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Surgical Importance of Nasal SMAS in Open Rhinoplasty

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ABSTRACT

Open rhinoplasty became the standard approach in primary rhinoplasty. There is no available literatures about planes of dissection whether; subcutaneous, sub SMAS or subperiosteal. Subcutaneous plane was studied in this study. It was found to be the most convenient plane of dissection, as it is safe, rapidly and easily performed. Nasal muscles are preserved which guarantee animated nose postoperatively. Avoidance of cutting the connection between the depressor septi nasi and the levator septi nasi prevents occurrence of postoperative drooping of the nasal tip. There was less injury of vessels and lymphatics which causes less postoperative edema even in the early period.

INTRODUCTION

Open rhinoplasty may disrupt the holding and functioning ligaments which may add to the aging effects. Aesthetic results may not be long lasting which is considered one of big limitations of the described techniques. There is almost resection of some parts of nasal cartilages with the attached intrinsic muscle fibres. Ozturan et al., found that postoperative electromyographic activities of the muscles were significantly less than preoperative measurements for all movements **[1]**. Any surgery that ignores the delicate nasal muscles and their functions may lead to a paralytic nose **[2]**. Guyuron stated that nasal muscle dysfunction is a hallmark of rhinoplasties performed three to four decades ago when the dissection was conducted in a supraperiosteal plane, irreparably damaging the thin nasal muscles **[3]**.

Some denied the existence of real nasal superficial muscular aponeurotic system (SMAS) **[4,5,6,7]**, while others saw that it exists from a gross macrofunctional viewpoint, but it does not exist from a microscopic and microfunctional viewpoint **[8]**. Saban et al., showed its existence as a unique and continuous layer consisting of the internal nasal muscles. This may explain connections between all muscular and ligamentous components. SMAS overlies the nasal bony and cartilaginous framework and continues from the frontal SMAS till the nasal tip. At the level of the internal nasal valve, it seems to divide into superficial and deep layers. Each layer can be divided into medial and lateral expansions. Both deep and superficial medial layers may be considered to be the lowering ligaments of the nasal tip. They may be routinely resected during open rhinoplasty **[9]**. The dermocartilaginous ligament described by Pitanguy **[10]** corresponds to the deep medial expansion. Its section determines nasal tip rotation and improvement in nasal tip definition. Nasal Mimetic muscles do not have well-defined fascia. Each muscle is independent, with its own bundles and has separate synergic and counteracting functions **[11]**. Normally, equilibrium of the dorsum-tip of the nose is maintained by the antagonistic actions of the levator septi nasi muscle and the depressor septi nasi. When one smiles broadly, levator septi nasi muscles lift the central part of the upper lip so that more of the upper incisor teeth are seen, whereas the levator labii superioris muscles and the risorius muscles only move the angles of the mouth upward and laterally **[12]**. Violation of nasal muscles may affect functions and aesthetics adversely. However planned release of certain muscles may improve nasal function and form **[3]**. Some surgeons planned to resect or transpose one of the static or dynamic structures. Some remove the subcutaneous layer of the nose to reduce skin thickness **[13,14]**. Some transposed **[15,16]** and some removed **[17,18]** the depressor septi to improve the smile through correction of the synergic action with the musculus levator labii. Others preferred its preservation as it draws the septum in deep inspiration **[19]**. Understanding of dynamic effects of these muscles is important for nasal functions and aesthetics.

MATERIAL AND METHODS

30 open primary rhinoplasties were done. 20 were females and 10 were males. Their age ranged between 18 and 35 year. Preoperative evaluation, standard photographs, examination of nasal muscles and intranasal examination were done to all patients.

Preoperative evaluation includes facial and nasal analysis. Postoperative evaluation was done one week, one month, 6 months and one year.

Technique:

All patients had general anaesthesia without use of muscle relaxants. Transcolumellar incision is done followed by subcutaneous dissection of nasal dorsum and radix (Fig. 1). Electric stimulation is done to examine dynamic nasal muscle action. Splitting of SMAS in the midline is performed from the radix to nasal tip. Two laterally based muscle flaps are elevated after bilateral sub SMAS dissection using sharp dissection (Figs. 2,3). Dissection of nasal muscles from the cartilagenous framework is minimal according to the surgical needs. The levator alae nasi is seen and identified from the fibro-fatty tissue (Fig. 4). Bony framework and cartilagenous modifications needed to correct the present deformities are done. Excess of nasal SMAS is trimmed (Fig. 5). Tight resuturing of SMAS and periosteum in the midline using 5-0 Monocryl is done at the end of surgery. Muscles are resutured in the scroll area over the upper lateral cartilages and in the interdomal area. The splitted SMAS is re-sutured to the depressor and to the alar cartilages (Fig. 6). Electric stimulation of nasal SMAS is done after subcutaneous undermining and at the end of surgery. This is done to ensure tip movement and transversus nasalis action. The tip bounces back on pulling (Fig. 7). This indicates preserved balance effect between levator nasi and depressor septi nasi. Bulk of nasal muscles and fibrofatty tissues are assessed.

