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Mid-Face Lifting Using Endoscopic Vs. Conventional Technique: a Retrospective Comparative Study

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Abstract

Bckground: The objective of this study was to retrospectively compare results of conventional rhytidoplasty with subcutaneous detachment and plication of the SMAS, and endoscopic-assisted subperiostal midface lifting.

Methods: 61 patients, (M=2, F= 59, ages 35-59), participated. 32 underwent conventional rhytidoplasty, 29 underwent endoscopic-assisted facelift. Patients were classified by the four HESTER aging types (2000). Hester types I and II comprised Group A. Types III and IV comprised Group B. Evaluation criteria were both objective, using pre- and post-operative inferior periorbital measurements, and subjective, using plastic surgeons that independently compared pre-and post-operative photos. Criteria were: pre-and post-operative measurements of the inferior periorbital region, analyzed by delta value, and restoration of volume and malar positioning, evaluated visually in pre- and post-operative photos.

Results: In both groups, the Deltas of the distance from the inferior palpebral rim to the blepharo-jugal ridge were more significant in the endoscopic cases. The deltas of the inferior ray of the periorbital oval were also more significant in the endoscopic cases, in both groups. Of the criteria evaluated by the plastic surgeons, only restoration of volume and of malar positioning scored better results for the endoscopic procedure over the conventional method, with significance for both groups.

Conclusions: The results in the midface were superior using the subperiosteal endoscopic-assisted method, in reduction in distance from the inferior palpebral rim to the blepharo-jugal sulcus, in restoration of volume, and in malar repositioning. Age types III and IV showed the best results, with both techniques.

Keywords: *Midface Lift; Endoscopic Lift; Conventional Vs. Endoscopic; Facial Rejuvenation; Midface Rejuvenation; Facial Rejuvenation; Endoscopic Midface Lift.*

Introduction

Over time, concepts of facial rejuvenation have undergone constant evolution. Current emphasis is on the preservation of expression and the natural contours of the youthful face. Today´s harmonious, comprehensive rejuvenation must deliver a natural result, without looking like a post-surgical face. In conventional rhytidoplasty, plastic surgeons have long focused on the mandibular and neck contours [1]. Introduction of new concepts, such as restoration of the three dimensional volume of the face (especially the mid-third), the elimination of the naso-jugal fold, and anatomical restoration of the periorbital region, were positive contributions, offering important improvements in midface rejuvenation in the same way that current concepts in periorbital rejuvenation, including preservation of orbital fat; repositioning of the brow, the orbicularis muscle, and the orbital septum; and minimizing and filling in the area from the palpebral rim to the blepharo-jugal sulcus; have all contributed to a more natural result.

Traditionally, facial rejuvenation has been addressed by conventional rhytidoplasty, with its extensive incisions, but offering excellent aesthetic results in the lower facial and cervical regions, regarding flaccidity and restoration of the cervical-facial angle. To avoid treatment of the central region of the face, rhytidoplasty employs extended dissection, with prolonged surgical time and greater morbidity: in particular, hematoma, nerve injury and flap necrosis. However, treatment of the lateral face is visible, with little improvement in the central oval of the face, and sometimes a volumetric flattening of the midface caused by the lateral traction of the flaps, as cited [2-6]. Techniques initially proposed [2, 7-10] presented enough problems to warrant a search for other methods.

Since 1991, with the work of [11-17] attention returned to the midface, recommending itselevation along a vertical vector, using endoscopic techniques, with smaller scars. In 2007, Saint-Cyr et al. [18] described a vertical midface lift focused on preservation of natural facial expression, maintenance of the lateral canthus position, restoration of cheek volume, and correction of periorbital hollowness. Owsley And Roberts [19] eloquently described the anatomical changes, including the role of levator muscular action, contributing to midface changes in features and fat.

Objectives

The objective of this study was to compare, in patients aged 35-59 years, the results obtained with conventional rhytidoplasty and with endoscopic face lift, in relation to the midface, as measured by the following criteria:

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1. Reduction in the distance between the palpebral rim and the blepharo-jugal sulcus using computerized measurements of pre- and post-operative photos.
2. Subjective analysis of the aesthetic results by grading the pre- and post-operative photos, using pre-established criteria, as performed by five plastic surgeons who did not know which technique had been used.
3. Determination of the importance of the aging classification in predicting the best aesthetic results with rejuvenation surgery.

