

Analysis of the Effect of Zygomatic Fat Pad Lifting Combined with Ultra-High SMAS Technique on the Improvement of Nasolabial Folds (Lower Eyelid Margin Incision)

Jun Xiao, Mandi Zhou, Chu Zhang, Yongjia Tan, Hongwei Shi*

Hanmei Medical Beauty Clinic of Xiaogan City Development Zone, Xiaogan 432000, Hubei Province, China

*Corresponding author: Hongwei Shi, xj1219058896@163.com

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Abstract: This paper aims to explore the effect of zygomatic fat pad lifting combined with ultra-high superficial muscular aponeurotic system (SMAS) technique on the improvement of nasolabial folds. From December 2021 to June 2022, 40 patients with facial sagging were selected in our hospital to perform zygomatic fat pad lifting combined with ultra-high SMAS technology for large facelift surgery. Combined with lower eyelid incision and zygomatic fat pad degloving, the middle and lower face lift surgery, the improvement of the nasolabial fold, and the reduction of the apple cheeks were evaluated to assess the surgical effect. Statistics were collected on the improvement of nasolabial folds and apple cheeks aesthetic units before and after operation in 40 follow-up patients, and the satisfaction degree of nasolabial fold elevation and apple cheeks reduction was investigated and analyzed. The facial nasolabial folds and apple cheeks aesthetic units of 40 patients were followed-up after operation and compared with those before operation, and the difference was statistically significant ($P < 0.05$). After surgical treatment, 95% of patients were satisfied with the improvement of nasolabial folds, and 97.5% were satisfied with the reduction of apple cheeks. Zygomatic fat pad lifting combined with ultra-high SMAS technique has a significant effect on the reduction of apple cheeks zygomatic fat pad and nasolabial fold elevation, and it has clinical application value.

Keywords: Malar fat pad; Ultra-high SMAS technique; Nasolabial fold; Apple cheeks

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1. Introduction

In all kinds of large-scale facelifts nowadays, the peeling of the largest range of skin flaps generally reaches the limit of peeling at the vertical line of the outer corner of the eye. This kind of face lift is still very limited to the improvements of apple cheeks or nasolabial folds and Indian lines^[1]. The main reasons are:

- (1) The zygomatic fat pads of the apple cheeks is basically in an unstripped state.
- (2) The important anatomical basis of the nasolabial fold is the buccal maxillary ligament.
- (3) Most of the anatomical basis of the Indian striae is involved with the zygomatic ligament.

- (4) The zygomatic fat pad cannot achieve complete reduction and healing.
- (5) The orbicularis oculi ligament, the buccomaxillary ligament, the zygomatic ligament, and the ligament around the inferior orbital fissure are all involved in the zygomatic fat pad, which affects the oblique outward and upward elevation of the zygomatic fat pad.
- (6) The formation factors of the nasolabial fold are not only the fixation of the buccal maxillary ligament, but also the aging hyperplasia of subcutaneous fat in the nasolabial fold area, and the pyriform foramen, osteoporosis, bone resorption, aggravation of periosteum absorption depression, and the influence of muscle movement near the fossa axis.

The presence of these factors makes nasolabial fold resolution very difficult. The ordinary SMAS double-layer technique can be stripped to the origin of the zygomaticus major at the vertical line of the outer canthus^[2]. There are still a lot of ligaments in the inner part of the apple cheeks, and the local subcutaneous SMAS is very thin, which is difficult to peel off. Based on this, this study selected 40 patients with facial sagging in our hospital as the research objects, and used the zygomatic fat pad lifting combined with the ultra-high SMAS technique for large facelift treatment. The effect is significant, and the report is as follows.

2. Materials and methods

2.1. General information

A total of 40 patients with facial sagging admitted to our hospital from December 2021 to June 2022 were selected as the research subjects, all of whom were female, aged 40 to 67 years old, with an average age of 51.4 ± 7.2 years old. The study hospital was approved by the ethics committee. All patients are operated on by the same team of skilled surgeons.

2.2. Methods

The surgical procedure is as follows. Mid-lower face lift combined with lower eyelid incision and degloving of zygomatic fat pad was performed. After designing and drawing the line, the drape was sterilized with iodophor, and after general anesthesia, the sterile drape and skin were sutured for fixation. Tumescence fluid was injected into the surgical area. Swelling solution 500ml, with proportion of 8 sticks of 2% lidocaine, 5ml sodium bicarbonate, 500ml normal saline, 0.5ml adrenalin. The swelling fluid was uniformly injected into the subcutaneous fat layer of the face and neck, and the mixed solution of ropivacaine and lidocaine was used for nerve block anesthesia on the sensory nerve.

