Surgical procedures in face and neck rejuvenation

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1. Abstract

The relationship between the one's emotional well-being and appearance is a component of each ones personality that influence much of their life. It can be complex and multifaceted.

An identical element among humans is that we all desire to look at our best and to feel comfortable in our own skin, and for some, this desire may lead to a lack of confidence in themselves, which can have a negatively impact their emotional well-being. When a person we feel confident in his physical presentation, the feeling of self-assured and capable are increased and positive impact on our personal and professional relationships.

The Plastic field is a diverse one, which encompasses a wide range of procedures in it. It is not confined to a specific organ in the body, and every part of the body can be involved through surgical procedure. It can be divided into major categories: cosmetic surgery and reconstructive surgery.

Plastics surgery refers to a group of procedures that are performed on a patient body primarily to enhance one's mind on his owns appearance. Its range from relatively minor procedures (like Botox injections or chemical peels), to more complicated surgeries, such as facelifts, augmentations of the breast, or liposuction. It aim to help patients achieve their wanted physical appearance, leading to higher confidence and improved sense of self-worth.
Reconstructive surgeries are also focus on restoring function from a damaged arear in the body and the appearance of it. Those are more complex than usual cosmetic surgeries. Reconstructive surgery can be used to address a wide range of issues, including congenital anomalies, traumatic injuries, and diseases such as cancer.

One part of plastic surgery that has gained a big amount of attention in the last few years is the facial rejuvenation part. It refers to a range of cosmetic procedures, or combinations of them, which helps to restore a more youthful appearance to the face.

Its include all from Botox injections and dermal fillers to more invasive surgeries, such as facelifts.

For a facial rejuvenation procedure to success it is important that the surgeon's will have the ability to see the potential beauty and attractiveness in each patient. Practiced plastic surgeons use a combination of exist medical knowledge and surgical expertise. They work closely with patients to understand their goals and expectations, and then develop a customized treatment plan that addresses their individual needs.

Facial rejuvenation surgeries can have a significant change for the better on a patient's emotional state. Its helps patients feel confident and comfortable in their own skin. These types of procedures can contribute to an overall feeling of happiness and well-being.

In conclusion, plastic surgery is a varied and rapidly changing field, which suggest a wide range of options for patients looking for improve their appearance or restore function to a damaged or injured parts of their body. Facial rejuvenation surgeries, can have a significant impact on a patient's emotional well-being by helping them feel more confident and comfortable in their own skin. As the plastic surgery field keep to evolve during time, we can expect to see even more innovative and effective techniques emerge, further improving the lives of patients around the world.

Sažetak

Veza između izgleda i emocionalnog blagostanja osobe je složena i višestruka. Svi imamo duboko usađenu želju da izgledamo najbolje što možemo i osjećamo se ugodno u vlastitoj koži. Međutim, za neke je ta želja ograničena manjkom samopouzdanja vezanim uz fizički izgle, što može negativno utjecati na njihovo emocionalno blagostanje. S druge strane, kad se osjećamo samouvjereno u vlastitom fizičkom izgledu, obično se osjećamo sigurnije i sposobnije, što može pozitivno utjecati na naše osobne i profesionalne odnose te doprinijeti općem osjećaju sreće i blagostanja.

Plastična kirurgija je raznoliko i neprestano evoluirajuće polje koje obuhvaća širok raspon postupaka. Nije ograničena na bilo koji određeni organski sustav i gotovo svaki dio tijela može se riješiti kirurškim zahvatom. Plastična kirurgija se široko dijeli .u dvije glavne kategorije: estetska kirurgija i rekonstrukcijska kirurgija

Estetska kirurgija se odnosi na skup postupaka koji se izvode prvenstveno radi poboljšanja izgleda osobe. Ti postupci mogu varirati od relativno jednostavnih kao što su injekcije Botoxa ili kemijski piling, do složenijih operacija kao što su zatezanje lica, povećanje grudi ili liposukcija. Cilj tih postupaka je pomoći pacijentima da postignu željeni fizički izgled, što dovodi do povećanja samopouzdanja i poboljšanja osjećaja vlastite vrijednosti.

Rekonstrukcijska kirurgija, s druge strane, usmjerena je na vraćanje funkcije i izgleda oštećenim ili ozlijeđenim dijelovima tijela. Ovi zahvati obično su složeniji od estetskih operacija i mogu zahtijevati korištenje naprednih kirurških tehnika, poput mikrokirurgije ili presađivanja tkiva. Rekonstrukcijska kirurgija može se koristit za rješavanje širokog raspona problema, uključujući kongenitalne anomalije, traumatske ozljede i bolesti poput raka.

Jedno područje plastične kirurgije koje je u posljednjih nekoliko godina dobilo ,značajnu pažnju je regeneracija lica. Taj se pojam odnosi na razne estetske postupke ili kombinacije postupaka, koji imaju za cilj obnoviti mlađi izgled lica. Postupci

regeneriranja lica mogu uključivati injekcije Botoxa i dermalnih punila kao I invazivnije operacije, poput liftinga lica ili podizanja obrva.
Uspješnost postupka pomlađivanja lica ovisi o sposobnosti kirurga da vidi potencijalnu ljepotu u svakom pacijentu i njihovu skrivenu mladost i privlačnost.

Vješti plastični kirurzi koriste kombinaciju medicinskog znanja i kirurške stručnosti kako bi pomogli pacijentima da postignu željeni fizički izgled. Tijesno surađuju s pacijentima kako bi razumjeli njihove ciljeve i očekivanja, a zatim razvijaju prilagođeni tretman koji se bavi njihovim individualnim potrebama.
Postupci pomlađivanja lica mogu imati dubok utjecaj na emocionalno blagostanje pacijenta. Pomažući pacijentima da se osjećaju samouvjerenije i ugodnije u vlastitoj koži, ovi postupci mogu doprinijeti općem osjećaju sreće i blagostanja. Pacijenti izvještavaju o osjećaju veće samopouzdanosti i sposobnosti, što može dovesti do poboljšanja osobnih i profesionalnih odnosa.
Zaključno, plastična kirurgija je raznoliko i brzo se razvijajuće područje koje nudi širok raspon opcija za pacijente koji žele poboljšati svoj izgled ili obnoviti funkciju i ,izgled oštećenih ili ozlijeđenih dijelova tijela. Postupci pomlađivanja lica, posebno mogu imati značajan utjecaj na emocionalno blagostanje pacijenta pomažući im da se osjećaju samouvjerenije i ugodnije u vlastitoj koži. Kako se područje plastične kirurgije nastavlja razvijati, možemo očekivati još inovativnijih i učinkovitijih tehnika koje će dalje poboljšati živote pacijenata diljem svijeta.

2. Introduction and Basic Anatomy

Understanding facial anatomy is crucial for performing safe and effective cosmetic procedures.

The face is composed of numerous muscles, ligaments, fat compartments, and fascial planes, all of which contribute to the overall shape and contour of the face.

The organization of the face is typically divided into five layers that are continuous from the neck to the scalp, known as "The Layered Concept".

These five layers consist of the skin, subcutaneous fat layer, aponeurosis (also called the musculoaponeurotic layer), loose connective tissue (also referred to as areolar connective tissue), and the periosteum (also known as the deep fascia).

while this arrangement is generally true, there are regions of the face where the organization may differ, such as the infraorbital region with only three layers or the temporal region with up to nine layers. Thus, a thorough understanding of the order and organization of facial anatomy is critical for the safe and effective performance of facial surgery. [1, 2]

3. Facial Anatomy:

3.1 Skin (Layer 1)

The skin is a remarkable and constantly regenerating organ, representing approximately 15% of the total body weight and serving as the body's primary defense structure [3]. Positioned at the interface between the human body and the environment, it plays a crucial role at various essential functions, such as physical barrier protection, immune response, sensation (perception of pain, temperature, touch, and pressure), endocrine (vitamin D synthesis), neuro-endocrine (tightly networked to central stress axes), and homeostatic (elimination of uric acid, ammonia, urea, and excess water).

The primary purpose of normal, developed and mature skin is to maintain healthy skin and a fully functional skin barrier/stratum corneum.

Healthy skin serves two purposes, both looking and functioning well [3].

The skin has a natural ability to self-heal, restoring its integrity and preserving its function within about a week for mild wounds [4].

The skin has distinct characteristics in different areas of the face, such as differences in pigmentation, thickness, and subcutaneous adherence.

Understanding the skin's anatomy requires an examination of both the dermis and epidermis, with the thickness and composition of each layer varying depending on the region of the body [3].

The skin is comprised of two layers, the epidermis, and the dermis, separated by a basement membrane [4]

The Epidermis:

The epidermis consists of five layers, namely the stratum corneum, the stratum lucidum (found in certain body parts such as the fingertips, palms, and soles of the feet), the stratum granulosum, the stratum spinosum, and the stratum basale (the innermost layer containing epidermal stem cells).

The principal cell in the epidermis is the keratinocyte, and it also contains other cells such as melanocytes, Langerhans cells, and Merkel cells [4].

The sweat glands, pilosebaceous follicles that produce hair and sebaceous excretions,

and nails covering the distal phalanges are the three epidermal appendages. Sweat glands function as thermoregulators, and recent discoveries suggest that they also secrete antimicrobial peptides. The normal turnover rate for the epidermis is about 28 days, and the thickness of the epidermis varies from 0.04 mm on the eyelids to 1.6 mm on the palms and soles of the feet [3].
The epidermis is anatomically divided into layers from the basement membrane to the outer layer, the stratum corneum, as the skin develops and matures. The regenerative layer of the epidermis contains basal keratinocytes where cell regeneration occurs. Developing keratinocytes mature and form the stratum spinosum, the stratum granulosum, and ultimately the stratum corneum [4].

The stratum corneum is notably thick, consisting of dead cells (corneocytes) encircled by lipid drafts that form the strong physical barrier of the skin. As the keratinocytes leave the basal layer, they undergo significant cellular changes, taking basic building blocks like carbohydrates and amino acids to create all the necessary chemicals required to build the stratum corneum skin barrier.
The cellular processes involved in the development of skin and the lifelong process of repair and regeneration require ongoing cellular activity throughout life.The cells mature as they move towards the surface, and internal processing of keratohyalin filaments and proteins like involucrin and filaggrin result in the development of mature corneocytes, which have natural moisturizing factors and a strong corneocyte envelope that bonds to the intercellular lipid complex. Phospholipids, cholesterol, and glucosylceremides are the synthesized precursor lipids stored in the lamellar granules of the stratum granulosum cells, along with the enzymes and proteases needed for the development of the intercellular lipid complex.
At the transition layer of the granulosum to the stratum corneum, the lamellar granule contents are extruded from the cells and chemically processed to form the intercellular structure. The final lipids in the stratum corneum intercellular complex are equimolar amounts of cholesterol and cholesterol esters, ceramides, and long-chain fatty acids [3].

