

Intraoral Reduction Malarplasty with Simultaneous Zygomatic Soft Tissue Lifting: Prevention of the Mid-Face Sag

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구강접근법을 통한 광대뼈 축소술에서 수술 후 뺨 처짐의 문제점을 방지하기 위한 술기적 섬세함에 대해 연구가 필요했다. 저자들은 2005년 1월부터 2006년 1월까지 두드러진 광대뼈를 가진 24명의 환자에게 구강 내 접근법을 이용한 광대뼈 축소술을 시행하면서 이러한 관점에서 접근하고자 하였다. 전체 증례에서 절골된 광대뼈는 상, 후측으로 재위치시켰고, 동시에 입주위 근육들과 골막을 적절히 재배치시켜 심부측두근막에 고정시켰다. 전체 환자에게서 좌, 우측의 광대뼈의 대칭적 축소가 수술 후 확인되었으며, 평균 10.22 ± 1.97 mm의 얼굴 폭의 감소가 있었다. 6개월에서 12개월의 추적관찰 기간 동안 모든 환자들은 수술결과에 만족하였으며, 수술 후 뺨 처짐은 발생되지 않았다. 저자들이 시행했던 입주위 근육들과 골막의 상, 후측 재배치 방법은 간단하고 효과적인 방법이지만 좀 더 긴 기간의 추적관찰이 필요할 것으로 생각된다.

Key Words: Zygomatic arch, Face lift / Reduction malarplasty, Intraoral approach, Technique refinement

I. INTRODUCTION

Currently, restoration of zygomatic complex protrusion deformity is increasingly popular in China, and intraoral approach is widely used in clinics. According to Choi and colleagues,¹ L-shaped osteotomy with temporal minor incision is a second-generation oral approach procedure. Despite many advantages of such procedure, we have found some inevitable shortcomings that should be studied and improved. For example, L-shaped osteotomy exposes the middle part of zygomatic complex more during operation, and the ensuing nerve violation results in feeling of temporal anomaly; intrusion into maxillary sinus leads to potential sinus inflammation

술후 뺨 처짐 방지를 위한 구강 접근 광대뼈 축소술

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as well as intractable bleeding; steel-wire fixation is not entirely reliable and apt to split; symmetrical outcomes may be affected by masseter internal rotation forces; zygomatic arch may squeeze coracoid process, resulting in chewing pain and; the soft tissue ptosis of the mid-face brings about deeper nasolabial fold. The former four defects could be avoided by detailed preoperative design, precise manipulation during operation, and reasonable care after operation. However, problems of the mid-face ptosis remains impracticable. Qi² suggested that young patients who undergo L-shape osteotomy with temporal minor incision are prone to ptosis of mid-face, Baek et al.³ and Choi et al.¹ thought that intraoral approach is usually followed by such complications, and Cho⁴ advocated it as the major complication. Nevertheless, there have been no effective clinical solutions. From January 2002 to December 2004, 10 cases of 62 patients in our

hospital exhibited various degrees of mid-face ptosis within 6 months follow-up(Fig. 1). Therefore, according to anatomic study of zygomatic complex and relative supportive structures, we modified the surgery with the design of zygomatic soft tissue suspension through intraoral and temporal small incision.

II. MATERIAL AND METHOD

Patients

Patient charts and photographs from January 2005 to January 2006 were reviewed. We have identified 24 cases among the patients. All women(aged 18 to 37 years old, and an average of 27.8 years old) were affected by congenital or developmental abnormalities with no other craniofacial disease. Pre-operative and post-operative photographs were comparatively analysed for the efficacy of the surgical treatments. Follow up of patients was made at least six months to maximum of one year.

Methods

Estimation

Three-dimensional CT scan of zygomatic complex was employed pre- and post-operatively to evaluate the bony shape changes(Fig. 2). Supra-face/mid-face ratio of this group was greater than 0.75. All cases presented protrusive zygomatic complex.

