

## War and Medicine: The Origins of Plastic Surgery

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### Abstract

As the number of casualties accumulates in the war in Iraq, the United States medical personnel finds itself developing new and innovative techniques to treat the wounded. The current crisis serves as a poignant reminder of the struggles and advances made throughout the past century by modern medicine in a battlefield setting. Perhaps no other field of medicine has been so transformed by the challenges of war than plastic surgery. From humble beginnings in ancient India, plastic surgery came to blossom during the First World War amid the horrors of trench warfare. Through the heroic efforts of wartime surgeons such as Sir Harold Gillies, the specialty of plastic surgery gained worldwide prominence for its treatment of the devastating facial wounds suffered by so many in World War I. Since that time, plastic surgery has broadened its scope to include the numerous and diverse procedures that define it today.

### Introduction

In a recent update provided by the U.S. Department of Defense, it was reported that the number of American casualties (dead or wounded soldiers) from Operations Iraqi Freedom and Enduring Freedom (the campaign in Afghanistan) has now reached a staggering 11 716.<sup>1</sup> This figure now represents the greatest the number of wounded servicemen the United States medical personnel has had to manage since the Vietnam War.<sup>2</sup>

The war in Iraq, like all modern wars, has been an arena showcasing the tremendous strides the field of medicine has taken in the treatment of traumatic injury. A great deal of the success in the treatment of the wounded in Iraq can be attributed to the innovation of the Forward Surgical Team (FST) – a multidisciplinary unit of surgeons, nurses, anaesthetists, and medics equipped to move directly behind the troops and establish a functioning hospital with ventilators and operating tables within a mere 60 minutes.<sup>2</sup> The achievements of such units are striking: of the 11 716 war injuries mentioned above, 1214 have resulted in the death of the victim in action – a lethality

of 14%. When this quantity is compared to the 33% lethality of war wounds in the U.S. Civil War,<sup>2</sup> the truly remarkable evolution of the field hospital is even more clearly illustrated.

As a consequence of the heroic efforts of such military medical personnel throughout the 20th century, countless lives have undoubtedly been saved. However, just as medical science has rapidly progressed through the years, so too has the weaponry of warfare. In today's age of heat seeking missiles, rapid fire assault weapons, and antipersonnel mines, the capacity of human beings to kill one another is at an all time high. The end result of such an antithetical collision of the machinery of life-sustaining and life-destroying technology has been an increasing proportion of severely maimed yet living soldiers.<sup>2</sup> Thus, once an injured soldier has been stabilized by an FST, the road to full recuperation has really only just begun.

Prominent among the medical team caring for soldiers on an inpatient and outpatient basis is the plastic surgeon.<sup>3</sup> Whether it is through burn care, amputation revision, or reconstructive surgery, the plastic surgeon and the soldier have been intimately linked throughout history. In fact, it is widely believed that the modern specialty of plastic surgery was born from the disfiguring brutality of war, as it reached then unknown levels of carnage in the early part of the last century.<sup>4</sup>

### In the Beginning

The word plastic is derived from the Greek *plastikos*, meaning “to mold” or “to give form”, yet there is considerable evidence that the discipline traces its origins to a date much earlier than the formation of its linguistic root.<sup>5</sup> In fact, the first documented accounts of reconstructive surgery go back as far as 600 B.C. to ancient India. During this period, Indian surgeons had much opportunity to hone their skills of nose repair, as the Indian penal system decreed nose amputation the punishment for adultery.<sup>6</sup> Through the use of a pedicle cheek flap<sup>5</sup>, these Indian surgeons pioneered what was to become the modern rhinoplasty, which, with its later use of tissue from the forehead, was dubbed the “Indian technique”.<sup>7</sup>

### The Face of Battle

While many advances were made through the ages further perfecting and adding to the specialty, medical historians generally consider the modern specialty of plastic surgery to have emerged during the First World War. As sophisticated weaponry showered explosives onto millions of entrenched troops in Europe and the Middle East through the years 1914-1918, new and innovative reconstructive procedures were desperately needed. The nature of trench warfare, with its defensive focus, dictated that a given soldier's lower body and torso remain shielded by the earth around him, leaving only the head and neck vulnerable to enemy fire. The inevitable result of such a style of fighting led to a disproportionate number of facial injuries with the consequent disfigurements being impossible to hide. Aside from the potentially life-threatening implications of the horrifying skull wounds, jaw fractures, and facial burns suffered by the men of combat units, even once stabilized, many found that their troubles were only beginning. As they returned home, discharged soldiers with gross facial deformity found it impossible to acquire a job, find a wife, or simply walk down the street without receiving glances of disgust. It was clear to the pioneers of modern plastic surgery that something needed to be done.<sup>7</sup>

