



Cosmetic and Aesthetic Surgery

¹ Shreyes D Naik, ² Sreeraj H, ³ Abinav N, ⁴ Dr. Hari Murthy

^{1,2,3} Students., ⁴ Assistant Lecturer

School of Engineering and Technology, Christ University, Bengaluru, India

hari.murthy@christuniversity.in, sreeraj.h@btech.christuniversity.in, abinav.n@btech.christuniversity.in, shreyes.d@btech.christuniversity.in

ABSTRACT

This extensive report describes into the intriguing history and contributions of cosmetics and aesthetic surgery with a peculiar focus on India's legacies in this field. The narrative embarks on an illuminating journey through time, tracing the origins of cosmetics practices to ancient civilizations and holistic principle of Ayurveda. We explore the role of the ancient Indian physician Sushruta, who documented surgical techniques for reconstructing noses and ears, laying the foundations for reconstructive surgery.

Exploring the Chronicles of time, we study that at the time of medieval era, Indians surgeons honed their skills in reconstructive procedures, particularly rhinoplasty, addressing disfigurements resulting from war fare and judicial punishments. As time unfolded, the scope of cosmetic surgery expanded, encompassing an array of procedure like facelifts and skin resurfacing.

Today, the modern cosmetics and aesthetic surgery stands as a dynamic and evolving aspect of healthcare. The report underscored the remarkable advancements in patient safety, the ethical standard and the diversification of available procedure. Practitioners in India and worldwide draw from ancient wisdom and contemporary innovations to offer a diverse range of services, celebrating the art of enhancing human beauty, the future of this field is a promising journey of growth, innovation and cultural adaptation.

Keywords: beauty enhancements, lip augmentation, Botox and dysport, dermal fillers, Collagen Induction Therapy

1. INTRODUCTION

The field of cosmetic and aesthetic surgery has a rich history dating back thousands of years, as the desire to enhance one's appearance and maintain a youthful look has been a fundamental aspect of human culture. In this introduction, we will explore the origins of cosmetic practices and the evolution of aesthetic surgery, from its humble beginnings to the sophisticated procedures of the modern era.

^[1] While autogenous tissues are often the first choice, implant materials have wide application in plastic surgery including reconstruction or augmentation of soft-tissue defects, bony deformities, or the fixation of fractures. Selecting the implant material depends on the specific requirement for its application. For example, tissue ingrowth into a polypropylene mesh or the rigid incorporation of a bone substitute is often desirable, while the encapsulation (or lack of tissue ingrowth) of a silicone Hunter rod allows for free gliding of a subsequent tendon graft.

Autologous tissue may be more appropriate in many clinical scenarios including patients with a history of radiotherapy, marginal blood supply of the surrounding tissue, or tenuous soft-tissue coverage over the implant. In these cases, the risk of implant-related complications, including infection and implant extrusion, is significant, and the use of an alloplastic implant should be avoided if possible.

Implant materials, however, can be used as alternatives to autogenous tissue in selected cases and in specific situations are superior to autogenous tissue. Implant materials can be created to undergo no resorption and are preferable to autologous grafts that will resorb when used as onlay grafts. For example, implants have been successfully used as bone graft substitutes in orbital floor reconstruction, cranioplasty, and maxillofacial reconstruction. They have the advantage of avoiding operative time for graft harvesting and the absence of donor site morbidity.

There are variety of different surgeries as the time passed down like beauty enhancements', lips Augmentation, Botox and dysport, dermal fillers, Collagen induction theory and etc. the modern surgeries make the reconstructive surgery more promising, convenient and safe.

2. BEGINNING AND HISTORY

From the early records of ancient civilizations to the contemporary era, humans have sought to improve their appearance using various cosmetic methods. The roots of cosmetic practices can be traced back to the ancient Egyptians, who are renowned for their elaborate beauty rituals. They used natural

substances like oils and minerals to enhance their skin, eyes, and hair. Cosmetics also played a prominent role in the religious and cultural ceremonies of the time.

Moving forward in history, the ancient Greeks and Romans further developed cosmetic techniques, which included perfumes, powders, and even rudimentary surgical procedures to repair facial deformities or injuries sustained in battle. These early endeavors laid the foundation for the field of plastic and aesthetic surgery, which began to take shape during the Renaissance period in Europe.

Cosmetic surgery in India has ancient origins, with practices rooted in Ayurveda and early surgical advancements. Notably, the ancient Indian physician Sushruta documented early surgical techniques, including reconstructing noses and ears, laying the foundation for reconstructive surgery. These practices evolved over time, particularly during medieval India, where surgeons developed skills in rhinoplasty and other reconstructive procedures to restore facial features damaged during wartime or as forms of punishment. Gradually, the focus expanded to include more cosmetic procedures such as facelifts and skin resurfacing.

