

TITLE: Rhytidectomy

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Rhytidectomy, or facelift, is a cosmetic surgery procedure designed to reposition the facial skin in an attempt to rejuvenate the aging face. The benefits of the facelift are limited to tightening and re-supporting of the lower 2/3 of the face. The primary areas improved by facelift are jowl, submentum, anterior neck, nasolabial fold and to some degree the malar eminence. It is often performed in conjunction with other procedures like forehead lift, brow lift or blepharoplasty to rejuvenate the entire face. With proper patient selection and technique, rhytidectomy can be a rewarding procedure for patient and physician alike.

Anatomy:

Platysma is a thin, paired muscle extending from the lower cheek to the level of the second rib. Its anterior borders more or less fuse along the midline of the neck and have deep attachment to the thyroid cartilage, defining the mandibular angle. Three variations of the anterior borders of the right and left platysma muscle have been described: 1) separated in the suprahyoid region and interlacing 1 to 2 cm from the chin (75% cases), 2) intermingled at the level of the thyroid cartilage, as a single muscle (15% cases), 3) remained completely separated along the entire length of the two muscle (10% cases). Laxity in the platysma in the anterior neck accounts for the paramedian vertical bands that extend from the mentum to the mid or lower neck with aging. Also ptosis of the platysma caused by gravitation, along with a varying amount of subcutaneous fat and skin gives the appearance of the broken jawline or "jowling".

SMAS stands for superficial muscular aponeurotic system. It was first described by Mitz and Peyronie in 1976. In the upper part of the face, it is in continuity with the posterior part of the frontalis muscle and orbicularis oculi. And it is continuous with platysma inferiorly. Superiorly in scalp, it is the galea. In the temporal region, it becomes temporoparietal fascia (aka superficial temporal fascia). Over the parotid area, SMAS becomes a condensed mesh, distinct from the parotid fascia. It is adherent in the pretracheal area for 1-2 cm, then it separates from the parotid fascia. Anteriorly in the cheek area, SMAS becomes thinner and invests the superficial mimetic muscles (orbicularis oculi, platysma, zygomaticus major and minor, risorius). Further anteriorly, at nasolabial fold area, SMAS is deep and thin. It is separated from dermis by a large amount of cheek fat. SMAS sends several thin muscle expansion to the dermis. SMAS ends here as a distinct layer.

SMAS represents a continuation of the superficial cervical fascia into the face. The corresponding deep layer of cervical fascia continuing into the face is called parotidomasseteric fascia. The facial nerve lies deep to it. In the parotid area, facial nerve is protected by the superficial lobe of the parotid gland. In the cheek area, facial nerve runs deep to the parotidomasseteric fascia. The motor branches reach the superficial mimetic muscles through their deeper aspect. Only the buccinator, the levator anguli oris, and the mentalis muscle lie deeper to the plane of the facial nerve and receive their innervations from their superficial surface. The exception is the frontal branch of the facial nerve, which lies deep to the SMAS in the temporal area when it exits from the parotid gland. It crosses the junction of the anterior 1/3 and posterior 2/3 of the zygomatic arch. Above the arch it travels within the SMAS (aka temporoparietal fascia or superficial layer of the temporal fascia). At temporal area, SMAS crosses in front of the zygomatic arch and adheres to the periosteum by thin expansion. Therefore dissection in the area carries a high risk of nerve injury.

SMAS is a continuous fibrous net sending multiple fibrous extensions out to the dermis. The importance of the SMAS is its double attachment with skin above and muscles below. When muscles contract, SMAS can translate the contractions along the level parallel to the skin. Also it translates the contraction in the plane perpendicular to skin through its fibrous expansion to the dermis.

Facial skin is supported in normal anatomic position by retaining ligaments of the face. Stuzin, Baker, and Gordon described two types of retaining ligaments. One type is the true osteocutaneous ligaments including zygomatic ligament and mandibular ligament. The other type is formed by a coalescence that occurs between the superficial and deep facial fascias. They are parotidocutaneous ligaments and masseteric cutaneous ligaments. The masseteric cutaneous ligament locates along the anterior boarder of the masseter muscle. It begins at malar region and extends inferiorly to the mandibular boarder. Its function is to support the medial cheek superiorly over the mandibular body.