The Dermis:

The dermis can be divided into two layers based on the thickness of collagen fibers: the upper stratum papillare and lower stratum reticulare, which consist of thin and thick collagen fibers, respectively.

The dermis, situated between the subcutaneous layer and the dermal-epidermal junction, ranges from 0.3 mm on the eyelids to 3.0 mm on the back. The dermis and its blood supply are responsible for providing nutrients and circulation (as the epidermis lacks its own blood supply).

The dermis and epidermis are in constant communication, and the junction between them is undulating. This undulation results in a deeper protrusion of the epidermis into the dermis, alternating with a shallower protrusion into the epidermis. This interdigitation results in the formation of the rete pegs via invagination. Nutritive capillaries and venules are present near the dermal-epidermal junction at the top of the rete pegs.

Afferent and efferent nerve endings, including small-diameter unmyelinated C-fibers and thinly myelinated A-δ fibers, are located in and near the basement membrane and even penetrate into the epidermis. At the dermal-epidermal junction, these nerve fibers lose all myelin.

As reported in a recent review article, the neurites extend into the epidermis and connect with all of the cell types in the epidermis, affecting skin responses to nerve stimuli from a variety of neurotransmitters such as norepinephrine, acetylcholine, and epinephrine, along with various neuropeptides such as calcitonin gene-related peptide, nitric oxide, vasoactive intestinal peptide, amino acids, histamine, and serotonin.The dermis comprises approximately 10% of dermal content, consisting of various cellular components such as fibrocytes, monocytes, histiocytes, Langerhans cells, lymphocytes, eosinophils, and vascular- and lymphatic-associated cells. The dermis is primarily composed of a connective tissue matrix, accounting for approximately 90% of the tissue, consisting mainly of Type I collagen, along with elastic fibers, blood vessels, and lymph vessels.

The dermis also contains some muscle fibers, as well as pilosebaceous and sweat glands. These structures originate in the deep dermis and subcutaneous layer. Two blood vessel plexuses are present: one in the deeper area of the dermis where it meets the subcutaneous tissue and the other in the more superficial aspect of the reticular

dermis below the rete pegs. The capillaries extend into the rete pegs from the superficial subpapillary plexus near the dermal-epidermal junction. [4]

3.2 Connective Tissue (Layer 2)

The subcutaneous tissue, also known as hypodermis, is a layer of elastin and loose connective tissue that provides insulation against cold, shock absorbent capability, and serves as a nutrient and energy storage reservoir. The thickness of the hypodermis varies across the body, with the thickest layer found in the buttocks, palms of the hands, and soles of the feet. Aging can cause the hypodermis to atrophy, leading to the appearance of thin and wrinkled skin [4].

The subcutaneous fat layer has distinct compartments that are separated by fibrous septae.

These septae provide attachment sites for the skin to underlying muscles of facial expression, other fasciae, or the facial skeleton. They also serve as pathways for cutaneous nerves and vessels emerging from the depth. As the muscles of facial expression can differ in position and course and vary between individuals of different ethnicities, it is reasonable that the size and extent of subcutaneous fat compartments can vary as well.

The subcutaneous fat is separated from the deep fat by the musculoaponeurotic layer and is continuous with the general fat in the body. It also demonstrates similar characteristics as the general fat, such as volume increase during adiposities. However, it has different morphological features compared to the deep fat in the face. In the infraorbital region, the subcutaneous fatty layer is typically absent, and the thin skin in this area is transparent for the underlying orbicularis oculi muscle.

In the perioral region, subcutaneous fat cells are intermingled with skeletal muscle fibers and bundles of elastic collagens, which allow precise movement of the lips and oral commissure [1].

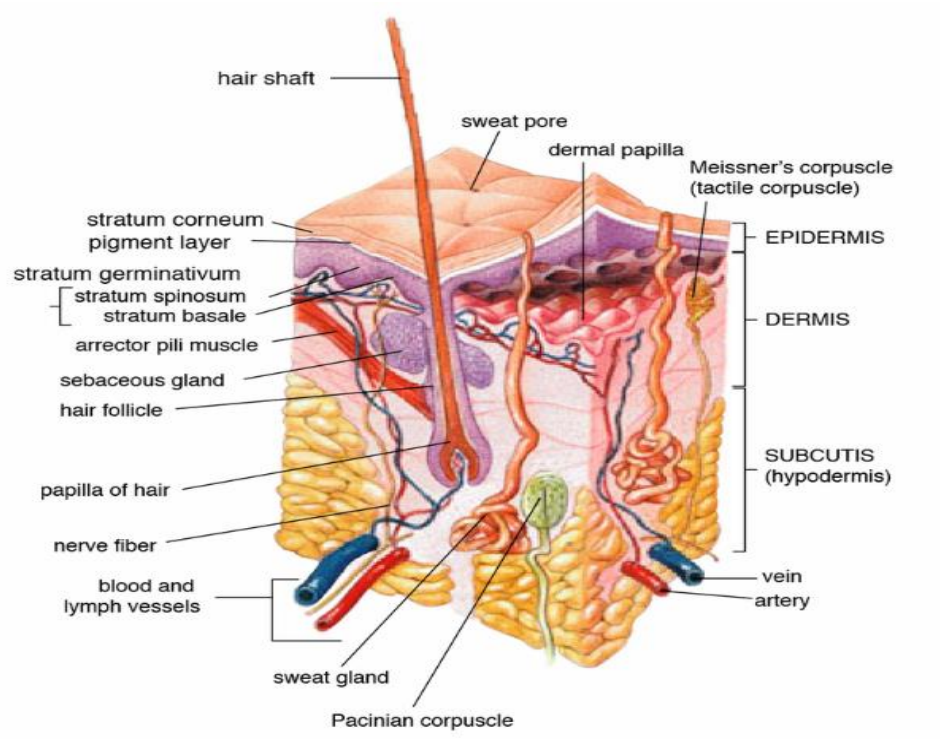

Figure 1. The hypodermis is the lower layer of skin shown in the diagram above.
To view a copy of this license, visit: https://en.wikipedia.org/wiki/Subcutaneous_tissue

3.3 Musculoaponeurotic (Layer 3)

The SMAS, or superficial musculoaponeurotic system, is a fibrous network composed of the platysma muscle, parotid fascia, and fibromuscular layer covering the cheek, with unique biomechanical and viscoelastic properties. This system separates the deep and superficial adipose tissue of the face and has specific morphology depending on the region. The SMAS layer is essential in facial aging due to its relationship with the mimetic muscles. Surgeons often alter this layer, either by shortening, duplication, or refixation, to perform facelift procedures. The zygomatic arch superiorly and the platysma inferiorly are the key anatomical boundaries of the SMAS. The subcutaneous superficial fatty tissue of the face lies directly anterior to the SMAS, while the parotidomasseteric fascia is directly deep to it, with an intervening potential

space between the two connective tissue layers.
The SMAS is present on the nose and in the periorbital region, where the orbicularis oculi muscle is included in this layer. In the temporal region, the layer is continuous with the superficial temporal fascia, including the anterior and posterior branches of the superficial temporal artery. On the head, the SMAS is continuous with the galea aponeurotica and the occipitofrontalis toward the epicranius muscle. The zygomaticus major and minor muscle originates in the lateral midface, deep to this layer. In the medial midface, these muscles and, in some cases, the risorius muscle pierce the SMAS and are henceforth included in this layer. The SMAS is often described as a fibrous degeneration of the platysma muscle itself.

The branches of the facial nerve (CN VII) are the most anatomically relevant nerves that lie close to the SMAS and the facial muscles & associated fascial layers. The facial nerve exits the skull inferior to the tragus of the ear. The proximal branches of the facial nerve, mainly the temporal, zygomatic, and marginal mandibular nerves, course deep to the SMAS after exiting the parotid gland. Despite the anatomic disparity, the superior masseteric retaining ligament and zygomatic ligament form a groove through which the upper zygomatic branch of the facial nerve traverses. The greater auricular nerve is another nerve of significance to the SMAS. This nerve originates from the cervical plexus, passes inferiorly to traverse the sternocleidomastoid muscle about 6 cm inferior to the auditory canal, and runs just deep to the SMAS along the course of the external jugular vein. The only nerves that traverse superficial to the SMAS are the sensory branches from the trigeminal nerve.

3.4 Loose Areolar (Layer 4)

The areolar connective layer that is loose contains the deep fat and its compartments. This layer is separated from the subcutaneous fat (layer 2) in the face by the SMAS. Adipocytes, which are of different sizes compared to the superficial fat, are present in the deep fat. Some authors believe that the deep fat acts as a gliding plane for the facial expression muscles. The deep fat is compartmentalized and the boundaries of these compartments provide transition pathways for facial nerve branches and the branches of the facial artery and vein. The existence of these compartments has been postulated for a long time, and their confirmation has been recently established

through cadaveric and imaging studies. The retro-orbicularis oculi fat (ROOF) pad was first described in 1909, and the suborbicularis oculi fat (SOOF) pad in 1995. The temporal region has minimal presence of this layer in the upper temporal compartment, but it varies during aging in the lower temporal compartment, where it houses the temporal branches of the facial nerve. However, some fat compartments in this layer, such as the deep nasolabial fat compartment, need to be confirmed to enhance the understanding of facial anatomy, which will have a significant impact on future rejuvenative applications [1].

3.5 Periosteum (Layer 5)

The scalp gives this layer its name since layer 5 covers the bone, leaving only bare bone deep to it. In other parts of the face, layer 5 is identifiable as a distinct structure, which is not the periosteum. In the temple, this layer is called deep temporal fascia and includes the superficial temporal fat pad. In the lateral midface, this layer is called parotideomasseteric fascia. In the neck, it is connected with the investing layer of the deep cervical fascia. However, the scientific evidence of its continuity is presently under investigation, and its results will contribute to a new understanding of facial anatomy. In the temporal region, the temporalis muscle and the temporal extension of the buccal fat pad can be identified deep to this layer. In the lateral midface (from occipital to masseteric ligaments), this layer encompasses the parotid gland, the occipital one-third of the parotid duct, the accessory parotid gland, the origin of the zygomatic muscles, and the branches of the facial nerve emerging from the parotid plexus. In the medial midface (rostral to the masseteric ligaments), this layer covers the parotid duct and forms the fascia of the facial vein before attaching to the buccopharyngeal fascia and the buccinator muscle. However, in the periorbital region, the superficial lamina of the deep temporal fascia continues toward the orbit, not the deep lamina, and separates the SOOF from the prezygomatic space. This layer is continuous with the periosteum of the facial skeleton medial to the facial vein and is connected to the epineurium of the infraorbital nerve.