Surgical procedures

The anesthesia was performed using intravenous induction, and nasal intubation inhalation with local injection of 0.4% lidocaine along with appropriate amount of adrenaline. With 1 cm incision inside the temporal hair line, a reciprocating saw was inserted to cut off the root of zygomatic arch from its inner to outer side. With an another 4 cm incision on the oral buccal mucosa of upper lip, a freed periosteum was used to elevate the anterolateral periosteum of zygomatic complex, which included inferior area of the orbit rim, zygomatic body and 1/4 anterior part of zygomatic arch. According to the L-shaped line designed in advance, 3 mm to 8 mm wide bone of zygomatic body was removed. Then, the dissociated part of zygomatic complex was lifted upward along

oblique osteotomy line, while the zygomatic arch was pressed inwards. Subsequent to reduction of zygomatic complex in appropriate site, a two-way steel wire was used to tightly fix it. Then, two anatomical hanging points were selected: one was set up on the zygomatic muscle at the superior point of zygomat-maxillary suture, and the other was designed on zygomatic fat pad on the vertical line of lateral canthus. The distance between two hanging points was less than 1.5 cm, and suspension line was ensured underneath the SMAS(superficial musculoaponeurotic system) layer with no damage to facial nerves. After a round needle drilled through the hanging points, two 10 cm long cutting needles with suture line(4-0 PDS) were passed beneath SMAS layer. The two needles advanced outward and upward from the hanging points to ear-temporal incision, respectively. Under the ear-temporal incisions, we hooked downwards to temporal deep fascia and stitched, properly adjusting the degree of tension of knot until relatively obvious lift of zygomatic soft tissue could be ensured without dimpled pileup deformity. Fixed zygomatic complex exhibited overall upward shift also in favor of soft tissue coverage located in slightly higher area. The ear-temporal incision should be kept away from superficial temporal arteries. The proper separation angle between the hanging lines and the vertical lines of lateral canthus should be no less than 45 degrees, thereby preventing lifted soft tissues to be excessively piled up (Fig. 3, 4).

III. RESULTS

The differences in the mid-facial widths between pre- and post-operative measurements were analyzed (Table I). Scrupulous post operative analysis of 24 cases, revealed that our technique of prevention of zygomatic soft tissue drooping resulted in no malar drooping and nasolabial sulcus deepening in 23 (96%), and slightly but unnoticeable nasolabial sulcus

Table I. Relevant Anatomical Measurements Before and after Zygomatic Complex Reduction (n=24, $\bar{x} \pm s$)

