Long-term Analysis of Surgical Correction of the Senile Upper Lip

Paul K. Holden, MD, MS; Ahmed S. Sufyan, MD; Stephen W. Perkins, MD

Objective: A quantitative comparison of immediate and long-term results of surgical correction of the senile upper lip using lip advancement and lip lift.

Methods: Retrospective review of 30 patients who underwent senile upper lip repair, including lip advancement or lip lift. Digital image analysis was used to standardize each patient’s preoperative and postoperative photographs for accurate, objective comparison.

Results: Lip lift and lip advancement achieve significant improvement in the appearance of the senile upper lip (P < .001). This improvement is sustained during many years (mean, 5 y; P < .001). Using repeated measures analysis of variance, no significant difference was found in the operative group compared with the control group when examining age-related change.

Conclusion: Lip advancement and lip lift can restore the senile upper lip to a more youthful and natural appearance with sustained long-term benefits.

increase in vermilion red show is accomplished by removing skin and subcutaneous tissues to advance the upper lip mucosa. The SNLL procedure allows reduction in the elongation of the upper lip by removing excess skin and subcutaneous tissues. In both procedures, the underlying facial support is left undisrupted. We document the immediate results and examine the long-term effectiveness of these techniques to rejuvenate the senile upper lip.

**METHODS**

**INCLUSION CRITERIA**

From a group of 300 patients, we selected 30 who had undergone SNLL and LA procedures between January 1, 2001, and March 31, 2010. These individuals were chosen based on the procedure performed and the availability of digital preoperative and postoperative photographs. Patients who had undergone other cosmetic procedures involving the nose or the perioral regions were excluded. Also, patients who had undergone SNLL and LA procedures in combination were excluded. All selected patients underwent preoperative evaluation in the private practice of the senior author. Postoperative photographs were taken at 6-month intervals; data were collected during these intervals, with a mean follow-up of 51 months. Preoperative photographs were compared with 12-month postoperative photographs; measurements obtained at the 12-month follow-up were used for immediate outcome analysis. Then, the 12-month measurements were analyzed and were compared with the long-term results. During long-term analysis, postoperative patients were compared with a control group who had not undergone operations to document the effects of normal aging of the treated and untreated individuals.

**DATA ANALYSIS**

All patients included in the study had unaltered digital photographs that were taken by a photographer in standard fashion. To obtain objective measurements, we used Adobe Photoshop Premiere Elements 9 (Adobe Systems Incorporated, San Jose, California). Photographs were examined at full scale to eliminate systematic errors from magnification. Using objective measurements, anatomic ratios were obtained. These ratios included the vertical height from the right alar rim to the medial canthus (Figure 1 and Figure 2). This alar-medial canthus line (L1) served as a reference for calculation of the preoperative and postoperative anatomic ratios. These ratios were used to eliminate slight variations in focal distance, head positioning, and zoom.

In the LA group, vertical measurements were recorded from the right alar rim to the vermilion border at the midphiltrum (SNC). A second vertical measurement from the right alar rim to the lateral vermilion border (SNL) also was obtained for further comparison. In the SNLL group, a single vertical measurement was obtained by using the right alar rim as a starting point from which to draw a line downward through the midphiltrum to the vermilion border.

**SPECIFIC PHYSIOLOGICAL PREOPERATIVE EVALUATION AND SURGICAL TECHNIQUES**

For the SNLL procedure, surgical markings (Figure 3) were made using a fine-tipped marker. A contoured ellipse was marked under the nose following the nose-lip junction just outside the nasal sill and 1 mm away from the alar crease to minimize postoperative webbing. Calipers were used to measure a distance of 5 to 6 mm, which then was tapered laterally. This measurement defined the location of the inferior limb of the incision.