The skin and subcutaneous fat layer were cut through the standard incision of the face lift. The temporal part was peeled first, and the layer of peeling was the superficial fascia layer. The principle is that the hair follicles are faintly visible and do not damage the hair follicles. The temporal part was dissected forward to 2.5cm lateral to the temporal ridge. Then the area in front of the ear was peeled off, and the subcutaneous fat was split to ensure that there is a uniform fat and capillary network under the skin. The skin in front of the ear was peeled off to 2.5cm outside the vertical line of the outer corner of the eye. Then the ear was peeled off to the back of the ear, and to 7cm below the ear and to 6cm behind the ear. After the first layer stripping is done, design the SMAS stripping area. From the level of the eye fissure, preauricular dissection to the emergence of the orbicularis muscle, the dissection layer was the superficial layer of the SMAS fascia and did not enter the middle temporal fascia. After the orbicularis muscle was dissected, it was dissected downwards, and the zygomatic ligament, the parotid cortex ligament, and the suspensory ligament of the platysma muscle were interrupted. After reaching the skin peeling boundary, the complex peeling under the SMAS was carried out and continued to move forward, exposing the zygomaticus major muscle and the masseter muscle encapsulated by

the buccal fat pad. The zygomaticus major was continued to be carefully dissected under the zygomatic fat pad, and all ligaments that restricted the movement of the zygomatic fat pad were severed, for further exposure of the zygomatic minor muscle. At the same time, the ligament around the zygomatic minor muscle was severed. The fibrous ligament around the buccal fat pad was severed, the masseter cutaneous ligament was fully severed, and the SMAS was dissected down to the vicinity of the pupil. Using the lower eyelid incision to enter, the attachment of the orbicularis muscle to the orbital rim is first dissected. Then tissue scissors were used to gently peel off the medial side, separate the orbicularis muscle and the levator alar nasi muscle, slide along this gap into the nasolabial fold area, and large blood vessel forceps were used to stretch and release the buccomaxillary ligament. The complete release of the ligament at the nasolabial fold was observed, the lower middle part of the lower eyelid was peeled off, center on the infraorbital foramen, and tissue scissors were used to peel off the attachment of the buccomaxillary ligament to protect the vascular and nerve bundles. After the release of the central ligament, it was observed that the malar fat pad was completely without gap. The outside was continued to be peeled off. First, the surface of the periosteum was peeled outward, and then the surface of the periosteum of the zygoma was peeled to about 3cm outside the outer corner of the eye. At the lower part of the dissection, on the surface of the zygomaticus major and minor muscles, the zygomatic ligament was carefully dissected to allow the zygomatic fat pad to be further dissected, and it was observed that the gap had been dissected and penetrated with the lateral SMAS. At this time, the SMAS was lifted and it was observed that the entire middle and lower face is tightened and lifted without resistance, and the peeling is completed. The wound was washed, with the bleeding stopped, the parotid gland was folded and sutured, the excess buccal fat pad was released and sutured. The SMAS was sutured in the deep temporal fascia through multi-point suspension, the SMAS was interrupted from the mandibular line, with the excess SMAS removed, and the SMAS incision line was sutured. The firmness of the face was observed, the apple cheeks were reset, the wound was rinsed and sutured again. Three upper drainage tubes were attached, and the same was done for the opposite side. Then, it was covered with sterile dressing and elastic bandage for compression.

2.3. Evaluation indicators

The same doctor took natural photos of the face before the operation and one year after the outpatient follow-up. According to the data, the improvement of the nasolabial fold and the reduction of the apple cheeks were evaluated to assess the effect of the operation. Statistics were collected on the improvement of nasolabial folds and apple cheeks aesthetic units before and after operation in 40 follow-up patients, and the satisfaction degree of nasolabial fold elevation and apple cheeks reduction was investigated and analyzed.

2.4. Statistical processing

The relevant data before and after the operation were entered into an Excel table, and the results were counted by SPSS26.0, and the count data were analyzed by *t* test. $P < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1. Esthetic unit score before and after surgery for the improvement of nasolabial folds and apple cheeks reduction

Based on **Table 1**, the facial nasolabial folds and apple cheeks aesthetic units of 40 patients in the postoperative follow-up were improved compared with those before the operation, and the difference was statistically significant ($P < 0.05$).