Patients and Methods

In the six years prior to this retrospective study, 349 patients underwent facial rejuvenation surgery in our clinic, either by conventional rhytidoplasty or endoscopic face lift. Within this group, 108 patients presented with indications for treatment of the midface. From among these 108 patients, our inclusion criteria were: patients between 35 and 59 years of age, for whom we had photographic follow-wup for a minimum of six months, up to a maximum of 3 years. A total of 61 patients (58 female, 3 male) met these criteria, and of them, 32 had undergone conventional rhytidoplasty, and 29 had undergone endoscopic face lift. All procedures were performed between 1996 and 2002.

Surgical Techniques

Conventional Rhytidoplasty

In the temporal region, subgaleal undermining was performed. In the mid-third, inferior and cervical regions, undermining was subcutaneous. The treatment of the deep plane, at the level of the SMAS, was made by means of plication [20], performed along a line from one centimeter below the earlobe up to the lateral canthal ligament, as shown in Figures 1 and 2, or by SMA Sectomy [21] in faces with more adipose volume.

Endoscopic Technique

Temporal incision with subgaleal undermining was performed. The periorbital septum, in the superior, lateral and inferior portions, was dissected in the subperiostal plane, and likewise the body of the zygoma. Subperiosteal dissection of the zygomatic arch was limited to the anterior two-thirds. Periosteal release along the inferior orbital rim was performed with golf club-shaped dissectors,Permitting dissection up to the nasal base, medially, and to the infraorbital nerve inferiorly. The periosteum was also freed along the inferior edge of the malar and maxillary rims, up to the buccal fat pad. The medial dissection was made up to the pear-shaped opening, and past the nasolabial sulcus. With a golf club-shaped dissector, the opposite side was dissected up to the lateral portion, freeing the rest of the periosteum and also the ligament fibers of the masseter, at its insertion in the inferior portion of the zygomatic arch, allowing ample mobilization of the midface Systematization of the fixation and the elevation of the midface were designed to include three main points, allowing for a distribution of traction forces calculated to create a more enduring, stable fixation [22, 23] [Figure 1].

These three points, marked pre-operatively, were suspended by 3-0 braided nylon passed transcutaneously using a fine Casagrande needle, 20cm in length, threaded through the tip [24].

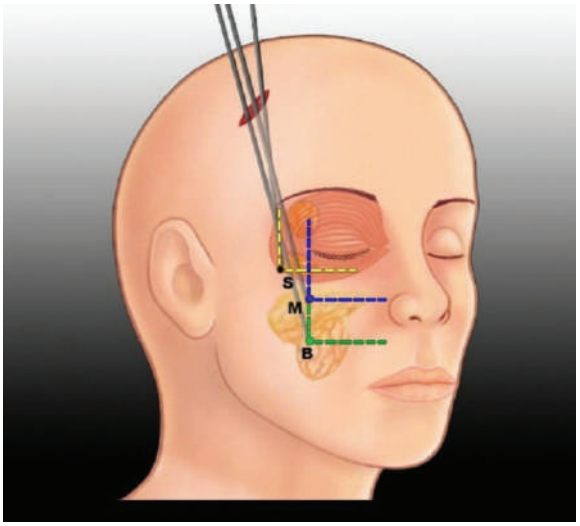

Figure 1: Suspension points and other correlation with face structures

Evaluation Criteria

Orbital Measurements

Orbital measurements were taken of the diameter of the periorbital oval; of the inferior ray (the center of the pupil to the ridge blepharo-jugal ridge); and from the inferior palpebral rim to the blepharo-jugal sulcus. These measurements were taken by the Mirror Suite software program, Version 6.0.

Pre- and Post-operative Photographs

Pre- and post-operative photographs were analyzed by five plastic surgeons. For this analysis, the images were electronically captured and standardized. The pre-and post-operative photographs were aligned into the same position using the measurement of intrapupillary distance. The distance between the centers of the pupils was measured with patients seated, backs erect. This measurement was input into the program, which regulated the post-operative photos with the same distance and rotation of the pupillary axis as in the pre-operative photos. [Figure 2].

