HISTORY OF MEDICINE
ISTORIJA MEDICINE

Institute for Child and Youth Health Care of Vojvodina, Novi Sad
Department of Children’s Surgery

History of medicine
Istorija medicine
UDK 617.007.844(091) i
UDK 616-089.844(091)
DOI: 10.2298/MPNS1506199P

DEVELOPMENT OF PLASTIC SURGERY
RAZVOJ PLASTIČNE HIRURGIJE

Marija D. PEĆANAC

Summary
Introduction. Plastic surgery is a medical specialty dealing with corrections of defects, improvements in appearance and restoration of lost function. Ancient Times. The first recorded account of reconstructive plastic surgery was found in ancient Indian Sanskrit texts, which described reconstructive surgeries of the nose and ears. In ancient Greece and Rome, many medicine men performed simple plastic cosmetic surgeries to repair damaged parts of the body caused by war mutilation, punishment or humiliation. In the Middle Ages, the development of all medical branches, including plastic surgery was hindered. New age. The interest in surgical reconstruction of mutilated body parts was renewed in the XVIII century by a great number of enthusiastic and charismatic surgeons, who mastered surgical disciplines and became true artists that created new forms. Modern Era. In the XX century, plastic surgery developed as a modern branch in medicine including many types of reconstructive surgery, hand, head and neck surgery, microsurgery and replantation, treatment of burns and their sequelae, and esthetic surgery. Contemporary and future plastic surgery will continue to evolve and improve with regenerative medicine and tissue engineering resulting in a lot of benefits to be gained by patients in reconstruction after body trauma, oncology amputation, and for congenital disfigurement and dysfunction.

Key words: Surgery, Plastic; History of Medicine; Famous Persons

Sažetak
Uvod. Plastična hirurgija je hirurška grana koja se bavi korekcijom i rekonstrukcijom forme i funkcije. Prvi dokumenti nalaze se u indijskim tekstovima pisanim na sanskritu i detaljno svedoče o rekonstruktivnim operacijama nosa i ušiju. Medicina u staroj Grčkoj i Rimu nastavila je sa primenom intervencija radi modeliranja delova tela koji su bili povređeni u ratovima, drugim mehanizmima povređivanja ili bolestima. U srednjem veku nastaje zastoj u svim tadašnjim granama medicine do XVIII veka, kada ponovo počinju operativni zahvati rekonstrukcija delova tela. Novi vek. U plejadi vrsnih hirurga novog veka velik je broj entuzijasta i harizmatičnih likova koji se prihvataju hirurške discipline i postaju umetnici stvaranja nove forme. Moderna era. U XX veku stvorena je plastična hirurgija čije dimenzije postaju toliko obimne da se razvija nekoliko pravaca: rekonstrukcija deformiteta i defekata na telu, hirurgija šake, hirurgija glave i vrata, onkoplastika, mikrohirurgija, lečenje opekotina i njihovih posledica i estetska plastična hirurgija. U futurističkom razmišljanju, regenerativna medicina i tkivni inženjering sigurno će dati svoj doprinos i proširiti operativni program rekonstrukcija posle traume i onkoloških defekata kao i funkcionalno i estetsko rešavanje kongenitalnih malformacija.

Ključne reči: Plastična hirurgija; Istorija medicine; Poznate osobe

This branch of medicine, which is applied to different parts of the body, with different roles, has developed in several directions, the latest being microsurgery. It was initially used in treatment of congenital anomalies or trauma, which later lead to replantation surgery and microsurgical free flap skin transfer. Another branch of this specialty is surgery of burns and its sequelae. Esthetic surgery was born as the culmination of art modeling, with a task to reconstruct the shape of the body altered by aging or unsatisfactory appearance.

Corresponding Author: Dr Marija D. Pećanac, Institut za zdravstvenu zaštitu dece i omladine Vojvodine, 21000 Novi Sad, Hajduk Veljkova 10, E mail: marion.pec@gmail.com
Development of plastic surgery

Ancient Times

The invention of writing and its application marked the beginning of Ancient Times. In all ancient civilizations there were people who offered help or healing to the sick and injured. Writing made it possible to record and transfer the knowledge and experience of educated people. Injuries of the nose and the way of its treatment, considered as the first descriptions of rhinoplasty, had been recorded in the medical papyrus dated from 1500-2000 BC, and was found by Edwin Smith in Egypt [4].