While India's history contributes to the foundations of cosmetic surgery, it's essential to acknowledge that modern cosmetic and aesthetic surgery has advanced significantly in terms of patient safety, ethical standards, and the diversity of available procedures. Today, practitioners in India and worldwide combine ancient knowledge with contemporary innovations to offer a comprehensive range of cosmetic and aesthetic services, making the field a dynamic and evolving aspect of healthcare.

During the Renaissance, pioneering surgeons like Gaspare Tagliacozzi, a 16th-century Italian physician, made significant strides in reconstructive surgery, particularly in repairing facial injuries. His groundbreaking work paved the way for the refinement of surgical techniques aimed at restoring both form and function. It wasn't until the late 19th and early 20th centuries that cosmetic surgery began to encompass aesthetic enhancements beyond reconstruction, with the advent of techniques like rhinoplasty and breast augmentation. The 20th century marked a turning point for the field, with the development of safer and more sophisticated surgical procedures. The emergence of pioneers like Sir Harold Gillies, who contributed to the advancement of plastic surgery during World War I, and the introduction of silicone implants in the 1960s, expanded the possibilities for aesthetic surgical interventions.

Today, cosmetic and aesthetic surgery has evolved into a multifaceted field, offering a wide range of procedures, from non-invasive treatments like Botox and dermal fillers to complex surgical interventions such as facelifts, liposuction, and breast augmentation. This introduction sets the stage for an exploration of the modern landscape of cosmetic and aesthetic surgery, including the latest trends, ethical considerations, and the ever-evolving pursuit of beauty and self-enhancement.

3. LIP AUGMENTATION

^[2] Introduction

[2] Lips are located at the centre of the lower face and, together with the eyes and nose, comprise "the triangle of beauty." According to the American Society of Plastic Surgeons, there is tremendous and ongoing growth in lip augmentation procedures. Specifically, lip injections between botulinum toxin A injections and a variety of soft tissue fillers were part of nearly 2.6 million injection procedures in 2018, with a total increase of 312% between 2000 and 2017. Lip injections can be quick, lunchtime procedures, but the results from less-qualified providers can often be obvious and unappealing. The vast majority of severe complications are imputable to unauthorized non-medical injectors, and thus, there is an emerging need in this skyrocketing filler industry for well-trained board-certified plastic surgeons.

Lip Aesthetics

[2] The basic principles of ideal lips include the following: a pronounced cupid's bow, a well-defined vermilion border, upturned corners of the mouth, fullness in the center that fades out toward the mouth, symmetry between the left and the right sides, philtrum length of 12–15 mm, a thinner upper lip protrusion compared with the larger lower lip, and a balanced upper and lower lip. Specifically, on the frontal view, the ratio of ideal upper lip to lower lip is determined by the golden ratio, which is 1:1.61. However, it cannot be ignored that lip aesthetics change throughout history, eras, and races; however, voluptuous lips with an accentuated volume are delightful and very popular as well. Specifically, the current contemporary preferred female-lip ratio has recently been found to be 1:1 in White women. To clarify what is considered the best lip ratio among patients, we conducted a survey in 2008 to evaluate their preferences compared with experts' opinions and use it as a guiding tool during the patient–doctor consultation process. Among 700 participants, 70% chose the 0.85:1 ratio, 20% the 1:1, and 6% the 0.65:1. [2]



This study shows us the overall procedure, results, safety of getting a lip surgery in these modern times. As we progress into the future the upcoming technology might increase its efficiency and safety, which would make it more convenient to get this surgery in a short duration of time. This surgery is based on derma fillers which is the most preferred way in the field of lip surgery which is biocompatible.,

4. BIO STIMULATION AND COLLOGEN INDUCTION THERAPY

Introduction:

^[3] Micro needling (MN), also known as collagen induction therapy, is a process involving repetitive puncturing of the skin with sterilized microneedles. Its original conception can be traced back to 1995, when Orentreich and Orentreich developed the concept of “subcision”, or using hypodermic needles to induce wound healing in depressed cutaneous scars. In 2006, Dr. Desmond Fernandes developed the first MN product which became the modern-day Derma roller® (Derma roller Deutschland GmbH, Wolfenbuettel, Germany).

