

The Influence of World War One on
the Development of Reconstructive
Plastic Surgery

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INTRODUCTION

The First World War, unprecedented in violence, served as the catalyst for the development and formation of reconstructive plastic surgery as an internationally recognized medical specialty. Although plastic surgery was not a new field at the beginning of the twentieth century, specialized treatment centers, international and interdisciplinary medical collaboration, and the establishment of key principles of practice served to define the metamorphosis of plastic surgery from uncertified into a well-reputed specialty. Multiple components were necessary for the development of plastic surgery; many surgeons from numerous countries were integral in the formation of this specialty. As a result, this thesis is not able to comment on the impact of each individual involved. The Queen's Hospital in Sidcup, England, was the epicenter of the advancement of plastic surgery during WWI at the helm of Harold Gillies. Therefore, the impact of WWI on the treatment of patients at the Queen's Hospital will be examined as a proponent, which significantly changed plastic surgery in the 20th century.

The term “plastic”, in plastic surgery, is derived from the Greek word *plastikos*, meaning to mold or shape. Plastic surgery combines many other specialties¹ and as stated by the father of plastic surgery, Harold Gillies, plastic surgery is a “special branch of reparative surgery”, which “...strives, sometimes for the ideal, more often the best surgical compromise.”² Ralph Millard states that plastic surgery is a “battle of beauty versus blood supply.”³ Unlike general surgery, the end result and appearance of plastic surgery is of greater importance.

¹ Wangensteen, *The Rise of Surgery*, 531.

² Gillies, *Plastic Surgery of the Face*, x, xi.

³ Gillies, *The Principles and Art of Plastic Surgery*, xxii.

Consequently, mastery of the techniques used in plastic surgery is more important than those used in general surgery.⁴

John Staige Davis (1872-1946), an important figure in the birth of the specialty, defines plastic and reconstructive surgery as

the branch of surgery which deals with the repair of defects and malformations, whether congenital or acquired, and with the restoration of function and the improvement of appearance... The deformities dealt with in plastic surgery for the most part involve the skin or adjacent soft parts, rather than the bones and joints, ligaments or tendons.⁵

In the foreword of *The Principles and Art of Plastic Surgery* by Harold Gillies, Jerome Pierce Webster gives an eloquent example of how art makes plastic surgery unique from other medical specialties:

An artist, therefore, must not only be able to conceive the end result to be produced, but he must also be able to visualize all the necessary steps leading to that end, and he must have the imagination, the intelligence and the dexterity to bring about that result. Is not, then, plastic surgery an art and the plastic surgeon an artist? The plastic surgeon works with living flesh as his clay, and his work of art is the attempted achievement of normalcy in appearance and function.⁶

Twentieth-century plastic surgery was largely founded on the influence of three pieces of literature: *The Surgery and Diseases of the Mouth and Jaws* by Vilray Blair, published in 1912; *Plastic Surgery: Its Principles and Practice* by John Staige Davis, published in 1919; and *Plastic Surgery of the Face* by Harold Gillies, published in 1920.⁷ Of the three authors listed, Harold Gillies, with his contributions to war-time surgery at Aldershot and Sidcup, was perhaps the most influential founder of modern plastic surgery. John Staige Davis notes that

⁴ Gillies, *Plastic Surgery of the Face*, 28.

⁵ Davis, *Plastic Surgery: Its Principles and Practice*, 12-13.

⁶ Gillies, *The Principles and Art of Plastic Surgery*, ix.

⁷ *Ibid.*, x.

prior to WWI general surgeons often completed cases which resembled plastic surgery; as a result by the end of the war it had become necessary for plastic surgery to be distinguished from general surgery. Plastic surgery was becoming more complex, and in order for the patient to receive the best treatment, specially trained plastic surgeons were required. Davis states, “The time has come for the separation of plastic surgery from the general surgical tree. There should be a well-trained plastic surgeon on staff of every large general hospital, in order that these patients may be cared for intelligently.”⁸

It is important to note that although the development of plastic surgery was highly influenced by the abundance of facial wounds due to trench warfare, plastic surgery is not solely the surgery of the face. It also encompasses the surgery of the entire human body. As noted by Davis,

During the war (1914-1918) plastic surgery was arbitrarily limited, by regulation, to maxilla-facial reconstruction. This, it is true, is a very important part of the subject, but it must be remembered—and the fact should be emphasized—that plastic surgery of the trunk and extremities is equally important...The field of plastic surgery extends from the top of the head to the sole of the foot, and no properly trained plastic surgeon would be willing to limit his work to the face alone.⁹

After WWI, the techniques instituted by Gillies and others were converted for use on the face, trunk and extremities in civilian practice.

Plastic surgery is not entirely a new craft developed during the onslaught of the great war; rather it has been in existence since antiquity. For example, the Indian Pedicle Flap was developed in ancient India to repair the noses of many women, which had been sliced off by their husbands in suspicion of adultery. Specifically, the tilemaker caste in India used

⁸ Davis, *Plastic Surgery: Its Principles and Practice*, vii.

⁹ Ibid.

pedunculated flaps, similar to the tubed pedicles of Harold Gillies, from the cheeks and forehead to reconstructed noses.¹⁰ In 1597, Gaspare Tagliacozzi (1546-1599) invented a method of Rhinoplasty by which skin from the upper arm was used to reconstruct the nose. In this method the arm, which is attached to the nose via a pedunculated flap, is maintained in place by a strange and presumably uncomfortable apparatus made from leather straps¹¹. Davis states that Tagliacozzi's Rhinoplasty was the "first systematic treatise of plastic surgery."¹²

Prior to WWI, plastic surgery was undertaken in the United States by general surgeons in order to fulfill need as it arose; however these surgeries were not performed at the standards which were later established at Sidcup. John Staige Davis also states, "...every general surgeon was operating because they had to be taken care of, but no one in this country was doing the work properly and the field was undeveloped."^{13, 14} Consequently, few principles of plastic surgery were developed prior to the work of Gillies, and few advancements were made in the field. Along with Davis, Vilray Papin Blair (1871-1955) published one of the first textbooks concerning plastic surgery, which helped to lay the foundation on which Gillies and others later built a robust specialty. In the first edition of *Surgery and Diseases of the Mouth and Jaws*, published in 1912, Blair outlines that a lack of collaboration between medical surgeons and dental professionals was present. With the efforts of Harold Gillies in WWI, these two professions were more closely aligned in medical cases dealing with the face.¹⁵

¹⁰ Davis, *Plastic Surgery: Its Principles and Practice*, 1.

¹¹ Wangenstein, *The Rise of Surgery*, 531.

¹² Davis, *Plastic Surgery: Its Principles and Practice*, 1.

¹³ *Ibid.*, vii.

¹⁴ For more information about surgery prior to WWI see: Tolhurst, David. *Pioneers in Plastic Surgery*. Cham: Springer International Publishing Switzerland, 2015. Wangenstein, Owen H. and Wangenstein, Sarah D. *The Rise of Surgery: From Empiric Craft to Scientific Discipline*. Minneapolis: University of Minnesota Press, 1978.

¹⁵ Blair, *Surgery and Diseases of the Mouth and Jaws*, Preface.

WORLD WAR I (1914-1918)

The influence of WWI on plastic surgery is undoubted, as warfare and the development of surgery have historically been linked. As stated by surgeon and historian Owen H. Wangenstein (1898-1981), “traditional counsel to those who wanted to be surgeons was to follow the army.”¹⁶ Although WWI was not the direct cause of the formation and specialization of plastic surgery, it greatly influenced the development and emergence of plastic surgery as an internationally recognized specialty.

Prior to WWI, the Boer War (1899-1902) in South Africa was Britain’s last major conflict. Although this war saw casualties and gave surgeons the ability to improve their craft, it did not prepare the surgeons for the scale and class of injuries they would witness in WWI. In contrast to the moist, bacteria-rich farm soil of Europe; the South African soil was dry and not contaminated by pathogenic organisms and manure. The European soil resulted in far greater complications during patient treatment and rehabilitation, namely due to wound sepsis.¹⁷

John B. Roberts (1852-1924), alludes to the significance of WWI in the preface of his book *War Surgery of the Face*, stating that,

The possibility of correcting a hideous distortion of features or replacing a large section of the human face was realized inadequately until this great European War produced so many mutilations. The public at large and even a considerable number of members of the medical profession were unfamiliar with the advances made in plastic surgery. Military surgeons were soon confronted with problems with which they were unfamiliar; but they quickly used with ever-increasing skill the reparative methods of Tagliacozzi, Szymanowski, Nelaton, Wolfe, Lexer, Morestin, Esser and other workers.¹⁸

¹⁶ Wangenstein, *The Rise of Surgery*, 18.

¹⁷ Meikle, *Reconstructing Faces*, 37.

¹⁸ Roberts, *War Surgery of the Face*, Preface.

The medical situation that arose out of the trenches of WWI created problems which needed solutions; these “surgical problems presented by the war were new in extent, but not new in kind. The doubts which were revived were old; the questions which urgently demanded an answer were of ancient times.”¹⁹ In order to properly find solutions to the questions, many surgeons were required to operate on the maimed soldiers. The main surgical triumphs of WWI occurred in the areas of anesthesia, antisepsis (eliminating microorganisms that cause disease) and asepsis (the absence of disease-causing microorganisms), all of which aided the development of reconstructive plastic surgery.²⁰

Trench Warfare

During WWI new weapons that fired at higher velocities were produced; as a result, more devastating wounds were created. The greater the velocity produced by a gun, the larger and more destructive the exit wound. Therefore, the introduction of new, higher-velocity guns in WWI led to more devastating flesh wounds.²¹ For example, the use of pointed bullets, in contrast to the rounded bullets used during the Boer war, travelled at greater velocities, causing greater damage. Pointed bullets had the ability, after contact with a sandbag in the trenches, to enter their targets in a rotated position, such as backside first or sideways. The skewed entrance of these bullets generated large lacerations, often taking sizable chunks of flesh with their exit.²² The majority of wounds acquired during trench warfare resulted from

¹⁹ Keith, *Menders of the Maimed*, viii.

²⁰ *Ibid.*, vii.

²¹ Wangenstein, *The Rise of Surgery*, 499.