Using a No. 15 blade, a skin incision was made; the symmetric wavy ellipse was excised using sharp dissection. The plane...
of dissection was carried down to but not into the fascia of the orbicularis oris muscle. Care was taken not to disrupt the deep fascial planes or the layers of the orbicularis oris muscle; only skin and subcutaneous tissue were elevated. The resultant defect was then reaproximated with 3-0 Monocryl suture (Ethicon, Inc, Somerville, New Jersey) in a buried, interrupted fashion. The remaining subcutaneous tissue was reaproximated with 6-0 Polysorb suture (Covidien plc, Dublin, Ireland) in the same fashion. The skin closure was performed without tension using 6-0 mild chromic gut suture in a running, locked fashion.

For the LA technique, surgical markings were made using a fine-tipped marker. On the upper lip, the tracing for skin excision was outlined beginning at 4 to 5 mm above the vermilion border at the level of the philtral columns and 2 to 3 mm to the central portion of the upper lip (Figure 4). This marking was extended laterally from the philtral columns, was made parallel to the lateral upper lip, and was subsequently tapered down to the vermilion 5 mm medial to the oral commissure bilaterally. The marked skin was excised down to the orbicularis oris muscle. Hemostasis was obtained with low-level electrocautery using a Colorado tip needle. The vermilion border was closed with a few buried 6-0 Polysorb interrupted sutures and a simple running line of 7-0 blue PROLENE suture (Ethicon, Inc).

**RESULTS**

**LA DATA**

In the LA group (15 patients), the average ratio between the L1 reference line and the 2 vertical measurements, central (SNC) and lateral (SNL), were obtained. The average ratios for the SNC and SNL vertical measurements in the preoperative group were 0.44 and 0.40, respectively. Postoperatively, the average ratios improved to 0.36 and 0.32, respectively.

In the LA group, analysis of variance revealed a main effect of time for the SNC and SNL ratios of \( F_{2,10} = 41.27 \) and \( F_{2,10} = 56.21 \) (\( P < .001 \), respectively. Post hoc pairwise com-

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**Figure 3.** Surgical markings and technique for the subnasal lip lift procedure. A, A contoured ellipse is marked under the nose following the nose-lip junction just outside the nasal sill and 1 mm away from the alar crease to prevent postoperative webbing. B, Calipers are used to measure a distance of 5 to 6 mm inferio, which defines the location of the inferior limb of the incision. C, Skin is incised down to the superficial fascial layer. D, The incision is closed.

**Figure 4.** Operative marking and surgical technique for the lip advancement procedure. A, The upper lip is marked 4 to 5 mm above the vermilion border at the philtral columns and 2 to 3 mm at the central portion of the upper lip. B, The marking is extended laterally from the philtral columns, parallel to the lateral upper lip. C, The marking is subsequently tapered down to the vermilion 5 mm medial to the oral commissure bilaterally.

**Figure 5.** Mean lip lengths for the control, upper lip advancement (LA), and subnasal lip lift groups. A, Mean upper lip lengths of central and lateral measurements preoperatively, postoperatively, and with long-term follow-up at a mean of 51 months. B, Gradual lengthening of the upper lip is seen with aging (occurring at the same rate as in the control group). SNC indicates the central white show vertical length measurement from the right alar rim through the central philtrum to the vermilion border; SNL, the lateral white show length measurement from the right alar rim through the lateral philtrum to the vermilion border.
parison demonstrated a significant difference between all times in the SNC and SNL advancement data when comparing preoperative and postoperative measurements. This demonstrates a statistically significant improvement in the lengths of the SNCc and SNLa (Figure 5) at 12 months (the immediate outcome) (Figure 6). Statistical analysis also was performed to examine long-term outcomes in patients with LA compared with the untreated control group to account for the normal aging process and to examine whether senile changes were accelerated in the operative group. Analysis revealed no statistically significant differences between the aging LA group and the aging control group ($P < .001$). Thus, the benefits of LA surgery are sustained over time (Figure 7).

**SNLL DATA**

In the SNLL group (15 patients), the average ratio between the L1 reference line and the central lip SNCc vertical measurement preoperatively was 0.45. This ratio improved postoperatively to an average of 0.38.

