

What's in a Nose: The Changing Face of Plastic Surgery

by

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Abstract

As humans, our face and our features identify us as individuals. They define who we are and who we are not. The nose in particular, is especially noticeable, as it is so specifically placed in the centre of our face. This prominent location is one factor why it once, and still is to some degree, considered to be an “organ of reputation.” Since ancient times, many have believed that the nose and its conformation are indicative of character. Egyptian priests considered a large nose to indicate wisdom and long sculpted noses were considered beautiful by the Greeks and Romans (Whitaker *et al.*, 2007). Whether there is truth in these beliefs or not, what cannot be disputed is that a person's facial characteristics identify who they are to other people. They make up part of who an individual is. So what transpires when these features are altered by insult, injury, or disease? Some believe that once an individual's face is altered, the individual is changed forever, and they are no longer the person they were before. This however, does not need to be. Plastic and reconstructive surgery has made it so that once a person's features are altered, they may be set right again, as close to original form and function as before. The basic techniques of this specialty have been around since ancient times and have been improved and advanced upon by many great surgeons. It has proven to be, and still remains, an important field that has always dealt with some element of human suffering. Among the many milestones in the development of this specialty, there are a select few that stand out and deserve recognition.

Introduction

The birthplace of reconstructive surgery is ancient India, and the “Father of Plastic Surgery” is the Hindu physician and surgeon, Susruta (also: “The Surgeon”), who supposedly lived in the Sixth Century BC. The first description of total nasal reconstruction is found in the *Susruta-samhita*, written around 600 BC. This is one of the five works of the medico-philosophical text compilations of the *Ayur-veda*, and it is devoted to the art and science of surgery (Mahabir *et al.*, 2001). The Hindus recorded knowledge, cultural, and religious beliefs in a series of four books called the *Veda*. The *Atharva-veda* includes the earliest record of medical subjects in India (Mahabir *et al.*, 2001). The *Ayur-veda* was developed from the *Atharva-veda* and includes many medical practices still used in India today (Mahabir *et al.*, 2001). Susruta is credited for detailing the procedures of nose and earlobe reconstruction by flap repair, skin grafting, classification of burns, wound care and healing (Rana and Arora, 2002). Nasal reconstruction was in great demand during Susruta's time as facial mutilation, specifically “rhinokopia” or nasal amputation, was a popular form of punishment and humiliation in Hindu society (Whitaker *et al.*, 2007). This custom was performed on adulterers, thieves, criminals, and as a form of punishment for disobedient wives (Whitaker *et al.*, 2007). Susruta describes nasal reconstruction:

First the leaf of a creeper, long and broad enough to fully cover the whole of the severed or clipped part, should be gathered; and a patch of living flesh, equal in dimension to the preceding leaf should be sliced off [from down upward] from the region of the cheek and, after scarifying it with a knife, swiftly adhered to the severed nose. Then the cool-headed physician should steadily tie it up with a bandage decent to look at and perfectly suited to the end for which it has been employed. The physician should make sure that the adhesion of the severed parts has been fully effected and then insert two small pipes into the nostrils to facilitate respiration, and to prevent the adhesioned flesh from hanging down. After that, the adhesioned part should be dusted with [haemostatic] powders; and the nose should be enveloped in Karpasa cotton and several times sprinkled over with the refined oil of pure seasmum (from the *Susruta-samhita*).

(c. 600 BC, Bishagratna, 1969)

Susruta's original method of nasal reconstruction described above involves taking a delayed skin flap from the cheek. There was, however, another technique developed in India that was performed near Delhi from 1000 AD onwards that used a flap from the forehead (Wallace, 1978). This was deemed the "traditional" or "Indian method" of nasal reconstruction (Wallace, 1978).