²² Meikle, *Reconstructing Faces*, 37.

wounds from rifle or machine gun bullets, wounds from shrapnel balls or parts of explosive shells, and wounds from high velocity missiles such as bombs or grenades.²³

A vast number of the battles of WWI were fought on farmland in France and Germany; as a result, the bacteria present in the soil became lodged in the open wounds, leading to infection. Thus for effective treatment it was imperative that the wounds were properly debrided and sterilized.²⁴ One bacterium, *Clostridium* (*C.tetani*, *C. perfringens*), which results in tetanus and gas gangrene, is an example of a bacterium which may have been transferred from the dirt via the bullets and shrapnel into wounds causing dangerous infections.²⁵

Due to the physical nature of the trenches, the heads and necks of soldiers were elevated above the protecting barriers. As a result the faces of these soldiers were especially vulnerable to the high-velocity bullets coming from the enemy lines.²⁶ One estimate states that about 15% of the wounded soldiers evacuated from the trenches received head injuries.²⁷ The sheer quantity of facially disfigured casualties prompted the emergence of new surgical techniques and disciplines. Gillies mentions that the majority of facial cases as a result of bullets and shrapnel often caused severe facial wounds that were not usually lethal. The advancement in medicine and surgical procedures in the 19th and beginning of the 20th century led to the survival of a greater proportion of injured men; as a result more men were in a position of disability or disfigurement.

Surgery at the Queen's Hospital is significant because advanced surgical cases were sent to England. One statistic specifies that 40% of the casualties brought to the frontline hospitals

²³ Laffin, *Combat Surgeons*, 147, 152. Meikle, *Reconstructing Faces*, 37.

²⁴ Laffin, *Combat Surgeons*, 153.

²⁵ Meikle, *Reconstructing Faces*, 66.

²⁶ Simpson and David, "World War I", 71.

²⁷ Meikle, *Reconstructing Faces.*, 37.

were eventually evacuated to the United Kingdom.²⁸ Early in the war the medical personnel were largely unprepared for the severity and amount of casualties. The war lasted longer than expected and the wounds were much worse than expected. The large number of casualties, many of whom bore facial wounds exhibiting a sizable amount of tissue loss and jaw fractures, gave surgeons the ability to practice and determine the best methods of treatment. The war provided surgeons with an experiential learning classroom previously unavailable.

The propulsion of plastic surgery forward was greatly influenced by the infamous blood bath, the Battle of the Somme. Starting on the first of July 1916, the Somme produced one of the highest numbers of casualties. The British Expeditionary Force suffered a record number of casualties lost on a single day in the history of the British Army, with 60,000 casualties including 20,000 dead.²⁹ The casualties that rushed into Aldershot, at the time the designated place of treatment for facial and jaw cases, from the frontlines of the battle, signified the real beginning of Gillies' war surgery. The hospital had prepared for an increase of casualties by organizing for 200 beds; to their dismay over 2000 men arrived within a span of ten days, which completely overwhelmed the system.³⁰ These casualties were regarded as some of the worst cases yet seen. In a letter, Harold Gillies states, "Men without half their faces; men burned and maimed to the condition of animals. Day after day, the tragic, grotesque procession disembarked from the hospital ships and made its way towards us."³¹

Surgery on the Frontlines/Mainland

²⁸ Laffin, *Combat Surgeons*, 148-9.

²⁹ Meikle, *Reconstructing Faces*, 37.

³⁰ Pound, *Gillies: Surgeon Extraordinary*, 33.

³¹ Letter to Dr. Lyndon Peer, May 14, 1959. Cited in: Pound, *Gillies: Surgeon Extraordinary*, 33.

Before patients were sent to England they received treatment at Casualty Clearing Stations (CCS), which were generally located 6-10 miles from the front. The use of ambulances on the frontlines during WWI significantly shortened the amount of time required before the soldier could receive proper medical care. The main aim of the CCS was to reduce sepsis and gas gangrene by treating wounds through debridement. Patients were then transferred to base hospitals, where they would receive further treatment. The base hospitals were either designated as stationary, containing 200 beds, or general, containing over 500 beds. If the patient obtained a severe facial wound he would then be sent to England for further treatment.³²

Transport to England posed several problems, not in the least the fact that the journey lasted 8-10 days from the time leaving the base hospital to arriving at Aldershot or Sidcup. Patients with severe facial injuries were often unable to eat and arrived malnourished. Anesthetics and antibiotics were awkwardly administered and the communication from the facially maimed patients was very limited.³³ Due to the infestation of wounds with particles from the soil, explosives and shrapnel it was essential to debride wounds; this became a vital focus of the surgeon and his team.³⁴ If shrapnel and other foreign particles were not properly removed, the reconstruction of the wound was greatly impeded.

The treatment of wounds on the frontlines was discussed at the Inter-Allied surgical conference located in Paris in 1917. Countries represented by delegates included England, France, Belgium, Italy, Japan, Portugal and Serbia. The differences between primary and secondary wound closure was the matter discussed. This issue had become a major surgical

³² Meikle, *Reconstructing Faces*, 40-41.

³³ *Ibid.*, 67.

³⁴ Wangensteen, *The Rise of Surgery*, 53.

debate among allied doctors. The consensus reached at the conclusion of the conference was that primary closure was to be used if the creation of the wound occurred less than 8 hours prior. Another principle was established and became standardized; during open wound management damaged tissue was to be removed. It was also clarified that the use of debridement and irrigation with saline solution does not act to sterilize a wound, and that antibiotics must also be administered.³⁵

Charles Valadier

The rise of Harold Gillies as surgeon extraordinaire is not without the influence of other great minds. One such person is Auguste Charles Valadier (1873-1931), a French-American who volunteered his dental and surgical skills to the British army. At the beginning of the war Gillies was assigned to assist Valadier, from whom he gained a large appreciation for the collaboration between surgeons and their dental counterparts.³⁶ Valadier was largely influential in the establishment of special centers to address facial and jaw injuries. The first facial and jaw treatment center was established at No. 13 stationary hospital in Boulogne-sur-Mer, later renamed as the No. 83 Dublin general hospital.³⁷

Injuries seen during the war were vastly different from the civilian cases and required a new set of techniques in order to treat them. Valadier performed many jaw reconstructions and formulated a set of principles that would aid in the best treatment of such cases. He advocated for the preservation of as much natural tissue as was feasible, including the teeth of

³⁵ Wangenstein, *The Rise of Surgery*, 61, 517. Meikle, *Reconstructing Faces*, 66. "General Principles of the Treatment of Wounds of War", 838.

³⁶ Meikle, *Reconstructing Faces*, 47.

³⁷ *Ibid.*, 49.

the patient. In congruence with the report from the Inter-Allied surgical conference, Valadier suggested primary closure of the wound ought to be used along with proper wound sterilization. Having travelled to many of the frontline hospitals in France, Valadier noted that many of the wounds that were treated improperly result in cicatrized, and keloidal scars.³⁸

Varaztad Kazanjian

Another prominent frontline surgeon was Armenian born, Varaztad H. Kazanjian (1819-1974). He was known as “the miracle man of the western front”³⁹, for his pioneering work on the faces and jaws of maimed soldiers during WWI. Many years after immigrating to America Kazanjian obtained his dental and medical degrees from Harvard. In 1915, Kazanjian was the Dental Chief of the First Harvard Unit which served with the British forces in France.⁴⁰ This unit was established at No. 22 general hospital at Dannes-Camier. Kazanjian focused on maxillofacial orthopedics and jaw fractures. Many of his patients were later transferred to England where they would receive further treatment from Harold Gillies and his team.⁴¹

When Kazanjian’s injured soldiers arrived at the hands of Gillies the results were keenly examined. Gillies states:

Although the “jaws” coming over from France were often untreated, cases coming from Kazanjian’s Harvard unit always showed excellent care. His work about the mouth and his use of weighted dentures produced such soft lips and ample chins that we would always gather around his cases on arrival to see exactly what he had done.⁴²

³⁸ Valadier, “Oral and Plastic Surgery”, 152.

³⁹ Converse, *Surgical Treatment of Facial Injuries*, viii.

⁴⁰ Ibid.

⁴¹ Meikle, *Reconstructing Faces*, 53.

⁴² Gillies, *The Principles and Art of Plastic Surgery*, 22.

Kazanjian served as an important pioneer for plastic surgery by establishing principles of practice and by hosting and teaching Allied army surgeons during the war. He has been honored with the title of ‘the father of plastic surgery’ for his continual development of techniques, and his plethora of publications. He continued to restore faces through the second world war and into the second half of the 20th century.⁴³

⁴³ For more information on the fascinating life and work of Dr. Kazanjian see: Deranian, H.M. “The Miracle Man in the Western Front: The Story of Dr. Varaztad Kazanjian.” *Bulletin of the History of Dentistry* 32, no. 2 (1984): 85-96.

QUEEN'S HOSPITAL, SIDCUP, ENGLAND

Plastic Surgery at Aldershot

Prior to the establishment of the Queen's Hospital at Sidcup, facial and jaw cases were admitted to the Cambridge Military Hospital at Aldershot. Harold Gillies was influential in the initiation and creation of a specialized military hospital, which exclusively treated facial wounds. By the latter half of 1915 he had convinced enough high ranking officials of the need for a specialized treatment center for facial and jaw cases in England. On January 11, 1916, a section of the Cambridge Military Hospital at Aldershot was made available for "special duty in connection with plastic surgery."⁴⁴ The immense amount of casualties, which arrived at Aldershot from the Battle of the Somme in July 1916 overwhelmed Gillies and his team. The arrival of over 2000 casualties swamped the 200 allocated beds at Aldershot and prompted the unit to transfer to a larger space. In 1917 the Queen's hospital at Sidcup was established at the grounds of Frogmal house, a Jacobean mansion.⁴⁵

In his book *The Principles and Art of Plastic Surgery*, Gillies quotes nurse Catherine Black about the plastic unit at the Aldershot Cambridge hospital:

The facial wounds in many respects were the most serious of the war casualties. Despite all that could be done for them, they were responsible for a high mortality rate... In that silent ward where only one in ten could mumble a few words from shattered jaws the problem of feeding was acute... Hardest of all was the task of trying to rekindle the desire to live in men condemned to lie week after week smothered in bandages, unable to talk, unable to taste, unable even to sleep, and all the while knowing themselves to be appallingly disfigured.⁴⁶

⁴⁴ Pound, *Gillies: Surgeon Extraordinary*, 24. Meikle, *Reconstructing Faces*, 55.

⁴⁵ Meikle, *Reconstructing Faces*, 72.

⁴⁶ Gillies, *The Principles and Art of Plastic Surgery*, 8, 9.

Although successful results were obtained at Aldershot, true advancement of plastic surgery came at Sidcup.

