Effect of Depressor Septi Resection in Rhinoplasty on Upper Lip Length

Yan Ho, MD; Robert Deeb, MD; Richard Westreich, MD; William Lawson, MD, DDS

IMPORTANCE  Resection of the depressor septi in rhinoplasty has been used to correct the smiling deformity. Studying the effects of this maneuver on the upper lip length is important for operative planning, as well as for patient counseling.

OBJECTIVE  To define an approach to the resection of the depressor septi muscle during functional and aesthetic rhinoplasty and to determine whether performing this maneuver causes any measurable change in the length of the upper lip in the repose position.

DESIGN, SETTING, AND PARTICIPANTS  A retrospective medical record review and photographic analysis were performed on 36 patients who had undergone rhinoplasty involving resection of the depressor septi by either of 2 of the investigators at a tertiary care academic center and a private practice between 2010 and 2013. All maneuvers performed during the procedure were recorded. Preoperative photographs were compared with postoperative photographs using Adobe Photoshop, and percent change in upper lip length was calculated.

INTERVENTION  Rhinoplasty involving resection of the depressor septi.

MAIN OUTCOME AND MEASURE  Percent change in upper lip length, calculated by measuring the ratio between upper lip length and intercanthal distance and comparing the preoperative and postoperative ratios.

RESULTS  Thirty-six patients were evaluated, including 22 men and 14 women. Postoperative photographs were taken a mean (range) of 7.06 months (7 days to 2 years) after surgery. The mean change was a 1.74% decrease in upper lip length; 24 patients (67%) had a decrease (mean [maximum], 5.89% [21.22%]), and 12 patients (33%), an increase (mean [maximum], 6.55% [12.68%]) in upper lip length. Compared with the preoperative lip length, the mean (95% CI) postoperative lip length was 100.09% (97.35%-102.83%) in women vs 95.37% (90.86%-99.88%) in men (P = .07). No predictable factors determined whether a patient would develop a postoperative increase or decrease in upper lip length.

CONCLUSIONS AND RELEVANCE  Resection of the depressor septi muscle during rhinoplasty is a well-documented maneuver often used in the treatment of the ptotic tip and smile deformity. This descriptive study showed that resection of the depressor septi muscle has an unpredictable but small effect on upper lip length in the repose position.

LEVEL OF EVIDENCE  3.
The depressor septi is a paired muscle largely contained within the columella, which originates on the medial crura footplates and caudal septum and has variable insertion patterns in the region of the orbicularis oris and nasal spine. The muscle is active during facial expressions including smiling and speaking. During smiling, the functional unit is activated, and the net result is rotation of the nasal tip caudally while the nasal base is elevated. In addition, the upper lip shortens.

In some patients, action of the depressor septi muscle leads to what is commonly referred to as the “smiling deformity.” The smiling deformity is characterized by (1) a descending nasal tip, (2) a shortened upper lip, and (3) a transverse crease in the mid-philtral area. All components are not necessarily present in all cases; instead there is a spectrum of severity. A mild smiling deformity includes only the first component. Moderate smiling deformity includes nasal tip movement and shortening of the upper lip. Severe deformity includes all 3 components.

The degree of smiling deformity is directly related to the degree to which the depressor septi muscle is hyperactive.

A thorough preoperative rhinoplasty evaluation is necessary to diagnose the smiling deformity. A shortened upper lip, possibly leading to a “gummy” smile, in combination with downward movement of the nasal tip, is generally considered to give an unesthetic appearance. As a result, a variety of rhinoplasty techniques have been developed to reduce or eliminate the smiling deformity. To date, the majority of reports concerning the smiling deformity have relied on a subjective analysis of the patient in the repose and smiling positions. Although there are diagnostic criteria, there are no objective measurements that are generally taken. As a result, there is a substantial amount of variability. In addition, few, if any, studies have objectively quantified the degree to which the smiling deformity is corrected after a given intervention.

Despite this lack of objective data, it is generally accepted that if a patient receives an appropriate diagnosis of the smiling deformity, treatment involving some type of intervention on the depressor septi musculature leads to an improvement in the postoperative dynamic appearance of the nasal tip–lip complex. The primary outcome measure in these studies generally relates to tip position. In addition, analysis of postoperative smiling views tends to be the standard by which the success of the intervention is measured. However, to our knowledge, there have been no studies analyzing the effect of depressor septi interventions on the nasal tip–lip complex in the repose position. Intuitively, if the benefit gained in the smiling position is outweighed by an untoward effect in the repose, the intervention can be judged to be undesirable.

The present study describes the method of 2 of us (R.W., W.L.) for treating a hyperactive depressor septi muscle. Preoperative and postoperative photographs were objectively analyzed to determine whether this intervention affects the length of the upper lip in the repose position.

