

# Role of Autologous Fat Transfer to the Superficial Fat Compartments for Perioral Rejuvenation

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**Background:** Autologous fat transfer to the deep compartments of the face has proven to be a powerful adjunct to volume restoration during rhytidectomy. However, to treat all components of volume deflation in facial aging, the perioral superficial compartments must be addressed. Various fillers have been used to augment these compartments; however, few studies have assessed the efficacy of autologous fat transfer to these areas. This study is the largest series to date to assess the utility of autologous fat transfer to the perioral superficial compartments.

**Methods:** A retrospective chart review was conducted on an individualized component rhytidectomy database. Patients who underwent autologous fat transfer to the perioral superficial fat compartments were identified; patients who did not undergo autologous fat transfer served as controls. All patients had follow-up images that had been obtained a minimum of 1 year postoperatively. Three independent observers reviewed preoperative and postoperative images using the Modified Fitzpatrick Wrinkle Scale.

**Results:** Sixty-five consecutive patients underwent rhytidectomy without perioral rejuvenation (group A), and 65 patients underwent rhytidectomy with autologous fat transfer to the perioral superficial compartments (group B). Group B had a two times more significant improvement in perioral aesthetics than group A.

**Conclusions:** This study is the largest review to date demonstrating safety, longevity, and success of autologous fat as an ideal filler of the perioral superficial compartments. In light of the aesthetic improvements with autologous fat transfer to the perioral region, this surgical adjunct should be a fundamental component to achieve global facial rejuvenation during rhytidectomy. (*Plast. Reconstr. Surg.* 136: 301e, 2015.)

Recently, there has been an emergence of transferring autologous fat to treat facial aging. Facial aging is not merely a skin problem, as all layers of the face (i.e., skin, fat, and bone) change with age and therefore collectively contribute to senescence.<sup>1-3</sup> There are many causative factors of facial aging, although not all forces are completely understood.<sup>4,5</sup> Over time, epidermal thinning and loss of collagen allow the facial skin to lose elasticity. This process, in conjunction with deflation, gravity, and muscle pull, will eventually cause the formation of prominent rhytides.<sup>6</sup> Even if patients gain weight, Lambros demonstrated a “deflation wave” pattern in specific areas of the face with aging.<sup>7,8</sup> This understanding has transitioned the art of facial rejuvenation from

simply pulling and tightening to a more intricate model of a “lift-and-fill” technique based on the topography of the face.<sup>9,10</sup>

Detailed anatomical analyses have given us tremendous insight into the true superficial and

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deep facial compartments. Facial fat is not composed of a single confluent mass; it is constituted with highly partitioned deep and superficial compartments separated by distinct barriers and depths. These compartments are divided by fascial membranes that arise from the superficial fascia and insert into the dermis of the skin,<sup>11</sup> and they are the basis for the distinct phenotypical appearances of the face.<sup>12,13</sup> The concept of a “topographic map,” introduced by Rohrich et al., indicates the precise location, depth, and magnitude of each patient’s facial deflation pattern, allowing surgeons to individualize facial rejuvenation to the needs of the patient.<sup>10</sup>

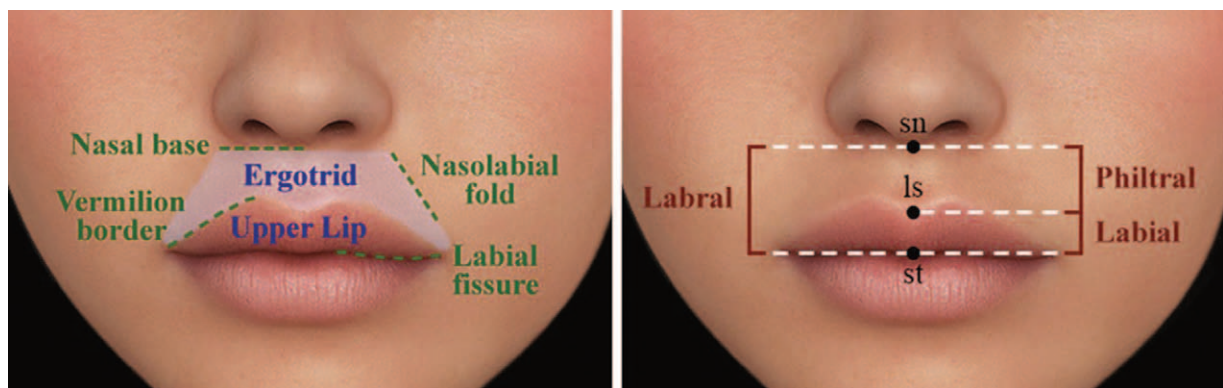
The perioral region has distinct superficial fat compartments and is an aesthetically fundamental component that aids in expressing emotion, passion, youth, and vigor. An aesthetically ideal lip, characteristically, has a vermilion/cutaneous border thickened with a pout, philtral columns prominent and full, and commissures slightly upturned.<sup>14</sup> Figure 1 outlines these aesthetic features and the geometric proportions of the ideal lip.<sup>15</sup>