History of the Queen's Hospital

The realization that the allotted space at Aldershot would be insufficient for the vast number of jaw and facial cases prompted a search for an alternative location. Gillies recognized that the most effective treatment for soldiers with facial wounds would be administered if they were treated at the same location. Twelve miles from London, in Kent, between Sidcup and Chislehurst, lay 90 acres⁴⁷ of grounds belonging to the Jacobian mansion, Froggnal House. Once home to Lord Sydney⁴⁸, the grounds would be transformed to become the temporary home of thousands of invalids. The construction of the hospital involved building huts with twenty to fifty beds in each, where the patients could recover.⁴⁹ Based on the design by Gillies the hospital was built in a horseshoe shape, where the wards diverged out from the central admissions block.⁵⁰ New Zealand surgeon Henry Percy Pickerill (1879-1956) states:

The fundamental idea was that it should be a British Empire Hospital to which all wounded soldiers with facial losses should be sent from all theatres of the 1914-18 war. Thus it was divided into four sections, British, Canadian, Australian, and New Zealand, each autonomous and staffed by its own officers.⁵¹

The hospital was not ready for full use until August 1917, and remained in use as the specialized treatment center for jaw and facial cases until March 1920. Thereafter it came

⁴⁷ Meikle, *Reconstructing Faces*, 72.

⁴⁸ "The Queen's Hospital, Froggnal, Sidcup", 688.

⁴⁹ "Plastic Surgery at the Queen's Hospital, Sidcup", 87.

⁵⁰ Pound, *Gillies: Surgeon Extraordinary*, 41.

⁵¹ Pickerill, "The Queen's Hospital, Sidcup", 247.

under the authority of the War Office and became a Central Military Hospital.⁵² The hospital included ample space to house the soldiers and medical staff. In addition it was equipped not only with operating theatres but also with dental and x-ray rooms, photography rooms, examination rooms and an art studio for Henry Tonks,⁵³ allowing the surgeons access to everything needed to restore the broken in one central location. The two operating theatres at Sidcup were used from dusk to dawn and located centrally between the four wings of the hospital,⁵⁴ and by the end of the war they were running seven days a week⁵⁵. Froggnal house became the administrative block and contained the dining hall, accommodating a medical and nursing staff that totaled 120 persons.⁵⁶

Sidcup became the epicenter of plastic surgery during the war, Andrew Bamji, curator of the Gillies Archives in England writes,

In France, where facial injury services were dispersed, and likewise in Germany and Austria, single surgeons such as Morestin and Esser emerged as pioneers but never developed the teaching base that Sidcup provided with its 5000 subjects. American surgeons in France such as Allbee, Ivy and Kazanjian did pioneering work, but would send difficult cases to Sidcup, as indeed would Valadier in due course.⁵⁷

From the outset of its creation the hospital at Sidcup was built to not only treat the defaced soldiers from the trenches but also to house them and provide education to aid their reintegration into society.⁵⁸ Due to the nature of the facial wounds mirrors were not allowed at the Aldershot or Sidcup hospitals in order to preserve patient morale.⁵⁹ The ability to house

⁵² Meikle, *Reconstructing Faces*, 74.

⁵³ “The Queen’s Hospital, Froggnal, Sidcup”, 689. Pound, *Gillies: Surgeon Extraordinary*, 41.

⁵⁴ “Plastic Surgery at the Queen’s Hospital, Sidcup”, 88.

⁵⁵ Pound, *Gillies: Surgeon Extraordinary*, 54.

⁵⁶ “The Queen’s Hospital, Froggnal, Sidcup”, 688. Pound, *Gillies: Surgeon Extraordinary*, 41.

⁵⁷ Bamji, “Sir Harold Gillies”, 144.

⁵⁸ “The Queen’s Hospital, Froggnal, Sidcup”, 687.

⁵⁹ Gillies, *The Principles and Art of Plastic Surgery*, 9.

the patients at Sidcup was considerably important because many encountered acute depression and would refuse to return to their homes and families until their wounds were treated as best as was possible.⁶⁰ By the end of the war, over 1000 convalescent beds were available, and filled. These beds were located at Sidcup and the surrounding hospitals.⁶¹ After the war, when the Queen's Hospital came under the authority of the war office, it was renamed Queen Mary's Hospital, Sidcup. In 1975 all medical usage of Sidcup came to an end when the buildings were demolished.⁶²

Harold Gillies

Born in 1882, Harold Delf Gillies (1882-1960), son of a land agent, Robert Gillies, was the youngest of eight and spent his childhood in New Zealand. His grandfather emigrated from Scotland in 1852.⁶³ After attending Lindley College in England for four years following his 8th birthday, Gillies returned to New Zealand to attend Wanganui College.⁶⁴ Upon graduation, Gillies spent another seven weeks at sea on his way to England, where he attended Caius college at Cambridge to study medicine. Gillies was an avid sportsman and seemed to excel at everything he did; he rowed in the winning Cambridge boat in the 1904 boat race, he shone in golf, played cricket and billiards, enjoyed painting and played as the first violinist for the hospital musical society at St. Bartholomew.⁶⁵

Gillies finished his medical training at St. Bartholomew's Hospital and trained as an otolaryngologist (ENT) specializing in the diseases of the ears, nose and throat.⁶⁶ Gillies was

⁶⁰ "The Queen's Hospital, Frognaal, Sidcup", 688.

⁶¹ Pound, *Gillies: Surgeon Extraordinary*, 49.

⁶² Meikle, *Reconstructing Faces*, 94.

⁶³ Pound, *Gillies: Surgeon Extraordinary*, 10-11.

⁶⁴ *Ibid.*, 12.

⁶⁵ *Ibid.*

⁶⁶ *Ibid.*, 15.

a very able student of medicine and a diligent worker, even practicing his golf swing in the bathroom or between buildings at Sidcup. His tenacity to challenge authority and the ways things were, as well as the ability to do exactly what he intended, were some of the traits that distinguished Gillies and would serve him well later in his career.⁶⁷

When WWI broke out, Gillies volunteered his services to the British Red Cross and was sent to France as a general surgeon. Upon arrival, Gillies was introduced to Valadier and his jaw surgical unit at the 83rd General Hospital at Wimereux.⁶⁸ One of Gillies' friends, an American dentist, gave him a German book by August Lindemann titled, *Die gegenwärtigen Behandlungswege der Kieferschussverletzungen* (Contemporary Treatment Methods of Gunshot Injuries of the Jaw). The book revealed surgical cases and techniques as conducted by the German surgeon Lindemann. This book, along with his introduction to the work of Valadier, greatly inspired Gillies to prompt the British army toward action; no meaningful attempt to aid soldiers with facial disfigurements was made prior to Gillies' appeal.⁶⁹ The ability of Gillies to obtain a book about the medical practices of the adversary suggest that communication regarding medical advancements was not kept secretive between the warring nations.

Gillies' philosophy about plastic surgery was shaped by his exposure to the literature available at the time. He mentions that although the Germans were advancing the field of plastic surgery, their "... books revealed a greater interest in getting their soldiers back to the front. Appearance was of secondary interest, and like a dueling scar, an ugly war wound in the enemy camp was a mark of honour." In contrast to the German view of reconstruction Gillies

⁶⁷ Pound, *Gillies: Surgeon Extraordinary*, 14.

⁶⁸ *Ibid.*, 22.

⁶⁹ Pound, *Gillies: Surgeon Extraordinary*, 23. Meikle, *Reconstructing Faces*, 48.

proposed to combine the restoration of form and function: “It seemed that aesthetics as well as function were important and that in reconstruction we might attempt to achieve the best of both.”⁷⁰

As an amateur facial surgeon, Gillies travelled to learn from the best reconstructive surgeon in Western Europe at the time, Hippolyte Morestin⁷¹ (1869-1918), a Frenchman who worked at the Val de Grace Military Hospital in Paris. Gillies travelled to Paris to observe and learn from Morestin; he was amazed at the skill and results of the surgery. Upon later reflection he stated: “Although in the light of present-day knowledge it seems unlikely this repair could have been wholly successful, at the time it was the most thrilling thing I had ever seen. I fell in love with the work on the spot.”⁷² On the second visit he was not as cordially accepted as his previous trip and was denied access to the operating theatre, thus ending the professional relationship between Gillies and Morestin.^{73 74}

Gillies continued to travel and learn from other surgeons at Boulogne, Etaples, Amiens and Paris; however, the results he witnessed were dismaying and suggested that, unlike the work of Kazanjian, most frontline surgeons did not properly restore the faces of the injured.⁷⁵

⁷⁰ Gillies, *The Principles and Art of Plastic Surgery*, 10. Pound, *Gillies: Surgeon Extraordinary*, 28.

⁷¹ Laldrie, “Hippolyte Morestin”, 39.

⁷² Gillies, *The Principles and Art of Plastic Surgery*, 7.

⁷³ Meikle, *Reconstructing Faces*, 48. Pound, *Gillies: Surgeon Extraordinary*, 24.

⁷⁴ The reason for the curt treatment Morestin showed Gillies on their second meeting is largely unknown. It may have resulted from Morestin’s feeling threatened by the bright mind of Gillies, an Englishman. The *British Journal of Surgery* describes Morestin as a brilliant surgeon but a man who “was too fond of the sound of his own voice and was also rather pretentious” (Laldrie, J.P. “Hippolyte Morestin 1869-1918.” *Journal of Plastic, Reconstructive and Aesthetic Surgery* 25 (1972): 39). Morestin may have felt that he did not want to easily divulge years of knowledge to the next surgical genius who could then surpass his own influence and prestige.

⁷⁵ Pound, *Gillies: Surgeon Extraordinary*, 25.

Most of these surgeons simply closed the wounds without any attempt to fix the fundamental structure or replace the lost tissue, this caused poor results with unnecessary amounts of scarring.⁷⁶ Many such cases would later be sent to Sidcup where Gillies and his team painstakingly undid the damage before attempting their own reconstruction.

As mentioned above, Gillies was instrumental in the founding of the facial and jaw unit at Aldershot and the Queen's Hospital at Sidcup. While at Sidcup, Gillies was named the chief medical officer and carried the primary responsibility of the Queen's Hospital.⁷⁷ The plastic surgery completed at Aldershot and Sidcup was relatively undocumented and new, as well as highly complex. The medical problems Gillies and his team faced were unique and required careful judgment and uncompromised skill. Davis states, "sound surgical judgment is often necessary to determine what should be done; whether or not a plastic procedure should be finished at one operation; how far to go in the initial operation, and when to follow with the secondary procedure."⁷⁸

Due to the main problem of tissue loss, Gillies established two principle techniques, the tubed pedicle flap and the epithelial outlay for the reconstruction of eyelids.⁷⁹ The first tubed pedicle was performed on A.B. Vicarage on October 3, 1917. Vicarage had not suffered from trench warfare wounds but rather from burns while abroad the H.M.S. *Malaya*. He found his way to the hands of Gillies and became the first patient to undergo the tubed pedicle treatment. The end result is rather remarkable. The principle of the tubed pedicle was to

⁷⁶ Pound, *Gillies: Surgeon Extraordinary*, 26.