Table 1. The improvement of nasolabial fold and the reduction of apple cheeks in patients before and after aesthetic unit score (\pm s).

Time	n	Grading by aesthetics unit	
		Facial nasolabial folds	Apple cheeks
Before surgery	40	2.602 \pm 0.517	3.823 \pm 0.409
After surgery	40	2.295 \pm 0.438	2.576 \pm 0.314
<i>t</i>		7.037	10.256
<i>P</i>		0.003	0.000

3.2. Survey of patients' satisfaction with nasolabial fold improvement and apple cheeks reduction

After the application of zygomatic fat pad lifting combined with ultra-high SMAS technology, the patients were satisfied with the improvement of nasolabial folds. Among them, 32 cases were very satisfied, 4 cases were relatively satisfied, 2 cases were satisfied, and the satisfaction rate was 95%. For the satisfaction of apple cheeks reduction, 30 cases were very satisfied, 6 cases were relatively satisfied, 3 cases were satisfied, and the satisfaction rate was 97.5%.

3.3. Comparative analysis of preoperative and postoperative cases

The comparison between preoperative and postoperative effects of zygomatic fat pad lifting combined with ultra-high superficial muscular aponeurotic system (SMAS) technique on the improvement of the nasolabial fold and the reduction of the apple cheeks is shown in **Figure 1**.



Figure 1. Comparison of preoperative and postoperative effects of patient 1

4. Discussion

With age, the loss of fat accelerates, the subcutaneous tissue becomes thinner, and the apple cheeks become smaller and plump. In this study, the zygomatic fat pad lifting combined with the ultra-high SMAS technology for large face lift program added the eye bag incision. Peeling was performed under direct vision. The approach is the anterior zygomatic space, as shown in **Figure 2** ^[3].

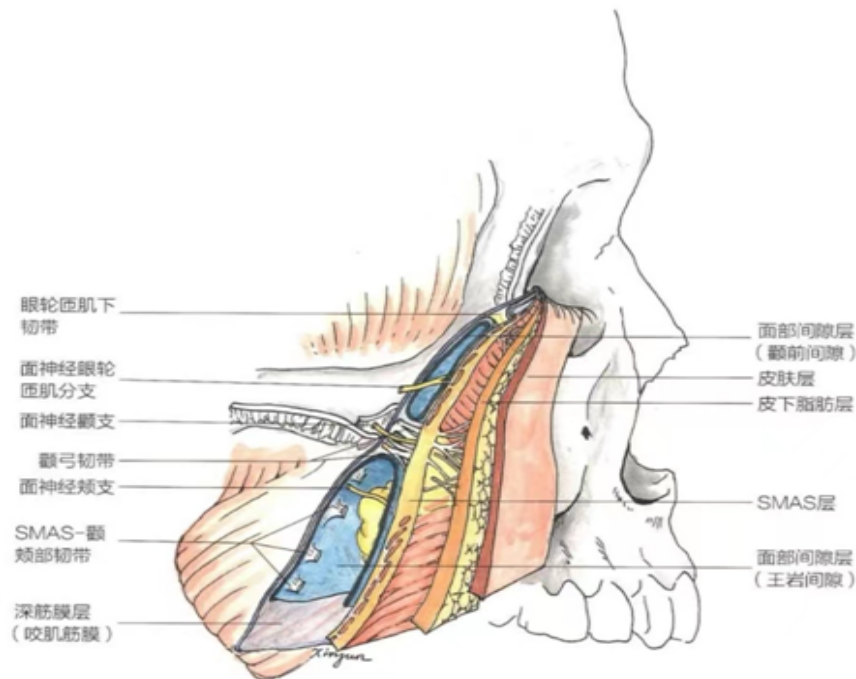


Figure 2. The supporting ligaments of the face play the role of identifying, guiding, stabilizing, and protecting the branches of the facial nerve

Translation: (on the left, from top to bottom) suborbicularis ligament, orbicularis oculi branch of facial nerve, zygomatic branch of facial nerve, zygomatic ligament, SMAS-malar buccal ligament, deep fascia (masseter fascia); (on the right, from top to bottom) facial space layer (prezygomatic space), skin layer, subcutaneous fat layer, SMAS layer, facial space layer (Wang Yan space).