Item	Distance(mm)
Reductive width of mid-face	10.22 \pm 1.97

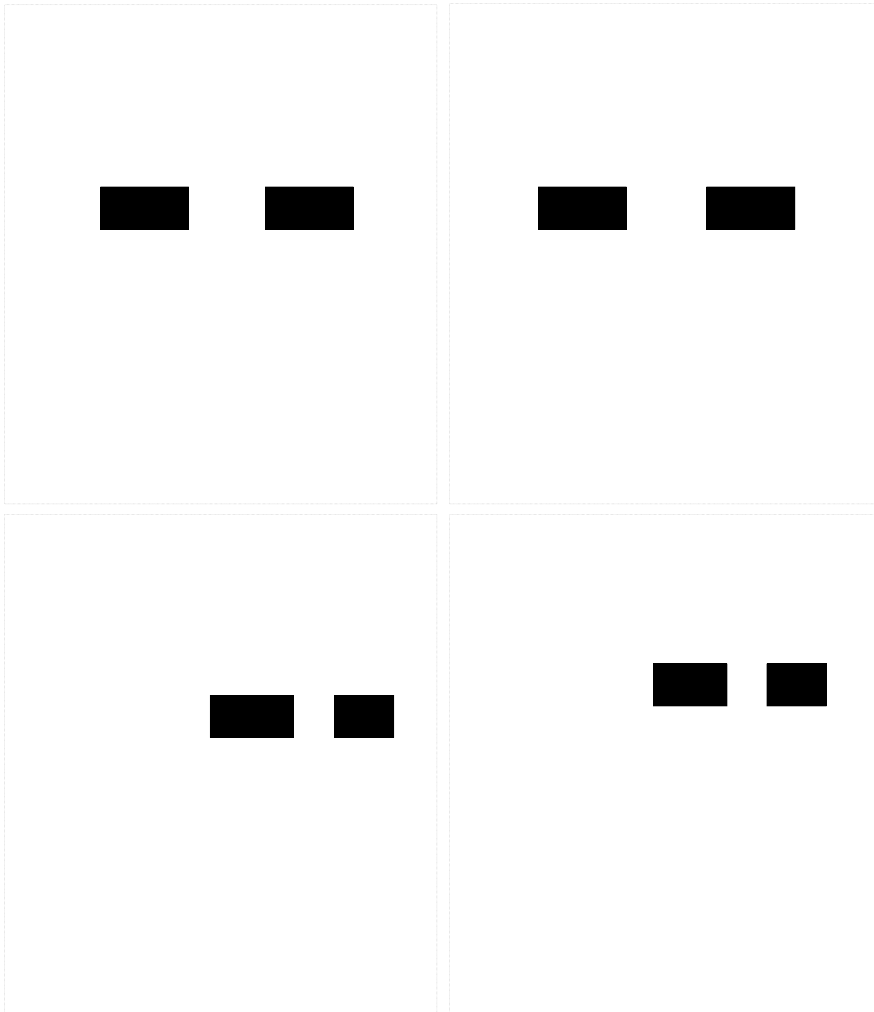


Fig. 1. Frontal view of postoperative cheek drooping and nasolabial fold deepening. (Above left, Below left) Pre-operation; (Above right, Below right) post-operation after 6 months.

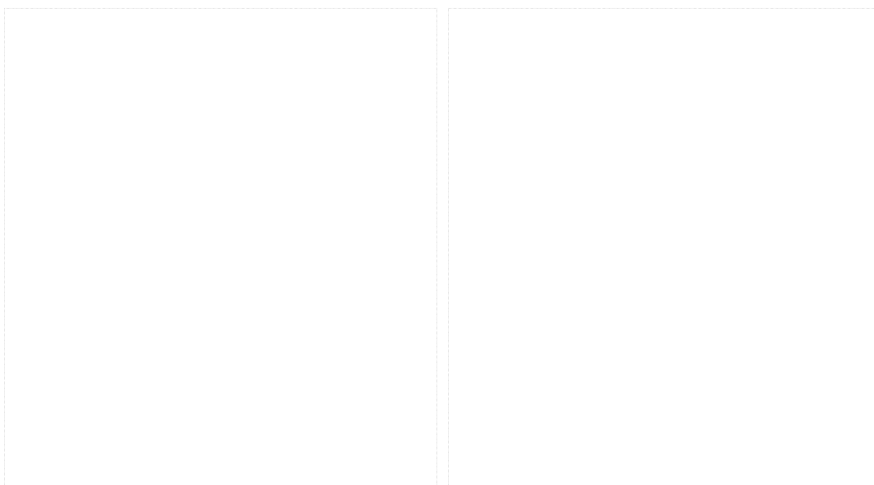


Fig. 2. Skeleton measuring marks and lines. (Left) Upper facial width and malar process distance; (Right) middle facial width.

deepening in 1 patient(4%). We also conducted personal inquiries about patients, revealing that all 24

patients were satisfied with postoperative results and with no facial aging (Fig. 5).

