Evaluation of Lateral Crural Steal in Nasal Tip Surgery

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In the aesthetic surgery of the nose, the nasal tip is considered by many to be the most complex component, the long-term effects of scar contraction that can distort a favorable outcome being one of the main reasons. Projection, rotation, and definition are fundamental aspects to be controlled and achieved in the nasal tip surgery.1-3

In response to this challenge, several techniques to increase projection and rotation of the nasal tip have been described previously.4-7 Some maneuvers to increase projection, such as transdomal suture, columellar strut, septal extension graft, shield-shaped graft, and cap graft, have been described. Techniques to increase rotation of the nasal tip have also been described, such as cephalic trim, overlay of the lateral crura, caudal septal resection, tongue-in-groove technique, septal columellar suture, and resection of the radix skin. The lateral crural steal (LCS) technique, described by Kridel et al,4 proposes to increase nasal tip rotation, definition, and projection.

Although those techniques showed excellent results, none of them demonstrated reproducibility in the immediate and long-term postoperative periods. When using the LCS technique, we have observed a partial loss of the surgical outcome in many patients in the long term when compared with the immediate postoperative results.

The objective of this study was to evaluate the efficacy of the LCS technique, comparing the preoperative with immediate and late postoperative periods, especially evaluating nasal tip projection and rotation.

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Methods

Patients
Twenty consecutive patients who underwent rhinoplasty performed using the LCS technique were identified. All patients presented with a slightly underprojected and underrotated nasal tip. Patients who presented with severe to moderate underprojection and/or previous rhinoplasty were not considered candidates for the study. The research ethics committee of the Federal University of Uberlândia approved the study, and patients provided written, informed consent.

Nasal tip projection was measured from the alar-cheek junction to the tip of the nose, and it was determined in relation to ideal nasal length (ideal tip projection = 0.67 × ideal nasal length). The nasal length was measured from the nasal tip to the radix. The base projection was calculated by drawing a line from the bottom of the columella to the top of the lobule, on the base view. Nasal tip rotation was analyzed by assessing the nasolabial angle, which is formed between a straight line through the most anterior and posterior points of the nostrils and a perpendicular line to the natural horizontal facial plane.

Nasal tip projection, base projection, nasal length, and tip rotation were measured in vivo with a digital caliper (model MIP/E; Mitutoyo) (resolution, 0.01 mm/nominal capacity; 150 mm/precision; error margin, 0.02 mm; repetitivity, 0.01 mm) and bar. All measurements were performed in vivo in the preoperative and immediate postoperative periods; at 1, 3, and 6 months; and at 1 year postoperatively. Statistical analysis was performed by comparison of means using t test.

Surgical Technique
The surgical procedure starts with the marking of the new domes (Figure 1). After drawing 2 dots to demarcate on the nasal skin the patient’s own domes, we press on the inferior nasal tip with the index finger, rotating it cephalically to the desired position, and identify the level of the new domes by drawing a vertical line located more lateral to the patient’s own dome.

All rhinoplasties were performed with the patient under local anesthetic and receiving intravenous sedation using premedication with midazolam hydrochloride and fentanyl citrate, topical anesthesia with amethocaine hydrochloride, 2%, and oxymetazoline hydrochloride, 0.05%, and extravascular infiltration anesthesia with bupivacaine, 0.5%, with adrenaline, 1:80 000.

Intercartilaginous and marginal incisions were used to access the nasal tip and to expose the lower lateral cartilages. Careful separation of the vestibular skin from the concavity of the domes, for approximately 5 mm to each side, is the next step. By placing a single hook in the vestibular vault at the corresponding level of the vertical line on the skin of the nasal tip, the cartilages are delivered, and we are able to confirm the place to locate the new dome, generally some millimeters lateral to the patient’s own dome (Figure 1A). Using a double transfixation transdomal 5-0 permanent suture, we pass the needle 2 mm from the level of the new dome in the caudal and cephalic portion, leaving the knot medial to the domes (Figure 1B and C).