4. Age-Related Changes

The process of aging affects every layer of the face. Each facial layer changes over time, and individuals in different age groups require specific attention [5]. Aging is a complex process characterized by the gradual decline in the functionality and the ability to reproduce of all higher organisms, leading to an increased likelihood of morbidity and mortality [6]. At the cellular level, aging involves biologic attrition manifested in various ways. Senescence and apoptosis play a role in the aging processes of all cells, and both are affected by cumulative DNA damage from internal and external insults [3]. Visible changes occur within the structures of the face as a person ages, such as the descent and atrophy of the malar fat pads, deepening of the nasolabial folds (NLFs), loss of skin elasticity, and development of jowls [2].
Facial volume decreases, skin thins, and the underlying fat and muscles descend with age, leading to the formation of wrinkles, jowls, and deepening of facial folds. An effective facelift involves addressing these changes while also restoring facial harmony and balance [1].

4.1 Aging Changes in the Skin Layer of the Face (Layer 1)

The body's largest and most visible organ, the skin, undergoes an aging process that results in various clinical manifestations and issues [3].
Similar to internal organs, the skin is affected by the biological clock, and it is the outermost and most apparent layer, exhibiting the most widely recognized signs of aging [5].Throughout the aging process, the skin is exposed to various internal and external stimuli that impact its functionality, leading to the development of wrinkles, dryness, a weakened barrier integrity, and thinning of the epidermis [6].
External factors such as pathogens, ultraviolet light, and pollution, as well as endogenous alterations associated with aging and/or oxidative stress disturbance, can cause skin disorders [4]. Intrinsic and chronological aging, as well as extrinsic aging factors like UV radiation, visible and infrared light, smoking, and nutrition, affect the skin. These stimuli collectively contribute to the aging skin exposome. [5]

There is ongoing debate regarding epidermal anatomical changes that occur with aging. Due to variations in skin thickness across the body, it is challenging to generalize about age-related thickness changes. However, with aging, the epidermis does become thinner, primarily due to a retraction of the rete pegs. The vertical height of the keratinocytes decreases, corneocyte surface area enlarges, keratinocyte adherence decreases, and the turnover rate slows down. The skin thickness decreases with a decline in the thickness of the stratum spinosum and a significant decrease in the maximum thickness of skin. The usual 28-day turnover time for skin increases by approximately 30% to 50% by age 80. The mitotic activity in the basal layer is reduced, and the orderly maturation of the skin proceeds at a slower and incomplete rate. [3]

The significant changes associated with aging skin include progressive fragmentation of the dermal extracellular matrix (ECM) and decreased production of crucial ECM components, such as type I collagen. The dermal elastic fibers become disorganized, and the epidermal mitochondrial network becomes more fragmented with age, resulting in a loss of skin elasticity and the formation of drier, thinner skin with more wrinkles. Loss of volume is also a hallmark of aging, resulting from age-dependent

degradation of ECM components such as hyaluronic acid (HA) and collagen. In addition to the skin changes mentioned above, sagging and irregularities in the skin tone and texture are key signs of aging, and the skin barrier function is compromised. [5]

At the cellular level, aging was first described by Hayflick and Moorhead, who demonstrated that human primary fibroblasts have a limited ability to divide, known as the Hayflick limit, due to the inability of telomeres to maintain their lengths during the replication process. Consequently, cells lose their proliferative capacity and enter a state of irreversible cell cycle arrest, later termed cellular or replicative senescence. Senescent cells are characterized by their inability to proliferate, resistance to apoptosis, and secretion of factors that promote inflammation and tissue deterioration. Senescent cells accumulate with age and may contribute to age-related skin changes and pathologies [6].

Histologically, the skin's outer layer thins as the rete pegs retract. A decrease in melanocytes leads to uneven pigmentation. Elastic filaments in the dermis thin and become fragmented, causing skin laxity. Although dermal collagen becomes more stable, it decreases in quantity. Vascular supply is also reduced, giving the skin a pale appearance.
Subcutaneous tissues experience fat atrophy, which leads to the redistribution of soft tissues due to gravity. As skin laxity worsens, larger areas of facial skin may droop and sag. Habitual facial expressions can cause the subcutaneous layer to reshape over time, leading to the formation of coarse wrinkles and deep folds.
Exposure to sunlight contributes to the visible changes in the aging face. Sun-damaged skin is characterized by a decrease in structural elements, which leads to the formation of wrinkles. Elastic fibers become thickened and disorganized, a process called elastosis, and dermal collagen becomes degenerated [7].

4.2 Aging Changes in Superficial Fat Layer of the Face (Layer 2)

The subdermal adipose tissue of the face is situated between the skin and the SMAS layer. It consists of the subcutaneous fat, which provides volume, and the fibrous network of collagenous fibers or retinacula cutis (RC) linking the dermis to the underlying SMAS. The subdermal adipose tissue compartments appear to have different morphological characteristics than the deep adipose tissue compartments.

In youth, there is a smooth and continuous transition between the compartments. However, with aging, a series of irregularities and bulges develop, which separate these compartments. It is hypothesized that with aging, selective loss of volume in the deep adipose tissue and the underlying bony skeleton, along with ligamentous fatigue, leads to loss of support and the appearance of the descent of the overlying subdermal adipose tissue, contributing to the sagging appearance of the aging face. It has been suggested that age-related volume loss starts in the subdermal adipose tissue laterally and progresses medially. However, there is no compelling evidence to support the idea that aging has a preferential impact on any particular subdermal adipose tissue compartment. The perioral area's subdermal adipose tissue has a small number of adipocytes interlaced within a meshwork of collagen fibers that is much more adherent to the skin, and the septae separating the compartments in this region result in perioral wrinkles. The change in the subcutaneous arrangement between the firm perioral attachment and the loose, layered arrangement of the remaining facial regions underlies the formation of the nasolabial and labiomandibular furrows. [5]

4.3 Aging Changes in the SMAS/ Muscle Layer of the Face (Layer 3)

The SMAS layer is a critical contributor to facial aging due to its association with the mimetic muscles.

The facial blood vessels have a close connection with the SMAS in certain regions of the face, such as the temple, nasolabial fold, infrabrow, jawline, and perioral areas. Mimetic muscles contract to produce facial expressions, connecting the dermis to the deep facial structure, while masticatory muscles link bone to bone and impact mandible movement.

Muscle contraction in the SMAS layer is responsible for creating the skin's dynamic lines. The skin, muscle, and superficial fat layers are interconnected, and muscle contraction results in wrinkles in the skin that are perpendicular to the direction of muscle fibers. These wrinkles are temporary in youth but may become permanent due to skin atrophy, loss of superficial fat in specific regions, and excessive muscle activity. Wrinkles caused by muscle movements are most commonly observed in regions such as the forehead, glabella, perioral, periocular, chin, and depressor anguli oris (DAO). This leads to a general tightening of the facial muscles, limiting the amplitude of facial expression. These permanent contractions may result in fat displacement, accentuation of skin creases, and permanent skin wrinkling. Gradually, dynamic facial lines become static lines. Understanding the location and depth of muscles is essential to comprehend the face's dynamic movements, which displace fillers and make them visible with muscle action. [5]

The SMAS, or superficial musculoaponeurotic system, is important in facial rejuvenation procedures, particularly in the lower third of the face. The SMAS can be manipulated surgically to elevate superficial dermal and muscular structures and reverse age-related drooping of facial fat. Studies have shown that SMAS manipulation and dissection are employed in at least 50% of all rhytidectomies, or facelifts. Additionally, neuromodulation agents like botulinum toxin can be used to tighten mimetic facial muscles, directly altering the conformational shape of the SMAS and achieving desired results in a less invasive manner. The SMAS, therefore, plays a crucial role in cosmetic and dermatologic surgical procedures. [1, 8]

4.4 Aging Changes in Deep Fat Layer of the Face (Layer 4)

The underlying fat layer of the face has a distinct tissue composition from the superficial fat deposits. The deep fat compartments consist of various structures, including the deep pyriform, deep medial cheek, deep nasolabial (located in the premaxillary space), retro-orbicularis oculi (ROOF), and both medial and lateral suborbicularis oculi (SOOF).
Age-related volume depletion in the deep fat compartments is believed to be the primary cause of loss of structural support in the face, resulting in "pseudoptosis" of the overlying superficial soft tissues. Although fat compartment migration and increased spacing between fat pads are considered to contribute to aging-related changes, recent research indicates that the location and size of the deep fat compartments remain relatively stable with age, after adjusting for age-related skeletal changes. [5]

The loss of volume in the deep compartments in the upper third of the face, such as the retro-orbicularis oculi fat (ROOF), deep temporal fat, and temporal extension of the deep buccal fat pad, is responsible for the hollowness of the temple and the descent of the brow. In the middle third, the most apparent signs of aging are caused by deflation of the deep medial cheek fat compartment (DMCFC), resulting in loss of the cheek's anterior projection, sagging of the superficial compartments, deepening of the nasolabial fold and nasojugal groove, and revealing the tear trough. The DMCFC's elasticity decreases with age and higher BMI, indicating changes in the fat's ultrastructure and metabolism. Loss of volume in the deep fat pads in the lower third of the face contributes to a loss of support for the lips (through the upper and lower sub-orbicularis oris fat pads) and deepening of the labiomental crease. Buccal fat descent and extension of the buccal space with age also contribute to the formation of jowls. [5]

4.5 Aging Changes in the Bones of the Face (Layer 5)

The arrangement of the human face is complex and consists of multiple layers, including skin, muscles, subcutaneous fat, deep fat compartments, retaining ligaments, and bones. Although visible aging changes can be seen in the skin, the full extent of bone aging can only be appreciated radiologically [5].

Age-related changes in bone density affect the facial skeleton. A loss of bone mass in the mandible, maxilla, and frontal bones can cause the forehead and facial skin to sag. This process contributes to the appearance of a sagging neckline and the development of jowling along the mandible, with a loss of distinction between the jaw line and the neck [7].

Bones provide the underlying structure for the soft tissues of the face, covered by the periosteal layer. The facial bones, like the rest of the skeleton, undergo continual lifelong remodeling. The aging of the facial skeleton can be observed to start between 20 and 29 years old, regardless of gender, and continues throughout life. Facial bone remodeling directly correlates to visible facial aging signs. While numerous studies have demonstrated bony aging, they often report varying conclusions due to small sample sizes, inter-individual differences, gender, and ethnic considerations. Nevertheless, predictable facial bone aging signs occur sequentially, including

The changes to facial angles, the maxilla, the pyriform aperture, and the mandible. changes in facial bone morphology are closely linked to cosmetic changes in the face. Visible skeletal aging signs include flattening of mid-face bones, retrusion of the bony chin and pyriform fossa, and blunting of the mandible angle and jawline shape [1, 8, 5]. If the bony foundation of the face changes, it indirectly affects the position of retaining ligaments, overlying fat compartments, and other tissue layers [5].

