

# Maxillofacial surgery: the impact of the Great War on both sides of the trenches

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**Abstract** “War is the father and King of all”, Heraclitus the obscure philosopher, declares. It certainly appears that the specialty of maxillofacial surgery was greatly advanced during WWI. This article focuses on the circumstances under which the specialty was developed, the significant events and the important figures that played a leading role in the advancement of a new fascinating surgical specialty. The literature leaves no doubt that trench warfare despite its devastating outcome for humanity has forged the shape of modern maxillofacial surgery.

**Keywords** Maxillofacial surgery · Plastic surgery · Sidcup Unit · World War I · Charité the Düsseldorf Hospital for the Facially Injured

## Introduction

“War is the father and King of all”, Heraclitus the obscure philosopher, declares. It certainly appears that the specialty of maxillofacial surgery was greatly advanced during WWI. This article focuses on the circumstances under which the specialty was developed, the significant events and the important figures that played a leading role in the advancement of a new fascinating surgical specialty. The literature leaves no doubt that trench warfare despite its devastating outcome for humanity has forged the shape of modern maxillofacial surgery.

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## English and French speaking countries

### *Onset of War, 1914*

At the outbreak of the War, the development of machine guns, explosive shells, and particularly trench warfare resulted in vast numbers of soldiers with mutilating injuries of the face and head due to the fact that this type of battle gave some protection of the trunk but the head was left unprotected. Surgeons on either side were not prepared to face this number and severity of injuries and their work became much more difficult by the overwhelming sepsis in a pre-antibiotic era [1].

### *1915, Harold Gillies volunteers for the Red Cross*

Despite the fact that before the War, plastic surgery as a specialty was not well developed, surgical techniques were applied to reconstruct mutilating facial injuries by General or ENT surgeons, and a pioneer in this process was definitely a surgeon, born in New Zealand, called Harold Gillies (1882–1960) (Fig. 1). In 1915, Gillies met the American-French dental surgeon, Charles Valadier, in the French village of Wimereux where the latter had established the first British plastic and jaw unit at the 83rd General hospital [2]. Gillies was fascinated by the French surgeon’s hard tissue approach, and subsequently, he went on to meet Hippolyte Morestin, a leader facial reconstructive surgeon at the Val de Grace hospital in Paris.

### *1916, Cambridge Military Hospital, Aldershot-Battle of Somme*

Gillies immediately recognized the skills and potential of the French surgeons in reconstructing the mutilated faces but also identified the need for progress in the specialty



**Fig. 1** Sir Harold Gillies by Negus, painted from a photograph in 1966

that would be dedicated to the care of these injuries. In January 1916, he received an authorization by the British Army Medical Services to establish a unit with 200 beds at Cambridge Military Hospital for the treatment of injuries to the face and jaws. Following the Battle of Somme (July 2016, Fig. 2), one of the bloodiest in the history of mankind, the unit received more than 2000 soldiers with facial injuries and tissue loss [3].



**Fig. 2** Battle of Somme 1916, image by Hulton-Deutsch Collection/Corbis

*1917, Queen's Hospital, Sidcup, Kent-Battles of Ypres, Flanders*

The facilities and resources at Aldershot were proved to be insufficient, and the unit was eventually transferred at Sidcup in Kent, in August 1917. This was at the time of the terrible battles around Ypres, in Flanders. Sidcup was a designated specialist centre for the treatment of facial injuries (Fig. 3) [4]. It was there that a multidisciplinary approach to the treatment of facial injuries was initially established including plastic and dental surgeons as well as technicians and specialist nurses. One of the senior dental surgeons was William Fry (1889–1963), a medically and dentally qualified Captain of the Royal Army Medical Corp awarded the Military Cross for bravery at the Battle of Festubert [5]. Fry and Gillies consisted one of the first Plastic-Maxillofacial duo and despite the fact that various skin flap techniques were already in use, it was Gillies who established the specialty of “Plastic Surgery of the face” initially by using rotational and transposition flaps but also bone grafts from the ribs and tibia to reconstruct facial defects caused in the battlefield [4]. His experience from the War provided the material for a classic book with 844 illustrations published in 1920 [6]. Fry received the Cartwright Prize by the Royal College of Surgeons for his essay on the treatment of jaw injuries.

*1918, American and New Zealand military surgeons at Sidcup*

During the last year of the War, American surgeons under Colonel Vilray Blair (1871–1955) arrived at Sidcup. They joined British, New Zealand, Canadian and Australian physicians in an attempt to treat more than 8000 injured men, and it was at that time that several advances in the treatment of facial injuries were accomplished. The first tracheal tubes were fabricated; endotracheal anaesthesia and nasal intubation were introduced with purpose to enable surgery in the mouth. Henry Pickerill (1879–1956), a major from New Zealand who was already an established reconstructive surgeon, published “Facial Surgery” in 1924. Based on his wartime experiences, he described the surgical reconstruction of the face, bone grafting from the tibia and pin fixation of the mandible, treatment of gunshot wounds and external fixation [7]. The collaborative work of medical and dental surgeons of diverse origin and training at Sidcup set the foundations of modern maxillofacial surgery by establishing the fundamental principles of treatment of facial injuries.

