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Abstract

Plastic surgery is a branch coming from the main trunk of medicine and surgery and the origins are in antiquity. Of all branches of medical science plastic surgery is probably the most frequently misunderstood. The word 'plastic' is not modern. Today it is used in the main for products of a great modern industry. When one refers to plastic surgery, most people think of cosmetic surgery and unfortunately in some quarters plastic surgery and cosmetic surgery are virtually synonymous. This is far from the case. Again, some persons in ignorance believe that in plastic surgery plastic materials, are used to close wounds and to make scars invisible.

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HISTORY AND EVOLUTION OF PLASTIC SURGERY

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Plastic surgery is a branch coming from the main trunk of medicine and surgery and the origins are in antiquity.

Of all branches of medical science plastic surgery is probably the most frequently misunderstood. The word 'plastic' is not modern. Today it is used in the main for products of a great modern industry. When one refers to plastic surgery, most people think of cosmetic surgery and unfortunately in some quarters plastic surgery and cosmetic surgery are virtually synonymous. This is far from the case. Again, some persons in ignorance believe that in plastic surgery plastic materials are used to close wounds and to make scars invisible.

The confusion is increased by the somewhat frequent allusions to the wonders of plastic surgery in women's magazines, and readers seem to be encouraged to seek cosmetic surgery.

A definition of modern plastic surgery would be difficult to offer, but it can be considered as the repair or reconstruction of tissues following defects or destruction either congenital or acquired. A better term would be reconstructive surgery. Some call it the application of techniques to any branch or part of surgery. Any part of the body might need repair. The task of plastic surgery is to restore the appearance and function of parts of the body destroyed or damaged by disease or injury, parts removed by surgical operation, parts deformed embryologically and to correct physical deformities.

Plastic surgery attempts to fulfil its purpose by transferring to the site of the loss or defect, tissues from the adjoining parts, from near or more distant parts of the body and sometimes

from other individuals and in a limited number of cases animal tissues or foreign bodies of animal, mineral or artificial origin. Such transfers are termed transplantations.

It is impossible to say when the first plastic operations on man were performed. It can be assumed that grafting in plants, which was known in prehistoric times, gives rise to the idea of transferring tissues in man and animals. Progress in surgery has often accompanied changes in methods of warfare and the nature of mutilation.

A common form of injury over the ages was loss of the nose. Prehistoric man was at first armed to defend himself only with his hands and teeth and in close-quarter fighting the nose often suffered. Again, one of the oldest forms of judicial punishment was surgical removal of the nose. In olden times prisoners of war had their noses cut off. It is not surprising that the history of plastic surgery is to some extent bound up with the development of techniques to replace that part of the face lost from sword injury, gun powder and rifle injury, burns, etc.

The word 'plastic' comes from a Greek adjective derived from the verb meaning to mould or form. It is found in the Latin of the first century A.D. as *plasticus*, and by the time of the Renaissance it was common use in French (*plastique*) and English.

The root 'plastic' has been in continual use almost from the beginning of the 19th century when the present era of plastic surgery commenced. In 1816 Carpue published a book "An Account of Two Successful Operations for Restoring a Lost Nose." Carpue did not actually

mention the word but in 1818 Graefe published a book in German, termed "Rhinoplastic", and in Latin termed "De Rhinoplasticæ."

During the next decade a host of new words were coined by tacking the ending 'plasty' on to the Greek names for various anatomical sites, e.g. 'otoplasty', 'blepharoplasty'. It is clear, however, that plastic surgery existed long before the term plastic was employed. It might well be considered the oldest branch of surgery.

Portraits dating from 7000 B.C. were recently excavated around Jericho. Some skulls showed evidence of trephining, presumably to 'let out devils'. Similarly, excavations in ancient Egypt have brought to light many interesting surgical methods in practice about 1600 B.C., for instance, the treatment of the dislocated and fractured jaw and fractured nose.

Some of the oldest records of plastic operations come from India. In the chapters of the Indian Encyclopaedia, the "Ayurveda", which has been copied from time immemorial, it is stated that members of the Koomas caste constructed noses from the skin of the face or forehead for thieves who had been punished by loss of their nose.

Books older than "Ayurveda" have been found in Tibetan monasteries and are said to contain descriptions of reconstructions of the nose from the skin of the forehead. It is possible, therefore, that this knowledge spread to India in the stream of cultural influence which emanated from Tibet into the countries of the East.

It is in some ways surprising that the Bible contains no mention of plastic operations if we except the verse in Genesis "and the rib which the Lord God had taken from man, made he a woman." There are likewise no records in the Talmud. Even the Greek poet Homer, who loved to describe many types of wounds and their treatment, did not mention the possibility of replacement of lost parts.

The first European writer to mention plastic operations was a Roman doctor, Aurelius Cornelius Celsus, who lived in the time of Tiberius Caesar. Celsus gave detailed accounts of many techniques to repair loss of tissue of the nose, lips or ears.