Knowledge Transfers in the Classical World and Renaissance Period

It is known that the transferring of medical knowledge between Greek, Roman and Indian civilizations had occurred prior to the expedition of Alexander the Great (356-323 BC) to India in the fourth century BC (Whitaker *et al.*, 2007). What is not known is when and if the transfer of reconstructive nasal techniques ever occurred between civilizations (Whitaker *et al.*, 2007). The first Roman to describe the repair of mutilated lips, ears, and noses was Aulus Cornelius Celsus (c. 25 BC-c. 50 AD) during the first century AD in his medical text *De Medicina*. However, it is believed that these surgical procedures had been practiced in the three centuries before him (Marmelzat, 1982). Celsus is considered to be the greatest Roman medical writer and a pioneer in the description and evolution of advancement flaps (Wood-Smith, 1975). The need for reconstructive techniques stemmed from facial mutilation as punishment. Ancient civilizations, including Greece and Rome distinguished "public" from "private" life (*polis* vs. *oikos*, *res publica* vs. *res privata*), and they celebrated the public sphere as one of political freedom (Sorta-Bilajac and Muzur, 2007). Thus, the belief in public humiliation by violating one's most innate form of privacy, the physical appearance was strongly held (Sorta-Bilajac and Muzur, 2007). The Byzantine Emperor Justinian II (668-711 AD) was a victim of public rhinokopia during a rebellion on his reign. This was to ensure that he could never again sit as Emperor, a position held for those free of physical deformities (Remensnyder *et al.*, 1979). Justinian II is known as "Rhinometus," or "the one with the amputated nose," and the story holds that he returned to Constantinople with a golden prosthesis and regained his position as Emperor for a second reign. There are some scholars, however, who believe that Justinian II benefited from the Indian method of nasal reconstruction (Remensnyder *et al.*, 1979). This speculation has its root in the marble *Carmagnola* statue of Venice. The most striking features of this statue are the nose and forehead, both of which have been described as "not completely smooth" and having "defined irregularities" perhaps representing scars and possibly a donor and recipient site (Remensnyder *et al.*, 1979). The theory is that the statue is a depiction of Justinian II having benefited from Indian nasal reconstruction, as it is

believed that Greek reconstructive techniques were limited, and the zenith of contemporary Byzantine techniques was the limited advancement flaps described by Celus (Remensnyder *et al.*, 1979). If the statue indeed represents Justinian II post-nasal reconstruction, it would then represent the first documented case of Indian method reconstruction in the western world, indicating that reconstructive techniques had been passed between civilizations.

Advances in reconstructive surgery were brought to a halt after the fall of Rome, and it was not until the Renaissance that interest in this surgical practice increased again. It is believed that Indian methods were passed to Arabic culture during the Islamic conquest of India in the 10th century, and this knowledge was then brought to Europe with the occupation of Sicily in the ninth to 12th centuries (Whitaker *et al.*, 2007). After being passed through generations and civilizations, nasal reconstruction began to be practiced in Europe during the 15th century, albeit shrouded in great secrecy (Whitaker *et al.*, 2007). The Branca family of Sicily used the Indian method of reconstruction and passed this technique down from father to son (Whitaker *et al.*, 2007). Antonio Branca (b. 1434) modified the technique and developed the "Italian method" of using a delayed skin flap from the arm in order to decrease the damage done to the face (Wallace, 1987). This operation was not widely known or perfected until an anatomy professor from the North Italian University of Bologna, Gaspare Tagliacozzi (1546-1599), began to use the technique (Wallace, 1978). In 1597, Tagliacozzi published the first volume devoted to reconstructive surgery, *De Curtorum Chirurgia per Insitionem*, and in 704 pages described all that was involved in the Italian method (Wallace, 1978). After Susruta's writings, in the Western tradition, this book served as the next theoretical foundation of reconstructive surgical techniques, and included details of instruments, full operative instructions, nursing care, and illustrations (Wallace, 1978).

New Interest in Facial Surgery during the 18th Century

The field then lay dormant in Europe for the next 200 years as the sympathetic theory had a strong hold. This was the belief that tissues transplanted from one individual to another would only survive as long as the donor was living (Bennet, 1983). Two major events in the history of reconstructive surgery in Europe then occurred. In October 1794, "*Gentlemen's Magazine*" of London published an account written by Colly Lyon Lucas (1731-1797), Chief Surgeon in the British East India Company's service, describing the Indian method for reconstruction of an amputated nose of a bullock driver, Cowasjee (Figure 1) (Wood-Smith, 1975). Cowasjee, as a prisoner, had his nose and one of his hands amputated (Rana and Arora, 2002). His operation was performed by a man of the brickmaker or potter's caste near Poona (Rana and Arora, 2002). Another British surgeon, Joseph Constantine Carpue (1764-1846) from Chelsea, read the account and began to practice