### German speaking countries

Military surgeons of the German speaking countries had a great tradition and legacy passed on to them by reconstructive

**Fig. 3** The plastic and maxillofacial theatre Queen Mary's Hospital, Sidcup Unit, Kent, 1917. Harold Gillies archives



surgeons of the nineteenth century. In that respect, they were better prepared than their British and American colleagues. Bernhard von Langenbeck (1810–1887), Friedrich Dieffenbach (1792–1847), Carl Thiersch (1822–1895) and Fedor Krause (1857–1937) were all pioneers in reconstructive surgery with special interest in facial surgery who had established plastic repair long before the Great War. Similarly to the British, American and New Zealand surgeons who developed facial surgery from various backgrounds, German facial surgeons also originated from diverse specialties.

*1914, Düsseldorf Hospital for the Facially Injured (Die Düsseldorfer Lazarette für Kieferverletzte)*

In 1914, August Lindemann founded together with Professor Bruhn the first dedicated facial surgery unit in the world in Dusseldorf [8]. Lindemann had already been acknowledged as the pioneer surgeon in the field before the War by many renowned physicians including Gillies. The unit in Dusseldorf was equipped with a state of the art X-ray facilities, medical record department, specialist trained nurses and speech and language therapists and could offer hard and soft tissue repair of facial injuries. German physicians were the first to establish a multidisciplinary approach to maxillofacial injuries involving teams of surgeons, dentists and dental technicians which later became a prototype for other nations to follow. There was no discrimination of nationality among the patients as the clinic was offering treatment to German, French and British soldiers. Gillies writes in his book “Principles and Art of Plastic Surgery” that they managed to resolve complications with jaw surgery after reading Lindemann’s reports of series of bone grafts fixed with wires [8].

*1916, Department of Facial Plastic Surgery at the Royal Ear and Nose Clinic of the Charité Hospital in Berlin*

In 1916, Professor Jacques Joseph (1865–1934) (Fig.4) was appointed as head of the newly founded Department of Facial Plastic Surgery at the Ear, Nose and Throat Clinic at the Charité by the Prussian Ministry of Education and Cultural Affairs. The centre established itself early in the War as a centre for reconstructive surgery. During the same year,



**Fig. 4** Portrait of Professor Jacques Joseph (1865–1934)



**Fig. 5** The plastic surgeon Johannes Fredericus Samuel Esser (1877–1946)

Professor Bruhn published a textbook with the experience of the Unit in Dusseldorf which contained Lindemann's notes on bandaging and splints in order to avoid postoperative deformity in patients with facial trauma [9].

#### *1917, Esser appointed as head physician in plastic surgery in Berlin*

Berlin was the most important centre for surgery from the early nineteenth century on with international reputation in the field and the analogous infrastructure [10]. Before the War, Johannes Esser (1877–1946) (Fig. 5), a double qualified surgeon from Netherlands, had already been working on “Biological flaps”, meaning flaps that could survive based on the perfusion originating from a vascular pedicle. His monograph “The Cheek Rotation and General Comments on Plastic Surgery of the Face” was published in 1918. Therefore, Esser is credited for establishing the importance of vascularization in facial reconstruction. His experience during the War gave him the opportunity to devise many flaps especially for facial reconstruction which are still used today (oral cavity epithelial inlay, Esser's cheek rotational flap). It is estimated that between 1915 and 1921, Esser operated on more than 10,000 injured soldiers [10]. His work during the Berlin period from 1917 to 1925 influenced experts around the world and convinced them of the potential of facial plastic surgery and its significance for the disfigured patient. After the War, Esser wrote: “I went to Austria to help to repair and undo a little part of the cruel mangling that millions of men have produced all over Europe”.

## Epilogue

The trenches warfare with its shocking and unexpected outcome for soldiers and surgeons provided the opportunity for a small number of charismatic surgeons to demonstrate their skills and creativity in an attempt to reverse the damage of the catastrophic battles of WWI. The development of plastic and maxillofacial surgery between 1917 and 1925 is documented in a collection of case files of unique value, the Gilles archives, which are found at Sidcup. Esser's Berlin years, from 1917 to 1925, saw his greatest contribution to the proliferation and establishment of facial plastic surgery. After the War, Blair and V. Kazanjian (1879–1974), who had been working as a dental surgeon in France during the WWI, established the specialty of plastic and maxillofacial surgery in the USA [11]. As the historian of Sidcup Hospital, A. Bamji observed [12] “The war led surgeons to attempt ground-breaking procedures, which paved the way for modern plastic and maxillofacial surgery”.

**Compliance with ethical standards** The author declares no conflict of interest.

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