Techniques:

SMAS lift

This technique is still the most commonly used facelift technique today. The incision starts at temporal area. The classic incision extends above the auricle into the hair curing upward and forward to end 1 or 2 cm above the level of the eyebrow. In order not to disturb the height of the temporal hairline, more than half of the facelift surgeons make a horizontal incision beneath the temporal tuff of hair in female patients. Then the incision follows the preauricular crease inferiorly. For males, the incision is made in the pre-auricular crease. For females, some argue for making the incision go behind the tragus, others say just to stay within 2mm of the tragus going slightly onto the tragus, still others just stay in the pre-auricular crease. The incision then continues down to curve around the earlobe, leaving a 2-mm cuff of facial skin on the earlobe. In woman the retroauricular incision is made 2-3 mm anterior to the postauricular sulcus. Then the posterior scalp incision extends from the retroauricular incision across the postauricular sulcus at the level of the tragus or where helix meets the hairline. The scalp incision is made into the hair, curving inferiorly and parallel to the postauricular hairline.

Flap elevation begins in the peri-auricular area. As in the neck, a subcutaneous plane is used in all areas except above the zygoma. In this area, a subfollicular plane is necessary to avoid the superficially located frontal branch. Flap elevation behind the ear follows, and will be the most difficult as the subcutaneous tissues are very adherent. Frequent palpation and visual cues such as a uniform 'marbling' of fat on the flap undersurface will ensure maintenance of a subcutaneous plane. As mentioned, dissection below this plane jeopardizes the greater auricular nerve. Development of about two to three cm of flap here is then followed by elevation in the infra- and pre-auricular areas. Make sure to make the infra-auricular incision precisely where the neck skin meets the lobule to avoid the pixie ear deformity. Flap elevation continues anteriorly and inferiorly. In patients who smoke or who have diabetes or atherosclerosis, a short flap technique is safest. Three to four cms are elevated anteriorly, and five to seven cms are dissected in the neck. The liposuction cannulas can then be used to tunnel without the use of suction. The tunnels created will allow mobility of the flap without significantly compromising the vascular supply. Adjunctive liposuctioning would also be carried out at this time if the jowls or lateral neck necessitated this. In the nonsmoker, the long flap technique becomes an option. Here the neck dissection is made continuous with that of the platysmaplasty, and the preauricular flap is taken just beyond the anterior parotid edge. In the midface the advantages of the long flap are subtle and do not usually justify the additional risk of limiting the blood supply. In the neck, however, communication between the platysmaplasty and the facelift flaps allows for smoother contour and a greater excision of redundant skin.

Several techniques are available for suspension of the underlying soft tissue of the face and neck. With the flaps elevated, the suspension of the SMAS is accomplished with either plication or imbrication. Plication implies sutures that fold the SMAS onto itself to shorten it, while imbrication involves excising a block of SMAS and approximating the cut edges to tighten this layer. Imbrication does not provide any additional benefit according to cadaver studies by Webster, and involves an additional step. Proponents of imbrication feel that plication results in SMAS redundancy which can cause subcutaneous irregularities. These have been found to be short lived, however. The placement of sutures and the vectors of tension are well agreed-upon. The first suture is applied at the jaw line and is anchored at the mastoid periosteum, or deep tissues in the pre-auricular area. The choice of suture varies; most surgeons use permanent, while others use a longer lasting absorbable such as vicryl. Several sutures are applied along each vector, and the horizontal mattress technique seems to hold the tissues best. The posterosuperior vector in the neck is then created with sutures in the platysma being tightened by the SCM fascia or mastoid periosteum. Flattening of the jowls is accomplished with the third vector, as the SMAS is pulled with a suture in the deep preauricular tissues.

The SMAS suspension results in a skin excess that will require judicious trimming. The only way to avoid scar widening with healing is to eliminate any tension on the skin closure. The easiest way of ensuring this is to make pilot cuts in the redundant skin in the same direction that the SMAS was tightened. An anteroinferior incision is made where the lobule will attach. A tacking stitch is applied, and similar pilot cuts are made in front of and behind the ear. The excess skin is then removed by connecting the ends of these cuts.

