Fat Grafting to Improve Results of Facelift: A Systematic Review of Safety and Efficacy of Current Treatment Paradigms

**Presenter:** Paymon Sanati-Mehrizy, MD

**Co-Authors:** Saba Motakef, MD; Michael J. Ingargiola, MD; Felipe Molina Burbano, BA; Michael E. Hill, MD, PhD, FACS; Peter J. Taub, MD

**Affiliation:** Icahn School of Medicine at Mount Sinai, New York, NY

**BACKGROUND:** Autologous fat grafting is a helpful supplement to facelift surgery that helps to combat age-related volume loss of facial structures. Despite the widespread prevalence of combined facelift and fat-grafting, there exists significant procedural variation between providers. The purpose of this systematic review is to provide a summary of all published literature, outcomes, and complications available for fat grafting combined with facelift.

**METHODS:** A systematic review of the Cochrane Library and MEDLINE databases as completed to identify all clinical reports of fat grafting combined with facelift surgery using the following algorithm: (‘fat grafting’ OR ‘lipo-transfer’ OR ‘lipofilling’ OR ‘fat transfer’) AND (‘facelift’ OR ‘rhytidectomy’ OR ‘SMASectomy’ OR ‘facial rejuvenation’). Data on techniques, outcomes, complications, and patient satisfaction were collected.

**RESULTS:** The systematic review was performed in April of 2017. 248 articles were identified for review. After application of exclusion criteria, a total of 15 primary studies were included in this review. Various facelift techniques were used, including deep-plane or sub-SMAS facelift, SMAS facelift, modified MACS lift, component facelift, midface lift, SMAS plication, SMAS-stacking/SMASectomy, and SMASectomy. The most common locations of fat graft injection included the nasolabial folds, tear troughs, temporal regions, midface/cheek/malar eminence, marionette groove, lips, and ear lobes. The addition of fat grafting to facelift surgery resulted in significant improvement in facial volume and aesthetic assessments.

**CONCLUSION:** Combined facelift and fat grafting is a safe and efficacious means to simultaneously address age-related ptosis and volume loss. Further research is required to validate and improve existing treatment modalities.

Determining Facial Beauty Using Artificial Intelligence

**Presenter:** Eitezaz Mahmood, BA

**Co-Authors:** Abbas Peymani, MD, MS; Austin D. Chen, NONE; Sabine A. Egeler, MD; Anna R. Johnson, MPH; Masoud Malyar, MD; Samuel J. Lin, MD, MBA, FACS

**Affiliation:** Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA

**INTRODUCTION:** The most widely held theory of facial beauty is that faces which more closely represent the average are the most beautiful. Our study sought to determine whether the theory of averageness could be demonstrated in women seeking rhinoplasty using state of the art machine learning algorithms.

**METHODS:** Photographic analysis consisted of 1192 pre- and post- rhinoplasty photos of women as well as 139 photos of actresses, all of whom are listed as the most beautiful women of all time per IMDB. All photos are frontal shots with the face in a neutral pose. Using a pre-trained deep convolutional network algorithm, the photos were embedded with 128 vectors for clustering analysis. Phenotyping analysis of the pre-rhinoplasty photos was conducted via parameterized Gaussian mixture models optimized via Bayesian Information Criteria (BIC) for expectation-maximization. Furthermore, facial averages were generated via a Delaunay triangulation using the 68 landmarks and facial similarity scores were computed via similarity score of two faces by computing the squared L2 distance between their representations.

**RESULTS:** The optimal number of pheno-groups determined by BIC, bounded by 1–5. The model assigned 410 photos to “pheno-group 1” and 782 photos to “pheno-group 2.” Beautiful actresses were more likely to be in phenotype 2 as compared to pre-rhinoplasty women (82% vs. 65%, p = .0001). Further, post-rhinoplasty women switched from phenotype 1 to phenotype 2 considerably more than they
switch from 2 to 1 (21% vs. 7%, \( p = <.000001 \)). Post-rhinoplasty composite faces were more similar to the “beautiful actresses” composite than the pre-rhinoplasty photos (L2 norm = 0.518 vs. 0.621).