⁷⁷ Meikle, *Reconstructing Faces*, 74.

⁷⁸ Davis, *Plastic Surgery: Its Principles and Practice*, 13.

⁷⁹ Meikle, *Reconstructing Faces*, 81, 83. Gillies, *The Principles and Art of Plastic Surgery*, x.

maintain blood supply to the area where the tube was attached. The rolling effect of the tube increased the longitudinal blood supply.⁸⁰

Another tube was developed after the tubed pedicle, the branch pedicle. For this procedure Lieutenant Wallace served as the first patient.⁸¹ The success of the tubed pedicles resulted in their widespread use among the surgeons of Sidcup. Gillies states,

As in all innovations, limitations of the tubed pedicle method had yet to be discovered, and in the process the pendulum was allowed to swing too far. ... Nevertheless the value of the principle had been proved, and over the years it has spread its tubed tentacles into all regions of plastic surgery from the palate to the penis.⁸²

Although the creation of the tubed pedicle is credited to Gillies, J.L Aymard wrote a letter to the editor of the *Lancet* in 1920, claiming that he, along with Lieutenant G.S. Hett, did indeed partake in the creation of this method to which Gillies lays claim. However, he finishes his letter with this statement, “I do not intend to enter into any disputes, but hope to depict the influence of war surgery on civil practice, leaving out all war cases and much of the pettiness connected with them.”⁸³

One of Gillies’ main principles of reconstructive surgery was to fix the underlying structure before addressing the overlaying soft tissues. In this manner, dental surgeons were relied upon when the injury included the oral cavity. The foremost purpose of reconstructive surgery is to restore function, and then cosmetic results may follow. Gillies writes, “My days and nights were filled with a steady flow of injuries. I just had to go ahead with the ingenuity of my own mind and the principles of surgery behind it. Little by little principles evolved and

⁸⁰ Gillies, *Principles and Art of Plastic Surgery*, 34, 35.

⁸¹ *Ibid.*, 34.

⁸² *Ibid.*, 37.

⁸³ Aymard, “The Tubed Pedicle in Plastic Surgery”, 270.

I think if I have made a worthwhile contribution it is in the establishment of principles.”⁸⁴ The order of reparative importance was as follows: the lining membrane was addressed first. If the mucous cavity’s lining membrane was not properly restored then the result would fail, showing a drooping of the restored structure over time. After the lining membrane, the supporting structures such as the mandible and maxilla were addressed followed lastly by the outer skin covering.⁸⁵

Another principle strictly adhered to at Sidcup was that operations would not commence until the original wounds were fully healed. Reconstructive surgery consisted of multiple operations, meaning that patients would often be at Sidcup for months on end. The time needed for the successful repair of a deformity would often cause strain on the surgeon and patient alike. Gillies states, “In conclusion, it may be said that Time is the plastic surgeon’s greatest ally, and at the same time his most trenchant critic.”⁸⁶ Soldiers were needed to return to the front; however, Gillies and his team required months to allow for the proper recovery and reconstruction of the injured soldier. Gillies stressed that the plastic operation must not occur until the patient was fully healed; to rush into an operation was to doom it to failure: “Surgical haste definitely led to the irrevocable waste of tissue, and the value of never doing today what could be put off till tomorrow was emphasized.”⁸⁷ Davis also echoed Gillies’ views, stating, “plastic surgery cannot be done in a hurry, either in the operative steps or in the length of time required to complete the final operation.”⁸⁸ Unfortunately, due to the

⁸⁴ Letter to Dr. Lyndon Peer, May 14, 1959. Cited in Pound, *Gillies: Surgeon Extraordinary*, 33.

⁸⁵ Gillies, *Plastic Surgery of the Face*, 5.

⁸⁶ *Ibid.*, 34.

⁸⁷ Gillies, *The Principles and Art of Plastic Surgery*, 30.

⁸⁸ Davis, *Plastic Surgery: Its Principles and Practice*, 14.

demand for able bodied men, some of Gillies' patients were returned to the front before the most opportune time, these patients were acceptable but not yet finished.⁸⁹

The effect that Harold Gillies had on the formation and development of plastic surgery is unlike any other surgeon of that time. In the Introduction of *Plastic Surgery of the Face*, W. Arbuthnot Lane states, "It was largely due to [Gillies] that such rapid progress was effected in this special and difficult surgery, of which little or nothing was known before the war. Methods were employed and scrapped with great rapidity as improvements were devised."⁹⁰

Culture and Collaboration

Interdisciplinary Collaboration

Interdisciplinary collaboration was highly valued at Sidcup, and included plastic surgeons, as well as dentists and dental surgeons, oral specialists, radiographers, anesthetists and artists.⁹¹ Very few, if any, plastic surgery textbooks could be consulted; as a result, much of the surgery done at Sidcup (and Aldershot) was through a means of trial and error undertaken to find the best techniques. Reginald Pound, Gillies' biographer, notes that Gillies was a man of vision; he was able to see the end result before the surgery was even started,⁹² thus allowing him to propel a certain concept of plastic surgery into existence. Gillies states that his time at Sidcup was marked as "a period of doubt, trial and error", which ultimately resulted in a great deal of success.⁹³ Much of the experimentation occurred on wax models, through numerous sketches, and in the operating rooms.

⁸⁹ Pound, *Gillies: Surgeon Extraordinary*, 53.

⁹⁰ Gillies, *Plastic Surgery of the Face*, ix.

⁹¹ "The Queen's Hospital, Frognaal, Sidcup", 688.

⁹² Pound, *Gillies: Surgeon Extraordinary*, 37.

⁹³ Gillies, *Plastic Surgery of the Face*, x.

Each plastic case was unique and as stated by Charles Valadier, "...each case must be treated as one *sui generis*."⁹⁴ As a result, Gillies and his team did not develop a strict set of guidelines for plastic surgery but rather a set of principles which could be adapted to the case at hand. The large influx of casualties required that the six operating theatres at Sidcup be used to capacity every day. 11,572 major operations including 8,000 maxillofacial operations occurred at Sidcup from August 1917 through June 1921.⁹⁵

The establishment of surgical practices and principles of treatment were outlined, which allowed the international medical community to adopt plastic surgery treatments and drive the work of the plastic surgeon forward around the world. Gillies was particularly influential in the broader adoption of plastic surgery principles because he standardized techniques that had been in use since antiquity, including Rhinoplasty. Meikle states,

...it was under Gillies at Sidcup that these procedures evolved, became standardized, and led to the foundation of plastic surgery as we understand it today: plastic surgery had passed from trial and error to a specialty based on reasonably sound surgical and biological principles.⁹⁶

As mentioned above, the adoption of new surgical techniques at Sidcup did not occur without the influence of age-old techniques. For example, the original principles of Rhinoplasty were still in use. Gillies states, "There is hardly an operation-hardly a single flap-in use to-day that has not been suggested a hundred years ago. But our work is original in that all of it has had to be built up again *de novo*."⁹⁷ Forty years after the war, Gillies reflects in his book *The Principles and Art of Plastic Surgery* (published in 1957), that the surgeries performed at Sidcup were not original but rather surgeries that made progress on the

⁹⁴ Valadier, "Oral and Plastic Surgery", 151.

⁹⁵ Meikle, *Reconstructing Faces*, 79, 80. Gillies, *The Principles and Art of Plastic Surgery*, 45.

⁹⁶ Meikle, *Reconstructing Faces*, 81.

⁹⁷ Gillies, *Plastic Surgery of the Face*, 3.

established principles. This led to the formation of the specialty of plastic surgery: “There is little that can be called original since a sharp flint opened an abscess and some horsehair threaded through the first thorn needle sewed up a wound. Yet it all goes on, bit by bit, and the wheel of progress turns just a little in any man’s lifetime.”⁹⁸ Gillies and the surgeons of Sidcup turned the wheel of progress in a significant way, for without their contributions plastic surgery would not be where it is today.

In essence, the success of reconstructive surgery at Sidcup resulted from the improvement of old techniques, the initiation of new techniques through trial and error, and the standardization of these techniques. The collaborative and international work environment fostered a culture of creativity and competition, propelling surgical development forward.

Gillies states:

It is quite evident that for the developments of technique initiated at Sidcup inventive courage and an almost superhuman patience were needed, and, even these qualities would not have led to success unless coupled with an unusual dexterity and ingenious and creative minds.⁹⁹

One cannot omit the significant importance of the nursing staff at Sidcup: The success of surgery depends largely on the care received by the patients post-operatively. The nursing staff contributed largely behind the scenes but have nearly been forgotten in the shadows behind the limelight of Gillies and other surgeons. Gillies aptly acknowledges the contributions of the nurses in his book *The Principles and Art of Plastic Surgery*: “The expert plastic sister is not only a master of technique and a guide and philosopher in the theatre, but

⁹⁸ Gillies, *The Principles and Art of Plastic Surgery*, xv.

⁹⁹ “Plastic Surgery of the Face”, 194.

in the ward her meticulous care in control of haematoma, and grafts is often the deciding factor in success.”¹⁰⁰

Anesthesia in Association with Plastic Surgery

The development of plastic surgery was contingent on the development of anesthesia, for without anesthesia successful plastic surgery cannot exist. Gillies states, “It must be stressed that without the expert development of their [anesthesia] craft within the sphere of plastic surgery, that specialty, and indeed others, especially thoracic, would have been seriously hampered.”¹⁰¹ In *Plastic Surgery of the Face* Captain R. Wade addresses the problem of anesthesia faced at Sidcup. The operations were long and cumbersome resulting in an increased challenge to the anesthetist. Facial wounds were particularly difficult to anesthetize, especially those involving wounds of the oral cavity; for these operations endotracheal intubation with ether was used.¹⁰²

Problems facing the anesthetist at Sidcup were numerous. For example, the patient could not always be easily placed flat on his back, as respiratory obstruction was evident. Ivan Magill (1888-1986), an influential Irish-born anesthetist at Sidcup states, “Trying to maintain adequate airway by remote control and without the aid of suction was a nightmare. Often we sat under the table holding up the jaw for hours while a forehead rhinoplasty was performed.”¹⁰³ Due to the difficulty of the cases new advanced anesthetic procedures and techniques were developed.

¹⁰⁰ Gillies, *The Principles and Art of Plastic Surgery*, xvi.