MN offers a relatively low cost and minimally invasive tool for the treatment of multiple cosmetic and dermatologic conditions. The basis of MN relies on physical trauma. It has been proposed that the trauma generated by needle penetration in the skin induces regeneration of the dermis. The needles penetrate the stratum corneum and create small holes known as micro-conduits with minimal damage to the epidermis. This sequentially leads to the generation of growth factors which stimulate the production of collagen and elastin in the papillary layer of the dermis. The natural wound healing cascade is induced as platelets and neutrophils are recruited to release growth factors such as TGF-alpha, TGF-beta, and platelet-derived growth factor (PDGF). This ultimately results in the deposition of collagen by fibroblasts.

A variety of MN products have been developed to treat scarring and wrinkles, enable skin rejuvenation, and improve skin appearance. Clinical trials over the last several years have shed light on the applications of MN beyond cosmetic indications, including actinic keratoses (AK), disorders of pigmentation, hyperhidrosis, and striae. Additionally, the role of MN in the treatment of hair pathology has become a recent field of focus as it is thought to stimulate stem cells in the dermal papilla, increase blood flow to hair follicles, and recruit growth factors and signaling pathways which induce hair restoration. MN is also postulated to induce normal wound healing, specifically by breaking collagen strands in the superficial dermis and inducing collagen synthesis immediately under the epidermis. This mechanism is the guiding principle behind the application of MN in the treatment of scars of various etiologies.

This research infers that, the micro – needling method is the most direct way to get into the skin, which gives us access to different sorts of surgeries. The safety of the procedure is quite promising, but with general side effects which isn’t dangerous to an extent. Results of this procedure are assuring as; it gives a direct mitigation to your skin which results in optimal outcomes. ^[3]

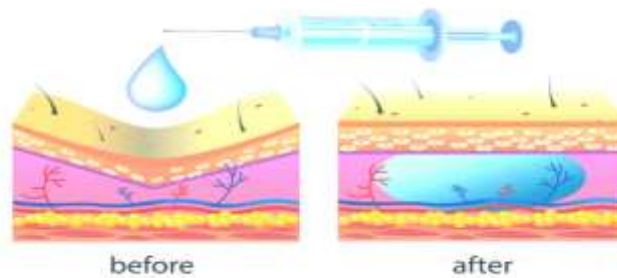
5. DERMAL FILLERS

Dermal fillers have transformed the field of cosmetic dermatology. Dermal fillers offer a youthful look with minimal time. Dermal fillers are gaining popularity due to the increased media attention and also availability of variety of fillers more affordably.

Fillers can be classified on the basis of origin, longevity. Based on the longevity in tissues the fillers are classified as Temporary, Permanent and Semi permanent. Whereas based on source of origin the fillers are divided as Human, Animal and Synthetic. Knowing the source of filler helps in taking decisions about preskin testing. Temporary fillers also referred to as non-permanent fillers stay in the tissues for less than 12 months. Some of the temporary fillers available in India are Bovine collagen-based products like Zyderm 1, Zyderm 2, Zylast and Human tissue-derived collagen like Cosmoderm, Cosmoplast. Permanent fillers are those that remains for more than two years in the tissue. These fillers tend to have more permanent side effects.

Although fillers are mainly used for rejuvenation of facial areas, it can also be used in nonfacial areas. Some of the facial areas where dermal fillers are used includes wrinkles, folds, nasal depressions, sunken ears, lip augmentation etc. and nonfacial areas includes neck, hands, corns and calluses.

Complications are generally rare in case of fillers; they include hypersensitivity to products, keloidal tendency etc.



(Figure.3: Describes the difference before and after injecting the anesthesia inside the skin.)

The procedure for filler injection starts with anesthesia. The area of injection and the surrounding skin is cleaned using antiseptics. The injection technique depends on the filler substance, location. The different injection technique includes linear threading technique, serial puncture, cross-hatching, depot, cone, fern etc. After the injection the patients are asked to avoid cold and heat for 2 days. The patients have to sleep with their heads elevated for a night and after 1 day skin care routine are followed.

Compared to permanent and semi-permanent fillers, temporary fillers have lesser complications. The early complications comprise of hypersensitivity, hematomas, ecchymoses, skin necrosis, embolism (blindness); and the later complications include implant migration, lipoatrophy, hypertrophic scarring, sterile abscess etc.

Effective treatment for these complications and assuring patients in the interim are the keys to a successful practice.