CONCLUSION: We demonstrate that women do not become more “average” after rhinoplasty, but rather trend towards the phenotype occupied by above average beautiful women.

**Volumetric Changes of the Mid and Lower Face with Animation and the Standardization of 3D Facial Imaging**

**Presenter: Sergey Y. Turin, MD**

**Co-Authors: Thomas Mustoe, MD; Roshni Rawlani, BA; Hannan Qureshi, MD; Vinay Rawlani, MD**

**Affiliation: Northwestern University Feinberg School of Medicine, Chicago, IL**

**GOALS:** 3D photography provides volumetric data and surface topography with sub-millimeter precision, but current methods lack standardization for facial expression and position. For example, smiling can mimic the desired outcomes of a facelift and fat grafting by increasing malar volume while decreasing volume in the jowls. Our goal was to quantify volumetric changes of the mid and lower face caused by facial expression so that we can accurately assess volumetric changes after surgery. Secondly, we aimed to identify soft tissue landmarks that can be used to detect these changes in facial expression or head position to ensure the standardization of 3D images.

**METHODS:** 3D facial images of 16 subjects performing 22 facial expressions or changes in head position were captured. Variable degrees of animation during smiling and frowning were also evaluated. Volumetric changes of the malar and jowl regions with facial expressions were quantified using a 3D superimposed image subtraction technique. Translation (movement >1 mm) of 14 standard soft tissue surface landmarks was assessed during various facial animations to determine which landmarks can be utilized to standardize 3D images.

**RESULTS:** Sixteen of the 22 facial expression studied had a significant effect on malar and/or jowl volume. Significant volume changes were noted with subtle animation during smiling and frowning. During maximal smile, mean excursion of oral commissures was 13.7mm +/- 3.0 and the malar region demonstrated a 17.2mL +/- 5.7 increase in volume, whereas the jowl region demonstrated a 1.7mL +/- 0.9 decrease in volume. During maximal frowning, mean excursion of oral commissures was 7.4mm +/- 2.3. The malar region demonstrated a 3.7mL +/- 2.3 decrease in volume, whereas the jowl region demonstrated a 5.4mL +/- 0.9 increase in volume. In the act of smiling, there was significant volume augmentation of the malar region with small degrees of oral commissure excursion, such that a quarter smile (excursion = 25% of excursion with maximal smile) could induce a volume change equivalent to 75% of maximum smile. The jowl decreases in volume with smiling, but in a linear fashion (a quarter smile yields a volume change equivalent to 25% of a maximum smile). Frowning exhibited the opposite, but similarly significant changes in mid and lower facial volume. A 1mm commissure excursion during smiling can produce 5-10mL of malar augmentation or 2-4mL of jowl augmentation with frowning. We believe these results are related to isometric contraction of mimetic muscles and their influence on fat compartments.

A combination of 5 landmarks (glabella, bilateral cheilion, pogonion and laryngeal prominence) was found to indicate all tested facial expressions which effect mid and facial volumes, with the exception of platysmal straining.

**CONCLUSION:** Most facial expressions will lead to translation of the oral commissures, with even a subtle (1mm) excursion leading to 5-10mL of malar augmentation during smiling or 2-4mL of jowl augmentation during frowning. We identified that the glabella, pogonion, laryngeal prominence, and bilateral cheilion can be used as a referencing system to allow identification of subtle changes in head position and facial expression for standardization of 3D images.

**Where Do We Look? Assessing Gaze Patterns in Cosmetic Facelift Surgery with Eye Tracking Technology**

**Presenter: Lawrence Z. Cai, MD**

**Co-Authors:** Jeffrey W.K. Kwong, BS; Amee Deepak Azad, BA; David Kahn, MD; Gordon K. Lee, MD; Rahim Nazerali, MD, MHS