Methods

Approval by the institutional review board of Mount Sinai Medical Center was obtained. Informed consent was waived due to the retrospective nature of the study. A retrospective review was performed on the medical records of 36 patients who underwent rhinoplasty involving resection of the depressor septi by 1 of the investigators (R.W., W.L.). All patients received a diagnosis of a hyperactive depressor septi muscle on the basis of a thorough preoperative history and physical examination. All of the operations were performed between 2010 and 2013. The patients and patient data were obtained from the surgical records of the 2 investigators including photographs and operative reports.

Surgical Technique

Resection of the depressor septi muscle was performed in the same manner by both surgeons. All rhinoplasties were performed via the endonasal approach. A full transfixion incision was used for access to the premaxillary region. The depressor septi musculature was identified at its insertion over the anterior nasal spine and resected. Additional fibers originating from the caudal septum or medial crural footplates were resected as well. Hemostasis, if necessary, was obtained using bovie cautery.

Analysis

Photographs (frontal views) of patients were taken before and after surgery during the preoperative assessment and postoperative visit. Patients were excluded from the study if the medical record, including preoperative and postoperative photographs, as well as the operative report, was incomplete. All surgical maneuvers performed during the rhinoplasty were recorded.

Preoperative photographs were compared with postoperative photographs using Adobe Photoshop CS4 Extended, Version 11.0.2 (Adobe Systems). All photographs involved the patient in the repose, nonsmiling position. Given that absolute distances cannot be directly measured, it was decided that determining the percent change in the upper lip length was the ideal outcome measurement. Given that intercanthal distance is a constant in every patient, the ratio between upper lip length and intercanthal distance was measured and percent change was determined by comparing the preoperative ratio to the postoperative ratio (Figure). The following equation was used:

\[
\frac{\text{Postoperative Upper Lip Length}}{\text{Preoperative Upper Lip Length}} = \frac{\text{Postoperative Intercanthal Distance}}{\text{Preoperative Intercanthal Distance}} \times 100 = \% \text{ of Preoperative Upper Lip Length.}
\]

The result from this calculation describes the postoperative upper lip length as a percentage of the preoperative upper lip length. Of note, patients were excluded from the study if the frontal views did not include the entire upper lip because of a ptotic nasal tip.
Each rhinoplasty technique used for each patient was recorded. Specific attention was directed toward rhinoplasty techniques that may change the upper lip length. These include posterior septal angle trim, septal caudal shave, columellar strut, and premaxillary (plumper) graft. These were recorded for each patient and taken into account in the analysis as potential confounding factors. All statistical analysis was performed using IBM SPSS Statistics, version 20 (SPSS).

Results

A total of 36 patients were evaluated. Twenty-two men and 14 women met the inclusion criteria and had complete patient records. The mean (range) time from the date of surgery to the date at which the postoperative photographs were taken was 7.06 months (7 days to 2 years).

Again, the most relevant outcome measure of this study was the percent change in upper lip length when the preoperative photographs were compared with the postoperative photographs in the repose position. The mean change in upper lip length was a 1.74% decrease. Twenty-four patients (67%) had a decrease in upper lip length. Among these patients, the mean (maximum) change was a decrease of 5.89% (21.22%).

The remaining 12 patients (33%) had an increase in lip length, with a mean (maximum) increase of 6.55% (12.68%) (Table 1).

Among women, the mean change was a 0.09% increase in lip length. In men, the mean change was a 4.63% decrease. However, this difference was not statistically significant ($P = .07$).

Of the 36 patients included in the analysis, 1 patient underwent a posterior septal angle trim, 10 patients underwent a caudal shave, 10 patients received a columellar strut, and 5 received a premaxillary graft. Change in upper lip length was compared in patients receiving 1 of these interventions vs those who did not. The mean change in lip length for patients who had a caudal septal shave was a decrease of 0.54%, whereas the mean change for those who did not was a decrease of 2.21% ($P = .42$). The mean change in lip length for patients who received placement of a columellar strut was a decrease of 0.05%, whereas the mean change for those who did not was a decrease of 0.24% ($P = .13$). The mean change in lip length for patients who underwent premaxillary grafting was an increase of 0.61%, whereas the mean change for those who did not was a decrease of 2.12% ($P = .71$) (Table 2). There were no predictable factors based on surgical technique or sex to determine whether a patient would develop a postoperative increase or decrease in upper lip length.

Discussion

Treatment of the nasal tip–lip complex is an important component of aesthetic rhinoplasty. The role of the depressor septi muscle in rhinoplasty has been discussed for many years. In 1955, Fred postulated that maneuvers that raise the tip complex that are not accompanied by sectioning of the depressor septi result in the tip being pulled back to the position it had before it was corrected.

