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Contouring of Non-Syndromic Long Face Deformity by Structure Lipofilling

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ABSTRACT

Long face deformity may be a part of craniofacial syndrome, which can be corrected by reduction osteotomies. However, non-syndromic long face is a common compliant which may be due to loss of facial fat foundation after weight loss in some individuals or constitutional in others. In this study, structure lipofilling of the different aesthetic zones of the face was used to contour the face and create well balanced facial dimensions. The study included 84 female patients with non-syndromic long face deformity. Structure lipofilling was performed according the standard technique of Coleman. The width of the face was measured at three transverse dimensions; transzygomatic (TZD), transtemporal (TTD), and transbuccal (TBD). With an average of 1 year follow-up period, there was an increase in the transverse facial dimensions with increased width/height facial index. More than 91% of the patients were satisfied by the results. The study concluded that long face deformity due to volume deficiency after weight loss can be corrected by lipofilling which restores the contour with balanced facial dimensions.

INTRODUCTION

Long face syndrome is a result of abnormal excess of the skeletal framework forming the longitudinal axis of the face **[1]**. The condition resulted from vertical maxillary excess or elongated chin and it is usually corrected by reduction osteotomies **[2]**. Another group of individuals are often presented by long face which is not related to abnormal skeletal growth. Loss of weight and wasting of facial fat foundation usually results in the decease of the width of the face leading to a relative long face appearance **[3,4]**. Contouring the face with respect to the different aesthetic units was the focus of interest among plastic surgeons in the past several years **[5-14]**.

In regard to the beauty of the face, there is a distinction between attractive and average faces in each culture. Many authors have reported that average faces are different from attractive faces and that attractive faces differ considerably according to race **[16,17]**. Furthermore, Perrett at al. **[18]** have reported that highly attractive facial configurations are not necessary average faces. Therefore, contouring of the face principally aims to produce an average face rather than an attractive face. Long face which is not a part of a syndrome has been presented as a disfigurement because it is usually considered out of the average face. Within this context, this study was designed to use the technique of lipofilling to contour the non-syndromic face.

PATIENTS AND METHODS

From June 2008 to December 2010, with an average follow-up period of 1 year, the study included 84 female patients who have had long face deformity. Based on cephalometric studies, the long face deformity was not related to syndromic reasons or excess skeletal growth. The age of the patients ranged from 18 to 38 year-old with an average age of 27.5 years. The study was conducted in plastic surgery center, state of Kuwait and Ain Shams University Hospital, Cairo, Egypt. The deformity was developed after variable degrees of weight loss in 49 patients (58.3%), while 35 patients reported that they did not have weight loss and their long face appearance was noticed since their adulthood. Blood tests were performed for bleeding and clotting profiles. The procedure was performed using general anesthesia with oral endotracheal tube.

Measurement and planning:

The vertical and horizontal measurements were taken directly on the faces of the patients. The vertical height was represented by a line starting from the anterior hair line traversing the central glabella, nasal tip, columella of the nose, Cupid's bow, and ending at the central of the menton (Fig. 1). Three horizontal lines represented the measurements of the width of the face at three different

levels. The transzygomatic distance (TZD) measures the maximum widest of the face at the zygomatic area. The transtemporal distance (TTD) measures the distance between both temporal areas at the level of the most depressed points on both temples. This line represented the width of the face at the upper midface. The transbuccal distance (TBD) measures the width of the face between the most distal points on both cheeks at the level of the mid upper lip. This line represented the width of the face at the lower midface.

Contouring of the face by lipofilling has addressed the aesthetic zones of the face "structure lipofilling". In this study, the aesthetic zones included the malar area, upper and lower cheek zones, preauricular zone, the nasolabial, and temporal zones (Fig. 2). Fat was injected through three sites on both sides of the face, the alar base of the nose, within the sideburn, and the inferior postauricular area just behind the lobule of the ear. For lip augmentation, fat was injected through the interior of the angle the mouth.

Operative procedure:

Structure lipofilling consisted of three steps; harvesting of the fat graft, preparation of the fat graft, and lipofilling of the different aesthetic zones of the face.