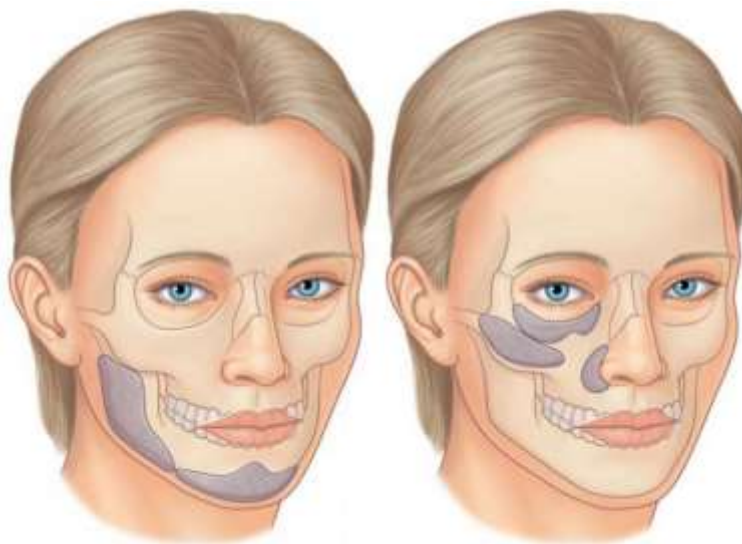
6. FACIAL IMPLANTS

Facial implants are a major and often overlooked part of cosmetic facial surgery. Facial implants provide a 3 dimensional and permanent solution to volume restoration in the lower and middle portion of face and these can be removed without any presumptuous surgery. Facial implants are solid and voluminous implants which is used to change the size of different areas of face to enhance the features of the face. The most common areas where facial implants are used are chin, cheekbones, lips, jaw, forehead etc. There are many different types of implants available in a variety of different materials including silicone and biologic and synthetic fillers.

Facial implants are used in oral and maxillofacial surgery and plastic, aesthetic and reconstructive surgery. The craniofacial implants which are used in maxillofacial and reconstructive surgery helps in correcting the structure of the jaw, improve the bone anchorage by bringing the chin or cheekbones forward. Depending on the need for the facial implants and the complexity of the case, there is a necessity for the use of a combination of implants and prostheses in order to reconstruct the affected area.

One of the most widely used implants for facial augmentation are silicone implants, especially in the chin, mandibular angle and malar area, utilizing different surgical approaches. Despite of the advantages, there are many complications that have been reported including infections, hematoma, numbness, displacement and asymmetry

For decades the treatment of implant-related infections from any source has been empiric, and then culture-directed antibiotic therapy, incision and drainage, and implant removal. However, the morbidity and mortality associated with hardware and/or device removal in cardiothoracic, vascular, and orthopedic surgery has led to the development of more conservative treatment alternatives.



(Figure.4: Location of different types of facial muscles which can augmented by this surgery)

There are many types of implants and grafts that are now available for facial augmentation. Radiologic imaging plays an important role in the assessment of cosmetic facial implants. Also, MR imaging and CT with multiplanar reformats and, in some cases, 3D surface renderings are useful modalities for characterizing facial implants and their complications.

7. BOTOX AND DYSPORT

Botox and Dysport are injectable treatments that are not biomaterials but are widely used in cosmetic procedures to reduce the appearance of wrinkles and fine lines. They are both forms of botulinum toxin and work through muscle relaxation.

Botulinum toxin (Botox) is a drug made from a toxin produced by the bacterium *Clostridium botulinum*. In large amounts, this toxin can cause botulism, an illness that affects the nerves. Botox has been used since the 1970s in the field of ophthalmology, and in the last 20 years, its use has expanded to various health scopes, especially dermatology.

^[9]Botox consists of 7 types of neurotoxins; however, only toxins A and B are used clinically. Botox A is used for several disorders in the field of medicine, particularly in dermatology, for cosmetic purposes. The first type of Botox introduced to the market was onabotulinum toxin A. In 2002, it was recommended to be used as a cosmetic treatment for glabellar frown lines by the Food and Drug Administration (FDA). The second formulation of onabotulinum toxin A, which was produced in France, obtained its license to be used for esthetic purposes from the European Union in 2006 and was approved by the FDA in 2009. Botox type A has become a term used by the society to describe all ingredients used in cosmetic treatments.

A study in 1994 reported the effectiveness of Botox A for reducing the appearance of facial wrinkles; since then, it has been used as a cosmetic treatment. Botox injections can be used to treat glabellar frown lines, wrinkles around the lips (smoker's lines) and marionette lines, platysmal bands in the neck, strabismus, blepharospasm, cervical dystonia, hyperhidrosis as well as synkinesis following facial surgery.



