

TITLE: The Aging Face and Complications of Rhytidectomy
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Introduction

Aging is a normal and ubiquitous process of life. The effects of aging on the face may carry the persona of being unattractive, undesirable, and helpless. Within a society which values youth and a youthful appearance, many desire to restore a younger form to disconnect from the connotations associated with aging. For these reasons, facial cosmetic surgery and facial rejuvenation procedures have become popularized. With an aging population, procedures that aim to restore a youthful appearance will increase in demand. The purpose of this review is to understand the process of aging upon the face and the complications associated with rhytidectomy.

Aging Face

Facial anatomy is composed of three essential elements. The skin serves as a protective barrier and varies by pigmentation, texture, elasticity, thickness, and hair distribution. The underlying soft tissue and fascia contains the musculature and neurovascular supply. The bony and cartilaginous skeletal elements provide the basic shape of the face. In aging, elasticity of skin becomes weakened and its texture and pigmentation changes due to inherent and environmental effects. Over time, the distribution of collagen loses its organized pattern. Additionally, there is resorption and remodeling of the underlying skeletal elements of the face with aging which replace the softer curves in youth. Age is the most significant factor determining facial structures. Ethnicity and gender are also elements involved in the aging process. Intrinsic factors that contribute to aging include genetic traits, ethnicity, and hormonal and biochemical changes that affect skin, subcutaneous tissues, and facial skeleton. Extrinsic factors include the effect of gravity, sun exposure, and smoking.

From a histologic perspective, the epidermis and subcutaneous fat thins and redistributes during the aging process which contribute to rhytid formation. Additionally, there is effacement of dermal-epidermal junction which leads to a flattened rete ridge pattern. Elastosis is the progressive loss of organization of elastic fibers and collagen and is another finding during

aging. Finally, there is weakening of the underlying facial mimetic muscles which may result in the sagging appearance of skin folds.

The appearance of aging upon the face begins from youth and there are distinct changes that may be identified as one ages. An understanding of normal anatomic landmarks and facial proportions is important when considering the changes which occur from aging. The upper third of the face results in elongation as the hairline moves upward and there is brow ptosis. There is hooding of the lateral brow which may obstruct vision in the elderly. The formation of crow's feet or rhytids just lateral to the lateral canthi occurs in the 5th decade. Fine and deep rhytids develop over the forehead and glabella. Aging effects upon the eyelids may be displayed as laxity in the upper and lower lids, narrowing of the horizontal and vertical dimensions of the palpebral fissures, obtuse canthal angles, and weakening of the orbital septum with pseudoherniation of orbital fat.

Aging of the nose may be exhibited by thinning and weakening of the nasal skin, bone, muscle, fibrous tissue and cartilage with visible underlying nasal skeleton and tip ptosis. There may be separation of the upper and lower lateral cartilages resulting from splaying of the fibrous attachments at the scroll. Narrowing of the nasal valve from weakened cartilage is not uncommon. Midfacial aging results in loss of orbicularis oculi muscle tone and descent of malar soft tissue. This results in an illusion of excess fat in the lower eyelid. Additionally, the nasolabial crease deepens.

The lower third of the face also has prominent age-related changes. There is chin ptosis, resorption of mandibular height, thinning of subcutaneous fat with excess skin resulting in jowl formation. There is platysmal banding, and loss of the youthful cervicomental angle, and submental fullness. Laxity of the platysma accounts for the formation of paramedian vertical bands in the neck, and ptosis of the platysma leads to enhancement of jowling.

SMAS

The Superficial Musculoaponeurotic System is a fibromuscular fascial extension of the platysmal muscle that arises superiorly from the fascia over the zygomatic arch and is continuous in the inferior cheek with the platysma. It was described in 1976 by Mitz and Pironie in a landmark paper. The branches of the facial nerve lie deep to the SMAS. The function of the SMAS is to transmit the activity of the facial mimetic muscles to the facial skin. Posteriorly, the SMAS fuses with the fascia overlying the sternocleidomastoid muscle, but it is a distinct layer superficial to the parotid fascia. Anterosuperiorly, the SMAS invests the facial mimetic muscles of the mid-face (i.e., orbicularis oculi, zygomatic major/minor, levator labii superioris). Anteriorly, the SMAS invests the superficial portions of the orbicularis oris and gives off fibrous septae that insert into the dermis along the melolabial crease and upper lip.