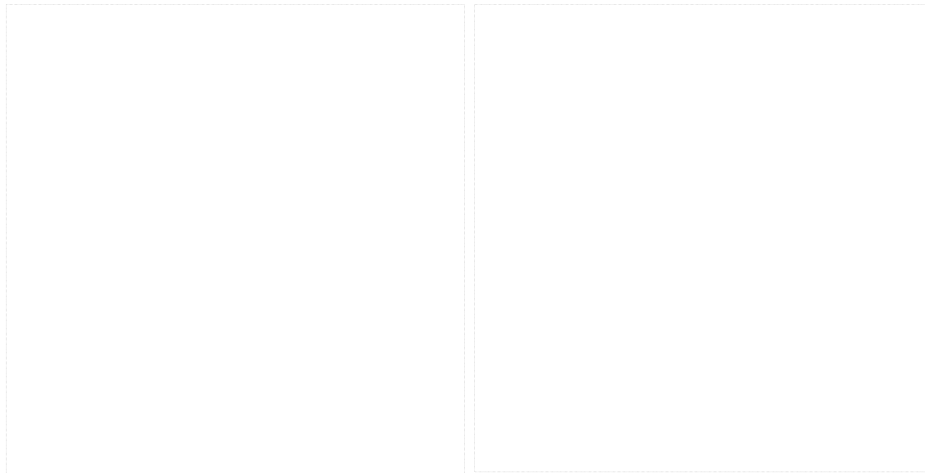


Fig. 3. Schematic diagram of simultaneous zygomatic soft tissue lifting. (Left) Two hanging points (one fixed on zygomaticus muscle; the other fixed on malar fat pad) (Right) Stitches to deep temporal fascia.

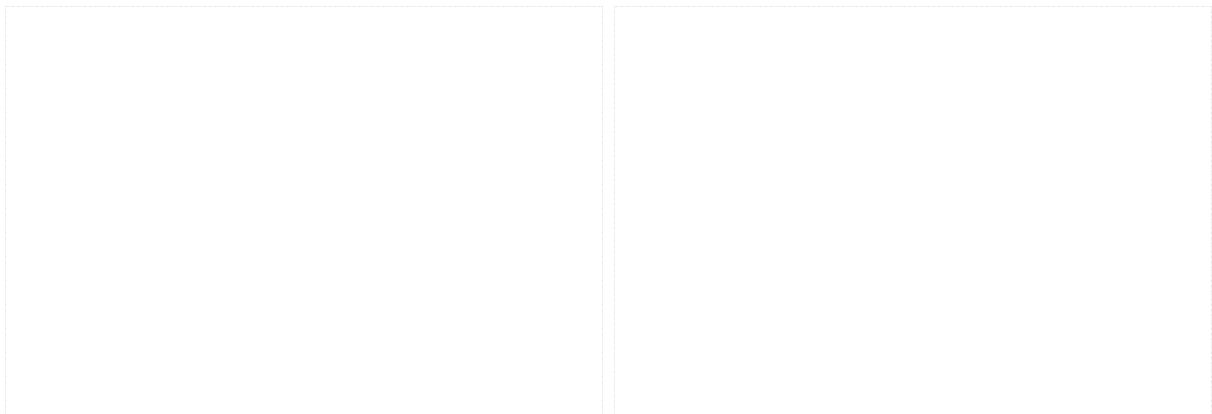


Fig. 4. Demonstration of zygomatic soft tissue lifting operation (needle passing twice; ligaturing and mounting).