The facial bones provide the underlying framework for the soft tissues and are essential to consider in facial rejuvenation procedures. Research has shown that the facial skeleton undergoes continuous and lifelong changes that affect the appearance and expression of the face. Previous studies have showed these changes are responsible for alterations in facial shape, including the position and origin of ligaments and fat compartments. The changes also affect facial angles, which can differ among populations. For example, a study in Caucasians found a decrease in glabellar, orbital, maxillary, and pyriform angles with age, while a study in Asians

showed less changes in orbital and maxillary angles but more changes in pyriform angle. The changes in the facial skeleton can cause an anterior positioning of the orbital septum due to expansion of the inferior orbital rim.

5. Face-Lifting: An Overview

Facial rejuvenation surgery is a very popular cosmetic procedure that aims to restore youthful appearance to the face and neck. [2] The procedure consist of removal excess skin and tightening of underlying tissues to create a smoother, firmer, and more lifted appearance. There are few techniques and each surgical approach has its own risks and benefits, as well as proponents and detractors. [9]

The first technique, skin-only facelift, is the most simple and least invasive from all of the techniques. It involves the removal of excess skin from the face and neck, without any changes in the underlying muscle or tissue. This technique is suitable for patients who have minimal sagging and laxity in the facial tissues and who wish to achieve a subtle better looking in their appearance.

The second technique, SMAS plication, involves the manipulation and tightening of the superficial musculoaponeurotic system (SMAS), which is a layer of tissue beneath the skin that supports the facial muscles.

In the 1970s, the concept of the superficial musculoaponeurotic system (SMAS) was recognized. SMAS manipulation is a widely used technique in face-lifting procedures, and proper modification of the SMAS can yield aesthetically pleasing results that last for a long time. [9]
During this procedure, the SMAS is folded and sutured to create a more lifted and youthful appearance. This technique is suitable for patients who have mild to moderate facial sagging and want to achieve a more significant improvement in their appearance.

The technique of plication depends on folding the SMAS on itself without undermining the SMAS. This method typically represents a safe way to perform face-lifting surgery since the SMAS and sub-SMAS structures remain untouched. [10]

The third technique, conventional SMAS lift, is similar to SMAS plication but involves the more extensive dissection and elevation of the SMAS layer. This technique provides a more significant lift than SMAS plication and is suitable for patients who have moderate to severe facial sagging.

The fourth and most extensive technique is the deep plane facelift. This technique involves the dissection and elevation of the SMAS layer and deeper facial tissues to

create a more dramatic and long-lasting lift. This technique is suitable for patients who have significant facial sagging and want to achieve the most significant improvement in their appearance.

Based on the 2020 Plastic Surgery Statistics Report released by the American Society of Plastic Surgeons (ASPS), facelifts were the third most popular cosmetic surgical procedure in the US, with 234,374 procedures performed in that year. The top two procedures were rhinoplasty and blepharoplasty with 352,555 and 325,112 procedures, respectively. [11] In 2020, the majority of facelifts, approximately 64%, were performed on patients aged between 55 and 69 years, according to the ASPS report [12].

According to the American Society of Plastic Surgeons, 128,266 facelifts were performed in the United States in 2014, making it one of the top five cosmetic surgical procedures performed, along with breast augmentation, blepharoplasty, liposuction, and rhinoplasty. The majority of facelifts (116,415) were performed on female patients [13].

In conclusion, facelift surgery is a popular and effective procedure that can help patients achieve a more youthful and refreshed appearance. There are several techniques used in facelift surgery, each with its own benefits and drawbacks. The choice of technique depends on the patient's individual needs and goals, as well as their degree of facial sagging and laxity. A thorough consultation with a qualified and experienced plastic surgeon is essential to determine the most suitable technique for each patient.

5.1 Skin Only Face lift

Over the past 25 years, there have been numerous improvements in rhytidectomy approaches beyond the typical skin-only facelift. The majority of these approaches focus on the drooping muscular layers beneath the subcutaneous tissue. Nevertheless, for specific patients, a skin-only facelift can still produce satisfactory and secure outcomes. A meticulous and thorough approach to planning is essential for achieving the best possible results. [14]

Historical Background of the Procedure

Until the early 1970s, subcutaneous facelift was the most prevalent surgical technique used in facelift surgeries. Improvements during that time were mostly limited to incision techniques and not surgical concepts. However, in 1974, Skoog introduced a new method that involved lifting the platysma of the neck and lower face without detaching the skin [15]. This technique, along with the development of the superficial musculoaponeurotic system (SMAS) by Mitz and Peyronie, led to a change in the surgical approach for many surgeons performing rhytidectomy. [16] Although not as commonly performed as other methods today, skin-only facelift still has a role to play in select patients. It is also the foundation for how most plastic surgeons perform a facelift. [14]

Indications of the procedure

assessment of specific issues and individual desires is necessary for every patient seeking facial rejuvenation. For a patient to be a good candidate for a skin-only facelift, the primary anatomic problem should be limited to skin excess. Patients who have previously undergone a facelift with SMAS tightening and now require a touch-up may fall into this category.

A skin-only facelift may also produce satisfactory results for thin women with good skin tone and underlying bony structure. In patients with a heavier face and less than ideal bony framework, obtaining a natural-looking outcome with a skin-only lift is more challenging due to the greater amount of pull required on the skin flaps.

For patients with significant jowling or obtuse cervical-mental angle correction needs, a different approach that incorporates deep suture suspensory techniques may be more appropriate. Patients must also be made aware of the limitations inherent in

performing a skin-only facelift since other facial structures that have aged are not addressed. With the recent resurgence of SMAS plication sutures and purse-string suturing of the underlying facial musculature, the skin-only approach is likely to be less frequently used.[14]

Relevant Anatomy

To achieve optimal results with minimal complications, thorough understanding and knowledge of the facial region's anatomy are necessary. Although there are variations, a common approach involves an incision that starts from the temporal area and continues down inferiorly to a preauricular incision that then becomes postauricular as it curves around the ear and down the edge of the hairline. Another approach to the temporal incision is to carry it horizontally along the sideburn/cheek junction and then vertically along or just posterior to the anterior hairline. This avoids the temporal dissection along the deep temporal fascia and preserves the superficial temporal vessels. Most surgeons use a posttragal incision in front of the ear, while some use a pretragal approach in males or patients who smoke. With a skin-only facelift, only subcutaneous dissection is required, leaving the underlying SMAS layer undisturbed.

Manchot first described the vascular supply to the face in 1889. [17] Whetzel and Mathes later refined the study and described the vascular territories of the face and scalp. [19] The facelift flap is mainly supplied by musculocutaneous perforators as they emerge from three arterial trunks: the facial, superficial temporal, and ophthalmic arteries. Most blood flow originates in the central facial area, and rich anastomotic networks exist, allowing for skin-flap survival after undermining. As more extensive dissection is carried out medially, the risk of ischemia in the flaps increases. Other deeper plane techniques such as composite facelift preserve the blood supply to a greater degree, making ischemia less likely, even with extraordinary tension that a subcutaneous facelift would not allow. [18] [19]

The underlying facial musculature lies beneath the dissection plane and is covered by the SMAS.

Intraoperative Procedure

The surgical approach may differ among surgeons, although some steps are consistent among many. [20,21,22,23,24,25]

A skin-only facelift can be performed as an outpatient procedure or with an overnight stay. Likewise, either IV sedation or general anesthesia can be utilized.

After preparing and draping the surgical site, mark the proposed skin incisions. A solution containing lidocaine with epinephrine is injected into the proposed skin incisions and the area that will be undermined during dissection. To avoid using excessive amounts of either lidocaine or epinephrine, 0.5% lidocaine with 1:200,000 epinephrine can be used at the incision sites, followed by 0.25% lidocaine with 1:400,000 epinephrine for injection into the cheek and postauricular regions. The dose for lidocaine varies from 3.5mg/kg of body weight (without epinephrine) to 7mg/kg of body weight with epinephrine. It is essential to note that in elderly patients, epinephrine carries some risks. The total amount of epinephrine injected should also be closely monitored and adjusted accordingly to the patient's condition. Waiting at least 10 minutes for the hemostatic effects of the epinephrine is recommended.

Incisions are made using a scalpel, followed by flap dissection with either the scalpel or dissecting scissors. In the postauricular region, care should be taken to avoid injury to the great auricular nerve, which usually crosses the sternocleidomastoid muscle approximately 6.5 cm below the external auditory canal. [26]

Dissection in the posterior neck continues anteriorly and superficially to the platysma muscle. A submental incision is often used to undermine the neck skin and treat platysmal banding if present. Subcutaneous dissection in the cheek should only be performed to the extent of excess laxity present. While a more aggressive approach to skin undermining has become popular, a less aggressive approach should be employed in patients who smoke. As dissection moves medially, there is an increased risk of insufficient blood flow leading to skin slough or poor healing.

After completing skin undermining, it is important to ensure meticulous hemostasis. Maintaining the patient's blood pressure at the normal preoperative level can be helpful to avoid a factitiously low intraoperative blood pressure, which may deceive the surgeon into thinking that hemostasis has been achieved. If the patient's blood pressure returns to normal after being lowered, hematoma formation may occur in the postoperative period.

Next, the direction of vector pull for the undermined skin should be determined. Usually, the cheek skin is pulled laterally and superiorly in a direction parallel to the nasolabial fold, elevating the skin over the tragus to the superior helical rim. A purely vertical vector should be avoided to prevent a "lateral sweep" deformity. In the postauricular region, a more vertical upward vector is used. Tacking sutures at two points holds the flaps in the correct position, allowing for careful excision of excess skin. Removing more skin creates a tighter pull, but this can lead to increased tension on the closure, which may result in excessive or widened scars. It is important to minimize tension at the closure site to prevent earlobe deformities, which are more common when tension is applied at the inferior lobe.

If drains are used, they may decrease postoperative swelling or seroma formation. The skin should be closed in layers, with careful attention given to closure of the posttragal incision, defatting of the new tragal skin, and tragal reformation. In male patients, individually cauterizing hair follicles of the new tragal skin may be necessary to prevent beard growth from occurring in an unnatural location over the tragus. Other depilatory techniques may be required later despite this maneuver.