Accessing from standard pouch incision myocutaneous flap, tissue scissors are used to first peel off the adhesion between the medial orbicularis oculi muscle and the periosteum, and carefully peel off 3–5mm to decapitate the orbicularis oculi muscle. The suborbicularis oculi fat (SOOF) is peel off and its upper layer is peeled off with tissue scissors on the middle and outer sides, only to the inferior orbital fissure. The outer side is stripped under the SOOF near the periosteum to 3cm outside the outer corner of the eye. This dissection protects the portion of the zygomatic nerve branch that enters the orbicularis muscle under the SMAS. After the lower lateral side is stripped to the surface of the zygomaticus major, it is continued to the lower medial side. The main layer is under the malar fat pad. The blunt tissue shearing and dissection is continued along the zygomaticus major muscle to the inner and lower sides. The dense ligament tissue is cut off with scissors. Careful blunt dissection with scissors near the infraorbital foramen finds and protects the nerves and blood vessels in the infraorbital foramen. The surrounding tissues and ligaments are cut off on the inside, along the lower part of the orbicularis muscle, and along the gap between the orbicularis muscle and the levator lip nasius muscle, it is easy to enter the nasolabial groove. No active bleeding was observed after apple cheeks peeling was completed. Then the standard ultra-high SMAS technique was performed, it is peeled from the outer corner of the eye 1cm below the mandibular angle to the inside, and the 3cm of the outer corner of the eye under the SMAS is kept without peeling. The periosteum has already been peeled here. In this way, the outer SMAS dissection can be penetrated and released to the nasolabial fold. Nasolabial folds and marionette lines can be lifted very lightly ^[4]. **Figure 3** shows the structures of the whole face, the brow area, and the brow space eyebrow fat pad.

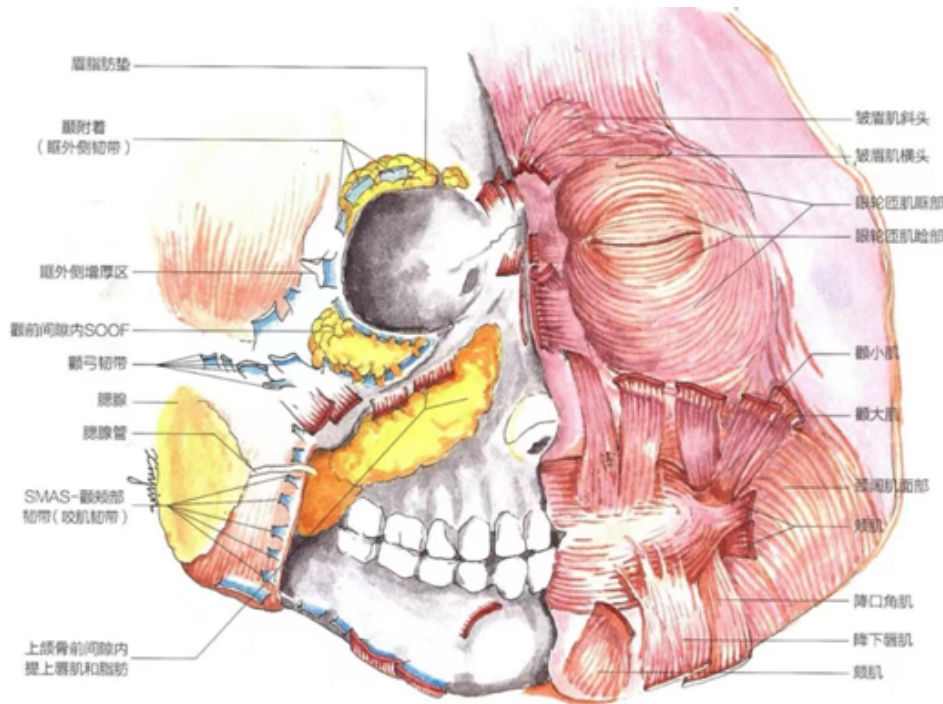


Figure 3. The structures of the whole face, the brow area, and the brow space eyebrow fat pad

Translation: (on the left, from top to bottom) zygomatic attachment (lateral orbital ligament), lateral orbital thickening, SOOF in prezygomatic space, zygomatic ligament, parotid gland, parotid duct, SMAS-zygomatobuccal ligament (masseroid ligament), levator labii muscle and fat in the anterior space of the maxilla; (on the right, from top to bottom) corrugator diagonal, corrugator horizontal, orbicularis oculi orbital, orbicularis oculi eyelid, zygomaticus minor, zygomaticus major, platysma face, buccal muscle, depressor anguli oris muscle, lower lip muscle, buccal muscle.