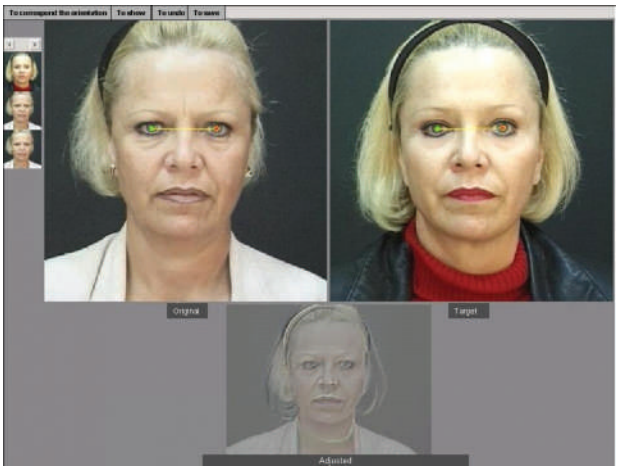

Figure 2: Calibration of the pre and post-operative photographs regarding interpupillary distance

Subjective evaluation process

The post-operative photos were compared with the pre-operative photos, without the evaluators knowing which procedure was performed. For each patient, grades from one through four were established for each of the criteria to be evaluated. The criteria were restricted solely to the midface (between the lateral canthus of the eye and the outer corner of the mouth). Evaluation criteria included: naturalness of result, restoration of the malar position and volume, blepharo-jugal ridge, lower eyelid flaccidity, nasolabial fold, facial flaccidity, lateral canthus of the eyes, facial shape (triangular or square), and corner of mouth [Figure 3].

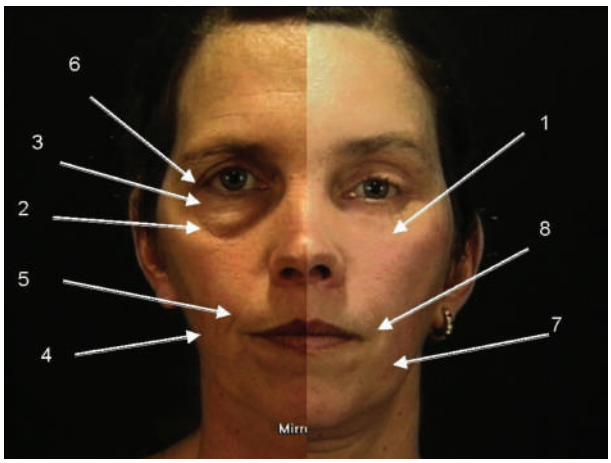

Figure. 3: (1)Restoration of the volume and Malar position, (2)Blepharo-Jugal Sulcus, (3)Interior Palpebral flaccidity , (4)Facial flaccidity, (5) Nasolabial fold, (6)Lateral canthus of the eyes, (7)Facial shape trianular or square, and (8)Corner of mouth

Each evaluator filled out a prepared form that included definitions/explanations for the evaluation criteria. For each criterion analyzed, ratings were established from 1 to 4: Worsening = 1; No change = 2; some improvement = 3; and Significant improvement = 4.

Results

Orbital Measurements

Table I itemizes the differences in the pre- and post-operative measurements of the distance from the inferior palpebral rim to the blepharo-jugal sulcus (D_BP), and distance from the pupil to the blepharo-jugal sulcus (D_RAI), for each of the aging categories A and B, in relation to the endoscopic and conventional surgeries. The relationship between the surgical technique used and aging category was not significant (p>0.05), making it possible to compare the surgical techniques, independent of aging category.

In Table 1, the D_BP and the D_RAI showed highly significant P values, indicating that the differences in the pre- and post-operative measurements for endoscopic surgery were superior and highly significant in comparison to the conventional surgery, for both aging groups A and B.

In the analysis in Table 2, comparing by surgery the D_BP and the D_RAI, the reduction of the distance with conventional surgery was not significant (column Median=0), while the reduction of the distance with endoscopic surgery was highly significant (p<0.0001 for 0001 for D_BP and D_RAI). Comparing the two techniques, the difference between the respective deltas was highly significant for D_BP, (p<0.0001) relative to D_RAI, (p=0.0002).