Deep-plane rhytidectomy

Deep-plane rhytidectomy was presented by Hamra in 1990. The main goal of deep-plane

lift was to improve the nasolabial fold area, which was not adequately addressed by the SMAS lift. Descent of the cheek fat is responsible for the increasing redundancy of the nasolabial fold with aging. In order to reposition the cheek fat, Hamra believes that the cheek fat has to be lifted from the zygomaticus major and minor muscles which it rests on. The deep-plane facelift flap consists of skin, subcutaneous tissue, cheek fat and platysma. Hamra described his techniques as following. The skin incision is the same as SMAS lift. He then performs a limited subcutaneous dissection approximately 2-3 cm in front of the tragus, ending at the jawline. The SMAS is incised with a scalpel and the dissection is developed with spreading scissors. The lower extent of the dissection is at the jawline, and the upper extent is at the malar eminence, where the vertical ligaments are divided. When the lateral edge of the zygomaticus major muscle is reached, the dissection then changes to the level superficial to the zygomaticus musculature. As the facial nerve innervates these muscles from the under surface, it is important to stay in a plane superficial to the zygomaticus muscles. The dissection exposes the orbicularis and zygomaticus muscles and extends medial to the nasolabial fold. Then 3-0 Vicryl sutures are then used to attach the platysma muscle to the preauricular fascia near the lobule of the ear. The upper face lift flap is sutured to the superficial temporal fascia at the level of the helix.

For the neck treatment, Hamra starts with a preplatysmal dissection in the submental area. The dissection extends superiorly to the jawline and inferiorly to 8-10 cm below the mandible. All redundant anterior platysma is then excised and anterior edges of the platysma closed with tension. If the fat on the flap is abnormally thick, excess fat is excised with scissors under direct visualization. He then makes a horizontal cut in the platysma muscle leaving the posterior border of the muscle intact to create an angled neck. This last step was described in his 1990 article. However in his later article, he reported that he has abandoned this step. Hamra reported his experience with 403 patients who had deep-plane lift in 1990. He reported 4 patients with post-op hematoma of the neck requiring evacuation in the operating room. He pointed out that the face dissection and neck dissection doesn't communicate. So the neck hematoma can't expand under the face lift flap. 2 patients had pseudoparesis of the lower lip and 2 patients had weakness of the upper lip. All of them recovered within 6 weeks. In addition to its ability to better address the nasolabial fold, the deep-plane lift also traps the entire subcutaneous vascular system to give the result flap a more vigorous circulation. The additional subcutaneous fascia contained in this thicker flap also gives a greater tensile strength so that it is more effective in mediating a lift to facial ptosis.

Composite rhytidectomy

Composite rhytidectomy is based on the deep-plane rhytidectomy and again was presented by Hamra in his 1992 article. In addition to correct the jowling and nasolabial fold, this technique also is intended to improve the inferiolateral descent of the orbicularis oculi, which is responsible for "malar bags" or "festoons". The composite face lift flap consists of orbicularis, cheek fat and platysma en bloc. Hamra described it to be a bipediced musculocutaneous flap based on the facial artery to the platysma and the angular and infraorbital arteries to the orbicularis oculi muscle. He also pointed out that the key of the composite lift is that orbicularis oculi, cheek fat and platysma are repositioned while maintaining their relationship with each other.

Hamra describes his techniques as following. After performing the upper blepharoplasty,

he makes incision for lower blepharoplasty and elevates the orbicularis off the malar eminence through the blepharoplasty incision. The face lift started as the deep-plane lift as above described. The sub-SMAS dissection is carried to the lateral boarder of the orbicularis oculi and zygomaticus major muscle. Then the dissection plane changes to just superficial to the zygomaticus musculature. This dissection is then carried down to and beyond the nasolabial fold, with all fat being left on the flap. Communication is made between the face lift flap and the previously made blepharoplasty skin-muscle flap from 5 o'clock to 9 o'clock position on the right side and 7 o'clock to 3 o'clock on the left side. The communication can be approached from either dissection. The inferior margin of the orbicularis is excised off the flap. The platysma muscle is advanced and sutured at the jawline to the preparotid fascia just anterior to the lobule of the ear. The face lift flap that carries cheek fat is advanced and sutured with a dermis to deep fascia suture at the helical junction. The orbicularis oculi is sutured in a superomedial direction to the periosteum of the lateral orbital rim.

The neck treatment along with the composite lift is similar to above described in deep-plane lift. The excessive platysma muscle is excised, thereby leaving a total decussation of the muscle from the submental area down pass the thyroid cartilage. 3-0 Nylon sutures are used to close the muscle from the hyoid up. 3-0 Vicryl sutures are used from hyoid down. After the anterior advancement of the platysma muscle, the flap is then defatted.