RESULTS

Thickness of SMAS was found to be different. Small noses have thinner SMAS layer, while big noses have thicker SMAS layer. Nasal muscles were contracting in all cases preoperatively. Nasal tip movement was shown after SMAS resuturing. Postoperative assessment was done for position and movements of both nose and lip. Nasal tip drooping did not occur. Upper lip was not affected. There was no affection of skin vascularity. No irregularities were seen or palpable There was mild postoperative edema. Aesthetic results were maintained in most of the patients during the follow-up period. Fig. (8) shows preoperative photographs and one week postoperative results after open rhinoplasty.

Fig. (1): Dissection in subcutaneous plane to expose the nasal SMAS.

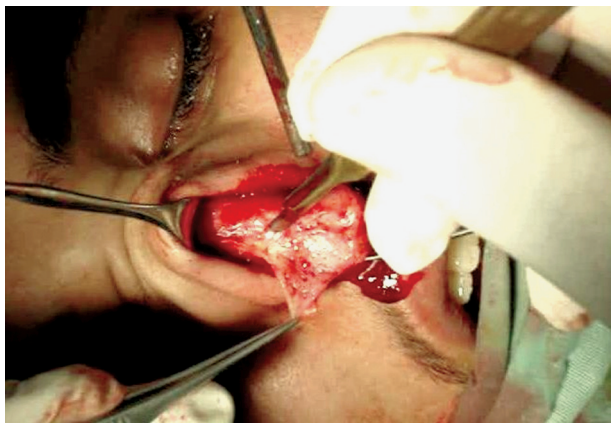

Fig. (2): Dissection of Nasal SMAS using sharp dissection.

Fig. (3): Two laterally based muscle flaps are elevated after bilateral sub SMAS dissection.

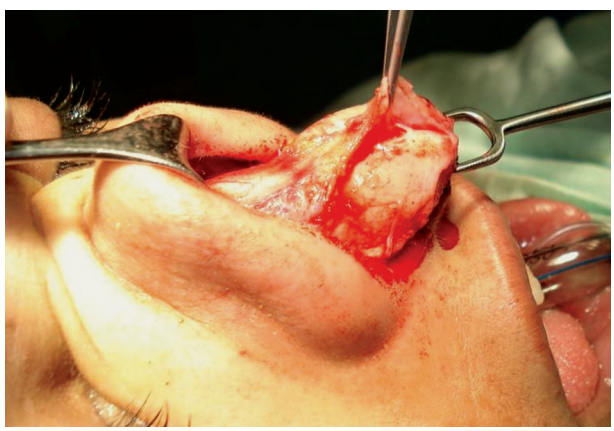

Fig. (4): The levator alae nasi is seen and identified from the fibro-fatty tissue.

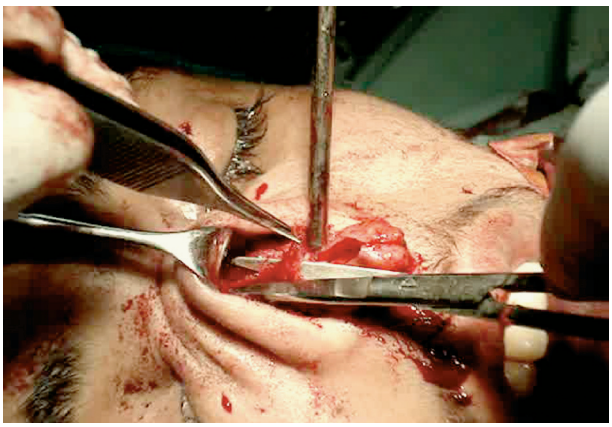

Fig. (5): Excess of nasal SMAS is trimmed.

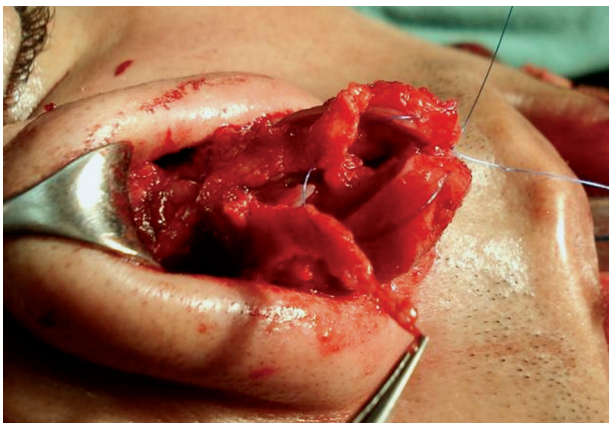

Fig. (6): At the end of the procedure the splitted nasal SMAS are re-sutured to the depressor and to the alar cartilages.

