Quantitative Comparison Between Microperforating Osteotomies and Continuous Lateral Osteotomies in Rhinoplasty

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Objective: To determine the difference in nasal bone narrowing between 2 techniques: the low lateral intranasal perforating osteotomy technique and the low lateral continuous osteotomy technique.

Methods: A retrospective analysis of preoperative and postoperative photographs to determine the changes of the dorsal width of the nose (width of plateau of the nose, or dorsal nasal highlight) and the ventral width (junction of the flattened surface of the maxilla and the ascending nasal process of the maxilla).

Results: Twenty patients underwent continuous osteotomies, and 40 underwent intranasal perforating osteotomies. The continuous osteotomy technique had a preoperative to postoperative decrease in the ventral width of 7.0% (P < .01). The perforating osteotomy technique had a decrease in the ventral width of 3.6% (P < .001). Neither technique resulted in a statistically significant change in dorsal width (P > .25). There was no significant difference in ventral and dorsal narrowing when comparing continuous osteotomies to perforating.

Conclusions: Both the continuous and perforating osteotomy technique resulted in a decrease in the ventral nasal bone width. No statistical difference was found between continuous and perforating osteotomy techniques in the amount of nasal bone narrowing (P > .25).

LATERAL OSTEOTOMIES ARE used in rhinoplasty to narrow the nasal bones, close the open roof deformity after hump removal, and achieve symmetry of an asymmetrical framework. The 2 basic techniques for performing lateral osteotomies are continuous and perforating. The continuous lateral osteotomy creates a single fracture along the lateral portion of the nasal process of the maxilla and nasal bones. The perforating osteotomy creates a series of postage stamp–type perforations along the same line as the continuous osteotomy that are connected by digital in-fracture to mobilize the nasal bones.

The anatomy of the nasal bones has been likened to a pyramidal frustum, or a truncated pyramid. Figure 1A shows the geometric design of a pyramidal frustum. Based on this geometric parallel, 2 basic widths of the nasal bones can be ascertained: dorsal and ventral widths. Dorsal width is the distance between the lateral aspects of the dorsum of the nose at its widest point (Wt), just before the bones curve toward the face. This is also known as the dorsal nasal highlight on frontal photographs. Ventral width is the distance between the points at which the flattened surface of the maxilla meets the ascending nasal process of the maxilla (Wb). Figure 1B depicts a pyramidal frustum on a patient’s photograph.

Several studies have compared continuous vs perforating osteotomy techniques with regard to postoperative bruising and ecchymosis. Gryskiewicz and Gryskiewicz demonstrated that internal perforating osteotomies with a 2.0-mm straight osteotome significantly reduced postoperative swelling and ecchymosis compared with continuous lateral osteotomies with a 4.0-mm guarded osteotome. Perforating internal osteotomies gave better results than the transcutaneous perforating technique with regard to postoperative swelling and bruising. Likewise, Tardy and Denney showed that a perforating osteotomy performed with a 2.0-mm osteotome reduced tissue disruption and bleeding compared with continuous osteotomies. In a study using endoscopic evaluation of cadaveric nasal mucosa, Rohrich et al showed that the perforating technique produced fewer mucosal tears than the continuous technique. Eleven percent of the perforated osteoto-

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There were 20 patients in group 1 and 40 patients in group 2. In group 1, 16 were women and 4 were men. In group

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2, 31 were woman and 9 were men. The minimum follow-up time after which postoperative photographs were analyzed was at 6 months after surgery. The follow-up photographs analyzed were taken an average of 9.6 months after surgery. The maximum follow-up time was 16.5 months.

In the 20 patients who underwent continuous lateral osteotomies with a 4.0-mm osteotome (group 1), there was a significant decrease from preoperative to postoperative ratios of ventral width to interpupillary distance (Table). The ratio decreased from 0.29 to 0.27 (P < .01), representing a 7% decrease. There was no significant difference between preoperative and postoperative values in the ratios of dorsal width to interpupillary distance (0.15 to 0.14, respectively; P > .25).

In the 40 patients who underwent perforating intra-nasal lateral osteotomies with a 2.0-mm osteotome (group 2), there was a significant decrease from preoperative to postoperative ratios of ventral width to interpupillary distance (Table). The ratio decreased from 0.39 preoperatively to 0.37 postoperatively (P < .001), representing a 3.6% decrease in ventral width. As with group 1, group 2 had no significant difference in the ratios of dorsal width to interpupillary distance between preoperative and postoperative measurements.

When the results of the change in widths using the 2 techniques were compared with each other using the Wilcoxon signed rank test, there was no significant difference in narrowing between the continuous and perforating osteotomies for both the dorsal (P < .31) and ventral (P < .14) measurements.