Harvesting of fat graft:

Harvesting the fat was frequently chosen from the inner or out thighs, lower abdomen, or the flanks. Tumescent technique was used for liposuction with a solution consists of 1cc of epinephrine, 200mg of lidocaine, and 5mEq of sodium bicarbonate in 1L of normal saline. The infiltration of the solution was mainly concentrated to the fat in the deep subcutaneous planes. The volume of the infiltrated solution was twice the volume of the anticipated lipoaspirate. Fifteen minutes after infiltration of the tumescent solution, liposuction was carried out using 3-mm liposuction cannula connected to 50cc syringe. Liposuction was performed by using gentle passing motions to minimize trauma to the fat cells. The harvested fat was collected in multiple 50cc syringes and then, these syringes were left in the upright position to allow for the precipitation of fat.

Preparation the fat graft:

After removal of the supernatant fluids, the fat was then gently transferred to 10mL syringes. Centrifugation of fat grafts was performed at 1000 RPM, for 1 minute, at 25 C^{o}. Following centrifugation, the aspirate was consisted of three layers. The top layer is free oil from ruptured fat cells which was decanted or blotted gently. The bottom layer contains variable amounts of tumescent fluid and blood and was drained. The middle layer consists of fat cells used for grafting.

Lipofilling of the face:

The prepared fat ready for injection in multiple 10cm syringes and each syringe was connected to tulip cannula. With the use of # 11 blade, a 1-2mm stab incision was made at the alar base on both sides. Through this incision, the fat was injected to malar area, the nasolabial folds, and the upper medial part of the cheeks. The cannula was inserted through this incision and gentle passes were performed parallel to the nasojugal fold to create small tunnels in the malar area. The fat was injected gently in a controlled method and upon withdrawal. The fat was injected from deep to superficial planes, including the supraperiosteal, muscular and subcutaneous planes. Continuous gentile digital pressure was performed to help in contouring the injected fat graft. The volume of fat injection depended on the structure and deficiency be corrected, however, slight overcorrection was performed. Much attention was given to inject equal volumes of fat in both malar areas to achieve symmetrical filling.

With a 1-2mm stab incision within the sideburn, fat was injected in the cheeks, particularly, the central check and the preauricular area. Transverse tunnels were performed parallel to the nasojugal folds and the mandibular borders. The lower face was contoured by fat injection through the incision behind the ear lobule. Some patients had severe deficiency of soft tissue at the temples which were contoured by fat grafting through the incision of the sideburn. Lip augmentation was performed to a number of patients upon their request which was not a part of the management of the long face. Fat was injected through small stab incision in the inner part of the angle of the mouth.

The total volume of fat injection to the whole face ranged from 64 to 95cc with a mean volume of 78mL. The mean volume of injected fat in each zone is shown in Table (1). Lipofilling of the lips was performed to only 16 patients with a mean volume of 3cc fat in each lip.

RESULTS

Out of 84 female patients included in the study and with an average follow-up period of 1 year, 77 patients (91.7%) were highly satisfied by the contouring of the face and balanced facial dimensions (Figs. 3-7). Three patients developed variable degrees of asymmetry which treated by secondary

lipofilling. Four patients were not satisfied by the contouring results and requested for additional lipofilling. Mild to moderate bruises developed in 12 patients which subsided in an average of 1 week.

The preoperative measurement of the facial dimensions revealed a mean value of the face midline distance of 19.25cm. The mean values of TTD, TZD, and TBD were 14.25, 14.75, and 13.75 respectively. One year after lipofilling of the face, the mean values of TTD, TZD, and TBD were 15.15, 16.50, and 15.25 respectively (Table 2). The postoperative increase in the transzygomatic dimension (TZD) was statistically significant (p<005) while the transverse facial dimensions at the temporal (TTD) and buccal (TBD) areas was not statistically significant (p>05). However, subjective evaluation which was based on patient, doctor and nurse evaluation revealed high satisfactory results.

