is an easy method to learn and can yield favorable results, even by a less experienced surgeon. The time from incision, osteotomy, and in-fracturing may take 10–15 min,

which is about 5 min more than other osteotomy methods. The nasal mucosa will be intact. Thus, this minimizes post-rhinoplasty complications and increases the chance for optimal aesthetic and functional outcomes.

Conclusion

The technique proposed can serve as an alternative to lateral osteotomy in challenging cases to minimize complications. This approach is a predictable strategy to achieve the desired outcome with less morbidity and ease in performance.

Conflict of interest The authors have no conflicts of interest or financial ties to disclose.

References

- Kienstra MA, Sherris DA, Kern EB (1999) Osteotomy and pyramid modification in the Joseph and Cottle rhinoplasty. *Facial Plast Surg Clin N Am* 7:279
- Fancous N (1997) Unilateral osteotomies for external bony deviation of the nose. *Plast Reconstr Surg* 100:115–123
- Hilger JA (1968) The internal lateral osteotomy in rhinoplasty. *Arch Otolaryngol* 88:211–212
- Gelb J (1982) Lateral osteotomy through existing alar base incision. *Ann Plast Surg* 28:269–271
- Goldfarb M, Gallups JM, Gerwin JM (1993) Perforating osteotomies in rhinoplasty. *Arch Otolaryngol Head Neck Surg* 119:624–627
- Amar RE (1998) Correction of the bony rings during the aesthetic rhinoplasty: apologia of the transpalpebral osteotomy. *Aesthet Plast Surg* 22:29–37
- Straatsma CR (1960) Surgery of the bony nose: comparative evaluations of chisel and saw technique. *Plast Reconstr Surg* 28:246–248
- Kuran I, Ozcan H, Usta A, Bas L (1996) Comparison of four different types of osteotomies for lateral osteotomy: a cadaver study. *Aesthet Plast Surg* 20:323–326
- Robiony M, Toro C, Costa F, Sembronio S, Polini F, Politi M (2007) Piezosurgery: a new method for osteotomies in rhinoplasty. *J Craniofac Surg* 18:1098–1100
- Mottura AA (2011) Internal lateral nasal osteotomy: double-guarded osteotome and mucosa tearing. *Aesthet Plast Surg* 35:171–176
- Thomas JR, Griner NR, Remmler DJ (1987) Steps for a safer method of osteotomie in rhinoplasty. *Laryngoscope* 97:746–747
- Rohrich RJ, Minoli JJ, Adams WP, Hollier LH (1997) The lateral nasal osteotomy in rhinoplasty: an anatomic endoscopic comparison of the external versus the internal approach. *Plast Reconstr Surg* 99:1309–1312
- Gryskiewicz JM, Gryskiewicz KM (2004) Nasal osteotomies: a clinical comparison of the perforating methods versus the continuous technique. *Plast Reconstr Surg* 113:1445–1456
- Rohrich RJ, Janis JE, Adams WP, Krueger JK (2003) An update on the lateral nasal osteotomy in rhinoplasty: an anatomic endoscopic comparison of the external versus the internal approach. *Plast Reconstr Surg* 111:2461–2462
- Rohrich RJ, Krueger JK, Adams WP, Hollier LH (2001) Achieving consistency in the lateral nasal osteotomy during rhinoplasty: an external perforated technique. *Plast Reconstr Surg* 108:2122–2130
- Harshbarger RJ, Sullivan PK (1999) Lateral nasal osteotomies: implications of bony thickness on fracture patterns. *Ann Plast Surg* 42:365–370
- Becker DG, McLaughlin RB, Loevner LA, Mang A (2000) The lateral osteotomy in rhinoplasty: clinical and radiographic rationale for osteotome selection. *Plast Reconstr Surg* 105:1806–1816
- Ghassemi A, Prescher A, Hilgers RD, Riediger D, Gerressen M (2011) Effect of the sequence of lateral osteotomy and hump removal on the aesthetic outcome. *Aesthet Plast Surg* 35:603–607
- Boyne PJ, James RA (1980) Grafting of the maxillary sinus floor with autogenous marrow and bone. *J Oral Surg* 38:613–616
- Murakami CS, Larrabee WF (1992) Comparison of osteotomy techniques in the treatment of nasal fractures. *Facial Plast Surg* 8:209