The first descriptions of surgery involving the reconstruction of body parts date from 800 BC and were written in Vedic medicine. The documentation about these works can be found in the written works of Sushruta, an Indian surgeon who is considered the father and founder of plastic surgery [5]. Sushruta and his contemporary Charak surgically treated patients and are well known for their nose and lip surgery (Figure 1). In India, the legal punishment at that time was cutting the nose so rhinoplasty was indeed necessary and it was performed as a method of reconstruction. In addition to these procedures, treatments of skin defects by rotational and pedicled lobes as well as methods of hemostasis were described in the notes. Sushruta Samhita records written in Sanskrit language are saved only in Arabic translation.

During the period of the Roman Empire, Aulus Cornelius Celsus (the first century AD) (Figure 2) wrote „De Medicina“, where the surgical reconstruction of ear, nose and lips was recorded [6]. There is a preserved text of breast reduction in men, as well as the reconstruction of defects with advancement flaps. In the fourth century AD, the famous Byzantine physician Oribasius wrote the encyclopedia „Synagogae Medicae“ which consisted of 70 volumes. In the book 42, chapter 25 and 26, a detailed description of reconstruction of facial defects (the eyebrows, forehead, cheeks, nose and ears) can be found [7].

Middle Ages

With the fall of the Roman Empire and spreading of Christianity, the time of mysticism and religion began, and surgery in all its forms became neglected. The period of the early Middle Ages represents hindered development of all surgical disciplines except the minor progress in surgery of cleft palate.

According to the recorded data from the XV century, the Branca family from Sicily developed some reconstructive methods. A father and his son from the family Branca, who were barbers, used the flap taken from the upper arm to reconstruct the nose or the face. The flap remained tied for twenty days and then was separated from the donor region [10] (Figure 3). The method had to be hidden and passed down as a family secret (the method was not published to avoid prosecution by the Church).

Al-Rhazi (865-925), an Arab physician and Avicenna, the Latin name for the Persian physician Ibn Sina (980-1037) (Figure 2), gave the description and emphasized the importance of the first aid in injuries caused by fire. They used cold water and greasy coatings later in the treatment [8].

During the Renaissance period, when science and art were flourishing, surgical disciplines developed as well. In the XV century Serafeddin Sabuncuoglu (1385-1468) wrote the article “Imperial Surgery” and described the material for maxillofacial surgery, intervention on the eyelids, as well as the protocol for the treatment of gynecomastia which is believed to represent the foundation for the development of modern breast reduction surgery [9].

New Age

The new age began with remarkable discoveries in the fields of science, art, technology and economy. Surgery developed into science which became a field of great interest of eminent doctors educated at medical faculties of universities throughout Europe.

The most famous name of Italian plastic surgery in the XVI century, today still considered as "the
Figure 2. *Photos of plastic surgeons from the new age and modern era (photos are arranged from the left to the right in rows).

Slika 2. *Plastični hirurzi nove i savremene ere (fotografije sleva nadesno, redovi od gore prema dole)

First row/Prvi red:
Karl Ferdinand fon Grafe (Karl Ferdinand von Graefe); Johan Fridrih Difenbah (Johann Friedrich Dieffenbach); Baron Gijom Dipietren (Baron Guillaume Dupuytren); Bernard fon Langenbek (Bernhard von Langenbeck); Karl Tirš (Carl Thiersch)

Second row/Drugi red:
Aleksis Karel (Alexis Carrel); Ser Harold Gilis (Sir Harold Gillies); Ser Arčibald Makindo (Sir Archibald McIndoe); Sterling Banel (Sterling Bunell); Aleksandar A. Limberg (Aleksandar A. Limberg)

Third row/Treci red:
Sofi Spic (Sophie Spitz); Harold E. Klajnert (Harold E. Kleinert); Zora Janjžekovič; Volas H. Klark (Wallace H. Clark); Aleksander Breslov (Alexander Breslow)

Fourth row/Cetvrti red:
Heri Banke (Harry Buncke); Foad Nahai (Foad Nahai); Marko Godina; Stefan J. Mates (Stephen J. Mathes); Bernar Devušel (Bernard Devauchelle)
Johann Friedrich Dieffenbach *(1792-1847), Von Graeff’s student, was the first who routinely performed reconstructive surgery of the nose, lips and other reconstructive methods in tendons and skin in Berlin in 1829. His postulates of the aesthetic and functional secondary rhinoplasty apply even nowadays [6].