¹⁰¹ Ibid.

¹⁰² Gillies, *Plastic Surgery of the Face*, 23.

¹⁰³ Ibid., 58.

One such method developed by Magill included passing a rubber tube through the patients' nostril or mouth and into the trachea, thus allowing the anesthetist to administer anesthesia intratracheally. This method is commonly used in modern medicine and is referred to as endotracheal anesthesia. An electric motor which used positive pressure to drive the ether up the tubing and into the patient through his nostril or mouth allowed ether to be dispensed much more efficiently.¹⁰⁴ Before this method was realized, ether vapor was blown into a funnel which attached to the patient's face via a rubber tube.¹⁰⁵ Consequently, the surgeon would also experience some light anesthesia due to escaping ether vapor. The mode of anesthesia developed by Ivan Magill significantly advanced the specialty of plastic surgery by allowing the surgeon greater freedom and permitting the anesthetist to have greater control in securing the desired result. Without the advance of plastic surgery, improvements in anesthesia in relation to the face would have been hampered. Therefore, the development of plastic surgery in the context of WWI also aided the development of anesthesia.

Dental and Oral Surgery

The collaboration between plastic surgeons and dental and oral surgeons allowed for the progress of the specialty of plastic surgery. Valadier states, "The plastic side of the work is most important. Mutually interdependent are the oral and plastic work, and the surgeons responsible for each of these must work in co-operation, if good results are to be expected."¹⁰⁶

Gillies was also a champion of collaboration and states, "In no other part of the work does the

¹⁰⁴ "Plastic Surgery at the Queen's Hospital, Sidcup", 89.

¹⁰⁵ Pound, *Gillies: Surgeon Extraordinary*, 56.

¹⁰⁶ Valadier, "Oral and Plastic Surgery", 151.

cooperation of the dentist and surgeon come more fully into play. Failure to provide a suitable substructure is, in our opinion, the commonest cause of plastic failures.”¹⁰⁷

Sculpture and Art

One cannot mention Harold Gillies’ plastic surgery without the inclusion of art. Murray C. Meikle states, “Gillies believed that plastic surgery was a form of art and that the activities of a plastic surgeon demanded the vision and insight of the artist.”¹⁰⁸ Gillies was a meticulous note taker and recorder; he kept excellent records, which included commissioned drawings, notes, and photographs. Gillies’ research work is evident in both of his books *The Principles and Art of Plastic Surgery* and *Plastic Surgery of the Face*, which are adorned with photographs, pictures and notes.

One of the principal and most distinguished artists who aided Gillies at Aldershot and Sidcup was Henry Tonks (1862-1937). Tonks, who initially trained as a surgeon, later transferred to a career in art, then taught as the prestigious Slade professor of art at the University College London.¹⁰⁹ Tonks’ pastel drawings have become icons of the reconstructive surgery of Gillies and WWI and represent the faces shattered by the conflict. The portraits created by Tonks and other artists were created for the purpose of documentation. Although cameras were used and photographs taken, the equipment often proved too large and cumbersome in the operating theatre. Therefore, art was relied upon to produce successful records. Art was also used to plan for a surgery; for example, plaster casts of the face were made, along with sculptor models. With the addition of x-ray images and old

¹⁰⁷ Gillies and King, “Mechanical Supports in Plastic Surgery”, 412.

¹⁰⁸ Meikle, *Reconstructing Faces*, 59.

¹⁰⁹ *Ibid.*, 60.

pictures of the wounded the surgeon was able to make the final diagnosis and adequately prepare for the operation. Appropriate patient diagnosis was essential and successful surgery could not be performed without the knowledge of the condition and the anatomical losses affecting the patient.¹¹⁰

Masks

Surgery was a burdensome process and sometimes proved too great for a patient to undergo. In the event that surgery was avoided, or all that was surgically possible was completed, masks could be given to the patient to restore an image of normalcy. Derwent Francis Wood (1871-1926), constructed facial masks out of copper, coated in enamel.¹¹¹ Glasses were often used to attach the mask to the face; although the masks served as a last resort to rebuild the image and identity of the patient, they were inanimate and did not allow for facial expression. Wood states,

My work begins where the work of the surgeon is completed. When the surgeon has done all he can to restore functions, to heal wounds, to support fleshy tissues by bone-grafting, to cover areas by skin-grafting, I endeavour by means of the skill I happen to possess as a sculptor to make a man's face as near as possible to what it looked like before he was wounded.¹¹²

After the war, in 1918 Anna Coleman Ladd (1878-1939), opened the 'American Red Cross Studio for Portrait Masks for Mutilated Soldiers' in Paris,¹¹³ where she, like Wood,

¹¹⁰ Gillies, *Plastic Surgery of the Face*, 4.

¹¹¹ Wood, "Masks for Facial Wounds", 951.

¹¹² *Ibid.*, 949.

¹¹³ Lubin, "Masks, Mutilation and Modernity", 6.

constructed masks for disfigured soldiers¹¹⁴. The creation of masks for soldiers suffering from facial wounds reveals that some limitations to plastic surgery were present and although great strides were taken in reconstructing faces, the devastation of the war left many, although medical marvels, unsightly in society.

International Collaboration

International collaboration was a key component to the surgical successes of the Queen's hospital at Sidcup. The hospital was divided into four main sections: British, Australian, Canadian and New Zealander. Harold Gillies headed the British section, Henry Pickerill the New Zealand section, Major C.W. Waldron and Captain Fulton Risdon the Canadian section and Lieutenant Colonel H.S. Newland the Australian section. Each country staffed its respective section with its own officers and personnel.¹¹⁵ The British section, the largest of the four, took two-fifths of the cases and the remaining three-fifths were evenly divided among the other sections.¹¹⁶

In addition to international Commonwealth units, American dentists and surgeons travelled to Sidcup to receive specialized training. The Americans were evenly distributed throughout the hospital¹¹⁷ and assisted the Commonwealth surgeons, therefore gaining valuable surgical experience in the new field of plastic surgery.¹¹⁸ American surgeons visiting Sidcup included John Staige Davis, Vilray Blair, Robert Ivy, Ferris Smith, J. Eastman

¹¹⁴ For more information on the work of Anna Coleman Ladd see Lubin, David M. "Masks, Mutilation and Modernity: Anna Coleman Ladd and the First World War." *Archives of the American Art Journal* 47, no. 3/4 (2008): 3-15.

¹¹⁵ Meikle, *Reconstructing Faces*, 25, 77.

¹¹⁶ Meikle, *Reconstructing Faces*, 74. Pickerill, "The Queen's Hospital, Sidcup", 247.

¹¹⁷ Ibid.

¹¹⁸ Gillies, *Plastic Surgery of the Face*, x.

Sheehan and George Dorrance¹¹⁹, all of whom became well respected plastic surgeons in the United States. The inclusion of an American presence at Sidcup allowed for the transfer of knowledge gained through the experience of Gillies and others to be transported across the Atlantic to establish and propel plastic surgery forward in the United States.

New Zealand surgeon Henry Pickerill comments on the collaborative nature of Sidcup:

Although each section was self-contained and autonomous there was a common record office open to all; so that if the officer-in-charge of one section was too busy to go along and see how the officer-in-charge of another section dealt with a particular case, he could next day read all about it in the record office, and adopt the new method himself if he wished on the following day. Thus was progress speeded up.¹²⁰

The surgeons from Canada, New Zealand, Australia, the United States and Britain all collaborated and learned from each other, thus raising the standard of plastic surgery completed at Sidcup and establishing a standard for the forthcoming specialty. Due to the large number of operations, which occurred within the close proximity of Sidcup, much collaboration occurred between the surgeons. This allowed for friendly competition between the sections, which ultimately led to the development of the best surgical techniques to address reconstructive problems. Gillies states that “clinics were held for open discussion of immediate problems and for presentation of difficult cases...It made it more difficult to hide a bad case than to get a good one, and consequently our standards rose.”¹²¹ In his book, *Plastic Surgery of the Face*, Gillies states that the international sections “...joined heartily in friendly rivalry and healthy competition, to the great benefit of [the] poor *mutiles*.”¹²²

¹¹⁹ Pound, *Gillies: Surgeon Extraordinary*, 42.

¹²⁰ Pickerill, “The Queen’s Hospital, Sidcup”, 247.

¹²¹ Gillies, *The Principles and Art of Plastic Surgery*, 31.

¹²² Gillies, *Plastic Surgery of the Face*, x.

Competition among the international units served to increase the level of expectation and accelerated the surgical innovation, which took place. Gillies notes,

With our artistic efforts constantly on exhibition about the wards, not only the patients judged our results but we, too, if only out of the corners of our eyes, jealously compared our work with that of our colleagues. It was obvious that this promoted stimulating competition. Each surgeon had his own characteristic style, somewhat, in a minor way, like the distinctive individuality of a Rembrandt, a Constable or a Disney. It soon became quite easy to pick out: Competition was keen, for the game was on.¹²³

“In fact, the rapid development of plastic surgery has been a remarkable vindication of the value of “team work,” the team consisting of surgeon, dentist, and artist.”¹²⁴ After the Armistice in November 1918, the Canadian, Australian and New Zealand sections returned home. Gillies and the British team remained on and continued with their surgical duties.¹²⁵

¹²³ Gillies, *The Principles and Art of Plastic Surgery*, 38.

¹²⁴ “Plastic Surgery of the Face”, 194.

¹²⁵ Meikle, *Reconstructing Faces*, 89. Gillies, *The Principles and Art of Plastic Surgery*, 43.

THE INFLUENCE OF PLASTIC SURGERY

Patient Treatment at Sidcup

The importance of the emotional and physical recovery of the wounded was addressed at Sidcup. One motive for the move from Aldershot to Sidcup was the need for ample convalescent spaces, which could not be met at Aldershot. The patients requested a place to recover, as many were not pleased with the thought of returning to their families and homes in a state of physical disfigurement. The grounds of Frogmal house at Sidcup presented ample space to house the patients as well as the medical staff.¹²⁶

The medical team at Sidcup realized the importance of psychology and plastic surgery; therefore, patient rehabilitation was addressed from both a biological and a psychological stance. As a result, special care was taken to rehabilitate the maimed men, while activities and classes were conducted to help the men learn trades and occupy their time. Rehabilitation classes and activities available to the maimed at Sidcup, included toy making classes,¹²⁷ garden work, agricultural work and carpentry.¹²⁸ An article published in *The Lancet*, a well-reputed medical journal, in 1917 makes this statement about Sidcup:

A farm of 100 acres is attached to the house, where the men, with a view to their future employment, will be instructed in outdoor occupations, such as gardening, market-gardening, dairy work, poultry keeping, forestry... In addition, workshops will be provided for practical instruction in estate carpentry and other handicrafts, and work in connection with electricity, agricultural machinery, and motor traction.¹²⁹

The fundamental aim of the work completed at Sidcup was to allow the patients to return to their families, jobs and normal society after they had undergone surgery and rehabilitation.