Finally, Xeroform strips or ointment should be applied to the incision site, and a very loose dressing should be used. A pressure dressing should be avoided to prevent undesirable consequences of pressure on the skin flaps. [14]

Future and Controversies

The subdermal facelift still has the potential to yield positive outcomes in certain individuals, although most surgeons agree that addressing the underlying SMAS layer (through techniques such as plication, SMAS-ectomy, or a composite facelift) typically results in superior outcomes. Additionally, many believe that a SMAS-

supportive surgery leads to longer-lasting cosmetic improvements. Nevertheless, objective data supporting this assertion have not been obtained. In 1995, Gamble et al compared composite facelifts to subdermal techniques and found that the composite flap resisted stretching more effectively than the subcutaneous flap. [27] This discovery implied that, for a given level of tension, less skin excision could be performed in the composite flap. However, they also suggested that this resistance could be countered by implementing deep support sutures.

A skin-only facelift can be combined with anterior platysmaplasty, which enables the removal of supraplatysmal and subplatysmal fat, adjustments to the digastric muscles, and even the excision of submaxillary glands directly through a submental incision. Nonetheless, this does increase both the duration of the procedure and the potential for complications. [14]

5.2 SMAS Plication Facelift

In this section we will discusses the SMAS plication technique in facelift surgery, where plication refers to folding, the process of folding, or the state of being folded.

In order to perform successful facial rejuvenation surgery, a comprehensive understanding of facial anatomy is crucial. For those new to cosmetic surgery of the face and neck, utilizing superficial musculoaponeurotic system (SMAS) plication can be a simpler approach. This technique provides a consistent and reliable way to rejuvenate the lower face and neck, and may result in fewer complications compared to more invasive procedures. Additionally, the SMAS plication technique can be customized to suit each patient's unique anatomy.

Facial rhytidosis is caused by gravitational effects, loss of skin turgor due to collagen breakdown, and reduced elasticity which is further exacerbated by sun exposure. These changes are influenced by various factors such as ethnicity, sex, and level of sun exposure. While non-surgical treatments can help to slow down these changes, they cannot prevent them from happening altogether. Some experts recommend specific facial exercises and devices that produce electrocurrents to stimulate facial muscles to address underlying tissue changes.

The aging process leads to the absorption of the buccal fat pad, as well as shrinkage or resorption of the skull, which typically begins in the sixth decade of life and progresses over time. Other changes, such as the descent of the brows, occur earlier, usually in the third or fourth decades of life. [12]

The term "facelift" is often used interchangeably with "rhytidectomy," which comes from the Greek words "rhytis" meaning wrinkle and "ektome" meaning excision. According to Dorland's Illustrated Medical Dictionary, a rhytidectomy involves the excision of skin to eliminate wrinkles [1], while rhytidoplasty is defined as plastic surgery to eliminate wrinkles from the skin [28]. However, rhytidoplasty may be a more comprehensive term since there are other methods besides skin resection to reduce or eliminate wrinkles [29].

In the past, facelift surgery involved lifting the skin, applying tension to reduce wrinkles, removing the necessary skin, and securing the edges. However, over time,

the surgery has progressed beyond the traditional definition of "rhytidectomy" to "rhytidoplasty," which now includes a variety of plastic surgery techniques that involve different depths of dissection and approaches, such as deep plane, subperiosteal, composite, subdermal, endoscopic, mini-incision, and laser-assisted, among other SMAS approaches. [30]

History of the Procedure

In 1969, Skoog integrated the manipulation of the SMAS into facelift surgery techniques [31]. According to Lemmon, he referred to sub-SMAS dissection as a "helpful technique in facelifting" [32]. Mitz and Peyronie's 1976 anatomical study [33], inspired by Tessier, provided further knowledge on the SMAS. Since then, many authors have contributed to the literature and education of SMAS manipulation techniques. The treatment of the SMAS involves suspending, excising, plicating, or a combination of these three techniques. [12]

Indications of the procedure

Facelift surgery patients may fall between the third and tenth decades of life, although the typical range is from the late fifth decade to the late seventh decade. While females more frequently seek out facelift surgery, these statistics are subject to change. Patients may present with a combination of facial rhytidosis, sagging neck skin, neck bands, submental fat, sunken cheeks, jowls, and pronounced melolabial (nasolabial) folds. These presentations may differ depending on the patient's age, gender, and ethnicity.

Some patients have undergone surgery in the past and require repeat surgery to maintain results that have faded over time.

Rhytidectomy aims to enhance facial rhytidosis and sagging of the skin and deeper facial layers, including the blunting of the cervicomandibular angle and the formation of jowls, cheek laxity and absorption of the buccal fat pad, neck laxity, neck bands, a large neck, and prominent melolabial (nasolabial) folds.

The ideal candidates for facelift surgery are thin, fair-skinned, and middle-aged, with moderate-to-severe skin laxity. Patients who are overweight or have thick skin tend to have a slightly less favorable outcome. [12]

Relevant Anatomy

The human face is a remarkably intricate structure that can be challenging for any surgeon. Specifically, a firm understanding of the blood supply and the relationship of the skin, fascia, fat, musculature, and periosteum in the cervicofacial region is essential.

The skin above the zygoma is supplied with a robust blood supply from the superficial temporal artery. Below the zygoma, the facial and transverse facial arteries provide blood flow to the skin before anastomosing with the superficial temporal artery in the subdermal region. These three vessels originate from the external carotid artery, while other tributaries originate from the internal carotid artery, including the supraorbital and supratrochlear vessels.

The superficial fascia of the face and neck that overlies the parotid and cheek region is the SMAS. It also attaches to the platysma, the superficial muscle covering the lower face and neck." [34]

This system has an extensive area, with most authors recognizing the galea as its superior extension and the intermingling with the platysma as its lowest extension.

As the SMAS runs over the deep temporal fascia, it is commonly referred to as the temporoparietal fascia or superficial temporalis fascia. It contains the superficial temporal artery and the frontal branch of the seventh cranial nerve, which can be easily injured during dissection and retraction in the region of the zygoma. The temporal branch of the facial nerve courses over the zygomatic arch anteriorly to it. There has been variation in the number of nerve rami and the pattern of this, often referred to as a singular "branch." At the level of the zygomatic arch, the attachments of the SMAS vary and are not typically contiguous.

As the SMAS descends inferiorly, it passes over the parotid gland. Jost and Levet believe that the SMAS is included in the parotid fascia. [35] The SMAS is attached to the deep fascia and skin through ligament-like tissue projections called parotid-

cutaneous. The SMAS courses anteriorly to the masseter muscle and then descends to envelop the muscles of facial expression. A thinner layer of the SMAS invests the undersurface of the skin of the face. The buccal branches of the facial nerve are distributed sub-SMAS in this region and should not be disturbed during dissection. [12]

Intraoperative Details

In a five-step neck-lift procedure, Narasimhan et al describe the use of SMAS plication, which involves the following:

• Undermining of the skin over the neck and cheek

• Submental access to the neck, with potential fat excision and midline plication of the platysma (with inferior muscle release)

• Lateral suspension of the platysmal window

• Precise release of the mandibular septum and ligament, if required

• SMAS redraping using plication or SMASectomy [12]

There are varying viewpoints on the management of submental adiposity and platysmal bands, if present. While some surgeons opt for submental lipectomy with or without platysmal band plication, others prefer liposuction.

Make a small cut using a 15 blade. Through this opening, anesthetize the region of the neck adiposity, which can be hydrodissected. Liposuction can be readily conducted via the incision used for tumescent anesthesia using a 12-gauge fat harvester on a 12-mL syringe or suction machine.

While adhering to the premarked boundaries, move the cannula in a fan or spoked wheel-like pattern back and forth until most of the submental fat is extracted. This may be succeeded by liposuction using a spatula cannula, which also helps to undermine and form a flap.

Using a 2- to 3-mm cannula, liposuction of the jowl can be done through the incision made at the inferior pole of the junction of the earlobe and cheek. If lipectomy and platysmal banding are required, then the incision must be expanded to 2-3 cm and suitably anesthetized.

If desired when liposuction is to be performed, the jowl may be infiltrated with tumescent anesthesia via the inferior incision.

To prevent injury to the marginal mandibular branch of the facial nerve, take care to remain superficial. Several surgeons make incisions around the ear and then undermine and lift flaps with curved Metzenbaum scissors. Other surgeons prefer to undermine the areas using a spatula cannula (without suction) to create tunnels that can be easily connected using the curved Metzenbaum scissors. A few prefer to use a scalpel for the initial dissection. The authors choose Kaye-type scissors after raising the initial flap with a 15 blade on a scalpel.

To begin, create the anterosuperior incision and undermine about 3 cm in front of the ear down to the mandibular angle. Then perform the same procedure through the inferior incision, thus undermining the area in front of the earlobe to about 2 cm medial to the mandibular angle and extending about 2 cm posterior to the mandibular angle on the lateral neck. Finally, create tunnels through the posterior incision, starting in the postauricular sulcus and fanning posteriorly about 3-4 cm directly behind the incision.

Surgeon opinions vary regarding the placement of incisions both in front of and behind the ears. Some prefer the posttragal incision, which may help to hide the scar in female patients. Obviously, this incision is not performed in bearded men because it pulls beard hairs back onto the tragus. However, with the availability of lasers for hair removal, this issue may be less critical. Other surgeons only perform pretragal incisions, which, unlike the former technique, do not affect the appearance of the tragus.

There are variations in the location of postauricular incisions. Some surgeons prefer to bring the incision down along the hairline, which reduces dog-ear formation, but results in a visible scar that can only be hidden if hair is worn down. Alternatively,

other surgeons prefer to bring the postauricular incision directly posterior, allowing for easier concealment of the scar.

Placement of incisions above the ears varies. Some surgeons make the incision along and in front of the hairline, preserving the sideburns but resulting in a visible scar. Other surgeons extend the incision directly superior, which elevates and pulls back the sideburns. A newer technique, the "mini-lift" or minimal-incision facelift, avoids extending the incisions beyond the most superior part of the ear to prevent distortion of the hairline or additional visible scars. [36]

After creating the flap on one side, locate the SMAS, which can vary in appearance and thickness. The SMAS is a fibrovascular layer that lies superficial to the muscles and larger vessels and nerves, and below the subdermis. It tends to be thicker anterior to the ear and less thick over the cheek. Plicate the SMAS by pulling it back over itself, which is done using an absorbable 3-0 or 4-0 Vicryl suture, a nonabsorbable suture such as a 3-0 or 4-0 polyester suture, or a 4-0 or 5-0 Prolene suture on an FS-2 needle. By keeping the SMAS plication below the zygoma, injury to the facial nerve can be avoided.