Facial Nerve

The anatomy of the extracranial facial nerve (FN) is important when considering surgery upon the face. The facial nerve is protected by the parotid after it exits the stylomastoid foramen. Its lower divisions are deep to the masseter fascia and there is a potential space between the SMAS and masseter fascia in the inferior cheek. This is an important factor when

considering deep/composite rhytidectomy techniques. The temporal branch is the most superficial division of the FN. It crosses the junction of the anterior 1/3rd and posterior 2/3rd of the zygomatic arch. Above the arch, it travels in the temporoparietal fascia to innervate the frontalis and orbicularis oculi muscles. The marginal division descends from the inferior parotid to 1-2cm below the mandibular body and returns above the inferior border of the mandible anterior to the facial artery.

Complication of Rhytidectomy: Hematoma

Although there are multiple approaches to rhytidectomy that are beyond the scope of this Grand Rounds, the surgeon must understand the complications which may result from this operation. Hematoma formation is the most common complication and has an incidence from 1-15%. Its consequences may be partial skin flap loss, infection, pigmentary changes, persistent facial edema, prolonged convalescence, and scarring. Major expanding hematomas occur within 24 hours of the operation and early signs may include sudden sharp pain followed by swelling and ecchymosis. There may be hardening or tightness of the skin, trismus, anxiety and dyspnea. Late signs include swelling and discoloration of the lips and buccal mucosa. 1.9%-3.6% of large hematomas require an operative intervention. Prevention and early recognition are keys to the management of hematomas. A compression dressing may provide the pressure needed to prevent the development of a hematoma. Aspiration and evacuation of hematomas when they are detected is essential to prevent the sequelae of this complication. Persistent ecchymosis and prolonged edema usually resolves after treatment of the hematoma without compromise to aesthetic result.

Complication of Rhytidectomy: Hematoma

Risk factors to the development of hematomas following rhytidectomy have been studied. The detection and management of preoperative and postoperative hypertension has been found to be an effective measure to prevent hematomas. In a study by Berner et al. in 1976, preoperative and postoperative BP within the first 2 hours of operation were found to be similar, but reactive hypertension was found in the subsequent 3 hours and medications were less effective in this period, and pain and anxiety had an effect on BP. Striath et al. in 1977 found a 9.2% hematoma rate in 500 rhytidectomies when systolic BP preoperatively was greater than 150 mm Hg. Recently, Grover et al. in 2001 conducted a multivariate analysis of 1078 rhytidectomies and found a strong association of hematoma formation when preoperative SBP was greater than 150 mm Hg.

Several retrospective studies have found a greater incidence of hematomas in males. Baker et al. in 1977 found a major hematoma rate of 8.7% in males and an overall rate of 3.26% in 137 men who underwent rhytidectomy. Lawson et al. in 1993 found a hematoma rate of 9.6% in 115 males. Grover et al. in 2001 found a 12.9% incidence in males and 3.6% in females. This finding may be related to increased blood supply to bearded skin and greater sebaceous glands in males.

The use of aspirin or other non-steroidal anti-inflammatory is also associated to the development of hematomas. Grover et al. found a higher hematoma rate in individuals that used

ASA/NSAID within 2 weeks of rhytidectomy. Other agents that may increase risk for hematoma formation include Vitamin E, Ginkgo, ginger, ginseng, and garlic.

The deep-plane technique was studied by Kamer et al. in 2000. In 451 rhytidectomies, there was an incidence of 2.2% of major hematomas and 6.65% incidence of minor hematomas. These all occurred in the subcutaneous plane.

The use of general anesthetic was studied by Rees et al. in 1994 in 1236 rhytidectomies. This study concluded that general anesthetic is not a risk factor for the formation of hematomas as there was a 1.1% rate of hematomas in the general anesthetic group and 0.9% in the conscious sedation group. The use of a suction drain prevents the formation of seromas, but has minimal impact on the formation of hematomas according to a study by Perkins et al. The use of fibrin glue has also been studied by several studies. These studies by Marchac et al., Grover et al., and Fezza et al. do not provide evidence that fibrin glue prevents the formation of hematomas.

Complication of Rhytidectomy: Nerve Dysfunction

There is risk of injury to sensory and motor nerves from rhytidectomy. The most common nerve injury is to the great auricular nerve with an incidence of 1-7%. When transected, it should be repaired with 10-0 nylon perineural sutures. Injury to the lesser occipital nerve may also be encountered. For this reason, dissection posteriorly should remain in a subcutaneous plane.

Facial nerve deficits from paresis to complete paralysis have an incidence of 0.3%-2.6%. In a study by Baker of 7000 rhytidectomies, there was a 0.7% incidence of paralysis with 0.1% of permanent paralysis. The marginal mandibular division was found to be most commonly affected followed by the temporal branch. Neuropraxia, heat injury, needle injury, and inadvertent transaction are the main causes of FN injury.