¹²⁶ “The Queen’s Hospital, Frogmal, Sidcup”, 688.

¹²⁷ Bamji, “Sir Harold Gillies”, 144-145.

¹²⁸ “The Queen’s Hospital, Frogmal, Sidcup”, 689.

¹²⁹ Ibid.

The process of rehabilitation was undoubtedly challenging, both physically and mentally, each individual underwent a unique process. The structured support at Sidcup, not only advanced the technical aspect of plastic surgery but also the humanistic side as well. An article published in 1917 in the *Lancet* supports the convalescent work that occurred at Sidcup, thus communicating to the broader medical community about the importance of the non-surgical treatment of patients:

No effort should be spared to give these men a fresh interest and a new start in life, lest many drift to the towns on their discharge from the Services, only to become mere objects of pity and recipients of charity, when with the right treatment surgically and proper after-care and attention to their future employment they might become good citizens. The Queen's hospital at Sidcup proposes, if the necessary cooperation is forthcoming, to be not only the scientific seat of this surgical work, but the organising [sic] centre for long courses of convalescent treatment, and an educating force for the future benefit of its charges.¹³⁰

Facial disfigurement not only affects the patient in a physical manner but also deeply on a psychological level. The human face can be seen as the seat of emotional expression, the point of focus during any social interaction and the most natural way to exhibit personality traits.¹³¹ When damaged, the face becomes an object of social pity or disgust, removing the dignity of the individual as well as many of their rights in society. Consequently, plastic surgery, particularly surgery of the face, must incorporate psychological healing as well as physical repair. The surgeon must be able to establish confidence in the patient, providing hope and boosting morale. The trust and commitment given by the patient to the surgeon is of infinite importance; the patient must be willing to undergo the arduous journey of difficult surgeries, rehabilitation and the long process of recovery all in the hopes of obtaining the desired

¹³⁰ "The Queen's Hospital, Frognaal, Sidcup", 689.

¹³¹ Converse, *Surgical Treatment of Facial Injuries*, 441.

outcome. Jerome Pierce Webster states, “The patient must share with the plastic surgeon the desire to attain the best possible result and must be willing to co-operate and to make various sacrifices in order to achieve that end.”¹³²

Plastic surgery repair affected the patients greatly. Owing to the psychological trauma associated with facial wounds, many patients would become depressed and entertain suicidal thoughts.¹³³ Gillies notes that the role of the surgeon is of infinite importance; surgical precision and skill could bolster the patient with a renewed appetite for life:

We noticed that if we made a poor repair for a wretched fellow the man’s character was inclined to change for the worse. He would be morose, break rules and give trouble generally. Conversely, if we made a good repair, the patient usually became a happy convalescent and soon regained his old character and habits. This seems to emphasize again the powerful influence that our physical appearance wields on our character.¹³⁴

The facially disfigured veterans of WWI represent a large population of individuals who would reenter society as maimed men. As the 20th century progressed, more facial disfigurements caused by automobile accidents were seen among civilian patients. Successful rehabilitation of these patients, both military and civilian, required three main components, as stated by surgeon and colleague of Varaztad Kazanjian, John Marquis Converse (1909-1981):

Highly skilled plastic surgery is an essential requirement; psycho-social rehabilitation is necessary to ensure that the individual resumes his place in society; the public must be made aware of its responsibilities in order to avoid exposing the disfigured to attitudes of intolerance when they attempt to follow usual pursuits in society.¹³⁵

The first two of the three postulates were met at Sidcup and thus resulted in men equipped with a skillset and a restored face to re-enter society.

¹³² Gillies, *The Principles and Art of Plastic Surgery*, x.

¹³³ Converse, *Surgical Treatment of Facial Injuries*, 441.

¹³⁴ Gillies, *The Principles and Art of Plastic Surgery*, 45.

¹³⁵ Kazanjian and Converse, *The Surgical Treatment of Facial Injuries*, viii.

Little information is available as to how the public was made aware of the condition of the disfigured so that they could be accepted with a welcoming embrace as patriotic heroes. In fact, some sources suggest that many patients were not received as fellow men but rather as grotesque distortions of the human race.¹³⁶ For example, certain benches on route to Sidcup were painted blue, in order to warn the passerby that a person of grim appearance, a convalescent, was sitting there.¹³⁷ The photographs and pictures taken at Sidcup were created for medical use and not publically distributed until Gillies published his book *Plastic Surgery of the Face*, in 1920. Although the book was intended for a medical audience one reviewer states in the *Lancet*, “Mr. Gillies’ book should go beyond the circle of his professional brethren and be distributed as a deterrent to the politicians of every country, for the things put before their eyes might well be a potent factor in promoting peace among the nations.”¹³⁸ The condition of the disfigured was dreadful but with the surgical aid of Gillies, and the convalescent treatment at Sidcup these soldiers were given a second chance.

¹³⁶ Callister, “Broken Gargoyles”, 125.

¹³⁷ Ibid.

¹³⁸ Pound, *Gillies: Surgeon Extraordinary*, 65.

PLASTIC SURGERY AFTER WWI

After the war in 1919 Gillies toured around the United States to share his expertise and knowledge of plastic surgery. Gillies himself believed that at Sidcup plastic surgery came into being as an important new specialty:

This trip brought home to me, and I may say to my United States colleagues, that at Queen's Hospital, Sidcup, we had witnessed the organization of a new surgery. The justification for such a bold assertion lies in the fact that plastic surgery had passed from the empirical to a stage based on sound principles.¹³⁹

Plastic surgery was readily adopted in the United States but seemed to have an uncertain future in Britain. The lack of enthusiasm for plastic surgery in Britain is evident in the fact that at the start of the Second World War only four trained plastic surgeons were established in Great Britain. Gillies notes that in Britain, "Plastic surgery became the hospital scrap-basket, but into it were eventually dropped cases that enabled us to inch our way up."¹⁴⁰ Many British surgeons believed that the plastic surgery was useful during the war but would not showcase great benefit in civilian practice. One such statement is as follows:

And this is well, for the general application of the same methods to the conditions met with in civil practice is of immediate importance, although the time may hardly be ripe for a department of plastic surgery at a general hospital. The defacements of heredity, disease, and accident are insignificant compared with the results of high explosives.¹⁴¹

Some surgeons returned to their pre-war practices and left plastic surgery behind. Gillies, unlike most, audaciously attempted to continue practicing plastic surgery. With the onset of the industrial age, more frequent use of automobiles, and congenital deformities Gillies was able to show that plastic surgery was a valuable tool to prevent amputation, and provide great

¹³⁹ Gillies, *The Principles and Art of Plastic Surgery*, 45.

¹⁴⁰ *Ibid.*, 46.

¹⁴¹ "Plastic Surgery of the Face", 194.

results to civilian cases.¹⁴² He once stated in a letter, “There is no doubt that one had a tremendous battle in the 1920s to establish in civil life the work that had been developed in the 1914-1918 war...All the general surgeons said I must not do nay cosmetic surgery and so another battle started.”¹⁴³

Specialized instruction in the field of plastic surgery was absent prior to WWI, general surgeons attempted to apply plastic surgery techniques with mixed results. Davis notes that in 1909, “the teaching of this subjects has been absolutely neglected everywhere, both for the medical students and for post graduates. There is as yet no department for instruction of this kind in any American University, and no complex text-book has hitherto been written on the subject.”¹⁴⁴ As a result, Gillies and others advocated for the value and legitimacy of plastic surgery as a fully recognized medical specialty. At the start of WWII, Britain had four excellent plastic surgeons: Harold Gillies, Archibald McIndoe, Rainsford Mowlem, and Pomfret Kilner.¹⁴⁵ These surgeons continue to advance plastic surgery and great innovations were made in relation to the treatment of burn wounds, particularly at the hands of Archibald McIndoe.¹⁴⁶

In contrast to the lack of acceptance of plastic surgery in Britain, the specialty rapidly became established in the United States. The American surgeons who viewed plastic surgery under the tutelage of Gillies and others at Sidcup, as well as Kazanjian, Blair, and Davis

¹⁴² For the story of how Gillies became recognized by the surgical community in the 1920s see: Gillies, *The Principles and Art of Plastic Surgery*, 44-47.

¹⁴³ Letter to Dr. Lyndon Peer, May 14, 1959. Cited in: Pound, *Gillies: Surgeon Extraordinary*, 68.

¹⁴⁴ Davis, *Plastic Surgery: Its Principles and Practice*, vii.

¹⁴⁵ Battle, “Plastic Surgery in the Two World Wars and the Years Between”, 845.

¹⁴⁶ For more information about the work of Archibald McIndoe in WWII see: Meikle, *Reconstructing Faces*, 107-192.

transported the sapling specialty from the trenches and planted it in fertile ground as a result the United States supplied 60 trained plastic surgeons¹⁴⁷ at the start of WWII compared to the four plastic surgeons produced by Britain. Reasons for the growth of the specialty in the United States include, the publications and results of Kazanjian, Blair and Davis. As well, the required training for surgeons in American universities held higher standards in regards to the years of postgraduate surgical training.¹⁴⁸ The American surgical community and the general public¹⁴⁹ accepted plastic surgery with more respect than did their British counterparts, and as a result professional organizations and societies were founded¹⁵⁰ including, the American Association of Oral and Plastic Surgeons (1921) and the American Society of Plastic and Reconstructive Surgeons (1931).¹⁵¹ While Sidcup greatly advanced and influenced the development of plastic surgery, it was largely the work of the Americans who visited Sidcup that allowed plastic surgery to become a fully recognized surgical specialty in the eyes of the international medical community.

Although Harold Gillies contributed significantly to the advancement of plastic surgery, Vilray Blair and John Staige Davis¹⁵², as mentioned in the introduction, were also large contributors to the specialty. While John Staige Davis was a highly influential American surgeon and proponent of plastic surgery, he commented in his book, *Plastic Surgery: Its*

¹⁴⁷ Fraser and Hultman, “America’s Fertile Frontier”, 610.

¹⁴⁸ Ibid., 612.

¹⁴⁹ For more information about the cosmetic history of plastic surgery in the United States and the acceptance by the general public see: Haiken, Elizabeth. *Venus Envy: A History of Cosmetic Surgery*. Baltimore: The Johns Hopkins University Press, 1997. Lubin, David M. *Flags and Faces: The Visual Culture of America's First World War*. Oakland: University of California Press, 2015.