Next, we insert a cartilage strut, obtained from the patient’s nasal septum, and affix it with 5-0 permanent suture, 6 to 8 mm from the domes, at the caudal edges of the medial crura. The new domes are sutured together by interdomal 5-0 permanent suture between the cephalic edges of the medial crura 2 mm from the domes. After replacing the cartilages into the nasal vestibule and confirming the position and symmetry of the nasal tip, the incisions are sutured with 5-0 permanent suture simple knots. Other maneuvers addressing the nasal dorsum and/or the bone pyramid were performed after the nasal tip surgery.

Results
Twenty patients (15 women and 5 men) underwent rhinoplasty using the LCS technique. The average LCS was 4.2 mm (range, 2.0-5.0 mm). Comparing preoperative and immediate postoperative measurements, we found that the projection and rotation of the nasal tip were increased, and the nasal length decreased in all patients. There was a statistically significant difference in measurements of nasal length and tip rotation. The average nasal length preoperatively was 46.5 mm and 40.5 mm in the immediate postoperative period (P = .005). The average tip rotation preoperatively was 89.4° and was 109.2° in the immediate postoperative period (P < .001). Measurements of lateral and base projection preoperatively were 32.6 mm and 23.0 mm, respectively. The increase in their corresponding lengths (34.5 mm and 24.3 mm) showed no statisti-
cal significance difference between the preoperative and immediate postoperative period ($P = .09$ and $P = .58$, respectively) (Table and Figure 2).

Comparison of the immediate and 1-year postoperative values showed no statistically significant difference between the measurements of nasal length, lateral and base projection, or tip rotation (Table and Figure 2). Regarding the differences between the preoperative and immediate postoperative measurements, there was a decrease in average nasal length of 6.0 mm, which corresponds to a decrease of 1.5 mm in length for each 1 mm of lateralization of the domes. The nasolabial angle increased 19.8° on average, corresponding to 4.7° for every millimeter of lateralization of the domes.

All patients were satisfied with the aesthetic and functional results (Figure 3 and Figure 4). There were no complications during the study period.

**Discussion**

Over the years, several techniques have been described to address nasal tip rotation and projection. They all seek predictable and accurate results with long-lasting patient satisfaction. Kridel et al4 described the LCS technique and claimed that it enhances nasal tip rotation and projection and refines the bulbosity with cartilage sutures, eliminating the need for compensatory overreduction of the dorsum. The “new domes” technique described by Pedroza5 is a similar technique that aims to create a more projected, cephalically rotated, and narrowed nasal tip. The tongue-in-groove technique6 aims to preserve the integrity of the cartilaginous structures and maintain projection of the nasal tip, providing a more controlled rotation and projection than maneuvers that rely on unpredictable healing and contracture to obtain these fundamentals.

Kridel and Konior7 described the lateral crural overlay (LCO) technique that achieves a larger increase in nasal tip rotation while reducing tip projection. Foda and Kridel8

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**Table. Comparison of Preoperative and Immediate Postoperative Nose Measurements**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Preoperative</th>
<th>Immediate Postoperative</th>
<th>$P$ Value</th>
<th>1-y Postoperative</th>
<th>$P$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, mm</td>
<td>46.5 (5.6)</td>
<td>40.5 (3.7)</td>
<td>.005*</td>
<td>41.9 (3.1)</td>
<td>.31</td>
</tr>
<tr>
<td>Projection, mm</td>
<td>32.6 (3.3)</td>
<td>34.5 (4.3)</td>
<td>.24</td>
<td>31.7 (3.6)</td>
<td>.09</td>
</tr>
<tr>
<td>Base projection, mm</td>
<td>23.0 (1.8)</td>
<td>24.3 (2.5)</td>
<td>.15</td>
<td>24.8 (2.4)</td>
<td>.58</td>
</tr>
<tr>
<td>Nasolabial angle, °</td>
<td>89.4 (9.2)</td>
<td>109.2 (7.0)</td>
<td>&lt;.001*</td>
<td>105.4 (7.8)</td>
<td>.23</td>
</tr>
</tbody>
</table>

* Significant at $P < .005$. 