In A.D. 30, Celsus wrote "De Re Medica", the oldest medical document after the writing of Hippocrates. Celsus could be called the father of plastic surgery. In his book he describes the first operative correction for ectropion, ptosis, and entropion of eyelids. He repaired with local skin flaps mutilated ears,

noses and lips. He also described a method of separation of fingers in syndactylism and a plastic operation on the penis to cover the glans with skin where circumcision had been too radical—what might be called penile reform. He also described the care of ears and lips cleft at birth or accidentally torn. Following Celsus there was a long period without progress.

A cultural decline followed the fall of the Roman Empire and the twilight of the Middle Ages was not favourable to scientific literature. The only mention of plastic surgery appeared in legends. In Florence there is a fourteenth century picture which shows St. Cosmas and St. Damian transplanting the leg from a Moor who had died, to a sexton with cancer of the leg—an early example of homotransplantation.

History relates how Justinian II (669-711), Roman Emperor, was so harsh a ruler that his subjects rose in rebellion, took the Emperor prisoner, cut off his nose and sent him into exile. Later he escaped, raised an army, recaptured Constantinople and again ascended the throne. The Emperor naturally demanded a nasal reconstruction and today, still preserved in Venice, is a marble bust of Justinian with a new nose, evidently constructed from a forehead flap. Yet, even after this triumph of reconstruction the whole art of facial restoration disappeared from recorded history for more than 700 years.

In A.D. 1215, Pope Innocent III decreed that no priest should perform any surgical operations which involved bloodshed and as a result procedures were turned over to barbers, bath-keepers, executioners, mountebanks and other individuals of low degree. And so the next genuine records of plastic operations from Italy are not found until the middle of the 15th century. In 1442, Branca, a surgeon of Catania in Sicily, carried out plastic repairs of the nose, using skin from the face. His son, Antonio, continued his work and was the first to replace the nose by a flap of skin from the arm.

The Brancas themselves left no writings but in 1460 Heinrich von Pfolspenridt, a Bavarian army surgeon, wrote on the flap-from-the-arm method used by the Brancas. Their technique was also written up by Fioravanti in 1549. He observed their secret work and wrote—"and everyday I went to their house for they have five persons on whom to make noses, and when they wished to perform these operations they called me to watch such a thing, and I turned my face away but my eyes saw very well, and

thus I saw the whole secret from the beginning to end and I learned it."

It was after seeing the Brancas at work that the Roman poet, Elisio Calenzio, wrote of using the nose from a slave to graft to a mutilated person. Voltaire, in his *Philosophic Dictionary* in 1792, wrote in the following lines of homografts—*

"And so Tagliacotius
A famous Aesculapius
Restored the missing nose.
Listen I pray to this prose
How in a strange way
He cut some skin away
From the bottom of a slave
And applied it swiftly
To the face adroitly
But there came the time alas,
When death of donor came to pass
The recipient's nose did follow
And then alas within the coffin
Lended nose did join the bottom."

The first systematic treatise on plastic surgery ever written was published in 1597 by Gaspar Tagliacotius, the Professor of Surgery at Bologna. In his book he describes in detail his pedicled arm flap for rhinoplasty.

Tagliacotius' temerity in interfering in the affairs of the Almighty found great disfavour in the eyes of the dignitaries of the Church. He was excommunicated and his corpse was exhumed from its grave in a monastery church and placed in unconsecrated ground. The citizens of Bologna, however, were so proud of their countryman that a monument was erected and the figure holds a nose in its hand. For some time after Tagliacotius' death his pupils continued his operations, but during the 17th and 18th centuries plastic surgery was almost completely neglected. In the 17th and 18th centuries no great importance was attached to men or women with missing noses and they had substitutes made of gold, silver or ivory.

In 1731 a female charlatan, Gambacurta, offered for sale her healing balsam in the streets of Florence. She would cut a piece of flesh from her thigh, pass it round on a plate, get it confirmed in writing by the town clerk and then apply the piece of flesh to the wound again. On treating it with the balsam, she got healing without a scar.

*Modified from E. V. ELST. *Physiopathology and Treatment of Burns*, J. Lorthioy. Presses Academiques Europeen—Brussels, 1964.

In October 1794 the Indian method of rhinoplasty by means of a forehead flap was brought to the attention of European surgeons by an anonymous letter in the "Gentlemen's Magazine" from two English observers who had seen a Mahratta surgeon perform it in India. This letter stimulated Joseph Carpue, a student at St. George's Hospital and later surgeon to the Duke of York's Hospital, Chelsea, to perform, in 1814, the first rhinoplasty in Europe in modern times. His work stimulated surgeons in some European countries, e.g. Graefe in Germany, but had little influence in Britain.

Britain, in the latter half of the 19th century, lagged behind and produced little in reconstructive surgery. It is interesting, however, to note that the principles of plastic surgery were evolved before "Listerism". It was however papers in this period that extended plastic surgery to all parts of the body—not only the face but the extremities.