The width/height index between the width of the face at the three transverse dimensions and the vertical height was calculated. The preoperative width/height index was 0.74, 0.77, and 0.72 at the TTD, TZD, and TBD respectively (Table 3). One year after contouring the face, the index was 0.79, 0.86, and 79. The difference in the transzygomatic facial index was statistically significant (p<005).

Table (1): Volume of lipofilling in each aesthetic zone of the face.

Facial aesthetic zones	Range of Volume of injected fat in each zone (mL)	Mean value (mL)
Malar	10-14	12.5
Nasolabial	1.5-2.5	2
Cheek buccal	8-12	9 .5
Cheek mandibular	6-8	7
Preauricular	4-6	4.5
Temporal	2-5	3.5

Table (3): Pre- and 1 year postoperative width/height index at the different transverse facial dimensions.

Width/height index	Transtemopral facial index	Transzygomatic facial index	Transbuccal facial index
Preoperative	0.74	0.77	0.72
1 year postoperative	0.79	0.86	0.79
(p-value)	>05	<005	>05

Table (2): Preoperative and 1 year postoperative measurements of facial dimensions (paired t-test).

	Face midline distance "FMD" cm	Transtemopral distance "TTD" cm	Transzygomatic distance "TZD" cm	Transbuccal distance "TBD" cm
Preoperative	19.25	14.25	14.75	13.75
1 year postoperative		15.15	16.50	15.25
Paired t-test (p-value)		>05	<005	>05

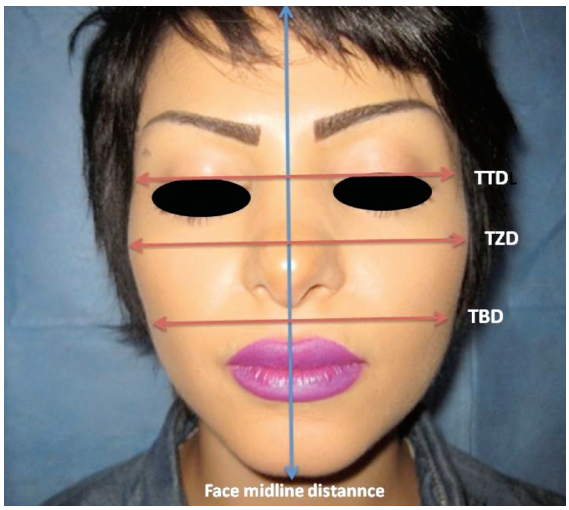

Fig. (1): Measurement of the vertical and horizontal dimensions of the face. The face midline distance is represented by a vertical line starts from the anterior hair line and ends at the central of the menton traversing the central face. TTD "tanstemporal distance" measures the width of the face at the level the most depressed points on both temples. TZD "transzygomatic distance" measures the width of the face at the level of the most distal points of the zygomatic areas. TBD "transbuccal distance" measures the width of the face between both cheeks at the level of the mid upper lip.

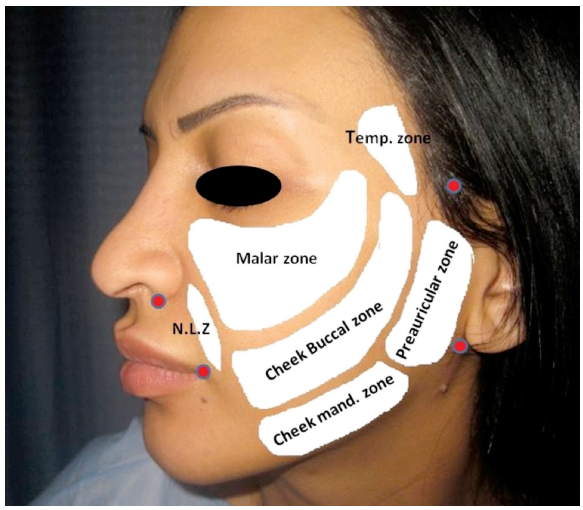

Fig. (2): Aesthetic zones of the face which were injected by fat. The malar, cheek buccal, cheek mandibular, preauricular, temporal, and nasolabial zones. The rounded red markings represent the approaching sites for fat injection at the nasal base, sideburn, post ear lobule, and angle of the lips.