With aging, the lips become thin and lose crispness in their white roll and philtral columns; the subcutaneous fat atrophies, highlighting the fine wrinkles.<sup>16</sup> The loss of lip volume and support is accentuated by increasing nasolabial fold depths and marionette lines. Treatment goals of perioral rejuvenation are directed toward reversing this process and restoring a more youthful appearance by lifting and filling the fat compartments.

Treatment of the deep facial compartments with various fillers is not a new concept. Bioengineered fillers have been used quite successfully in soft-tissue perioral augmentation,<sup>17,18</sup> but

complications may arise, including granulomas, nodule and cyst formation, and asymmetry.<sup>16</sup> Recent literature has suggested that autologous fat transfer to the deep compartments of the face is a powerful adjunct to volume restoration during rhytidectomy and an ideal autologous alternative to bioengineered fillers.<sup>19</sup> Rohrich et al. reviewed 100 patients who underwent a face-lift procedure followed by fat grafting to the deep compartments. This lift-and-fill technique successfully provides volumetric augmentation of the malar region, thus increasing the anterior projection, diminishing the nasolabial fold, correcting the V-deformity, and providing an overall youthful appearing cheek. In addition, autologous fillers have the advantage of little to no cost, permanence of effect, use of each patient’s own tissue, and potential stem cell rejuvenation of the overlying skin.

By failing to directly address the rhytides of the perioral region, a rhytidectomy without adjuvant therapy produces an inferior result and leaves a telltale sign of aging. To successfully manage all components of volume deflation in patients with facial aging, the perioral superficial compartments must be addressed. Ideal perioral rejuvenation requires a lift and fill of the deflated space followed by possible resurfacing of any deep vertical rhytides. Various fillers and resurfacing agents have been successful in rejuvenating the superficial compartments in the perioral region<sup>16</sup>; however, few studies have assessed the efficacy of autologous fat transfer to this area. The success of autologous fat transfer to the deep compartments has led us to hypothesize that volumetric manipulation of the superficial fat compartments



**Fig. 1.** Lip diagram. (Left) Perioral surface anatomy (blue) with defined borders (green). (Right) Midline reference points (black) and defined heights (red). *Sn*, subnasale; *ls*, labiale superius; *st*, stomion. These define important vertical measurements: philtral height and labial height. The ratio of these components, philtral height divided by labial height, is a reliable indicator of normalcy. (Reprinted with permission from Raphael P, Harris R, Harris SW. Analysis and classification of the upper lip aesthetic unit. *Plast Reconstr Surg.* 2013;132:543–551.)

with autologous fat transfer can enhance perioral aesthetics. This study is the largest series to date to assess the utility of autologous fat transfer to the perioral superficial compartments in facial rejuvenation.

## PATIENTS AND METHODS

A retrospective chart review was conducted on an institutional review board–approved database of patients who had an individualized component rhytidectomy between 2000 and 2014 performed by a single surgeon. Patients who received autologous fat transfer to the perioral superficial fat compartments were identified; those who did not have autologous fat transfer served as controls. Controls were chosen randomly and not prescreened. Patients who received adjunctive bioengineered fillers in the perioral region within the past year were excluded from the study, as were patients who underwent concomitant resurfacing methods. All patients had, on average, a 1-year follow up image. Three independent observers reviewed preoperative and postoperative images; the Modified Fitzpatrick Wrinkle Scale,<sup>20</sup> ranging from 0 to 3, was applied as follows: no wrinkles, 0; fine wrinkles, 1; moderate wrinkles, 2; and deep wrinkles, 3. Figure 2 demonstrates a sample preoperative patient from each subset of the Modified Fitzpatrick Wrinkle Scale. Complication rates following fat transfer were also assessed. The data then underwent statistical analysis using a paired *t* test.