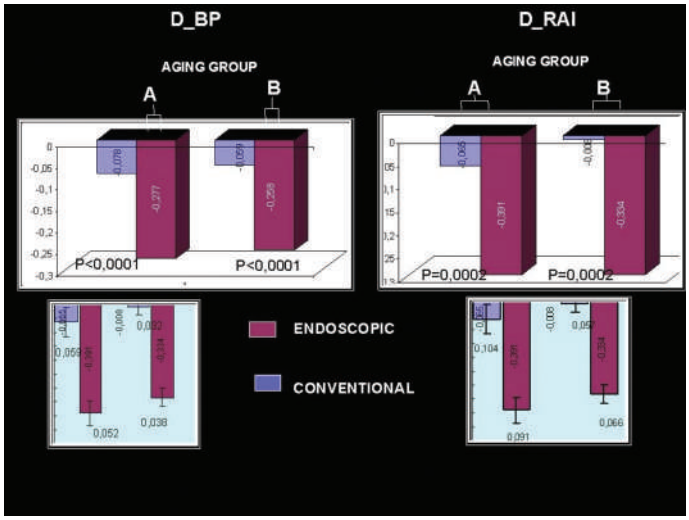

Table 1: Differences in the periorbital distance measurements by surgery, by category of aging

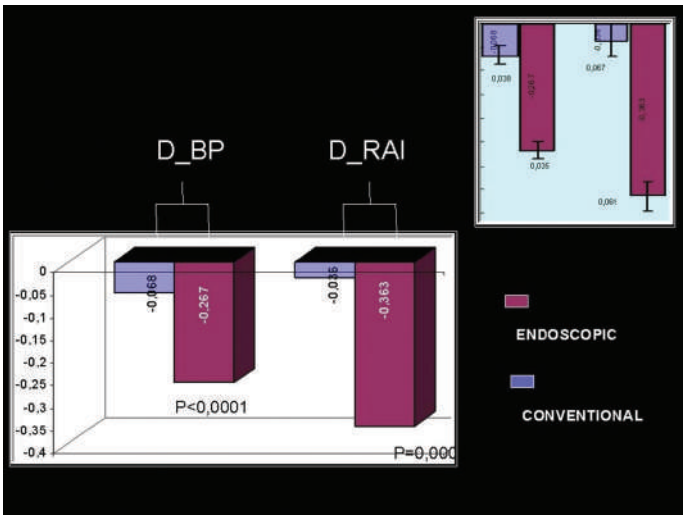

Table 2: Results in relation to the surgical technique used, by periorbital meas-urements of the face

Criteria Analyzed by the Evaluators.

Table 3 contains the results according to nine criteria evaluated by the 5 plastic surgeons, by type of surgery and aging category. In the analysis of those nine criteria, the relationship between the surgical technique employed and the category of aging was not significant (p>0.05), allowing simple comparison of the surgical techniques, independent of the aging category.

Among the criteria subjectively analyzed by the evaluators, using pre- and post-operative photos, the criterion "restoration of malar volume and position" favoured the endoscopic method. In both aging groups A and B, the endoscopic technique showed a superior result over conventional technique, with a high statistical significance (p=0.0076). [Figure 4].

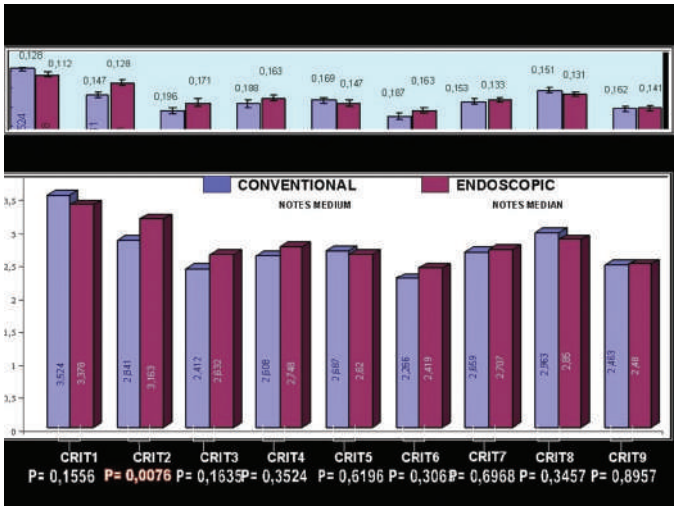

Table 3: Results according to criteria evaluated by the plastic surgeons, by type of surgery and aging category

Figure 4: Delta = post-operative measurement minus pre-operative measurement

Table 4 shows the results, according to criteria evaluated by the plastic surgeons by technique, independent of aging category. Endoscopic surgery, when compared with conventional surgery on the chosen criteria, was superior only in the criterion restoration of malar position and volume, with statistical significance (p=0.0076)

Table 5 shows the results of the criteria evaluated by the plastic surgeons, according to aging classification, independent of the type of surgery. Analyzing criterion 2 in Groups A and B, (p=0.0235), superior results were observed in Group B compared to Group A. The same occurred with the following criteria: distance from the palpebral rim to the blepharo-jugal sulcus, inferior palpebral flaccidity, and nasolabial face flaccidity, lateral canthus of the eyes, facial shape, and corner of mouth, all statistically significant. With both conventional and endoscopic techniques, better results were obtained in patients with more advanced aging (Group B, Hester types III & IV).