### Necessity's Mother

In Plato's Republic, Socrates, commenting on the creation of government, emphatically states that "necessity is the mother of invention".<sup>8</sup> Taking this concept one step further, it might be said that "war is the mother of necessity". This statement certainly holds true with regards to the origins of plastic surgery. As a consequence of the exceedingly high volume of maxillofacial injuries sustained during the First World War, the governments of Europe found themselves with an entirely new and potentially crippling social dilemma. If in fact these maimed soldiers were unable to find work, build families and become self-sufficient upon their reintegration into society, they would become "wards of the state", requiring economically unfeasible levels of government assistance.<sup>7</sup> In response, the British, French, and Germans set up unique and specialized hospitals to treat the severely injured and disfigured. Soon the United States got involved as well, sending a unit of physicians, surgeons, and dentists to France to develop unprecedented treatments for these never before seen injuries. When the U.S. officially joined the war in 1917, the Surgeon General established several new sections within the division of surgery, including ophthalmology, otolaryngology, and head and neck surgery, in order to better manage the vast new number of cases presenting.<sup>5</sup>

While the technological revolution taking place at the turn of the century provided the devastating weaponry which caused the medical crises of World War I, it also provided the inno-

ventions without which the field of plastic surgery could not have moved forward. Through the use of new anaesthetic techniques, the adoption of antiseptic surgical practices, and the utilization of the electric light bulb to illuminate the surgical field, the raw materials needed for the progression of plastic surgery were now ready to be exploited.<sup>5</sup> The First World War simply produced the cases and provided the backdrop for the collaborative and communicative efforts so vital to advancement in any medical specialty.

At this time, as groups of American, British, French, German, Russian, and Austro-Hungarian surgeons began to form associations for the purposes of cooperation and the dissemination of knowledge, the so-called "fathers of plastic surgery" rose to prominence. Foremost among the many important contributors to the specialty was Sir Harold Gillies.<sup>9</sup>

### Sir Harold Gillies

As war raged across the fields of Belgium and France in 1914 and 1915, the British Army began treating its wounded soldiers on the battlefield itself, followed by rehabilitation at a hospital as required. Working among the surgeons of the United Kingdom's medical personnel was a British trained otolaryngologist from New Zealand named Harold Delf Gillies. Stationed at an army hospital in Rouen, France, Gillies was inspired by the work of the French plastic surgeon Hippolyte Morestin.<sup>9</sup> Morestin was a strong advocate for the idea that wide skin and subcutaneous tissue undermining was beneficial to wound closure and could be achieved without skin necrosis. As well, Morestin originated the concept of utilizing many partial excisions for the treatment of a single large lesion.<sup>5</sup>

Bombarded with massive numbers of troops suffering from major skeletal injuries, nerve damage, and orthopedic problems, Gillies deemed it imperative to provide specialized and separate treatment for those soldiers with maxillofacial injuries. He thus succeeded in opening Cambridge Hospital in Aldershot, England to achieve that purpose and arranged for soldiers with facial injuries to be pinned with labels at battlefield hospitals directing their transit to his unique medical centre. There he operated among a multidisciplinary team and began the then unheard of practice of repairing jaw defects with bone and soft tissue from other regions of the body. In 1916, as the Battle of the Somme brought countless young men with faces shot off to Gillies' hospital, he also became proficient at the reconstruction of noses, mouths, eyelids, and ears using skin flaps.<sup>9</sup> The results were truly groundbreaking. No longer were crude facial masks the only option for individuals wishing to conceal broad facial injuries, giving many soldiers the confidence to return to society as productive citizens. Gillies soon began educating plastic surgeons from

around the globe, contributing greatly to the worldwide recognition of this emerging field. In 1921, he, as well as many other surgeons from different backgrounds, helped create the American Association of Plastic Surgeons (AAPS). For his enormous efforts both on and off the battlefield, Dr. Gillies was later knighted by the Queen of England.<sup>5</sup>

### A Specialty is Born

By the end of the First World War, plastic surgery had reached unimagined heights. The use of tube flaps was beginning to emerge and work was beginning on the delayed transfer of long pedicle flaps. Free cartilage grafts were being used in nasal reconstructions, and bipediced scalp and brow flaps were finding use in the reconstruction of the lip. As well, the use of neck flaps to rectify intraoral lesions was beginning in earnest.<sup>5</sup>

Soon the work of the reconstructive surgeons of World War I captured the attentive eye of both the general public and major academic institutions. As an organizational foundation took form and standardized treatments developed, plastic surgery was propelled into entirely new realms with new and exciting frontiers. World War II saw further growth and refinement of the specialty, with hand surgery in particular emerging as a distinct subspecialty within the field. War sowed the seeds of modern cosmetic surgery as well, as surgeons such as Max Thorek noted:

“If soldiers whose faces had been torn away by bursting shells on the battlefield could come back into an almost normal life with new faces created by the wizardry of the new science of plastic surgery, why couldn't women whose faces had been ravaged by nothing more explosive than the hand of the years find again the firm clear contours of youth.”<sup>9</sup>

Clearly, the devastation of war was the catalyst that propelled the field of plastic surgery on the path to its current global prominence. Sir Harold Gillies could scarcely have imagined that the facial reconstruction he aimed to perfect would one day translate into a multimillion dollar industry embracing procedures as diverse as nerve transfers and breast augmentation. Today, the world finds itself engulfed in yet another war, with the technology of the times once again producing unique injuries in mass quantities. And while history has proven to be cyclical in nature, replaying itself on the various stages of the earth, the science of medicine is expanding exponentially. The new directions that the field of plastic surgery may explore are indeed as limitless as the poppies still growing in Flanders fields.

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