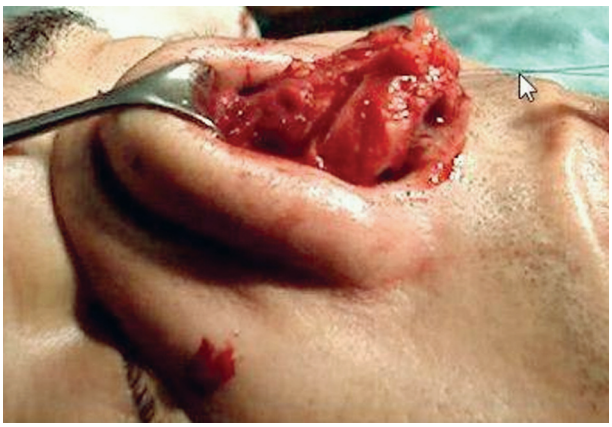

Fig. (7-A): Pulling on the tip.

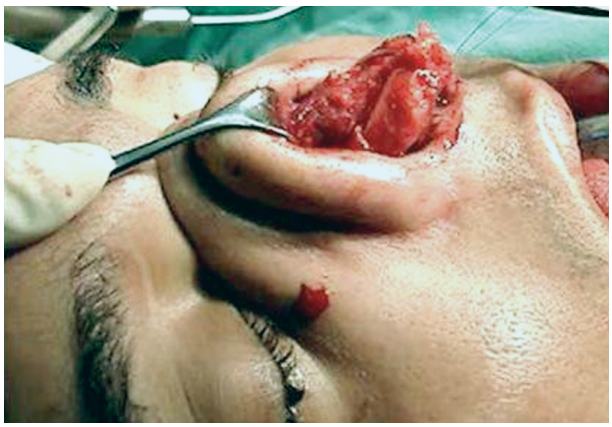

Fig. (7-B): The tip bounces back on release which indicates preserved balance effect between levator nasi and depressor septi nasi.

Fig. (8): Preoperative frontal view (a), Preoperative oblique view (b), Preoperative basal view (c), Postoperative frontal view (d), Postoperative oblique view (e), Postoperative basal view (f).

DISCUSSION

Elevation of soft tissue envelope in rhinoplasty must be done beneath the musculature over the perichondrium which is less traumatic and more physiologic. Preservation of the integrity of the nasal soft tissue layers can be performed adequately and in a much safer manner in open rhinoplasties. Dissection can be performed in the subcutaneous, sub-SMAS, or subperiosteal planes. Each has its own advantages and disadvantages. Skin vascularity is not expected to be affected as there are distinct vessels supplying the skin. Skin thickness are different in each plane; it is thicker in both sub SMAS and subperiosteal and thinner in subcutaneous dissection especially at the free zone region. This may reveal any imperfections by inspection and/or palpation. On the otherhand, thick flap may unreveal the present or created aesthetics such as supratip break. Subperiosteal dissection does not violate nasal SMAS; however, it may be difficult and creates a narrow pocket. In this technique in which dissection is made in a subcutaneous plane, muscle repair at the midline regains the continuous covering layer over the nasal framework. Thus, it reduces any degree of irregularity or imperfection. After osteotomies and hump resection muscle excursion may differ. Thus, trimming of SMAS and resuturing in the midline is mandatory. Weak muscle excursion leads to postoperative flaring of the nose during smiling. Cutting of the levator septi nasi is not advised as it leads to nasal drooping. Nasal dynamics may interfere with dynamics of upper lip. This layer with its blanket effect has holding and connecting functions with all ligamentous, intrinsic and extrinsic nasal muscles. SMAS and nasal musculature are preserved. Nasal animation is not affected. Also the lymphatics are not violated which decreases postoperative edema. Results are expected to be long lasting.

Conclusion:

There are natural connections between SMAS, nasal muscles, ligaments and cartilages through which nasal dynamics are performed with subsequent functional and aesthetic impacts. Preservation of SMAS becomes a mandatory prerequisite in rhinoplasty techniques. Tailoring of this layer is advised to readjust nasal muscles excursion. No irregularities were seen or palpable. There was no affection of vascularity. Occurrence of minimal postoperative edema may be due to preservation of lymphatic system. This may need further studies.

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