<table>
<thead>
<tr>
<th>Group</th>
<th>Preop DW/IP Distance</th>
<th>Postop DW/IP Distance</th>
<th>Difference</th>
<th>P Value</th>
<th>Preop VW/IP Distance</th>
<th>Postop VW/IP Distance</th>
<th>Difference</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous technique (group 1)</td>
<td>0.15</td>
<td>0.14</td>
<td>0.01</td>
<td>25</td>
<td>0.29</td>
<td>0.27</td>
<td>0.02</td>
<td>.01</td>
</tr>
<tr>
<td>Perforating technique (group 2)</td>
<td>0.17</td>
<td>0.17</td>
<td>0.00</td>
<td>NA</td>
<td>0.39</td>
<td>0.37</td>
<td>0.14</td>
<td>.001</td>
</tr>
</tbody>
</table>

Abbreviations: IP, interpupillary; NA, not applicable; postop, postoperative; preop, preoperative.

Once again, there was no difference in DW. Similar to the continuous technique, a statistically significant (P<.05) decrease in VW was achieved. The difference in narrowing achieved between the continuous and perforating techniques was not statistically significant (P > .31).

Figure 2. A patient who underwent microperforating lateral osteotomies by the senior author (M.C.). She also underwent dorsal hump removal and nasal tip contouring. Her measured dorsal width decreased by 2.23%, whereas her ventral width decreased by 5.93% with comparison to her preoperative photographs, taken at 12 months. A, Preoperative frontal view; B, postoperative frontal view; C, preoperative lateral view; D, postoperative lateral view. Lateral views are shown to demonstrate the amount of hump removed and lack of dorsal edema at time of photograph.

Figure 3. This patient underwent microperforating lateral osteotomies by the senior author (M.C.). Her dorsal width decreased by 1.53%, while her ventral width decreased by 3.7%. The osteotomies were also effective in improving her dorsal deviation. She also underwent a right spreader graft, dorsal hump reduction, and nasal tip contouring. A, Preoperative frontal view; B, postoperative frontal view; C, preoperative lateral view; D, postoperative lateral view. The postoperative photographs were taken at 8 months.
Both techniques resulted in statistically significant narrowing of the ventral width. Neither technique demonstrated a statistically significant difference in narrowing vs the other. In addition, neither technique resulted in significant dorsal width narrowing.

In reduction rhinoplasty, the dorsal hump is removed, which creates an open roof that widens the dorsal width. The nasal pyramid has been likened to a truncated pyramid. As one shortens the overall height of the pyramid by decreasing “pl,” the width of the dorsum (Wt) increases (Figure 1A). Lateral osteotomies fracture the nasal bones so that they can be repositioned and narrowed, that is, they close the open roof. Owing to decrease in dorsal projection and the creation of the wider open roof, hump removal and subsequent osteotomy closure are thought to widen the dorsal width postoperatively. However, this study shows that regardless of technique, dorsal width remains narrow after lateral osteotomies. These results confirm the results of our earlier study (Kortbus et al) that hump reductions do not necessarily lead to increases in dorsal width, something that had long been accepted as true. Indeed, it seems that regardless of osteotomy technique, reduction rhinoplasty can leave the dorsum narrow. Figures 2, 3, 4, 5, 6, 7, and 8 show preoperative and postoperative photographs of patients who underwent perforating lateral osteotomies performed by the senior author. 

Figure 4. While microperforating lateral osteotomies (performed by the senior author [M.C.] in this patient decreased her dorsal width by 5.45%, she had a negligible decrease in her ventral width (0.07%). She also had a left spreader graft, which may affect the appearance of the ventral width. However, it alleviated a concavity on the left nasal sidewall. A, Preoperative frontal view; B, postoperative frontal view; C, preoperative lateral view; D, postoperative lateral view. The postoperative photographs were taken at 12 months.

Figure 5. This patient underwent microperforating lateral osteotomies by the senior author (M.C.) and had dorsal width decrease of 2.46%, whereas she only had a ventral decrease of 2.05%. She also underwent maneuvers aimed at deprojection and rotation, which cannot be appreciated on these frontal images. A, Preoperative frontal view; B, postoperative frontal view; C, preoperative lateral view; D, postoperative lateral view. The postoperative photographs were taken at 9 months.

Figure 6. This patient underwent microperforating lateral osteotomies by the senior author (M.C.). She had a negligible decrease in dorsal width (0.08%), and her ventral width decreased by 2.1%. She also underwent dorsal hump reduction and tip contouring. A, Preoperative frontal view; B, postoperative frontal view; C, preoperative lateral view; D, postoperative lateral view. The postoperative photographs were taken at 11 months.
surgeon (M.C.). Profile views are also shown to demonstrate how much hump was removed and the lack of existence of significant postoperative edema confounding measurements.

It is not surprising that both techniques yielded similar amounts of narrowing. Both techniques create controlled fractures of the nasal bones that allow for the desired amount of narrowing. Murakami and Larrabee theorized further narrowing with perforating techniques owing to maintenance of soft tissues and periosteal envelope. However, our study suggests that the creation of complete fractures of the nasal bones, regardless of technique, may be the most important factor in nasal bone narrowing.

In conclusion, both continuous and perforating lateral osteotomies create statistically significant narrowing of the ventral nasal width. However, there was no statistically significant difference between the 2 techniques. In addition, neither technique created statistically significant change of the ventral width of the dorsum when compared with preoperative width. This confirms that lateral osteotomies can maintain the narrowness of the nasal dorsum despite hump reduction in reduction rhinoplasty.

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