(Figure.5: Difference between Botox and Dysport)

Botox and Dysport are most competent beauty pacer, as the results are very distinct within a very short period of time, as its procedure are quick and convenient which makes it more effective. The overall mechanism of working of Botox and dysport work on blockage as it causes the muscle to relax which results in a significant reduction in facial wrinkles and lines. ^[9]

8. CONCLUSIONS AND VIEWPOINT

This report has provided a comprehensive overview of the field of cosmetic and aesthetic surgery, encompassing its historical roots, developments, and the contributions of various regions, including India. We have explored the ancient practices of beauty enhancement and the early surgical innovations that paved the way for the modern discipline. India's historical legacy in surgical techniques, particularly in the realm of reconstructive surgery, has played a vital role in shaping the global landscape of cosmetic and aesthetic surgery.

While we have acknowledged the valuable contributions of the past, it is crucial to emphasize that the field continues to evolve. The modern era has seen remarkable advancements in surgical techniques, patient safety, and ethical considerations. With an array of procedures catering to diverse patient needs, cosmetic and aesthetic surgery remains an integral component of healthcare, contributing not only to physical transformation but also to improved self-confidence and overall well-being.

In the years to come, the field is poised to continue its growth, with practitioners, researchers, and healthcare professionals pushing the boundaries of what is possible. As technology, science, and cultural perspectives continue to evolve, the future of cosmetic and aesthetic surgery promises to be dynamic and full of promise, providing new opportunities for enhancing and celebrating human beauty.

ACKNOWLEDGEMENTS

We extend our sincere appreciation to Mr. Hari Murthy, our esteemed mentor, for his steadfast guidance, mentorship, and invaluable contributions throughout our research journey. His expertise has played a pivotal role in shaping this work. We are also grateful to our colleagues and peers who offered valuable feedback and engaged in thought-provoking discussions, enriching the ideas presented in this paper. Additionally, we wish to acknowledge Christ University for fostering a favorable research environment and granting access to essential resources.

REFERENCES

1. Schatz CJ, Ginat DT. Imaging of cosmetic facial implants and grafts. *AJNR Am J Neuroradiol*. 2013 Sep;34(9):1674-81. doi: 10.3174/ajnr.A3214. Epub 2012 Aug 9. PMID: 22878009; PMCID: PMC7965649.
2. Keramidas E, Rodopoulou S, Gavala MI. A Safe and Effective Lip Augmentation Method: The Step-by-Step Φ (Phi) Technique. *Plast Reconstr Surg Glob Open*. 2021 Feb 2;9(2):e3332. doi: 10.1097/GOX.0000000000003332. PMID: 33680634; PMCID: PMC7928943.
3. Iriarte C, Awosika O, Rengifo-Pardo M, Ehrlich A. Review of applications of microneedling in dermatology. *Clin Cosmet Investig Dermatol*. 2017 Aug 8;10:289-298. doi: 10.2147/CCID.S142450. PMID: 28848356; PMCID: PMC5556180.
4. Satriyasa BK. Botulinum toxin (Botox) A for reducing the appearance of facial wrinkles: a literature review of clinical use and pharmacological aspect. *Clin Cosmet Investig Dermatol*. 2019 Apr 10;12:223-228. doi: 10.2147/CCID.S202919. PMID: 31114283; PMCID: PMC6489637.
5. Vedamurthy M, Vedamurthy A. Dermal fillers: tips to achieve successful outcomes. *J Cutan Aesthet Surg*. 2008 Jul;1(2):64-7. doi: 10.4103/0974-2077.44161. PMID: 20300346; PMCID: PMC2840909.
6. Joe Niamtu III, in [Cosmetic Facial Surgery \(Second Edition\)](#), 2018
7. Gafar Ahmed M, AlHammad ZA, Al-Jandan B, Almohammadi T, Khursheed Alam M, Bagde H. Silicone Facial Implants, to Fixate or Not to Fixate: A Narrative Review. *Cureus*. 2023 Feb 1;15(2):e34524. doi: 10.7759/cureus.34524. PMID: 36874350; PMCID: PMC9984266.
8. Mohan K, Cox JA, Dickey RM, Gravina P, Echo A, Izaddoost SA, Nguyen AH. Treatment of Infected Facial Implants. *Semin Plast Surg*. 2016 May;30(2):78-82. doi: 10.1055/s-0036-1580727. PMID: 27152100; PMCID: PMC4856534.
9. Ranoux D, Gury C, Fondarai J, Mas JL, Zuber M. Respective potencies of Botox and Dysport: a double blind, randomised, crossover study in cervical dystonia. *J Neurol Neurosurg Psychiatry*. 2002 Apr;72(4):459-62. doi: 10.1136/jnnp.72.4.459. PMID: 11909903; PMCID: PMC1737843