

Johann Friedrich August von Esmarch – the Father of First Aid surgery

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Abstract:

Regarded as the Father of First Aid and surgical haemostasis for the war wounded soldiers, Johann Friedrich August von Esmarch was one of the greatest military surgeons ever born. His contributions range from devising his own illustrated bandage to application of tourniquet to prevent blood loss in trauma victims in the battlefield. He has also

invented an inhalation mask for chloroform anesthesia, splints and surgical instruments. He changed the way the war wounds were managed and made many serious war injured victims go home alive .

Key words: Tourniquet, Surgical haemostasis, Anaesthesia mask

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Introduction:

Johann Friedrich August von Esmarch is regarded as one of the greatest military surgeons from Germany and was the Director of surgery in the University of Kiel from 1857 to 1898. His contributions to military medicine were comprehensive, from initial management of wounds to surgical techniques, to the organizational structure of patient management and finally the documentation in a textbook for the students to learn in future.

Biography

“When I look back at my career as a surgeon, I can with truth say that many and many are the times I have deplored that so very few people know how to render the first aid to those who have suddenly met with some injury.....of the thousands who have flocked in their desire to help, so few have understood how to render aid “ quoted by Esmarch and his entire life was devoted for the cause of first aid to save precious human life¹.

Born on January 9, 1823, in Tönning, Germany to a surgeon Theophilus Christian Kaspar Esmarch, Johann Friedrich August Von Esmarch dissected frogs in school

and accompanied his dad for the hospital rounds. He studied medicine at the Universities of Kiel and Göttingen. In the latter he received his medical degree in 1846. After graduation, he was an assistant to Bernhard Langenbeck (1810-1887), one of the greatest surgeons of his time who created the German Society for Surgery and the journal *Archiv für klinische Chirurgie* . In 1848, Esmarch obtained a doctorate from the University of Kiel. Immediately following his graduation from medical school, war broke out between Denmark and Germany and Esmarch was called up and thus began his journey as a military surgeon. He was captured and held captive for 9 months in a prison ship by Denmark when Esmarch was trying to control a severe brachial artery injury of a fellow German soldier in the battle of Bau, until he was exchanged with a Danish doctor. During the truce of 1849 he obtained the title of *Privatdozent* at the University of Kiel but had to return to the front with the outbreak of war where he was promoted to Brigadier and Consultant surgeon in the army medical corps. He was with German orthopaedic surgeon Georg Friedrich Louis Stromeyer (1804-1876), who replaced Langenbeck when he was called to Berlin. The two got along well professionally and personally and he married one of his daughters in 1854, who died of chronic illness in 1870. When Stromeyer left, Esmarch succeeded him as head of the Kiel Surgical Clinic. He remained in this position as Professor from 1857 until he retired in 1899. In 1871 he was appointed Surgeon General of the German Army during the Franco – Prussian War . In 1872 he married

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Princess Henriett von Schleswig-Holstein-Sonderburg-Augustenburg, granddaughter of Emperor Wilhelm II. He therefore became the uncle of the Emperor of Germany and King of Prussia, Wilhelm II. In 1877 he won the prize offered by Empress Augusta on the Vienna Exhibition with the work *Handbuch der Technik kriegschirurgischen*. On 5th May 1882, he founded the German First Aid Volunteer Association. In 1887, he received a patent of nobility and on his retirement, the emperor conferred him the title of “His Excellency”. He was made Honorary citizen to the city of Kiel in 1903. Among his extracurricular activities, he was a great sportsman, mountaineer and hunter. He died on 23rd February 1908 in Kiel due to pneumonia following influenza².

Role as a Teacher

In a career spanning 40 years of surgical experience, Esmarch performed over 20,000 major operations and taught his students to be practical and effective on-ground surgeons rather than helpless theorists. As a military surgeon, he was against the highly aggressive management of war wounds and always insisted on conservative management with wound debridement and localised limited resection of the damaged or injured part. He was a pioneer in teaching the layman, the value of first aid with compression to any bleed due to gunshot injury and prevent mortality from exsanguination before the arrival of the doctor and medical aid. He used to teach his students with demonstration rather than didactic lectures and described various points in the body where finger pressure will control a named arterial bleed during a war. In his published pamphlet entitled “First Dressings on the Battlefield” in the year 1869, he quoted - “ Though I have invited you here to teach you how to render first aid to the injured, I do not in the least aim at rendering a doctor’s service unnecessary ; On the contrary, I hope to convince you how important the immediate help of a doctor is, in most cases. What I want to do is enable you to give the right kind of aid before the doctor arrives – without which , irreparable damage might be done, and perhaps even a valuable life be lost³.