In Paris in 1834, Baron Guillaume Dupuytren * (1777-1835) described the basics of anatomy and surgical treatment of palmar fibromatosis, which was later called Dupuytren’s contracture after him [11]. At the same time in Berlin, Bernhard von Langenbeck * (1810-1882) was the first to describe a transposition flap used for the lower lip defects and gave a description of cheilognathopalatoschisis reconstruction [12].

In 1838 Eduard Zeis (1807-1868) published a plastic surgery handbook and described everything known in plastic and reconstructive surgery at that moment [13]. Victor von Bruns (1812-1883) published an atlas of reconstruction of the nose, lips, helognathopalatoschisis and head and neck defects in 1857 [14]. In 1862 John Wood described the inguinal flap and its function in covering hand defects. It was also the first axial stalk lobe described [15].

Jacques Joseph is a name of German surgery of that time and remembered to this day in surgery of the head and neck: (1865-1934). He became famous for his otopostasis procedures and surgery of the nose [16].

Jacques Louis Reverdin (1842-1929) introduced the use of skin grafts in 1869. He removed them with a scalpel and transferred to the area with granulation tissue, that being the first skin transplantation in history [17].* Carl Thiersch (1822-1895) introduced the application of thin skin grafts with larger surface area for a successful resolution of major defects of the skin in 1874 [18]. In 1895, Vincenz Czerny (1842-1916) described a breast reconstruction using transplanted lipoma from a hip to fill in the defect after extirpation of fibroadenoma [19].

The end of XIX and beginning of XX century is important because the surgeon William Halsted’s (1852-1922), Baltimore (USA) gave grounds for radical mastectomy and radical excision of melanoma [20].

**Modern Era**

The Modern Era is the period of time continuing into the present moment without interruption, and represents modern history, which means that is present in “living memory”. The beginning of the XX century, which is considered the beginning of the modern era, witnessed a number of large-scale wars, which inevitably led to numerous injuries not only in soldiers but in civilians as well. All that imposed the need for reconstructive surgical procedures, but plastic surgery had not been promoted as a separate branch of medicine before the First World War, when the rapid course of many creative innovations in reconstructive surgery began:
In 1902, Alexis Carrel* (1873-1944) described the triangular suture of blood vessel and won the Nobel Prize in 1912.

Suzanne Noël (1878-1954) was the first female plastic surgeon. She gave the instructions for facial rejuvenation by cutting strips of the frontal region near hair in 1911. In 1914 [21] during the First World War, many surgeons became famous after their reconstructions of defects and scars after wound healing, such as Sir Harold Gillies* (1892-1960) and Archibald McIndoe from Great Britain, Hippolyte Morestin (1869-1919) from France, Erich Lexer from Germany, Johannes Fredericus Esser from the Netherlands (1877-1946), and so on.

In 1918 a Dutch surgeon Fredericus Johannes Esser described "biological flap" which involved lifting more tissue in one artery lobe. He was the founder of rotation lobe on the face and neck used for large defects. In 1920, Kirschner described temporal lobe of superficial temporal artery and Blair used thicker grafts for reconstruction of skin defects in 1921 [22].

At the same time, in 1936, Paget developed a cylindrical dermatome technique, which enabled the removal of larger grafts of different thicknesses.

Allen B. Kanavel (1874-1938), Sterling Bunell* (1884-1957) and others were the pillars of hand surgery in the period between the two world wars and they put all their knowledge and experience into the book published in 1942 explaining the treatment of injuries, tumors and deformities of the hand [23].

In spite of being a general surgeon, Sterling Bunell introduced many principles in plastic and vascular surgery and orthopedics. He wrote a book “Surgery of the Hand” which was published in 1944.

During World War II, Dr Edward Delos Churchil (1895-1971) [24] introduced the term of delayed primary closure of wounds after early debridement and control of war wound contamination. In 1946, Alexander Aleksandrovich Limberg* (1894-1974), a Soviet military surgeon and dentist, performed reconstructions of defects using diamond-shaped transpositional flap, as well as numerous maxillofacial surgeries.