Fig. (3A,B): Front and profile views of 28-year old female patient with long face deformity. C and D The front and profile views 1 year after lipofilling of the face.

Fig. (4A,B): Front and profile views of 33-year old female patient with profound long face deformity. C and D The front and profile views 1 year after contouring the face by lipofilling.

Fig. (5): Front and profile views of 31-year old female patient with long face deformity. C and D The front and profile views 1 year after contouring the face by lipofilling.

Fig. (6A,B): Front and profile views of 35-year old female patient with long face deformity. C and D The front and profile views 1 year after contouring the face by lipofilling.

Fig. (7): Front view of long face deformity of 26-year old female patient. B The front view 1 year after contouring of the face by lipofilling.

DISCUSSION

With respect to racial variations, a youthful face is characterized by a smooth transition between the different aesthetic zones and balanced vertical/width dimensions. The vertical height of the face is mainly made by skeletal framework while the transverse contouring is mainly formed by soft tissue and facial fat foundation. This fat is anatomically distributed in special facial fat compartments and in superficial and deep facial planes **[19]**. Wight loss with the consequent facial fat loss usually leads to a disturbance of the height/width proportions and the presentation of the long face deformity.

Measurements of the human face have been performed since the Greek era, and many aspects of ancient measurements can be found in modern clinical anthropometry **[20-24]**. Several studies described the anthropometry and canons of the harmonious face **[25-28]**. However, these studies described the vertical and horizontal measurements independently without a real correlation between the two dimensions. Farkas and his colleagues **[29-32]** extensively studied the anthropometry of the face. Among different ethnic groups, they could establish a facial height/width index as well as an inclination index for the different facial structures **[33-34]**. These studies have greatly affected our understanding to the facial aesthetics **[35-37]**, facial contour **[38]**, and facial aesthetic surgeries **[30-40]**. According to the morphometric study of Farkas et al. **[41]**, the transzygomatic distance (TZD) is the maximum width of the face. However, in this study, two measurements were invented which represented the width of the face at the upper (TTD) and lower (TBD) midface. Although, the increase in the facial width in two levels was not statistically significant, the patients were highly satisfied by the appearance of the face.

Objective evaluation of the balanced aesthetic facial dimensions may depend on the skeletal **[42]** as well as soft tissue cephalometry, **[43]**. In their earlier description, Whitaker and Bartlett **[44]** have introduced the concept of skeletal alteration to achieve facial rejuvenation. Bartlett et al. **[45]** studied the skeletal facial dimensions as an objective method for surgical planning. In our study, long face deformity was a result of wasting of the soft tissue foundation; therefore, the measurements of transverse facial dimensions included the soft tissue rather than bony framework.

In an attempt to contour the long face deformity, the most widely adopted fat-grafting technique is that popularized by Coleman **[46]**. The use of lipofilling is an ideal option to contour the different aesthetic zones and to produce a balanced face in both the static and dynamic reactions **[47-51]**. The engraftment of the malar, cheek, and temporal zones was able to increase the transverse dimensions of the face and reverse the long face appearance.

Many biosynthetic soft tissue fillers were widely used in the last 10 years **[52-59]**. Hyaluronic acid **[60-62]** and Polyacrylamide hydrogel **[58,63,64]** in their different forms are the most commonly used. The use of Hyaluronic acid to contour the face needs the injections of large volumes of already expensive temporary filler. Polyacrylamide hydrogel is long-lasting; however, short and long-term adverse effects have been reported **[65-68]**. More

important, local reaction and tissue fibrosis leads to unnatural expressions during facial animation **[69]**. Fat grafting gives balanced contour and natural facial animations with less reported complications **[5-11,70]**. In this series, with a mean of 1 year follow-up period, fat grafting was maintained. Unlike Polyacrylamide hydrogel, repeated lipofilling can be performed safely **[68]**.

"The authors declare that they have no conflict of interest".

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