Fig. 1. Rhinoplasty as illustrated in "*The Gentleman's Magazine and Historical Chronicle of London*" from 1794. (image taken from: Sorta-Bilajac and Muzur, 2007)

the technique on cadavers. After 20 years of practicing, the right patients finally came along: two military officers, one suffering the effects of mercury treatments and the other mutilated by a sword. Carpie published these two cases in an illustrated monograph, and subsequently the Indian method, or forehead pedicle flap, gained great acceptance throughout Europe (Whitaker *et al.*, 2007). The second major event occurred in 1818 in Germany, when Carl Ferdinand von Graefe (1787-1840), the father of the great ophthalmologist Albrecht von Graefe (1828-1870), published his book *Rhinoplastik*. This was his major work and is credited with the origin of “plastic” to refer to this field of surgery (Wood-Smith, 1975). Von Graefe modified the Italian method to use a free skin graft from the arm, as opposed to a delayed pedicle flap (Whitaker *et al.*, 2007). He also was the first surgeon to close a soft palate cleft, and was a pioneer in eyelid reconstruction (Bennet, 1983). This was now the beginning of the “Modern Era” of plastic surgery and Carpie was the father (Wood-Smith, 1975). As the foundations of plastic surgery began to form, developments of anesthesia in the 1840s and antisepsis by Joseph Lister (1827-1912) in the 1860s allowed for progress as the overall risks of any surgical procedure began to decline (Whitaker *et al.*, 2007). Many individuals all over the world continued to develop and improve upon reconstructive techniques in the following years.

Warfare and the Development of Plastic Surgery

It was the First World War and trench warfare that eventually gave birth to the “Modernist Era” of plastic surgery (Wood-Smith, 1975). WWI presented surgeons with new challenges as explosive shells, high velocity missiles, and a military strategy that treated infantry as “cannon fodder” slaughtered and disfigured many (Meikle, 2006). Harold Delf Gillies (1882-1960), a young New Zealand surgeon trained in the field of ears, nose and throat surgery, went off to France as a general surgeon with the Red Cross. Gillies was inspired by a French-American dental surgeon, Charles Daladier, and a maxillofacial surgeon, Hippolyte Morestin (1869-1919), and recognized the need for proper and specialized management of facial and maxillary injuries (Meikle, 2006). In 1916, he persuaded the War Office to allow him to set up a reconstructive face and jaw unit at Cambridge Military Hospital in Aldershot (Meikle, 2006). Gillies set-up a facial unit with 200 beds, but eventually the facilities proved inadequate as the number of injured soldiers was in excess (Meikle, 2006). The unit was then transferred to the Queen’s Hospital at Sidcup in Kent in 1917 and included 600 beds, operating rooms, an x-ray department, and a photographic unit (Grogono, 1991). This unit employed a multidisciplinary approach that was unique at the time, and included collaboration between Gillies and a dental surgeon, William Kelsey Fry (1889-1963) (Meikle, 2006). During his time at Sidcup, Gillies was able to standardize the techniques of antiquity and establish the discipline of “plastic surgery” (Meikle, 2006).

The major hurdle that the surgeons at the unit faced was the primary closure of gunshot wounds. The large tissue loss could only be reconstructed using tissue from elsewhere, and employing local rotation and transposition flaps, as well as soft tissue repair, and bone grafts for osseous defects (Meikle, 2006). This challenge inspired Gillies to convert the pedicle flap into a tubed pedicle flap in order to transpose skin from distant sites (Grogono, 1991). Two other surgeons described this technique independently around the same time (V.P. Filatov of the Russian Academy, 1875-1956, and Hugo Ganzer, 1879-1960, a German dental and military surgeon), but it was Gillies’ creativity and versatility in handling the flaps that others have credited him with its invention