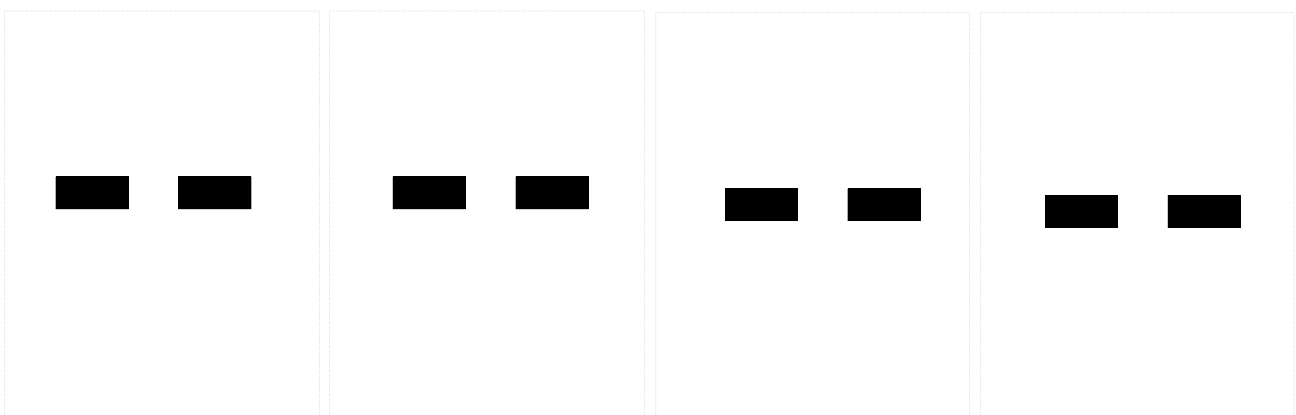


Fig. 5. Post-operative results after superiorposterior suspension without complication of mid-face sag. (Left, Center, right) Pre-operation; (Center, left, Right) post-operation after 6 months.

IV. DISCUSSION

The anatomical analysis of the malar supportive structure

One of the mid-face aging features is drooping malar soft tissue and deepening nasolabial folds after malar reduction, which will lead to a dissatisfied appearance. In recent years, the suspension techniques of facial soft tissue have extensively been studied. Most of them are involved with malar fat pad, major and minor musculus zygomaticus and orbicularis, hanging and tightening etc. These techniques have been assessed by Wang et al.,⁵ and a simple, effective method has not yet been reported until now. Furthermore, inadequate attentions have been paid on ensuing complications following malar reduction. Unfortunately, this aging complication will eventually lead to patients' concerns and pains in the end.

Anatomical study of the malar indicates that the musculus zygomaticus starts from the front of zygomatico-maxillary suture and inserts into the skin of mouth corner. The lateral fibers of quadratus labii superioris muscle arise from the malar surface of the zygomatic bone immediately behind the zygomatico-maxillary suture and pass downward and medialward to the upper lip. The forementioned muscle plays a very important role in maintaining youthful appearance against gravity. The musculus zygomaticus is regarded as one of three suspension supportive systems of facial soft tissues.⁶ By means of cadaver dissection, we found three main reasons of this complication of malar reduction as follows: 1) The range of periosteum elevation demolishes significant supportive structure of malar area. The anterior and lower part of temporal fascia (middle and superficial temporal fascias) is connected to soft tissues such as malar fat pad, musculus zygomaticus, orbicularis, periosteum and so on. Moreover, zygomatic ligament connects the zygomatic skins with periosteum,⁷ which was damaged by operation. As a consequence of elevation of these soft tissues attachment, post-operative drooping inevitably appears. 2) Masseter contraction as well as zygomatic arch moving inwards and downwards may lead to a saggy cheek. 3) Due to displacement of entire bony framework inwards and backwards, relative surplus of soft

tissues appears. We carried out this study in order to alleviate the above problems, while seeking a simple and reasonable means by intraoral approach. We repositioned the malar soft tissue on their original position and restored its local original anatomical structure instead of face lift. As for elderly patients, an associated rhytidectomy accompanied with visible scar may be necessary.⁸ However, post-operative prevention of saggy mid-facial tissues appears to be much more crucial for young patients.

V. CONCLUSION

Our simultaneous reposition method, which utilized two routine surgical incisions, one traveled beneath SMAS layer and the other stitched on deep temporal fascia, is simple, effective and safe. Review of 24 cases with 6 - 12 months follow-up indicated that the results were exceptionally good. According to Owsley,⁹ the recurrence of deepening nasolabial fold after suspension may occur after one year. Therefore, further observation with long-term follow-up is needed.

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