For the autologous fat transfer subset, adipose tissue was harvested from either the medial thigh or central abdomen using a 10-cc syringe attached to a 14-gauge cannula. No wetting solution was used. Lipoaspirated fat was centrifuged at 1200 rpm for 3 minutes, followed by oil and blood removal. Approximately 1 to 2 cc of the concentrated fat was transferred to each perioral superficial compartment using a 22-gauge, 1.5-inch needle and a 1-cc syringe.<sup>10</sup> The needle was inserted into the superior and inferior perioral superficial compartments, and the fat was injected in a fanlike pattern; the injected fat was massaged manually for uniform distribution. There were no injections to the intramuscular regions. In addition, the lateral perioral compartments received autologous fat in a similar fanlike distribution to create a smooth lateral transition and to achieve a central and radial three-dimensional expansion of the lips. [See Video, Supplemental Digital Content 1, which demonstrates fat injection into the left perioral superficial compartments

performed during an individualized component rhytidectomy. The same technique is applied to the right perioral region (not demonstrated), <http://links.lww.com/PRS/B367>.] No dressings were applied over the perioral region, and no specific postoperative care of the mouth was indicated. All patients received only one session of fat grafting to the perioral region at the time of rhytidectomy, with no subsequent sessions.

## RESULTS

A retrospective analysis was carried out on 65 consecutive patients presenting from 2000 to 2004 with adequate photographs who had undergone rhytidectomy without superficial fat compartment adipose injections (group A), and 65 patients presenting from 2010 to 2014 who had undergone rhytidectomy with autologous fat transfer to the superficial compartments (group B). In group A, the average preoperative score in the perioral area was 1.13, and the average postoperative Modified Fitzpatrick Wrinkle Scale score was 0.74 (average difference, 0.39;  $p < 0.01$ ). Sample patients are represented in Figures 3 and 4. In group B, the average preoperative Modified Fitzpatrick Wrinkle Scale score was 1.61 and the average postoperative score was 0.76 (average difference, 0.84;  $p < 0.01$ ). Sample patients are represented in Figures 5 and 6. Group B patients, who received autologous fat transfer to the superficial perioral compartments during a rhytidectomy, had a two times more significant improvement in perioral wrinkles and cosmesis than patients in group A. There were no complications such as cellulitis, hematoma, or fat necrosis associated with fat transfer, and no patients required revision.

## DISCUSSION

Cadaveric studies have revealed distinct vascular membranes responsible for partitioning subcutaneous fat into discrete anatomical units. These fat compartments add a new dimension to facial aging and allow precise anatomical targeting for the injection of bioengineered fillers and autologous fat.<sup>21,22</sup> The face is a three-dimensional structure consisting of height, width, and depth, and requires attention at all levels. Even though a rhytidectomy may improve some perioral wrinkles, the correction is limited, as the perioral area is surrounded by zones of adherence, is typically not undermined, and is the farthest area from the point of stretch. Even in the most experienced



**Fig. 2.** Examples of the Modified Fitzpatrick Wrinkle Scale. (Above) No wrinkles, 0; (second row) fine wrinkles, 1; (third row) moderate wrinkles, 2; and (below) deep wrinkles, 3.



**Video.** Supplemental Digital Content 1 demonstrates fat injection into the left perioral superficial compartments performed during an individualized component rhytidectomy. The same technique is applied to the right perioral region (not demonstrated), <http://links.lww.com/PRS/B367>.



**Fig. 3.** Preoperative (*left*) and postoperative (*right*) photographs of a woman who underwent rhytidectomy without perioral rejuvenation. Preoperatively, she had a Modified Fitzpatrick Wrinkle Scale score of 3. Postoperatively, persistence of these wrinkles and the appearance of an aged mouth with a score of 2.7 were observed.

hands, these patients lack complete rejuvenation and are simply “face lifted.”<sup>23</sup>

Because of the distinct boundaries of the perioral region from the other facial compartments, deflation and rhytides of the perioral region

require unique intervention to provide global facial rejuvenation during rhytidectomy. There are “minimally invasive” avenues that are fairly efficacious in the treatment of perioral rhytides, including chemical peels, microdermabrasion, and laser



**Fig. 4.** Preoperative (*left*) and postoperative (*right*) photographs of a woman who underwent rhytidectomy without perioral rejuvenation. Preoperatively, she had a Modified Fitzpatrick Wrinkle Scale score of 3. Postoperatively, persistence of these wrinkles and the appearance of an aged mouth with a score of 3 were observed.

resurfacing. These various modalities adequately provide dermal regeneration by removing the vertical rhytides but fail to achieve volume restoration. They primarily address the surface anatomy but do not provide volume augmentation and, consequently, fail to address deflation. Despite the reported success of these modalities, deficiencies include risk of thermal injury, scarring, and postprocedure erythema.