The ratios described herein for the SNLL group were analyzed using a repeated measures analysis of variance that revealed a main effect of time $F_{2,8} = 44.47$ ($P < .001$). Post hoc pairwise comparison revealed a significant difference between all times. This demonstrates a significant improvement in the length of the senile upper lip at the 12-month period (the immediate outcome) (Figure 7). Comparison to age-matched control groups who did not undergo operations was performed to assess long-term outcomes. Similarly, analysis revealed no statistically significant change between the aging SNLL group and the aging control group ($P < .001$). Thus, the benefits of the SNLL procedure are sustained over time (Figure 8).

The aging upper lip is an often-neglected component of facial rejuvenation. Many surgeons will use hyaluronic acid injection or placement of implant material in an attempt to improve the lost vermilion volume and height. Many different types of implant fillers are available.

Other procedures are used to increase the fullness of the lips, such as fat transfer using autologous fat in-
jected into the lips or insertion of other autologous tissues, such as a superficial musculoaponeurotic system.\textsuperscript{13} However, many treatments usually are required, and resorption is unpredictable.\textsuperscript{16,17} Also, increasing the volume of the lips often fails to provide more vermilion red show. One procedure that increases vermilion red show is V-to-Y lip advancement. This technique, however, does not reduce senile white show; thus, it may be more appropriate for a younger population. Also, recovery time is lengthy and may not be suitable for all patient populations. In addition, procedures such as chemical peels, dermabrasion, and laser resurfacing do not address the length of the senile upper lip.

In some cases, surgical reduction is needed to address the elongated upper lip typically seen in aging populations. In our patient population, the upper lip was proportionally elongated compared with ratios of the younger individuals in the cohort described by Akoz et al.\textsuperscript{7} The SNLL and LA procedures reduced the length of white show in the upper lip. In the SNLL group, a reduction in the ratio for the SNC and SNL vertical measurements from 0.45 to 0.38 was observed, a statistically significant change with results that were demonstrated to be sustained over time. Similarly, in the LA group, reduced white show of the upper lip and a more aesthetically pleasing appearance were achieved. Reductions in the ratios for the SNC and SNL vertical measurements from 0.44 and 0.40 to 0.36 and 0.32, respectively, were observed.

No adverse complications occurred in either surgical group. Two of the 15 patients (13%) in the LA group underwent revision surgery due to asymmetry of the vermilion border; both patients were smokers. No surgical revisions were performed in the SNLL group; however, 3 of 15 patients (20%) received dermabrasion to decrease subnasal scarring at a later time. This percentage requiring dermabrasion corresponded to the rate seen in all patients who underwent SNLL, including those not included in this study.

Four of the 30 patients (13%) in both groups reported being smokers. The need for revision in the aforementioned 2 LA patients was thought to be due to smoking, for which adverse effects are well documented.\textsuperscript{18,19} When comparing our overall revision rate of 2 of 30 patients (7%) undergoing lip augmentation, our rate is significantly less than the reported outcomes for implants or other surgical procedures, in which revision rates were significantly higher, in some cases as high as 100%.\textsuperscript{12}

In conclusion, the senile upper lip can be surgically treated with the LA and SNLL procedures. The successful reduction in white show in both groups and the increase in vermilion show in the LA group can be achieved on a broader scale. These results restore a more youthful aesthetic appearance, which can favorably affect the quality of life in patients who have undergone these procedures. Little risk of adverse events exists; the revision rate is extremely low. Surgical reduction of an elongated upper lip or advancement of the vermilion border is a powerful tool that provide simple, long-term upper lip rejuvenation that can be used safely.

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Correspondence: Ahmed S. Sufyan, MD, Department of Otolaryngology–Head and Neck Surgery, Indiana University School of Medicine, 702 Barnhill Dr, Bldg Code RI 0860, Indianapolis, IN 46202 (asufyan@iupui.edu).

Author Contributions: Drs Holden and Sufyan had full access to all 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: Holden, Sufyan, and Perkins. Acquisition of data: Holden and Sufyan. Analysis and interpretation of data: Holden and Sufyan. Drafting of the manuscript: Holden and Sufyan. Critical revision of the manuscript for important intellectual content: Holden, Sufyan, and Perkins. Statistical analysis: Holden and Sufyan. Administrative, technical, and material support: Holden.

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