¹⁵⁰ Fraser and Hultman, “America’s Fertile Frontier”, 612.

¹⁵¹ Ibid.

¹⁵² For more information about Davis and Blair see: Tolhurst, David. *Pioneers in Plastic Surgery*. Cham: Springer International Publishing Switzerland, 2015.

Principles and Practice, that he doubted that WWI had a significant influence in the development of plastic surgery:

Except for the progress made in the treatment of recent wounds of the face (especially those associated with the fractures and loss of substance of the jaws—which are seldom if ever referred to the plastic surgeon in civil practice) little or no advance has been made in plastic methods during the war.¹⁵³

Contrary to the Davis' belief, historical evidence suggests that the development of plastic surgery was contingent on the influence of WWI, which fueled the work completed at the Queen's Hospital in Sidcup. From Sidcup, principles and knowledge were transferred to the United States and throughout the allied nations¹⁵⁴. As the largest advancements in plastic surgery were seen in the United States post-WWI, it can be presumed that the influence of Sidcup transcended the war. Nevertheless, without the war such advances would not have occurred with the same frequency and rapidity.

¹⁵³ Davis, *Plastic Surgery: Its Principles and Practice*, viii.

¹⁵⁴ Davis may have felt that the technical contributions to plastic surgery during the war were solely limited to the face and that the advancements made by Gillies did not further plastic surgery as a whole, which is not limited to the face. Davis may not have been aware of the significance that Sidcup and Gillies played in the furthering of the specialty because facial cases were the predominant surgical undertaking during the war.

CONCLUSION

The development of reconstructive plastic surgery was highly influenced by WWI. The large scale of casualties from the trenches served as a catalyst for the establishment of specialized wards and hospitals to treat facial cases, for example the hospitals of Aldershot, Sidcup, and Val de Grace. International collaboration under the leadership of Harold Gillies at Sidcup resulted in the exchange of information and newly developed techniques. Not only did the plastic surgeons of WWI develop techniques to improve the treatment of facial wounds, such as the tubed pedicle flap and the epithelial inlay, but they transferred these techniques to civilian cases. After WWI, surgeons from the United States, Australia, New Zealand, Canada and Great Britain returned to their home countries and distributed the knowledge gained during the war. The experiences of WWI allowed Harold Gillies, for example, to pursue plastic surgery in a civil practice and aid a great deal of non-facial cases. Gillies' books *Plastic Surgery of the Face* and *The Principles and Art of Plastic Surgery*, showcase many such examples with photographs of non-maxillofacial cases. The development that plastic surgery experienced during WWI led to the increased international recognition and acceptance of the specialty. Without the casualties from the trenches of WWI, plastic surgery would not have advanced in the same degree. As a result, the groundbreaking achievements of plastic surgeons such as Sir Archibald McIndoe in WWII would not have had the same effect.

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APPENDIX

Tagliocozzi's Rhinoplasty method.



Cited on pg. 10 in: Gillies, Sir Harold and Millard, D. Ralph. *The Principles and Art of Plastic Surgery*. Boston: Little, Brown and Company, 1957.

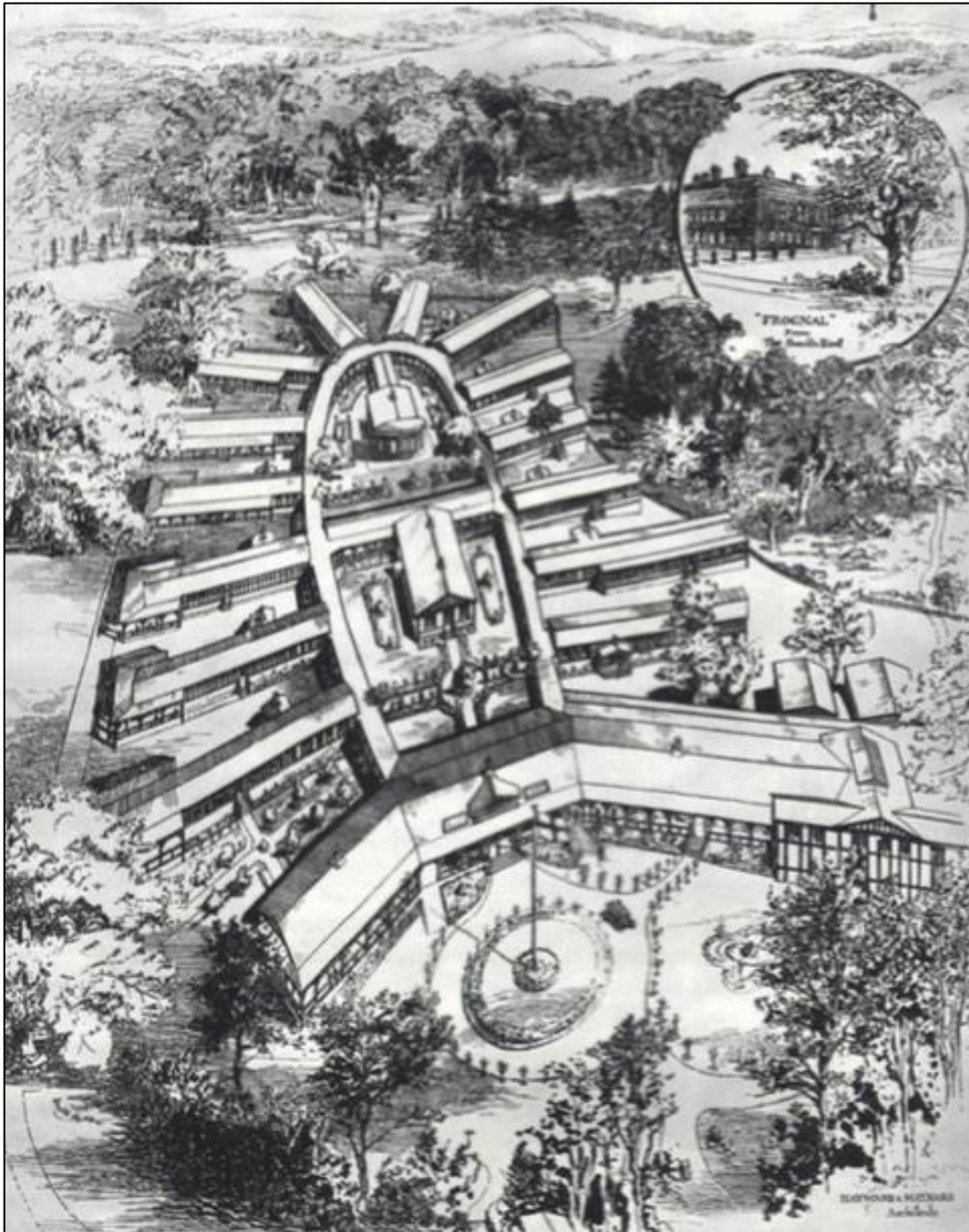
Harold Gillies



Cited facing page 41 in Pound, Reginald. *Gillies: Surgeon Extraordinary*. London: Michael Joseph Ltd., 1964.

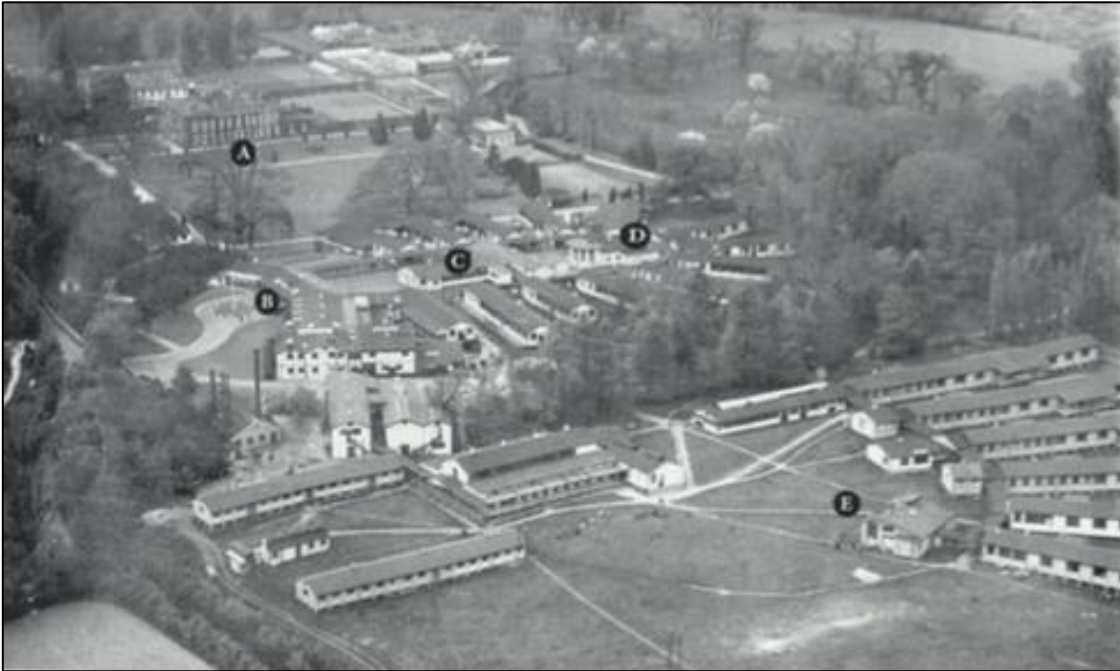
The Queen's Hospital, Sidcup

Architectural Drawing



Courtesy of the Gillies Archive, Queen Mary's Hospital, Sidcup. Cited on pg. 75 in: Meikle, Murray C. *Reconstructing Faces: The Art and Wartime Surgery of Gillies, Pickerill, McIndoe and Mowlem* Dunedin: Otago University Press, 2013.

Ariel View



As cited in Meikle: (A) Frognal House. (B) Main entrance and administrative block. (C) Dental workshops and surgeries. (D) Operating theatres. (E) New Zealand Section operating theatre.

Courtesy of the Gillies Archive, Queen Mary's Hospital, Sidcup. Cited on pg. 94 in: Meikle, Murray C. *Reconstructing Faces: The Art and Wartime Surgery of Gillies, Pickerill, McIndoe and Mowlem*. Dunedin: Otago University Press, 2013.