Hamra presented 167 patients in his article. He reported no nerve injury. The innervations to the mimetic muscles are from the undersurface of the muscles. Therefore he states that as long as the dissection is on top of the muscles, there should be little chance of nerve damage. One patient had neck hematoma required evacuation in the operating room. He also mentioned that malar tenderness and edema may persist for several months with this technique. Last he stressed that the repositioning in this technique must be done with extraordinary tension, because a timid pull will no give patient an adequate improvement.

Subperiosteal rhytidectomy

This technique was first published by Psillakis in 1987, and subsequently was revised by Ramirez and presented in 1990. This technique lifts soft tissues to the level of their bony insertions and then reestablishes their relationship to the underlying skeleton. Psillakis started with a bicoronal incision placed at lease 5cm behind hairline. The incision made through the galea and continued laterally as a preauricular extension. Limited subcutaneous undermining performed in the parotid area. Periosteum is incised 1 cm above the supraorbital rim. Subperiosteal dissection is carried lateral and inferiorly to expose superior and lateral orbital rim and infraorbital nerve. Medially the nasal root is exposed to nasal bone or even extends to nasal tip. Laterally the dissection is performed beneath the superficial temporal fascia (temporoparietal fascia) to zygomatic arch. The periosteum of the arch is elevated and dissection extends over the zygoma and anterior wall of the maxilla to the level of the nasolabial fold. The face lift flap is then pulled upward and laterally to suture to the deep temporal fascia to correct jowling and nasolabial fold. In addition, superior elevation and fixation of the galea to deep temporal fascia can lift orbicularis muscle, periorbita and lateral canthal ligaments. Psillakis presented 105 patients in which 15 patients were followed for 4 years. 4 out of their first 20 patients had temporary paralysis of the front branch of the facial nerve. Afterward he limited the dissection over the zygomatic arch to no more lateral than medial 1/3 of the arch. In the

remaining 85 patients, 3 patients had front branch injury. All 7 patients recovered within 1 year. Other complications include greater swelling and ecchymosis in the orbital region and temporary difficulty in eye closure.

Psillakis's technique was especially criticized for high rate of injury of the front branch of facial nerve and anchoring sutures catch the zygomatic branch of the facial nerve resulting orbicular oculi muscle palsy. Ramirez modified Psillakis's technique to correct the above two problems. He started with bicoronal or modified hairline incision. Laterally, the dissection is done under the temporoparietal fascia. At about 3 cm above the zygomatic arch, the dissection is through the both layers of the deep temporal fascia and superficial temporal fat pad to the superior margin of the arch. The periosteum of the arch is incised medially. The remaining subperiosteal elevation is carried out similar to Psillakis's dissection and carried further to piriform aperture. The temporal fascia left on the face lift flap is then used to lift and suture to the remaining temporal fascia. Ramirez presented 28 patients underwent face lift with modified technique and 60 patients had Psillakis's technique. He had no patient with nerve injury with modified technique, while 5 patients with facial nerve injury with Psillakis' technique. Ramirez believed that his modified technique provided better outcome because he was able to completely detach soft tissues from the zygomatic arch. Also temporalis fascia provides a stronger structure for lift. He also noted that this technique produces a significant facial edema which can take up to 6 weeks to resolve. Also face can have a mask effect which improves gradually over a 4-month period.

Complications

Complications in facelifting are most often a result of inadequate hemostasis or overextensive undermining of flaps. The most feared problem is facial nerve injury, but fortunately the incidence is uncommon, between 0.4% and 2.6%. The frontal branch is most commonly injured, and is vulnerable in its superficial path over and above the zygomatic arch. The marginal mandibular branch is at risk with dissection below the platysma at the mandibular angle, and buccal injury accompanies deep dissection medially in the midface. Facial nerve injury can be prevented by use of blunt finger dissection and bipolar electrocoagulation. Frontal branch injuries can be avoided by blunt finger dissection over the course of the nerve. This is the branch least likely to recover and the most likely motor branch to be injured. The buccal branch is the most likely to recover because of multiple interconnected branches. The marginal branch will usually recover spontaneously, but less likely than buccal. Most motor nerve injuries are discovered post-operatively. If discovered intraoperatively primary microsurgical repair is indicated. The vast majority of nerve injuries recover. Rarely, re-exploration and electromyography studies are needed. The greater auricular nerve is injured more commonly than the facial and is vulnerable when the postauricular flap is elevated off the adherent subcutaneous tissues. Such injuries should be repaired primarily if identified at the time of surgery.