Bioengineered fillers have been used successfully to provide perioral volumization.<sup>16,24,25</sup> They are readily available and tolerated by most patients, with good outcomes, but do have their limitations, including immunologic reactions, material migration, injection necrosis, and foreign body granuloma. In addition, certain fillers will require allergy testing before injection and, depending on the specific type of filler, the cost may be prohibitive.<sup>26–28</sup> Although bioengineered fillers adequately address the deflation and vertical rhytides of the perioral region, they fail to achieve the speculative dermal regeneration provided by autologous fat that many believe is a component necessary for global rejuvenation.

The development of more advanced and innovative techniques for the harvesting and purification of autologous fat has appreciably reduced, but not eliminated, the unpredictability of aesthetic outcomes historically associated with this procedure.<sup>29</sup> Facial aging cannot be explained as being attributable solely to the effects of gravity but is consistent with a more complex volumetric depreciation secondary to a progressive lipodystrophic phenomenon that accompanies aging. With that being said, ideally, perioral rejuvenation should involve replacing atrophied fat through an anatomically targeted approach with fat transferred to the perioral superficial compartments to lift and fill the perioral region.

Autologous fat could serve as the ideal filler because it not only provides volume replacement for the perioral region but also may offer dermal regeneration of the thinned skin. Recent studies have indicated that fat may play a role in the treatment of aged, scarred, irradiated, and ulcerated skin,<sup>30,31</sup> because the precursor cells within nonmanipulated adipose tissue may have regenerative potential. This encouraging prospect of



**Fig. 5.** Preoperative (*left*) and postoperative (*right*) photographs of a woman who underwent rhytidectomy with perioral rejuvenation. Preoperatively, she had a Modified Fitzpatrick Wrinkle Scale score of 3. Postoperatively, the wrinkles had diminished, providing more youthful perioral region, with a score of 1.

dermal regeneration with fat transfer may serve as an adjunct to our currently available resurfacing modalities, but more detailed investigations are required to make any definitive predictions.

One limitation of autologous fat transfer in the perioral region is the white roll; we and other authors avoid fat transfer in the white roll because of asymmetric and unpredictable take secondary to increased movement.<sup>29</sup> Bioengineered fillers should be first line for rejuvenating the white roll, and autologous fat can be reserved for volumizing the deeper perioral region.

The limitations of this retrospective study are well appreciated. We understand that the assessment is a subjective interpretation of aesthetic success and inherently lacks the capability to provide a purely objective analysis. Despite the exclusion of resurfaced patients from this study for our initial assessment, future studies require inclusion of this subset for comparison, as ideal perioral rejuvenation for severe rhytides requires lifting, filling, and possibly resurfacing. Furthermore, our expertise with fat transfer has not fully matured and there are still many unanswered questions with regard to which technique maximizes fat

viability for subsequent transfer.<sup>32</sup> Longer studies in a larger patient population are needed to draw definitive conclusions about the efficacy of fat transfer to the perioral region. In addition, the Modified Fitzpatrick Wrinkle Scale provides only a two-dimensional subjective assessment; a three-dimensional topographic analysis of the fine rhytides with three-dimensional imaging may provide objective measurements with which to assess the impact of this procedure. Despite these limitations, there is strong evidence to promote the use of autologous fat transfer in the perioral region for complete facial rejuvenation during rhytidectomy.

## CONCLUSIONS

By not addressing the rhytides and deflation of the perioral region, a rhytidectomy alone fails to obtain adequate global facial rejuvenation and thus creates facial disharmony. This study is the largest review to demonstrate the safety, longevity, and efficacy of autologous fat as an ideal filler of the perioral superficial compartments and an excellent adjunct to blend the cosmesis of the lift-and-fill rhytidectomy with the central face.



**Fig. 6.** Preoperative (left) and postoperative (right) photographs of a woman who underwent rhytidectomy with perioral rejuvenation. Preoperatively, she had a Modified Fitzpatrick Wrinkle Scale score of 2.7. Postoperatively, the wrinkles had diminished, providing more youthful perioral region, with a score of 1.4.

Because of the aesthetic improvements with autologous fat transfer to the perioral region as seen in the Modified Fitzpatrick Wrinkle Scale scale, this surgical step should be a fundamental component of complete facial rejuvenation.

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#### PATIENT CONSENT

*The patients provided written consent for the use of their images.*

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