The region from the mandibular angle to the facial artery is where injury may occur during dissection, and it is more commonly injured when dissection is performed to correct platysmal laxity. Presence of platysmal atrophy or hypoplasia may increase the risk of potential injury, as well as in revision rhytidectomy procedures. The temporal branch of the FN is at risk when a forehead or brow procedure is combined with rhytidectomy. For this reason, forehead procedures should remain subgaleal at the level of the superficial layer of the deep temporal fascia to avoid injury. The buccal division of the FN is at risk of injury from subperiosteal dissection for midface-lift. During this procedure, the dissection from periosteum along the inferior border of the zygoma requires transition over the masseter tendon near the buccal branch. A sub-SMAS dissection over the cheek also places the buccal branch at higher risk than a more superficial dissection.

Complication of Rhytidectomy: Skin Flap Necrosis

Compromise to the vascular supply to the skin and ischemia from vascular congestion may result in necrosis of the elevated skin flap. This may result from an unrecognized and untreated hematoma. The use of tobacco has been associated with a 12 time greater risk of skin flap necrosis. For this reason, smokers should be counseled for smoking cessation for several weeks prior to and after the procedure. Other causes of skin flap necrosis include an underlying

vasculitis, injury to the subdermal vascular plexus and excessive tension at the closure. The incidence of skin flap necrosis is 1.1%-3%. The most common region of skin flap necrosis is in the postauricular region where the flap is the thinnest and closure is under tension with the most distal arterial supply. Conservative management for partial-thickness skin flap necrosis is appropriate with local wound care. This usually heals with little or no visible scarring or with hypopigmented scar.

Complication of Rhytidectomy: Scars

Scarring from rhytidectomy usually occurs in the postauricular region. This may also occur in regions where the skin closure is under the greatest tension. Scars are usually evident at 12 weeks postoperatively and serial local steroid injections may diminish their appearance. The use of appropriate incisions in regions to camouflage the surgery also minimize the appearance of scarring.

Complication of Rhytidectomy: Hair Loss

Alopecia may occur along poorly placed incisions or in regions where the skin flap elevation is too superficial. Hair loss has an incidence of up to 8.4%, and 1%-3% require surgical revision. This most commonly occurs the temporal region of the hair-bearing scalp. Heat injury due to cautery and excess tension also contribute to hair loss from rhytidectomy. This complication may be prevented with carefully planned incisions respecting the hair follicles and minimizing the use of cautery with appropriate closure technique.

Minoxidil is an agent used for alopecia and has been studied as a preventative medication following rhytidectomy. Eremia et al. conducted a retrospective review of 60 rhytidectomies in 2002 and found that there was no incidence of permanent alopecia and temporary alopecia was found in 1.7% of cases.

Complication of Rhytidectomy: Pixie Ear Deformity

Excessive skin excision at the earlobe or excessive tension across the skin incision may result in the pixie ear deformity. This form of deformity may also occur from inappropriate closure technique following parotid surgery. This may be avoided by incising the flap prior to the SMAS dissection or placement of suspension sutures.

Complication of Rhytidectomy: Infection

Postoperative infection following rhytidectomy is relatively uncommon with incidence of about 1%. Leroy et al. reviewed 6166 rhytidectomies and found an incidence of 0.18% of postoperative infections that required hospitalization. The infections usually occurred within the first postoperative week and the most common organisms cultured were Staphylococcus and Streptococcus. These infections improved with intravenous antibiotics and incision and drainage. Of note, the majority of these infections had been prescribed postoperative antibiotics empirically.

Complication of Rhytidectomy: Parotid Injury

Parotid injury from rhytidectomy procedures is rare with appropriate dissection. It is more common in sub-SMAS dissection techniques and may delay healing with possible formation of a salivary pseudocyst. This may be prevented by cauterization of exposed ductules if noted during the dissection. Serial aspirations and compression dressings with use of anti-sialogogues or Botox injections may be used when appropriate.

Complication of Rhytidectomy: Pigmentary Changes

Individuals with darker complexions (Fitzpatrick types IV-VI) have a higher risk of hyperpigmentation postoperatively. This may persist for months, but gradually fades. For this reason, appropriate preoperative counseling is important along with avoidance of sun exposure and use of sun block and cosmetics. Telangectasias may develop in prone individuals in areas of dissection.