Most of the literature regarding depressor septi interventions relates to the net effect on tip position. More so, the majority of studies focus on the effect as it relates to dynamic fa-
Depressor Septi Resection and Upper Lip Length

Original Investigation Research

Depressor Septi Resection and Upper Lip Length

maneuvers that may affect the nasal tip–lip complex must facial position requires attention as well. In addition, other regarded as a problem that is important only in the dynam-

Although a hyperactive depressor septi muscle is generally

sures the effects of resection of the depressor septi muscle.

Again, no mention is made of upper lip length.

However, neither of these studies objectively quantified the degree of improvement or the method by which improvement was measured.

Pinto5 in 2003 described a similar method of transposing and suturing the paired musculature; however, he used a sub-

labial mucosal Z-plasty for wound closure. He reported on 2 patients who underwent this procedure. He stated that both procedures resulted in lengthening of the upper lip and elevation of the nasal tip; however, no objective measurements were provided.

Lawson and Reino6 in 1995 proposed a procedure known as reduction columelloplasty, which involved an external incision carried down through the skin, depressor septi muscle, and adjacent soft tissue as a method of refining the nasal base. They reported this technique to be a reliable method for narrowing splayed medial crura, increasing the nasolabial angle, modifying the shape of the nares, and increasing nasal tip projection. The effect on upper lip length was not discussed.

A study by Hwang et al8 in 2006 evaluated the relationship of the depressor septi muscle to the dermocartilaginous ligament, which is also known as the ligament of Pitanguy, and found that sectioning of both structures at the point of convergence resulted in an increase in the nasolabial angle by a mean of 15° in all patients. They also concluded that the noses were “shortened”; however, no quantifying data were provided. Again, no mention is made of upper lip length.

The present study is unique in that it objectively measures the effects of resection of the depressor septi muscle. Although a hyperactive depressor septi muscle is generally regarded as a problem that is important only in the dynamics of facial expression, evaluation of its effect on the static facial position requires attention as well. In addition, other maneuvers that may affect the nasal tip–lip complex must be considered. Our study showed no significant difference

in change in upper lip length in patients who received various rhinoplasty interventions, including caudal septal shave, columellar strut, and premaxillary grafting, compared with those who did not.

The results of the study were somewhat surprising in that resection of the muscle led to a decrease in upper lip length in the majority (67%) of patients. It is generally thought that the muscle has somewhat of a tethering effect on the upper lip and thus resection should “release” this and cause lip lengthening. However, this was not the case. A possible explanation of this phenomenon is the relatively short follow-up period (mean, ~7 months). Perhaps as additional inflammation subsides, the lengthening effect becomes more pronounced. Given the small difference between patient groups, perhaps it is due to insufficient power. In the technique used by the 2 primary surgeons, the insertion fibers to the orbicularis oris were not specifically identified and resected. Given the variability in the insertion of the depressor septi on the nasal spine and orbicularis oris, the changes in upper lip length could also be dependent on the exact height and location of the insertion fibers on the orbicularis oris. The study also has all the usual weaknesses of retrospective reviews. A prospective analysis with a longer follow-up period and a larger cohort of patients would add strength to our results.

To date, few objective data exist in the literature regarding depressor septi hyperactivity. Given the rise of social media, a growing number of patients are seeing themselves photographed from a variety of different perspectives. As a result, patients are more likely to notice a dynamic or static deformity. Additional research in this area is needed. We believe that a thorough evaluation of depressor septi activity is invaluable in achieving a balanced, aesthetically pleasing result.

Conclusions

Given the minimal and somewhat unpredictable change in upper lip length, we conclude that the benefits of resecting the depressor septi muscle in highly selective cases of muscle hyperactivity outweigh possible untoward effects of this intervention. However, it is recommended that patients be informed of all possible outcomes regarding this maneuver including changes that may take place in the repose and dynamic positions.

Table 2. Changes With Additional Rhinoplasty Technique

<table>
<thead>
<tr>
<th>Technique</th>
<th>Patients, No.</th>
<th>Change, Mean, %</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior septal angle trim</td>
<td>1</td>
<td>-0.54</td>
<td>.42</td>
</tr>
<tr>
<td>Caudal shave</td>
<td>10</td>
<td>-0.24</td>
<td>.13</td>
</tr>
<tr>
<td>Columellar strut</td>
<td>10</td>
<td>-2.12</td>
<td>.71</td>
</tr>
<tr>
<td>Premaxillary graft</td>
<td>5</td>
<td>-0.24</td>
<td>.13</td>
</tr>
</tbody>
</table>

*Not calculated because n = 1.

ARTICLE INFORMATION

Accepted for Publication: January 13, 2014.


Author Contributions: Drs Ho and Deeb had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Deeb, Westreich, Lawson.

jamafacialplasticsurgery.com

Copyright 2014 American Medical Association. All rights reserved.
REFERENCES