The most common complication following facelifting is hematoma, with some reports placing the incidence as high as 8.5%. Skin necrosis routinely follows unrecognized hematomas. Expanding hematomas must be addressed by opening the incisions and obtaining hemostasis. Smaller ones may disappear with serial evacuations. Meticulous hemostasis, judicious flap dissection, and attention to postoperative pain are the best defense against this common

complication.

Incisional problems can also ruin an otherwise perfect result, and are usually due to excessive tension. Widening of the scars, hypertrophic scarring, and skin slough can all result from this. Early treatment involves reducing edema, removing sutures causing tension, and, if skin slough occurs, expectant management with debridement and topical antibiotics. Hypertrophic scarring is treated with serial injections of triamcinolone on a monthly basis. Another problem along the incision line is alopecia. Most of the time this is temporary, with a return in about three months. However, approximately 1% of facelifts will be associated with permanent alopecia that may require scar excision or local flap reconstruction. Again, tension is the major culprit along with poorly planned incisions.

Infections are rare due to good blood supply of face; overall incidence is 0.7-3.9%. Staphylococcal infection is the most common, it usually responds well to antistaphylococcal meds. Many physicians give intravenous perioperative antibiotics and post-op antibiotics for 1 or 2 days.

Skin slough incidence ranges from 1-6%. It occurs in direct proportion to tension on skin. It has a much higher incidence in smokers and using long flap techniques. This should be treated conservatively as often with time they heal well. Do not debride eschars unless there is obvious liquefaction. Place ointment to allow them to flake off spontaneously. Although the initial scarring can be significant, over months and years this scarring will reduce. A secondary facelift can help remove the scars.

Ear lobe deformities such as the pixie ear are often secondary to excessive tension on the ear lobe. There must be no tension on the ear lobe at all. Psychological problems can also occur: Transient post-operative depression is extremely common. This and all psychological complications can be helped by proper patient selection and preoperative counseling.

In conclusion, rhytidectomy is an elective cosmetic procedure which, when performed correctly, is an important component of facial rejuvenation. Recent developments and techniques promise further surgical innovation. The otolaryngologist should be familiar with the preoperative issues, anatomy, technique and complications of this challenging and rewarding procedure.

Bibliography:

1. Baker SR: Rhytidectomy. *Cummings: Otolaryngology : Head & Neck Surgery*, 4th ed., Mosby, Inc., 2005.
2. Mitz V, Peyronie M: The superficial musculo-aponeurotic system (SMAS)in the parotid and cheek area. *Plast Reconstr Surg* 1976; 58: 80.
3. Stuzin JM, Baker TJ, Gordon HL: The relationship of the superficial and deep facial fascias: relevance to rhytidectomy and aging. *Plast Reconstr Surg* 1992; 89: 441.
4. Hamra ST: The deep-plane rhytidectomy. *Plast Reconstr Surg* 1990; 86:53.
5. Hamra ST: Composite rhytidectomy. *Plast Reconstr Surg* 1992; 90:1.
6. Psillakis JM, Rumley TO, Camargos A: Subperiosteal approach as an improved concept for correction of the aging fact. *Plast Reconstr Surg* 1988; 88: 383.
7. Ramirez OM, Maillard GF, Musolas A: The extended subperiosteal facelift: a definitive soft-tissue remodeling for facial rejuvenation. *Plast Reconstr Surg* 1991; 88:227.
8. Matarasso A, Elkwood A, Rankin M, Elkowitz M: National plastic surgery survey: face lift techniques and complications. *Plast Reconstr Surg* 2000; 106: 1185.
9. Becker FF, Bassichis BA: Deep-plane face-lift vs superficial musculoaponeurotic system plication face-lift: a comparative study. *Arch Facial Plast Surg* 2004; 6: 8.
10. Frank K, Frankel AS: SMAS rhytidectomy versus deep place rhytidectomy: an objective comparison. *Plast Reconstr Surg* 1998; 102: 878.