Pull up the skin flap located behind and just beneath the ear and secure it using skin staples at the postauricular sulcus. Excise the excess skin, taking care to minimize tension on the suture lines in front of the ear. Closure can then be performed using 5-0, 6-0, or 7-0 Prolene or nylon, with skin staples or sutures. [12]

Future and Controversies

Rhytidectomy and rhytidoplasty procedures have undergone numerous transformations since their inception, which involved solely removing skin. [37] Newer techniques are emerging that reduce complications, promote rapid healing, and result in shorter recovery times. Stem cell therapies that are either combined with traditional surgery or used in place of incision surgery are being examined. Moreover, the use of fibrin sealants to improve the healing process has been reported. [38] [39] Guyuron et al have proposed a so-called super-high superficial musculoaponeurotic system (SMAS) facelift procedure that employs tailor-tack plication. In this approach, a super-high SMAS flap is generated via a line from the tragus to the lateral canthus, which is dissected and incised through SMAS dissection adequate to "move the lateral

nose and the oral commissure with traction on the SMAS." The SMAS is suspended from the deep temporal fascia using 4-0 Mersilene sutures, and the use of tailor-tack sutures in the SMAS caudal to the malar bone is strategically placed to remove SMAS laxity in the oral commissure and cheek regions. Conservative lateral suspension of the orbicularis muscle from the deep temporal fascia, fat grafting to restore facial volume, and, if necessary, neck contouring, are all part of the procedure, which frequently utilizes the vest-over-pants platysma overlap technique.

5.3 SMAS Facelift Rhytidectomy

Patients who come in for rhytidectomy consultations are worried about their facial features showing signs of aging. These features can include droopy cheeks, jowls, and lines around the mouth, as well as excess tissue in the neck and chin area [40]. The aim of the plastic surgeon is to identify the specific factors contributing to the patient's aging appearance and which ones can be corrected.

The most suitable candidate for a rhytidectomy is a middle-aged woman with a fair or medium skin complexion, minimal adipose tissue, and moderate skin laxity in the jowl and cervicomental regions. An individual with a strong and attractive underlying bone structure, including prominent zygomatic arches, may experience even greater enhancement. However, individuals who are overweight with thick and hyperpigmented skin may not achieve optimal results. People with ptotic submandibular glands and a lower hyoid position may have a less-defined cervicomental angle and receive less than optimal results.

Indications

The primary surgical criterion is whether a technically proficient facelift can achieve a more youthful appearance for the individual. The benefits of a facelift are restricted to tightening and providing support to the tissues of the lower two thirds of the face, including the jowl, submentum, anterior neck, and, depending on the facelift technique used, malar tissues. If brow ptosis or excess eyelid skin contributes to the person's aged appearance, a brow lift or blepharoplasty is needed to achieve the desired outcome [41].

The overall improvement achievable with a facelift is restricted by aging of the upper third of the face and eyelids and the existence of wrinkles. Failure to address these issues results in suboptimal outcomes, with half of the face still appearing aged.

The underlying structure of the face is also crucial as the facelift's redraping of the skin highlights attractive cheekbones, chin, and jawline.

A relatively high and posterior hyoid is optimal, enabling maximum elevation of the submental contour.

Patients with rounder faces, low cheekbones, short mandibles, and ptotic submandibular glands have limited cervicofacial definition with a facelift alone. For such patients, adjunctive cheek and chin implantation may be necessary to achieve the desired result. Patients with a small chin or inferiorly placed hyoid cannot achieve the desired cervicomental definition without a chin implant [7].

Relevant Anatomy

The SMAS fascia is a fan-shaped fascia that surrounds the face and is utilized to lift sagging facial tissues. The SMAS is continuous with the platysma muscle below and the superficial temporal fascia above, and it is located superficially to the parotid fascia. The SMAS links to the fascial musculature in the nasolabial, perioral, and periorbital regions.

Facial nerve branches that exit the parotid gland lie deep to the SMAS. The frontal branch of the facial nerve is situated beneath the superficial temporal fascia. Hence, to prevent damage, the dissection plane should not be as deep as the temporal fascia.

Intraoperative Details

The patient is marked while in an upright position to delineate submental liposis, vertical platysmal banding, and the area where jowls form. Additional landmarks outlined include the anterior edge of the sternocleidomastoid muscle and the mandibular angle. Patanguay's line is marked, highlighting the trajectory of the frontal branch of the facial nerve. It's a straight line from just below the earlobe to 1.5 cm above the outer aspect of the eyebrow. A line 2.5 cm from the oral commissure and lateral canthus is marked as the most medial point of the skin dissection.

An incision is made in the temporal hair-bearing skin in a line that continues into the skin anterior to the root of the helix. The incision then curves just behind the tragus, partially concealing the incision, and emerges in the skin anterior to the ear lobule. It then curves behind the ear lobule and into the postauricular and occipital skin. High

postauricular incision is done, which is optimal for hiding the incision. For male patients, preauricular incisions are preferred over posttragal incisions to prevent hair growth in the external auditory canal.

Sharp dissection elevates the skin flap in the occipital area with the scissors tips pointing upwards. The skin may be firmly adherent in the area of the sternocleidomastoid fascia. Diligent dissection in this region helps avoid damage to the greater auricular nerve. Dissection then proceeds anteriorly with the complete freeing of the earlobe. Next, dissection proceeds in a superior direction. Superficial flap elevation in the area of the zygoma prevents damage to the frontal branch of the facial nerve. Dense osseocutaneous ligaments in the malar region make flap elevation more laborious. The skin flap is elevated to the previously marked point from the oral commissure and lateral canthus and from one side of the neck under the chin to the other side.

After the skin flap has been elevated, the SMAS is incised in a preauricular direction, and a SMAS flap is raised by blunt dissection until the anterior border of the parotid gland and the junction of the platysma. Blunt dissection is continued over the masseter superficial to the facial nerves up to the edge of the parotid gland. This level of dissection is necessary in patients with more severe jowling. Once the excess SMAS has been removed, the SMAS layer is redraped and resuspended with a 3-0 Ethibond suture [42].

The first suspension vector pulls from the angle of the mandible and sternocleidomastoid towards the mastoid, while the second vector tightens the periparotid SMAS upward towards the tragus. The overall pull is superior and partially posterior.

In cases where vertical banding is present in the neck, a submental incision can be made to plicate the medial ends of the platysma, in conjunction with lateral platysmal tightening to create a corset and further improve submental contour.

To reduce the risk of hematoma formation, a closed suction drain is used. The postauricular flap and temporal region are trimmed, and skin staples are used to reapproximate the skin in those areas. In non-hair-bearing skin, a 5-0 nylon suture is

used in an interrupted fashion, ensuring wound end eversion. A study of 405 patients showed that creating a hemostatic net also helped prevent hematoma [43].

A retrospective study by Rosenfield assessed the use of a solely lateral, "low" SMAS technique instead of the midline open neck lift in combination with SMAS rhytidectomy. Full correction of neck deformities was achieved in all 198 patients, with faster recovery times than with traditional direct neck lifts [14].

5.4 Deep plane face lift

Through the deep plane facelift technique, the malar fat pad and its adjacent skin can be elevated directly, providing an opportunity to adjust their position using sutures. This approach can effectively address age-related alterations in the midface. [44]

Facelift or rhytidectomy is a frequently performed surgical procedure for rejuvenating the head and neck region. Traditional techniques, like SMAS imbrication or plication, are effective in restoring the lower face and neck changes associated with aging. [1] For more information, refer to the SMAS Facelift Rhytidectomy article on Medscape Drugs & Diseases.

The deep plane facelift is a modification of standard facelifts that specifically addresses aging-induced changes resulting from midface structure ptosis (malar fat pad) and deep nasolabial folds. [8, 5, 6] These issues are inadequately resolved by other techniques, barring midface procedures.

Deep plane rhytidectomy can be safely performed with high patient satisfaction levels in carefully selected cases. Surgeons strive for aesthetically pleasing and natural-looking results that do not show any indication of a surgical operation. This article discusses the preoperative assessment and surgical methods that enable surgeons to identify patients who could benefit from deep plane rhytidectomy. [44]

Indications of the procedure

Patients who are suitable for deep plane rhytidectomy should exhibit notable age-related alterations around the midface and melolabial area. [44]

Standard facelift procedures, like SMAS imbrication or plication rhytidectomy, can effectively correct lower face aging alterations, such as sagging skin or platysmal banding in the neck. However, these techniques are insufficient in treating aging changes due to midface structure ptosis and deep melolabial folds. The deep plane rhytidectomy technique was developed specifically to target these aging-related issues. [44]

It is not necessary for every patient with lower face aging changes to experience midface ptosis or deep melolabial folds. Those who do not have these conditions may be eligible for other procedures, such as SMAS flap, plication, or imbrication facelifts, which generally require a shorter healing period and pose a lower risk to the facial nerve.

It is important to assess the patient's overall medical history, ensuring that they are in good health to undergo an elective surgical procedure lasting 3 to 4 hours. Take note of any bleeding tendencies or medication use that may affect blood clotting. Patients should discontinue anticoagulating medications for an appropriate period to prevent intraoperative bleeding complications.

Discuss the patient's expectations and goals during the initial consultation and review them before the surgery to avoid misunderstandings. Confirm that the patient's goals are practical and cannot be achieved with a less invasive rhytidectomy procedure or other cosmetic treatments.

The patient must be well-informed about the risks and different options for addressing aging-related facial changes before providing informed consent. Typically, deep plane rhytidectomy carries a higher risk of facial nerve branch injury and takes a slightly longer time to recover than other facelift techniques.

Relevant Anatomy

The SMAS is a layer of muscle and connective tissue that covers the facial muscles and the platysma in the neck, lying over the parotidomasseteric fascia. The branches of the facial nerve leave the parotid gland and run towards the midfacial muscles underneath the parotidomasseteric fascia.

To avoid facial nerve injury, dissection in the lower face should remain below the SMAS and above the parotidomasseteric fascia. The sub-SMAS dissection can proceed medially up to the facial artery and vein, but anterior to this point, the risk of nerve injury increases as the nerves innervate the perioral musculature. The sub-SMAS dissection is stopped about 1 cm below the zygomatic arch, to prevent injury to the nerves innervating the zygomaticus major and minor muscles. Dissection in the midface is performed above the SMAS to separate the malar fat pad and skin complex

from the deeper structures, allowing for safe dissection just above the orbicularis oris and zygomaticus major and minor muscles to the melolabial fold, and potentially into the upper lip. A subcutaneous flap containing the malar fat pad is created, allowing for posterior-superior repositioning of the malar fat pad-skin complex to achieve a more youthful appearance.[44]

Intraoperative Details

Various types of facelift incisions are available, and the authors use a standard incision starting from the temporal hairline and aligned vertically with the preauricular crease. The incision curves around the tragus in women or in the preauricular crease in men, and then passes near the postauricular sulcus and onto the conchal bowl for a short distance. To hide the scar, the incision curves horizontally into the hair at a level beneath the pinna, and care is taken to avoid altering the postauricular and temple hairline. Hairstyles of any length should be possible after the facelift.