The next few decades were marked in the annals of plastic surgery by the rapid development of several important sub-groups of specialties: implantation surgery, microsurgery and esthetic surgery.

During the mid-century, malignant skin tumors represented significant oncolgic clinical pathology. Sophie Spitz* (1910-1956), an American histopathologist, gave a great contribution to diagnosis of these tumors in 1948. She proposed the classification of melanocytic nevi, describing juvenile melanoma, today known as Spitz nevi [25].

In 1960, Strömbeck introduced a new method of breast reduction with deepratization of a pedicle [26]. Ivo Pitanguy, a plastic surgeon from Brazil, introduced the term dermolipectomy and used methods of "dry liposuction" [27]. That same year, Jacobson and Suarez experimented on sutures of blood vessels under the microscope and introduced the microsurgical technique in plastic and reconstructive surgery. In 1961, Thomas Cronin and Frank Gerow, Houston, USA, introduced the silicone breast prosthesis implantation [28]. Harold E. Kleinert* (1921-2013) and Mort Kasdan performed the first successful revascularization of the thumb in 1964 [29].

In 1968 in Maribor, Dr Zora Janžekovič* (1918), introduced tangential excision of the necrotic tissue as a method of early treatment for patients with burns. This contributed to better survival and gave remarkable results in treating patients with extensive burns. This method is still the best solution for the treatment of burn wounds [30]. American histopathologist Wallace H.CLARKE* (1924-1997), classified melanoma according to their histological invasiveness of the skin in 1969 and in 1970 Alexander Breslow* (1928-1980), also an American pathologist, described micrometer thickness of histological invasiveness of skin melanoma. These classifications are still used to grade skin melanoma [31].

Mr. John Cobbett performed the first successful transplantation of the big toe to the hand to reconstruct the thumb in 1968, and Harry J. Buncke* (1922-2008), the father of microsurgery in the USA, did it in 1972 [32]. They were followed by many others.

Doctor Marko Godina* (1943-1986), the great name of plastic surgery and microsurgery, presented his results of defects reconstruction using lattisimus dorsi muscle free flaps in 1978 [33].

John F. Burke (1922-2011) from Harvard used artificial skin (Integra) for the reconstruction of defects after necrectomy in patients with burns in 1981 [34]. In the same year, Stephen J. Mathes* (1943-2007) and Foad Nahai* published the first classification of microsurgical flaps [35].

Abraham George Thomas carried out the first face and scalp transplant in a 9-year old girl in India in 1994 [36].

Then the era of allotransplantation began. Long-time experimental works were completed when the first entire hand transplantation was carried out successfully in Lyon in 1998. Dubernard and his team performed the transplantation of the hand successfully in a 48-year old man [37].

In 1998 Milomir Ninkovič, as a member of a surgical team in Innsbruck, promoted the method of functional reconstruction of the urinary bladder using a free latissimus dorsi muscle flap [38].

In 2005, Bernard Devauchelle*, a maxillofacial surgeon, and his team successfully performed the first transplantation of middle part of the face (nose, chin, cheeks, lips) [39].

Sir Harold Gillies (1892-1960), a great name in the English surgery, helped to establish the department of plastic surgery and burns at the MMA (Military Medical Academy) in Belgrade, in 1945. The head of the department was Prof. Dr. Vinko Arneri, the founder of plastic surgery in this region.

Prof. Dr Branislav Bogdanov founded the Ward for Plastic Reconstructive Surgery of the Provincial Gen-
ereral Hospital in Novi Sad in 1964. Enthusiastic young surgeons started to treat severe tissue defects, congenital anomalies as well as burns and their sequelae. In 1986, the Ward for Children and Youth Plastic and Reconstructive Surgery was founded within the Department of Children’s Surgery of the Institute for Child and Youth Health Care in Novi Sad, whose main field of activity is treatment of congenital anomalies and burns in children.

As for the future of plastic surgery, regenerative medicine and tissue engineering will certainly contribute to and expand the possibilities of surgical reconstruction after trauma and oncology defects, as well as better functional and cosmetic results in solving complex congenital malformations.

References

14. Handbuch der praktischen Chirurgie (Textbook of practical surgery); Tübingen 1854-60, two volumes, with atlas 1853