Discussion

With publication of the work by [26] and their new anatomical-physiological approach, facial surgery underwent accelerated development, with scientific advancement and evolution of techniques based on the SMAS approach, using the SMAS as the support structure for a more lasting result. Prior to this, the concept of face lift rejuvenation focused on the lower face and neck, and a good result was synonymous with improved mandibular and cervical-facial delineation. For the newer definition of a good result, the different SMAS-platysma approaches served well, and were very useful.

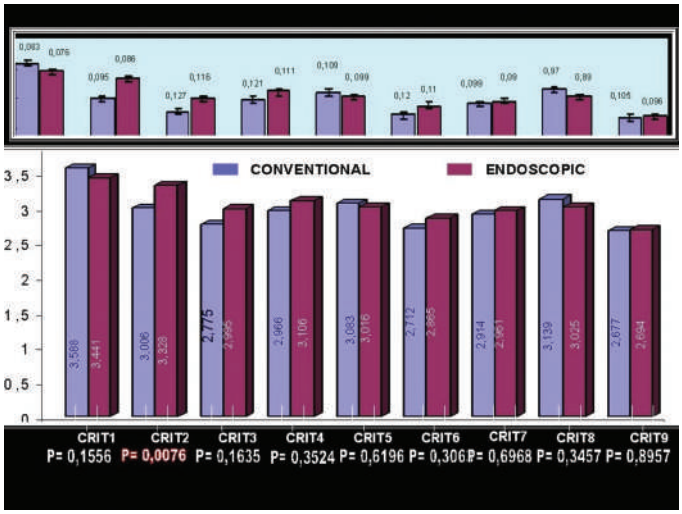

Table 4: Results according to criteria (crit) evaluated by the plastic surgeons by surgery, independent of the aging group

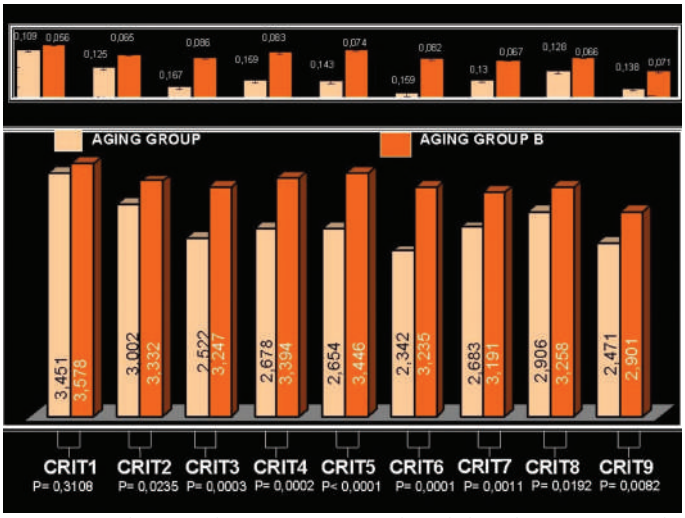

Table 5: Results according to criteria evaluated by plastic surgeons, by aging category, independent of surgery type. at the top: margin of error.

In 1980, [7] introduced subperiostal detachment of the upper portion of the face, yielding aesthetic results, and offering new horizons in deep undermining. Experts in this approach, [2, 8, 10, 13] extended the concept to the mid-portion of the face. With the evolution and development of video endoscopy, [27] introduced endoscopic assistance to facial surgery for subcutaneous and subperiosteal undermining, using it in the midface, forehead, and orbital, nasal and septal regions [11, 14] presented endoscopic techniques using the greatest variety of access points and planes of undermining.