In cases where there is a large amount of excess skin in the neck, the posterior incision may be altered to follow the postauricular hairline and angled across the hairs to allow for greater skin excision and a better outcome. A submental incision of 2 cm is made in the crease, and subcutaneous dissection proceeds above the platysma in the midportion of the neck. This dissection extends laterally by 5-6 cm and connects with the dissection from the periauricular incisions. If necessary, a corset platysmaplasty is performed to improve neck definition or remove significant platysma banding. This technique involves removing the excess medial platysma from the mentum to the hyoid bone level, and reapproximating the edges of the platysma in the midline using buried nonabsorbable sutures to tighten the platysma sling in the neck, similar to lacing a corset. Midline submental fat is often excised together with the muscle resection.

(Jacono and Malone's study on cadavers demonstrated that simultaneous midline corset platysmaplasty and deep-plane rhytidectomy significantly limits the ability to lift the neck, jawline, and midface. The study found that when deep-plane rhytidectomy was performed preauricularly in the vertical dimension with

platysmaplasty, lift was reduced by 40.5%; when it was performed postauricularly, lift was reduced by 23.9%. [3])

Periauricular incisions are created, and the skin is raised in a subcutaneous plane. Careful attention is given to avoid injuring the great auricular nerve in the neck. A minimal amount of subcutaneous fat is left on the skin flap to prevent excessive thinning. The dissection proceeds above the platysma to connect with the previous submental dissection in the neck. The subcutaneous dissection in the face extends approximately 2 cm beyond a line drawn from the mandibular angle to the origin of the zygomaticus major and minor muscles. An incision is made in the SMAS layer that runs parallel to this line. The SMAS is gently elevated, and the dissection progresses from inferior to superior and lateral to medial. Please refer to the image below.

The correct plane for dissection lies between the SMAS and the parotidomasseteric fascia. It is essential to keep the parotidomasseteric fascia intact to avoid injury to the facial nerve branches that can be seen passing from the parotid gland beneath the fascia overlying the masseter muscle. This loose plane is between the fascia on the undersurface of the platysma muscle (SMAS) and the parotidomasseteric fascia overlying the masseter muscle. The anterior border of this dissection is the facial artery and vein. Most of the dissection can be done bluntly with a Kitner dissector or a fingertip. The assistant continuously monitors for any signs of facial nerve stimulation. Any spreading should be done in the direction of the nerve with blunt instruments. Hemostasis is crucial for optimal visualization. It is essential not to breach the parotidomasseteric fascia during the procedure. Please see the images below [44].

The dissection is continued in the same plane superiorly until it reaches approximately 1 cm below the zygomatic arch. At the superior aspect of the dissection, subcutaneous dissection continues from the preauricular incision to the lateral part of the orbicularis oculi muscle. The dissection then proceeds on top of the orbicularis muscle medially and inferiorly until identifying the origins of the zygomaticus major and minor muscles. This dissection is defined as above the SMAS. Continuing this dissection inferiorly can safely connect with the sub-SMAS dissection in the lower face. From the origin of the zygomaticus major and minor muscles, the dissection proceeds

medially and stays directly on top of the fascia overlying these muscles, elevating the malar fat pad–skin complex from these deeper structures. The resulting facial flap consists of a myocutaneous flap (platysma/skin) in the lower part of the face and a thick subcutaneous flap with a malar fat pad attached to the skin in the midface. These two flaps can be elevated as a unit in a superior-lateral direction for a natural-looking improvement in the aging changes of the lower and midface.

After achieving absolute hemostasis, the malar fat pad is repositioned in a posterior-superior direction perpendicular to the melolabial fold and sutured to the fascia overlying the malar eminence using absorbable sutures like 3-0 Vicryl. The edges of the SMAS flap are then imbricated in a posterior-superior vector and sutured to the preauricular parotid fascia with a permanent 2-0 braided suture. For patients with a large amount of fat overlying the parotid fascia, open liposuction or direct defatting is performed to avoid excess bulk in the preauricular area. The SMAS flap is imbricated superiorly, and the posterior edge of the platysma in the neck is plicated to the fascia overlying the sternocleidomastoid muscle. Absorbable sutures are then placed between the permanent stitches to reinforce and smooth the suture line. Hemostasis is obtained, and drains may be placed or platelet gel may be used without drains. The skin is then redraped and closed as in a standard facelift, with care taken to avoid excessive skin removal, which may lead to unsightly scarring.

A retrospective cohort study by Schroeder et al showed that local employment of tranexamic acid (TXA) during deep plane rhytidectomy with platysmaplasty can significantly decrease intraoperative blood loss, postoperative drain output, and time to drain removal. 1 cc of TXA was added to every 10 cc of local anesthetic and tumescent solution. In the study, 75% of TXA patients had blood loss below 50 cc, while only 25% of control patients had blood loss below 50 cc.

Outcome and Prognosis

By employing meticulous patient selection and employing proper surgical technique, patients can anticipate a favorable cosmetic outcome with deep plane rhytidectomy (facelift). Although long-term studies have not conclusively demonstrated a significant advantage of the deep plane technique over other more conservative facelift approaches, Jacono et al's prospective study revealed that vertical vector deep plane rhytidectomy resulted in midface volume augmentation over the long term. With a minimum 1-year follow-up using a three-dimensional (3-D) analysis, the study, which included 43 patients who underwent the procedure, indicated that each hemi-midface increased by an average of 3.2 mL in volume. [9]

The surgeon must carefully assess those patients with marked malar sagging and deep melolabial folds who would benefit most from a deep plane facelift. Additionally, the surgeon must be familiar with the anatomy and accept the longer recovery period associated with deep plane rhytidoplasty.

Future and Controversies

According to Sand et al's study, the use of a high SMAS entry point in deep plane facelifts increased vertical tissue movement by 77.3% and horizontal movement by 61.4% compared to the movement achieved using a standard SMAS entry point. [2]

The effectiveness of deep plane rhytidectomy (facelift) is still a subject of debate, with both proponents and detractors. Other options, such as the subperiosteal midfacelift, are available to address age-related changes in the midface and melolabial fold region. Surgical procedures will continue to evolve as we seek safer approaches to address age-related changes in the midface.

The use of adjuvant therapies such as platelet gel or fibrin glue to promote hemostasis and wound healing is still a topic of debate. [44] Effective surgery not only requires avoidance of complications but also the achievement of the patient's goals. [2]
An optimal surgical result is based on profound knowledge of technical, historical, and anatomic features, experience, planning of each operation with respect to

individual facial properties, and benefitting from ancillary interventions, where indicated. [43]

6. Complications

Minor complications following a facelift are infrequent, and each should have an incidence of under 1-3%. Meticulous preoperative planning, attention to detail, and minimal skin closure tension should reduce the possibility of each incidence. These are considered delicate issues, and the surgeon's experience, along with careful preoperative planning and technique, can minimize these difficulties. [14]
The primary complications that can occur after facelift surgery include hematoma, nerve damage, and incisional problems. The occurrence of complications is proportional to the extent of the surgery and the degree of hemostasis. While facelift surgery is usually free of complications, as with any surgical procedure, issues can arise [42].

Hematoma

In 1994, Rees et al evaluated 1236 consecutive facelifts performed by 50 surgeons. The incidence of hematoma varied from 0-3.83%, all of which occurred within the first 48 hours postoperatively. The study identified that preoperative hypertension and below-normal intraoperative blood pressure that later rebounded to normal after surgery were associated with an increased hematoma rate.
Men generally have a higher incidence of hematoma after facelift surgery compared to women (8% vs 4%), which is partially attributed to the increased blood supply to the beard area in men. In 2004, Jones and Grover studied 910 patients to identify factors that may contribute to an increased risk of hematoma.
Individuals considering a facelift procedure should have well-controlled and stable blood pressure before surgery. A range of prescription and over-the-counter medications, herbal supplements, and food additives may adversely affect the coagulation cascade, and these must be avoided for 10-14 days prior to surgery. Keeping the patient's blood pressure at or near-normal levels prior to skin closure may help reduce this complication [14].
Edema and ecchymosis are common after surgery and are not considered significant complications. In most cases, ecchymosis fades by the 14th day after surgery, while edema may persist to some extent for up to 6 weeks [12].

Skin slough

Skin slough, or partial flap loss is another potential complication that may occur after a facelift procedure. It is commonly observed in the postauricular region, where tension is typically the highest, and the flap is the longest [12]. Skin necrosis is often linked with hematoma, infection, or excessive closure tension. In 1994, Duffy and Friedland analyzed 750 patients who had undergone subcutaneous facelift surgery and discovered a 0.5% incidence of skin necrosis. However, the average incidence seems to be approximately 1%. Patients who smoke are at a higher risk of flap loss due to the adverse effects of nicotine on platelets and microcirculation. Riefkohl correlated cigarette smoking with an increased incidence of skin necrosis in patients undergoing rhytidectomy in 1986. Smokers should ideally refrain from smoking for 3 weeks before surgery and 2 weeks after the operation. The amount of skin undermining is generally less aggressive in those who smoke to minimize the risk of skin healing issues. Another potential risk factor for skin necrosis is prior acne scarring. The subdermal scar associated with acne may compromise blood flow to portions of the flap. Surgeons must use their best judgment in these situations to determine the degree of undermining that can be performed safely [14].

Facial nerve injury

Complication of facial nerve injury is a possibility, but fortunately, it is rare. A subcutaneous facelift that does not violate the SMAS or platysma has a lower risk of this complication. Robbins reported 0 palsies in 226 subcutaneous facelifts, while Duffy and Friedland found 0.5% in 750 patients. The buccal branch is the most commonly injured facial nerve branch, but it may not always be recognized or clinically significant, as it has considerable overlap with other branches. Conversely, injury to the marginal mandibular and temporal branches is more noticeable and problematic, as they may have little or no cross innervation. A thorough knowledge of anatomy and meticulous dissection can greatly reduce the likelihood of a facial nerve injury in patients undergoing subcutaneous facelift.

After facelift, the great auricular nerve is the most commonly injured nerve [29]. This can cause sensory disturbances in the ear or posterior auricular region, which can

be quite bothersome to patients. Understanding the location where the nerve is in danger can help minimize this complication. Cutaneous anesthesia and hyperesthesia are also common after surgery, usually persisting for no longer than 2-3 weeks, due to severing of cutaneous nerve branches, postoperative edema, and/or trauma [14].

Post-surgery, it is common to experience cutaneous anesthesia and hyperesthesia, which usually last for no longer than 2-3 weeks. These effects are believed to be caused by severing of cutaneous nerve branches, postoperative edema, and/or trauma.