Complication of Rhytidectomy: Depression

An important postoperative complication that must be considered in individuals with either a pre-existing mood disorder or change in mood postoperatively is depression. Short term situational depression occurs in 30% of women following rhytidectomy. Onset of depression occurs within the first postoperative month and is related to the individual's unnatural appearance. Management of depression includes reassurance and possibly a short course of an antidepressant. Consultation with a psychiatrist may be required for some patients.

Complication of Rhytidectomy: Deep Vein Thrombosis and Pulmonary Embolism

DVT and PE account for up to 5% of postoperative morbidities. Reinisch et al. conducted a review of 9937 rhytidectomies and found a 0.49% incidence of thromboembolic complications (0.35% DVT and 0.14% PE). 83.7% of all patients had general anesthesia. A decreased incidence was found in patients in whom sequential compression devices were used.

Sources

Moyer JS, Baker SR. Complications of rhytidectomy. *Facial Plast Surg Clin NA* 2005;13:469-78.

Baker TJ, Gordon HL, Mosienko P. Rhytidectomy: a statistical analysis. *Plast Reconstr Surg* 1977;59(1):24-30.

Baker DC. Complications of cervicofacial rhytidectomy. *Clin Plast Surg* 1983;10(3):543-62.

Grover R, Jones M, Waterhouse N. The prevention of haematoma following rhytidectomy: a review of 1078 consecutive facelifts. *Br J Plast Surg* 2001;54:481-6.

Rees TD, Barone CM, Valauri FA, et al. Hematomas requiring surgical evacuation following face lift surgery. *Plast Reconstr Surg* 1994;93(6): 1185-90.

Perkins SW, Williams JD, Macdonald K, et al. Prevention of seromas and hematomas after face-lift surgery with the use of postoperative vacuum drains. *Arch Otolaryngol Head Neck Surg* 1997;123(7):743-5.

Kamer FM, Song AU. Hematoma formation in deep plane rhytidectomy. *Arch Facial Plast Surg* 2000;2(4):240-2.

Jones BM, Grover R. Avoiding hematoma in cervicofacial rhytidectomy: a personal 8-year quest. Reviewing 910 patients. *Plast Reconstr Surg* 2004;13(1):381-7.

Straith RE, Raju DR, Hipps CJ. The study of hematomas in 500 consecutive face lifts. *Plast Reconstr Surg* 1977;59:694-8.

Berner RE, Morain WD, Noe JM. Postoperative hypertension as an etiological factor in hematoma after rhytidectomy: prevention with chlorpromazine. *Plast Reconstr Surg* 1976;57:314-9.

Baker DC, Aston SJ, Guy CL, et al. The male rhytidectomy. *Plast Reconstr Surg* 1977;60: 514-22.

Lawson W, Naidu RK. The male facelift: an analysis of 155 cases. *Arch Otolaryngol Head Neck Surg* 1993;119(5):535-9.

Marchac D, Sandor G. Face lifts and sprayed fibrin glue: an outcome analysis of 200 patients. *Br J Plast Surg* 1994;47:306-9.

Fezza JP, Cartwright M, Mack W, et al. The use of aerosolized fibrin glue in face-lift surgery. *Plast Reconstr Surg* 2002;110(2):658-64.

Pantaloni M, Sullivan P. Relevance of the lesser occipital nerve in facial rejuvenation surgery. *Plast Reconstr Surg* 2000;105(7):2594–9.

Baker DC, Conley J. Avoiding facial nerve injuries in rhytidectomy. *Plast Reconstr Surg* 1979; 64:781–95.

Daane SP, Owsley JQ. Incidence of cervical branch injury with “marginal mandibular nerve pseudo-paralysis” in patients undergoing face lift. *Plast Reconstr Surg* 2003;111(7):2414–8.

Pitanguy I, Ramos AS. The frontal branch of the facial nerve: the importance of its variations in face lifting. *Plast Reconstr Surg* 1966;38:352–6.

Blackwell KE, Landman MD, Calcaterra TC. Spinal accessory nerve palsy: an unusual complication of rhytidectomy. *Head Neck* 1994;16:181–5.

MacGregor MW, Greenberg RL. Rhytidectomy. In: Goldwyn RM, editor. *The unfavorable result in plastic surgery*. Boston: Little Brown; 1972. p. 335–49.

Nason RW, Abdulrauf BM, Stranc MF. The anatomy of the accessory nerve and cervical lymph node biopsy. *Am J Surg* 2000;180:241–3.

Vecchione TR. Rhytidectomy flap necrosis in Raynaud’s disease. *Plast Reconstr Surg* 1983; 72(5):713–9. *Complications of Rhytidectomy* 477