The descriptions up to now have been all referable to 'flap' transplantations in the reconstruction of missing parts. Even before flaps were employed, the tilemaker caste in India are said to have successfully utilised free graft transplantations of skin, including the subcutaneous fat, taken from the gluteal region, after it had been beaten with a wooden slipper until a considerable amount of swelling had taken place. This process of beating was termed 'flagellation'. The Indians used a secret cement for the adhesion and the procedure was termed the 'Ancient Indian Method'. Flagellation brought more blood to the part. The removal of tissue from one part of the body to another was termed 'free grafting'.

Up to the beginning of the 19th century little further was done in relation to the transplantation of free grafts of skin. In 1869 Reverdin reported on grafting of small discs of skin to ulcers and he was followed by Ollier, Thiersch and Wolfe.

Even in the early 20th century there was little interest in plastic surgery in Britain and in 1914 reconstructive surgery had not one single exponent; it was considered purely a minor aide to the general surgeon on epithelialise raw surfaces and was not often practised. The outbreak of war in 1914 with its mounting toll of severe facial casualties showed the medical world the poverty of its surgical reconstructive resources. The trench, or static warfare, produced high proportions of missile injuries of the head and face.

In 1916 the British Dental Association held

a discussion on "The Treatment of Injuries of the Face and Jaw" in London. The German surgeons, with intelligent collaboration of surgeon and dentist, had obviously forged ahead. A Major Gillies had served with the Red Cross in France from November 1915 and had seen the results obtained by French plastic surgeons and dental surgeons and, on returning to England, set up a unit of 200 beds at Cambridge Hospital, Aldershot. Later a move was made to Queen's Hospital, Frognal, Sidcup, Kent, at first with 320 beds but later expanded to over 600. The unit was termed a maxillo-facial unit and was staffed by plastic surgeons and dentists. Many became famous—Gillies and Kilner of Britain, Davis of America, and Magill, the anaesthetist.

Between the two world wars plastic surgery entered a difficult phase. The possibilities of the speciality in peace-time were not appreciated. By 1930 there were only two plastic surgeons in Britain. At the outbreak of World War II Britain had only four fully experienced plastic surgeons and several centres were set up to train young surgeons in the methods of World War I.

The problems of World War II were however in many ways quite different from World War I. World War I was a static war but World War II was one of movement with severe injuries due to high speed crashes, crushes, burnings and fractures. The injuries were not confined to the face but were of the trunk and extremities. The plastic surgeon found himself on much more equal terms with his general and orthopaedic colleagues. Many units were set up. Since World War II most universities have recognised the speciality and brought added responsibilities in teaching and research.

What then does modern plastic surgery attempt? As has been said, plastic surgery is the application of special techniques—of careful handling, of transplantations, etc. The field is wide but not fixed. Patients of all ages with tissue defects are accepted.

In the newborn there are cleft lips and palates, defects of first arch, fused fingers, birth marks, etc. Many forms of accidents are accepted, maxillo-facial injuries, degloving injuries, crush injuries of hands, finger injuries, wringer injuries and severe burns. Over 30 per cent of all admissions to the South East Scotland Regional Plastic Unit are the results of acute trauma.

Skin cancers and oral cancers form an apprec-

iable percentage of all admissions. Treatment may include not only wide excision of the lesion but also all the regional nodes in continuity. In the face, the first step may be a tracheostomy and then a hemiresection of the jaw. Later extensive reconstructive procedures will be required.

Unfortunately to the lay mind a plastic surgeon continues to be looked on as a beauty surgeon. The amount of cosmetic surgery, however, carried out by plastic surgeons outside the London area is less than 2 per cent. of all their work. Essentially a plastic surgeon is a reconstructive and functional surgeon, one who by training and practice shares a place with his colleagues in the family of surgeons. His patients suffer from loss of functions and/or disfigurement.

Since World War II most universities have recognised the speciality. The plastic surgeon takes part in the teaching of the undergraduate and postgraduate medical student and he also plays a part in research. He has helped to revolutionise the treatment of burns, and has led in the studies of skin homografts, skin preservation and synthetic skin. He has helped in the development of modern anaesthesia. He has stimulated orthopaedic studies of facial abnormalities.

Many tissues can be grafted. Skin, fat, cartilage and bone grafts are common, but muscles, vessels, nerve and organs can be transplanted. Homografts and heterografts are used and tissues can be preserved. If the homograft rejection response is conquered a new extensive field of replacement surgery will be opened.

Grafts can be applied to any part of the body—ears, eyebrows, eyelids, nose, lips, chin, fingers, foot, etc.

If parts cannot be made in flesh they are made in artificial material.

Not only human beings benefit from plastic surgery, but also animals. Valuable dogs can be saved from destruction by excision of malignant cutaneous lesions and grafting.

The plastic surgeon has also played a prominent part in accident prevention, especially relating to burns.

The plastic surgeon cannot rest on his laurels but, with his surgical colleagues, can continue to help his fellow men. Surgeons from advanced countries have tremendous responsibilities to other countries. They can play a tremendous part in breaking down international barriers by teaching and helping.