Operating Theatre at the Queen's Hospital, Sidcup



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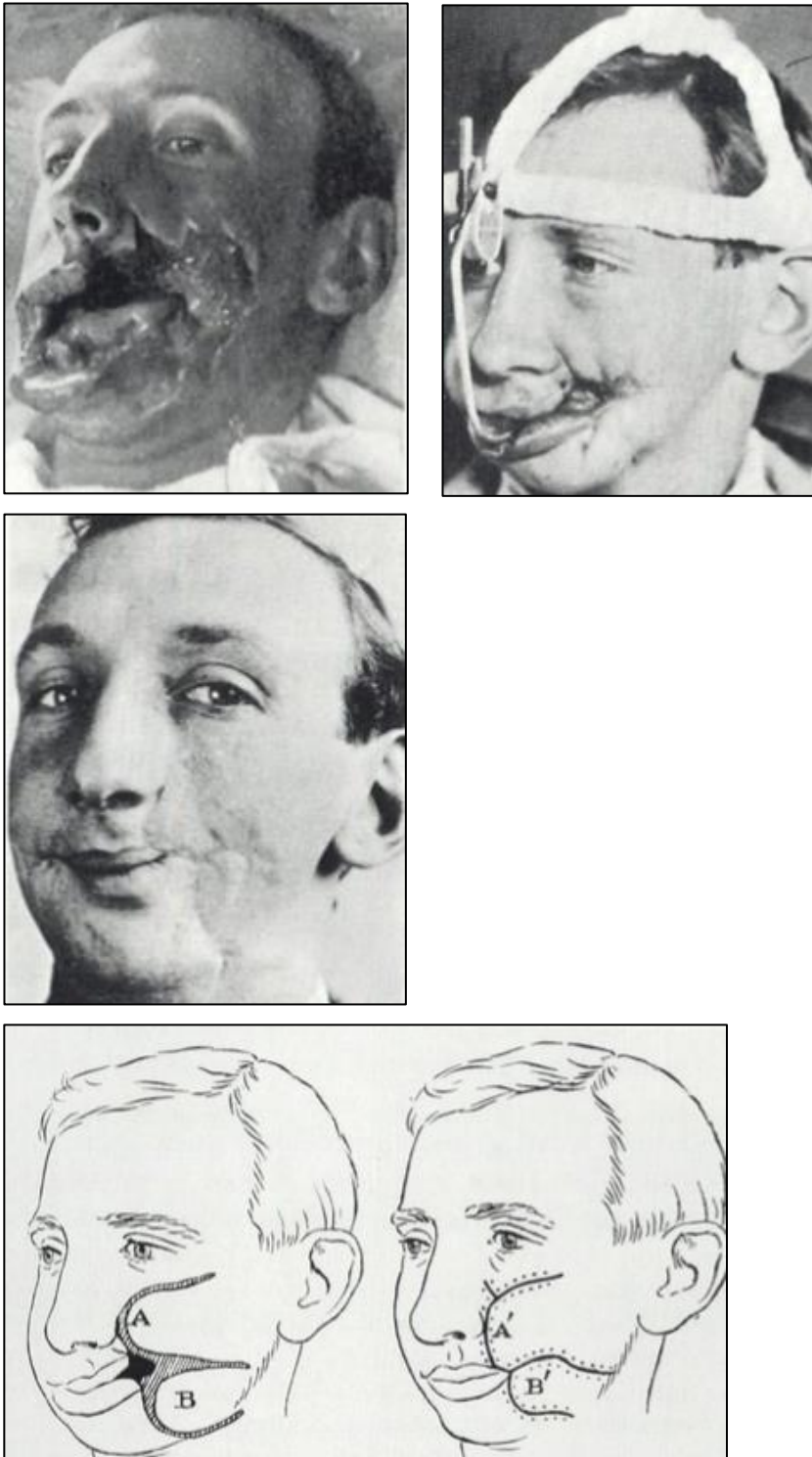
Surgical Work by Harold Gillies at Sidcup

The first tubed pedicle. A.B. Vicarage.



Cited on pg. 33, 34 in: Gillies, Sir Harold and Millard, D. Ralph. *The Principles and Art of Plastic Surgery*. Boston: Little, Brown and Company, 1957. Bottom row, middle picture cited on pg. 82 in Meikle, Murray C. *Reconstructing Faces: The Art and Wartime Surgery of Gillies, Pickerill, McIndoe and Mowlem*. Dunedin: Otago University Press, 2013.

The Problem of Tissue Loss. Private Walter Ashworth



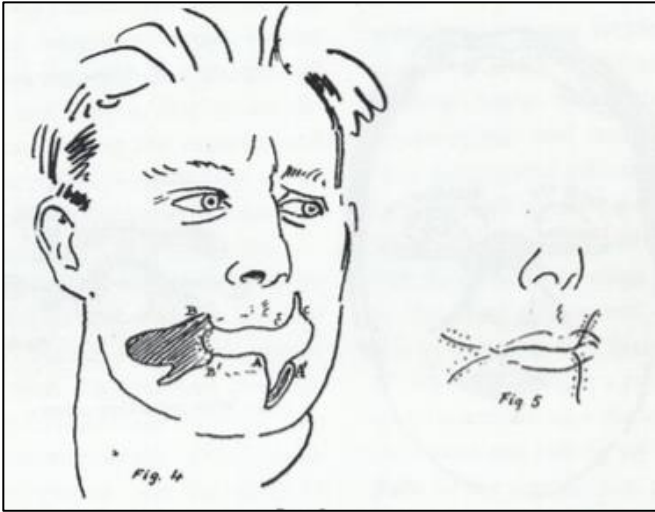
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The first branched pedicle. Lieutenant Wallace



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Private Charles Deeks



Courtesy of Gillies, 1917 St. Bartholomew's Hospital Journal. Cited on pg. 70 in Meikle, Murray C. *Reconstructing Faces: The Art and Wartime Surgery of Gillies, Pickerill, McIndoe and Mowlem*. Dunedin: Otago University Press, 2013.

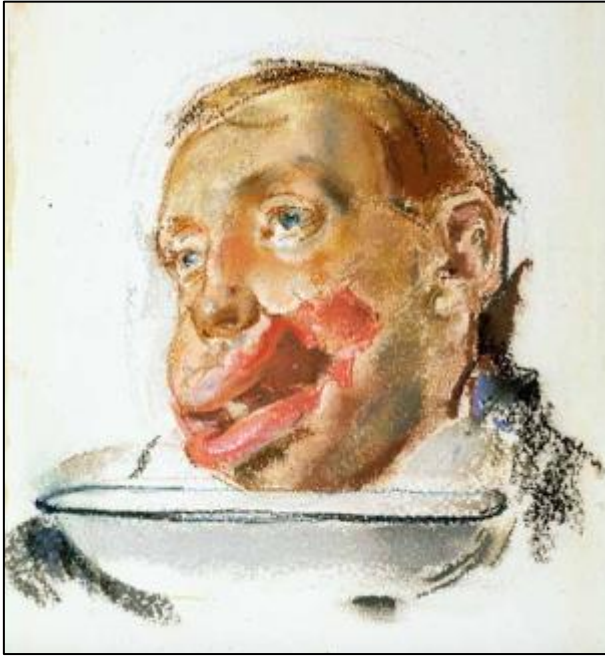
Henry Tonks' Pastels

Sketch of Gillies at work in Aldershot.



Courtesy of the Royal College of Surgeons Photography Unit. Cited facing pg. 57 in Pound, Reginald. *Gillies: Surgeon Extraordinary*. London: Michael Joseph Ltd., 1964.

Private Walter Ashworth



Courtesy of the Hunterian Museum at the Royal College of Surgeons of England. Cited on pg. 2 in Hussey, Kristin. "A Strange New Art: Plastic Surgery & The First World War, An exhibition from the Anthony Wallace Archive of BAPRAS." *British Association of Plastic, Reconstructive and Aesthetic Surgeons*. Pamphlet from website.

Private Charles Deeks



Courtesy of the Hunterian Museum at the Royal College of Surgeons of England. Cited on pg. 63 in Meikle, Murray C. *Reconstructing Faces: The Art and Wartime Surgery of Gillies, Pickerill, McIndoe and Mowlem*. Dunedin: Otago University Press, 2013.

The Principles of Plastic Surgery as Established by Harold Gillies

Cited in Gillies, *Principles and Art of Plastic Surgery*, 52-54.

1. **Observation is the basis of surgical diagnosis.**

There is no better training for a surgeon than to be taught observation by a physician.

2. **Diagnose before you treat.**

3. **Make a plan and a pattern for this plan.**

Use a paper, bandage or jaconet shaped to the defect and carry out a pretence [sic] operation in reverse. Do not rush in with a piece of skin hoping it will fit.

4. **Make a record.**

Start with a diagram on your notes... while you operate have special methods recorded by artists... Follow up the case with the camera, for that is where most of us slip up.

5. **The lifeboat. Have a backup plan.**

It is well to have a reserve plan... a lifeboat to get you home.

6. **A good style will get you through.**

Surgical style is the expression of personality and training exhibited by the movements of the fingers; its hallmark— dexterity and gentleness.

7. **Replace what is normal in normal position and retain it there.**

If some of the bones of the face have got out of place... it is incumbent on you to put them back in place and hold them there... If the soft tissue defect is too large for the primary closure without distortion, it is better to retain what is left in the normal position and so define the defect to be filled.

8. **Treat the primary defect first.**

Borrow from Peter to pay to Paul only when Peter can afford it. When Mahomet is a long way from the mountain, try to move the mountain to Mahomet.

9. **Losses must be replaced in kind.**

If it cannot be exact, do the next best thing; thus the eyebrow is grafted from the hairy scalp, thin skin from an eyelid and thick for the palm.

10. **Do something positive.**

When a lacerated lip is a jig-saw puzzle, look for the landmarks and if you can find two bits that definitely fit, put them together— at least you will have made your vital *first move*...

11. **Never throw anything away.**

In plastic surgery never throw anything away until you are sure you do not want it.

12. **Never let your routine methods become your master.**

Routine methods must be mastered, but never let them master you. The answer to the question, How do you do this or that? Should be, as in all surgery, 'Show me the case!'

13. **Consult other specialists.**

The reaction of one man's mind to another's is increased by the stimulus of sharing mutual problems...

14. **Speed in surgery consists of not doing the same thing twice.**

It's the old story of the hare racing back and forth at terrific speed while the tortoise, without retracing one step, slowly crosses the finish line.

15. **The after-care is as important as the planning.**

Or, for that matter, the surgery itself!... How futile it is to lose flap or graft for the lack of a little postoperative care.

16. **Never do today what can honourably be put off till tomorrow.**

... *When in doubt, don't!*... It is well to remember that *Time*, although the plastic surgeon's most trenchant critic, is also his greatest ally.