In the work presented here, evaluation criteria were developed and objective measures for evaluation of those criteria to give comparative results were created, using pre- and post-operative photos of the

the orbital region, especially of the inferior portion, for its immediate proximity to the midface and central oval. This allowed for quantification of improvement and study of the degree of significance, comparatively between the two techniques, and in relationship to the aging classification. The post-operative measurements of the distance from the inferior palpebral rim to the blepharo-jugal sulcus and the inferior ray of the periorbital oval were derived from the pre-operative measurements, in order to determine the value of Delta, which represents the true numerical value of the surgical results. When comparing conventional and endoscopic surgeries by these measures, the value of P for the results using the endoscopic method was highly significant, showing superiority of result, as evidenced by the reduction of the distances, which were as significant in Group A (Hester types I & II) as in Group B (Hester types III & IV).

It was clear how much of the difference in the measurements could be attributed to the surgical method, as it was observed that the changes in the measurement from the lower palpebral rim to blepharo-jugal sulcus and the inferior ray were not significant with conventional surgery, but were highly significant with endoscopic surgery. When compared in relation with the two surgeries, the difference was highly significant for D-BP ($p<0.001$), as well as for D-RAI ($p< 0.002$). Based on these results, it was possible to objectively demonstrate the comments cited in literature alluding to the superiority of results in repositioning of the central portion of the midface along a vertical axis obtained with the endoscopic technique, and that this does not occur when employing conventional rhytidoplasty. [Figure 5, 6].

Figure 5: Difference between pre and post op measurements ( ) - conventional and endoscopic facelift

In the criteria analyzed subjectively by the evaluators, they only gave grades significantly in favor of the endoscopic technique for the criterion restoration ofmalar volume and position, with this rating given equally to both Groups A and B. It is interesinteresting to the subjective evaluation of the criterion of the distance from the inferior palpebral rim to the blepharo-jugal sulcus was rated as `not significant´ by the evaluators, although objectively shown to be numerically significant. This dissonant data suggests that some new concepts for the assessing rejuvenation of the central face were not incorporated into the subjective analysis, and that objective studies with measurements [Figure 7, 8] can be very useful in contributing to the evolution of both the technique and the criteria for assessing aesthetic outcomes.

Figure 6: Difference between pre and post op measurements ( ) - conventional and endoscopic faceliftfacelift

Figure 7: Pre and post op– conventional and endoscopic facelift – subjective evaluation by plastic surgeons

Figure 8: Pre and post op– conventional and endoscopic facelift – subjective evaluation by plastic surgeons

When results of the criteria regarding the technique used were evaluated, only criterion 2 showed statistical significance (p=0.0076), indicating the superiority of the endoscopic surgery over the conventional technique in the item `restoration ofmalar position and volume.´ The effect of the subperiostal endoscopic technique inconjunction with the repositioning of ptotic tissue and, in the systematization developed in the elevation of the buccal fat pad, followed by the malar fat and SOOF, [22] repositions the ptotic malar region and restores the volume by the overlapping of the fatty structures, reducing the inferior portion and thus providing more contour contrast in the malar region. The results for Group B were graded as better in the subjective evaluations, suggesting that the contrast was greater in tissue with a greater degree of ptosis, relative to its subsequent repositioning.

Thus, both through objective measurement, and subjective evaluation by other plastic surgeons, the degree of improvement as shown in the pre- and post-operative photos demonstrates that the endoscopic approach to subperiosteal undermining and vertical cephalic repositioning is significantly more efficient in repositioning the central portion of the midface, as compared with conventional rhytidoplasty and treatment of the SMAS-platysma. In general, and as might be predicted, results were more dramatic for Hester types III & IV [25]. It is reasonable to expect that patients with more evidence of aging will require more treatment and that the results will be therefore more dramatic.

Future prospective studies will be able to analyze good indications for the selection of the endoscopic technique, based on the measurement of the inferior palpebral rim to blepharo-jugal sulcus in the different aging types, and to help predict the best techniques for achieving the most favorable aesthetic results.

Conclusion

The comparison between the techniques of conventional rhytidoplasty and endoscopic subperiostal surgery with emphasis in the midface allows us to conclude that the subperiosteal endoscopic approach presents superiority of results compared to conventional rhytidoplasty:

1. The reduction in the distance from the inferior palpebral rim to the blepharo-jugal sulcus obtained using endoscopic technique is significantly greater than the reduction in distance achieved with the conventional technique.
2. This endoscopic technique significantly affects the restoration of volume and malar repositioning, restoring the central portion of the midface better than by conventional rhytidoplasty.
3. Group B (Hester Types III & IV), obtained more remarkable aesthetic results, independent of the technique used.

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