(Rogers, 2001). By the end of hostilities in 1918, 11,572 major facial operations had been completed at Sidcup, and the Queen's Hospital had become internationally renowned with surgeons visiting from Australia, New Zealand, Canada, and the United States (Grogono, 1991). During the years at Sidcup, anesthetic techniques were also forced to advance due to the severity of facial injuries. Ivan Whiteside Magill (1888-1968), acting as the anesthetist, developed nasal intubation and endotracheal anesthesia, which allowed surgery to be performed on the face and mouth (Meikle, 2006). It was Kelsey Fry that manufactured the first endotracheal tubes (Meikle, 2006). The experiences that Gillies gained during WWI proved invaluable and provided the material for his pinnacle textbook, *Plastic Surgery of the Face*, published in 1920 (Meikle, 2006). This book contains 408 pages, 844 illustrations, and is credited for laying down the principles of modern plastic surgery that were subsequently adopted worldwide (Meikle, 2006). After the war ended Gillies devoted himself to plastic surgery as a specialty and took to training the next generation of surgeons (Bennett, 1983). Gillies' accomplishments have earned him the honour of the title, "Father of 20th Century Plastic Surgery" (Rogers, 2001).

At the outbreak of WWII there were four recognized plastic surgeons in England, the "Big Four" – Gillies, Thomas Kilner (1882-1960), Archibald McIndoe (1900-1960), and Rainsford Mowlem (1902-1986) (Rogers, 2001). With the war imminent, Gillies and Fry were consulted by the Ministry of Health to set-up specialist centres for facial injuries and nine were established (Meikle, 2006). Gillies continued his work in maxillofacial reconstruction at Rooksdown House. He also continued to train surgeons from all over the world; 34 nationalities having served on staff by 1944 (Meikle, 2006). WWII presented a new challenge to the surgeons in addition to tissue loss, and that was the treatment of severe burns sustained by aircrews (Meikle, 2006). McIndoe, as a civilian consultant to the Royal Air Force, was appointed to The Queen Victoria Hospital at East Grinstead, where the bulk of airmen requiring plastic surgery were sent (Meikle, 2006). At Grinstead, McIndoe established himself as the leading expert in the treatment and reconstruction of burn injuries (Meikle, 2006). McIndoe introduced the use of saline baths, mechanical cleansing, and dusting of wounds with sulfonamides, instead of the traditional coagulation therapy with tannic acid which would often lead to infection, gangrene and death from septicemia (Meikle, 2006). Nevertheless, it was his "Guinea Pig Club" that made him a household name. The club started as a joke between him and his patients, as much of the surgery at the time was experimental, but it soon became a society for the serving airmen who had passed through the unit who had gone through at least 10 surgical procedures (Wilton, 1998). By the end of the war the club had 649 members, including 170 Canadians (Wilton, 1998). Psychology and rehabilitation was a big part of the treatment at East Grinstead, and a conscious effort was made to involve the local community in the rehabilitation of the patients (Meikle, 2006). This holistic approach of McIndoe put him well ahead of his time (Heslop, 1998). After WWII, Gillies was largely responsible for the formation of the British Society of Plastic Surgeons in 1947, and became their first President. This eventually defined the field and catapulted it into the full blown vigorous specialty we know today (Rogers, 2001).

Conclusion

Plastic and reconstructive surgery is a well known specialty today with training centres all over the world. After the completion of WWII the specialty blossomed and grew

exponentially, with experts in almost every country. The origins of the specialty have been highlighted above, with mention of select pinnacle events. In addition to the individuals mentioned, there have been many surgeons that have contributed to growth and development in this field, including those responsible for the development of aesthetic surgery. In today's society with so much focus on aesthetic surgery in the media, it is important to not forget the other faces of plastic surgery. Plastic surgery is a specialty that has its roots in helping those affected by violence and war, those people who were disfigured and changed forever against their wishes. We must remember that this is a specialty that is grounded in the principle of restoration of form and function, which must be respected. It was said long ago by Gaspare Tagliacozzi and it still remains true of today's surgeons:

We restore and make whole those parts which nature has given but which fortune has taken away, not so much that they might delight the eye, but that they may buoy up the spirit and help the mind of the afflicted.

(Tagliacozzi, 1597, qtd. in Whitaker *et al.*, 2007)

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