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**Figure 2. Comparison of the Average Measurements of the Nose Preoperatively and Immediately and 1 Year Postoperatively**

**Figure 3. Patient With an Increase in Nasal Tip Rotation and a Decrease in Nasal Length**
compared the LCO and LCS techniques and concluded that the LCS technique is more suitable for patients who have underrotation associated with poor projection and that the LCO technique is indicated in patients who have severe underrotation associated with overprojection. Other techniques9-11 showing excellent aesthetic results have been described, and others have even been compared12-14 in terms of their efficiency in promoting rotation and projection of the nasal tip. However, to our knowledge, no techniques have demonstrated reproducibility in the immediate and long-term postoperative periods.

In the present study, the data showed 3 main points: (1) there was a statistically significant increase of nasal tip rotation and decrease in the nasal length when comparing measurements taken preoperatively and 1 year postoperatively; (2) there was a slight increase in the nasal projection, but with no statistically significant difference, when comparing measurements taken preoperatively and 1 year postoperatively; and (3) there was no statistically significant difference between the measurements obtained in the immediate postoperative period and after 1 year.

The first point is in agreement with the findings of all previous studies that suggested that the LCS technique promotes an increase in nasal tip rotation and a decrease in the nasal length. The tripod concept explains this feature very well because the lateralization of the domes does cause an increase of the medial foot as the lateral feet decreases, rotating the nasal tip.

The second point is partially in agreement with the findings of previous studies because our data suggest that the LCS technique promotes an increase of nasal tip projection; however, it is only a slight increase, which was not statistically significant. This statistically insignificant increase in nasal tip projection might probably be explained by 2 reasons: the position of the lateral crura and the thickness of the skin. Using the Tip-Plasty Simulator, a mathematical model to determine the relative effectiveness of various tip-plasty maneuvers, Sepehr et al14 showed that a cephalically positioned lateral crura has been found to affect the results of the tip-plasty maneuvers relative to the orthotopically normal positioned lateral crura. The LCS technique has been found to deproject when the lateral crura is in the orthotropic position and to cause projection when the lateral crura is in the cephalic position. Also, most of our patients have normal to thick skin, leading to a heavy soft-tissue envelope, which could be another explanation for the insignificant projection. Therefore, in our patients, when there is a need to substantially increase nasal projection, other maneuvers must be added, such as placement of grafts (usually a shield-shaped graft or a cap graft).

In addition, in the present study we found that for each millimeter of LCS, the nasolabial angle rotates approximately 5°, a finding that aids in surgical planning. The nasal length should not be used for planning the LCS procedure, but it is significantly reduced by this technique. There was no statistically significant difference between the measurements obtained in the immediate postoperative period and after 1 year. In this period, a slight swelling on the nasal tip still exists in most cases, but there is no significant change in the parameters measured. This demonstrates the stability of the surgical outcome, which can be estimated on the immediate postoperative period. The setting of the colu-

**Figure 4. Patient With an Increase in Nasal Tip Rotation and a Decrease in Nasal Length**

Preoperative (A, C, E, and G) and 1-year postoperative (B, D, F, and H) photographs showing increase in nasal tip rotation and decrease in nasal length.
mella strut between the medial crura is important to ensure the maintenance of the long-term outcome, even though the transfixing incision was not performed in any of these cases. Although not measured, the nasal tip definition was also improved in most cases, as we described elsewhere. All patients in this study were satisfied 1 year after the surgery, and no revision surgery was necessary.

Conclusions

The technique described in this study was effective, with a high rate of patient satisfaction, and achieved a significant increase in the rotation of the nasal tip and a slight, but not statistically significant, increase in the projection of the nasal tip.

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Conflict of Interest Disclosures: None reported.

REFERENCES