After the stripping is completed, the buccal fat pad is suspended outward and upward for suture. The parotid folds were narrowed with sutures. Then the SMAS is suspended at multiple points to the deep temporal fascia and sutured. The nasolabial fold can be completely flattened and disappeared, and the firmness reaches the limit. The bleeding is stopped and sutured, and the skin was removed according to the standard surgical procedure. Lastly, a part of the dermis is taken with the epidermis removed. The bilateral nasal bases are filled through the incision in the nostrils. On the one hand, it supplements the capacity and allows the nasolabial fold to receive better support, thereby reducing rebound. The excess fascia crescent is removed and filled into the lateral buccal depression ^[5]. On the other hand, through this set of procedures, the face can be reduced to a smaller face, and it can be transformed into a V-apple cheeks with an aesthetic arc, the nasolabial folds can also be resolved to the maximum extent, and the degree of rebound is greatly reduced. **Figure 4** shows the zygomatic fat pad.

In this study, the combination of zygomatic fat pad lifting and ultra-high SMAS technology is used to treat the SMAS fascia layer deep in the tissue, and at the same time, the skin and other tissues attached to it are jointly lifted to improve the signs of aging on the face. This approach not only effectively restores the plump state of the apple cheeks, but also improves the fatigue caused by the midface depression, reduces nasolabial folds, and lifts and tightens loose skin. In this study, the patient satisfaction of this method was very high. The facial nasolabial folds and apple cheeks aesthetic units of 40 patients were followed-up after surgery, and the difference was statistically significant. After surgical treatment, 95% of patients were satisfied with the

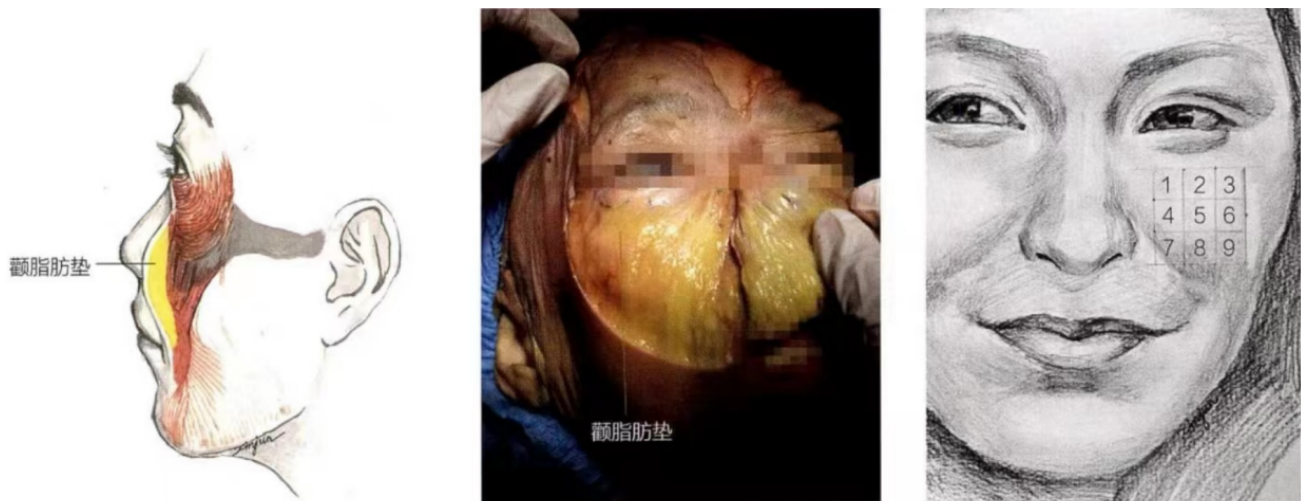


Figure 4. (From left to right) Diagram of zygomatic fat pad (Translation: zygomatic fat pad), anatomy of zygomatic fat pad (Translation: zygomatic fat pad), subcutaneous fat in midface (zygomatic fat pad)

improvement of nasolabial folds, and 97.5% were satisfied with the reduction of apple cheeks. Therefore, the application of zygomatic fat pad lifting combined with ultra-high SMAS technology, especially the reduction of apple cheeks zygomatic fat pad and the lifting of nasolabial fold, has significant effects and is worth clinical application value.

Disclosure statement

The authors declare no conflicts of interest.

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