Facial nerve injury is a possible complication that can occur in up to 2.6% of patients undergoing facelift procedures. Injury to the marginal mandibular or temporal branch of the facial nerve is most commonly reported. If such injury is not detected during surgery when primary repair can be performed, complete regeneration is only observed in 15% of patients [12].

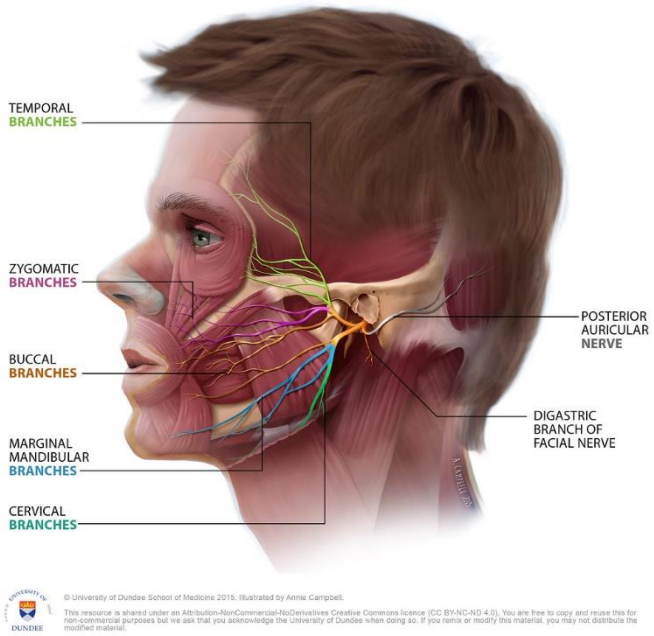

Figure 2. "Head Anatomy Facial Nerve WITH Labels by Annie Campbell" by dundeetilt is licensed under CC BY-NC-ND 2.0. To view a copy of this license, visit https://creativecommons.org/licenses/by-nd-nc/2.0/jp/?ref=openverse.

Deep venous thrombosis and pulmonary embolism

Deep venous thrombosis and pulmonary embolism are rare but serious complications that can occur after facelift surgery. Patients over 40 years old who undergo lengthy procedures under general anesthesia are at modest risk of developing blood clots. To minimize this risk, precautionary measures such as the use of pneumatic compression devices or low-dose subcutaneous heparin treatment before surgery are recommended [14].

Hypertrophic scarring

Hypertrophic scarring is an uncommon complication of facelift surgery that can result from flap necrosis, infection, or excessive tension on the flaps. Intralesional triamcinolone (10-25 mg/mL) is a satisfactory treatment option, and the pulsed-dye laser can be used in combination with it. Excessive turning of the head can lead to "stretching" or "widening" of scars, particularly in postauricular incisions that extend down along the hairline [12].

Infection

Infection is an infrequent complication of facelift procedures and is typically caused by Staphylococcus aureus or Pseudomonas aeruginosa. Early detection and prompt treatment with the appropriate antibiotics are crucial [12].

Hair loss

Hair loss is often observed in the temporal scalp when incisions extend into this region. To minimize hair loss, it is recommended to (1) limit the use of electrocautery to hair-bearing areas, (2) avoid excessive tension on hair-bearing flaps, and (3) avoid transection of hair follicles [12].

Earlobe distortion

Earlobe distortion, also known as a pixie-ear deformity, is another common complication [15]. It results from inferior pull on the earlobe, which is directly attached to the facial skin. If this complication occurs, it is often best to avoid correction for 6-12 months, as the distortion often resolves spontaneously [12]. This

can be prevented by leaving a generous amount of perilobular skin on the redraped skin flap during closure [42].

7. Recovering

Close monitoring of patients who have undergone facelifts is crucial in the postoperative period [14]. Vigilant observation during the early postoperative period can help identify any issues with hematoma or skin ischemia [45]. In addition, prompt evacuation of any hematomas can help prevent secondary skin flap ischemia or infection. Patients typically receive a standard light-pressure dressing after the procedure, which includes an ointment over the wounds, a nonadherent dressing, and fluffed gauze or cotton, secured with a light wrap [4]. Before discharge from the operating room, it is important to inspect the dressing and ensure that it does not exert excessive compression on the skin flaps. It is crucial to maintain meticulous hemostasis and not rely solely on an overly tight dressing [14].

If early flap ischemia is detected, releasing a few of the skin sutures may prevent significant skin loss. Allowing a small portion of the wound to heal by secondary intention is usually preferred over a large skin slough.

On the first postoperative day, the dressing and drains, if present, are typically removed. Patients should be instructed on basic wound care and to limit activity for the next few days. Early follow-up care is important to ensure no complications are developing.

Sutures can generally be removed in 4-6 days in non-hair-bearing regions and in 7-10 days elsewhere. Patients should also be reassured that swelling and bruising may take several weeks to subside completely [14].

Patients should be provided with an elastic neck support to wear for 24 hours per day during the first 7 days and then for 12 hours per day for the next 7-14 days. sleep slightly upright (>45°) and on their back is recommended to minimize edema for the first 7-10 days [12, 45]

Blood pressure should be maintained within the patient's normal range. Appropriate pain control can minimize the chance of a hypertensive episode related to patient discomfort. Nausea and vomiting must also be avoided, as they can increase bleeding or swelling.

Follow-up protocols may vary depending on the patient and the extent of surgery performed. Generally, follow-up visits are scheduled at 1 day, 1 week, 3 weeks, 3 months, and then yearly, but this schedule may be adjusted according to the patient's needs [14].

Patients should be advised not to force movement of the neck, which may remain tight for as long as 3 weeks. Recovery takes time, and patients may experience swelling, bruising, and some degree of discomfort and inconvenience. Bruising and edema may persist longer than expected [12].

Postoperatively, methylprednisolone (Medrol) is prescribed, along with high-dose vitamin C therapy (1000 mg TID) and Arnica Montana and bromelain therapy, to help minimize bruising and swelling. Prophylactic antibiotics, typically cephalexin (Keflex), are also prescribed [42].

8. Conclusion

Surgical procedures remain an effective option for face and neck rejuvenation, with different techniques tailored to individual patients based on their facial anatomy and desired outcomes. Facial anatomy plays a crucial role in determining the most suitable surgical approach, with an understanding of the underlying structures and landmarks being essential for achieving optimal results. Age-related changes in the face and neck are multifactorial, involving both intrinsic and extrinsic factors, and can be effectively addressed through various surgical techniques.

The skin-only technique is a less invasive surgical approach that is often used for patients with mild to moderate signs of aging. This technique involves the removal of excess skin and tightening of the remaining skin without involving the deeper tissue layers. This results in a more refreshed and youthful appearance without significant alteration of the underlying facial structure. However, this technique may not be suitable for patients with more advanced aging changes, as it may not provide adequate lift or support for sagging facial tissues.

For patients with moderate to severe skin laxity, SMAS plication techniques can be a more suitable approach. This technique involves tightening the SMAS layer, which is a deeper layer of tissue that covers the muscles of the face, in addition to removing excess skin. By tightening the SMAS layer, the facial tissues are lifted and repositioned, resulting in a more youthful and natural appearance. SMAS plication techniques can be combined with other procedures, such as fat grafting, to further enhance the facial contour and achieve optimal results.

The SMAS lift technique is a more versatile approach that allows for greater control over the facial contour. This technique involves lifting and repositioning the deeper tissue layers, including the SMAS and muscle layers, in addition to removing excess skin. This technique can be tailored to address specific aging changes in different areas of the face, such as the midface or jowls, and can provide more significant improvement in facial contour compared to the skin-only or SMAS plication techniques.

For patients with significant jowling and neck laxity, the preferred technique is the deep plane facelift. The deep plane technique involves the release and repositioning of the deeper tissue layers, including the SMAS, muscle, and fat layers, to get more comprehensive lift of the facial tissues. In addition, the deep plane facelift can also address the neck laxity and jowling that often accompany facial aging changes, resulting in a more harmonious and youthful look. While this technique is more invasive and requires a much longer recovery period than other techniques, it can provide significant and long-lasting results for the right patient.

While surgical procedures remain popular, non-surgical options such as hyaluronic acid fillers and botulinum toxin injections have increased their popularity in the last years. The non-surgical options can be used alone or in combination with surgical procedures to get an optimal results. Hyaluronic acid fillers can be used to restore volume and make a facial contours, while botulinum toxin injections can be used to treat dynamic wrinkles and have a better facial symmetry.

It is important for individuals to know the potential risks and benefits of both surgical and non-surgical options for face and neck rejuvenation. A comprehensive consultation with a physician can help patients make decisions while they are informed, and achieve their desired look while minimizing potential risks and complications. Individualized treatment plans should be developed based on each patient's different facial anatomy, changes happens from aging, and desired outcomes.

In conclusion, surgical procedures for face and neck rejuvenation is a popular and effective option, with lot of techniques that are available to address the different degrees of aging changes. Non-surgical options like an hyaluronic acid fillers and botulinum toxin injections can be used alone or in combination with surgical procedures to get an optimal results. Patients should be aware of the potential risks that possible and benefits of all options and work with a qualified physicians to make an individualized treatment plan to achieve their needs and goals.

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11. Biography

Tal Elkobi was born on February 28, 1995 in Be'er Sheva, Israel.
Due to her parents' appointment to key positions in the Israeli healthcare system, they decided to relocate from Kiryat Gat to Lahavim, where Tal studied in middle and high school.
During high school, Tal played tennis, and was in military fitness for about 3 years in preparation for the army.
After graduating, she joined the artillery corps force, where Tal served as an instructor of the artillery corps. She served for two years at a base in the south, near Egypt.
During the "Operation Protective Edge" in 2014, Tal joined the forces of the artillery on the Gaza border and trained soldiers to operate tanks.
Tal completed her service in the Israeli Defense Forces (IDF) with the rank of Sergeant in 2015. After the army, she flew to the Jewish Agency in Atlanta, Georgia, United States, for four months, where she volunteered to promote Israeli advocacy in the world and strengthen the Jewish community's connection with Israel.
In 2017, Tal began a pre-med course in Tel Aviv for about six months, preparing for entrance exams to the University of Zagreb in Croatia. She moved to Croatia in September 2017 to start her medical studies. During the covid 19 crisis, Tal worked in a study at a hospital in southern Israel, which examined the types of antibiotics recommended for children with a suppressed immune system after chemotherapy treatments.
During her medical studies, Tal continued to draw and create art. She enjoys working with her hands and demonstrating creativity and talents. She sees plastic surgery as a perfect fit for her interests and aspirations, and therefore, Tal is interested in specializing in plastic surgery in the future.