He was a pioneer in establishing the Samaritan movement for teaching first aid to civilians from all walks of life by giving simple medical lectures on emergency situations to the civilian population of Kiel.

According to Esmarch: “The primary objective of first aid is to protect the fresh wound from any insanitary factors that can be encountered during the patient’s transportation to the hospital. The soldier’s wound should be protected from dust, bugs, sun or such things by covering the wound in an appropriate way. Every little move during the transportation may cause the wound to deteriorate; therefore, the wounded part should be fixed appropriately.³

As a Professor of Surgery, Esmarch was harsh towards his students and his primary concern was for the welfare of the common soldier . He never granted higher than B grade to his students in his academic career and therefore, he was denied lecture time more than 1 hour a semester and later denied any lecture class at all⁴.

Contribution

“Like many eminent doctors, von Esmarch was a very mediocre pupil who would never have been allowed to study medicine by the standards of today, just like Billroth and Sauerbruch after him”..... Professor Christian Andree

Regarded as the “Ambroise Pare of Germany”, Esmarch’s primary and lifelong concern was to provide first aid to the wounded in the battle field. He not only taught surgical homeostasis with his tourniquet and bandage, but also taught the soldiers the triage system , use of rifles, bayonets or spears as splints where no medical aid was available and taught them the method and procedure of transportation of the wounded to the field hospital. A pioneer of disaster triage, Esmarch insisted strictly on treating the dangerously wounded soldiers first , regardless of the rank and those with less acute injuries second. His foresightedness and experience saved many a life in the battlefield. His aim was for the soldiers to treat themselves, so Esmarch designed a triangular bandage printed with instructions for its use, part of a prototypical first aid kit . Designated as “von Esmarch triangular cloth bandage” it was used to prevent bleeding during the amputation of limbs. It was 140 cm long and 5 cm wide and could be applied in 32 different ways. It was originally made of rubber from India. He was against the use of Esmarch bandage if there was a localized infection or malignancy. He remarked “ such parts as contain pus , sanious matter or soft tumour tissue, must not be bandaged because thereby infectious matter might be pressed into the cellular tissue and lymph channels”.

In 1873, Esmarch described use of a rubber bandage to exsanguinate the limb and application of a tourniquet made from rubber tubing and he described for the first time the “bloodless technique of surgery”⁵. ‘Esmarch haemostasis’ with rubber tourniquet was published as a text book, “The Art of Bloodless Operation” in 1873. Esmarch had such a clinical acumen that he advised every male citizen to wear specially designed suspenders which could be quickly removed in an emergency and used as a tourniquet in the battle field. Esmarch’s constrictor ring with elastic tubing was also used as a method of haemostasis during surgery of cervical amputation of prolapse uterus in 1877⁶. His monograph on elephantiasis was also well accepted. His bloodless technique was also used for the operation of the extremities and penile surgery.

Esmarch did a complete mortality review of the bullet injury wound of the US President James Garfield after an assassination attempt in 1881 and concluded that he did not die due to bullet injury shattering the T 12 vertebrae, and it only required conservative management. Garfield died due to sepsis caused by the numerous wound probing by the fingers, catheter and instrumentation which resulted in abscess formation and splenic artery rupture, bleed and death after 80 days of the incidence. “Yes, I shot the president, but his physicians killed him.” said Charles Guiteau, Garfield’s assassin⁷.

Esmarch also urged the use of ice packs to reduce inflammation in wounds, leading colleagues to give him the nickname “Fritz the Ice Pack”.

Esmarch is credited with the invention of jaw thrust named as ‘Esmarch – Heiberg manoeuvre’. Meier-Ewert used Esmarch–Heiberg manipulation, which opens the airway of a general anesthetized patient, and developed the Esmarch splint appliance for treatment of obstructive sleep apnoea syndrome in 1984.⁸

In 1877, Esmarch introduced “Esmarch inhaler anaesthesia mask” for open Chloroform anaesthesia where cloth was stretched over a wire frame and Chloroform used to be dipped till the patient became anaesthetized. Esmarch advocated the use of chloroform for all types of surgery in his pocket textbook on military surgery. He believed that patients should be fasted for four hours, premedicated with morphine and anaesthetized supine, as opposed to sitting and he

recommended constant monitoring of pulse and respiration.⁹

Esmarch invented a unique device for performing douching and rectal lavage procedures about 150 years ago. The invention bears the name – “Esmarch’s irrigator” and is used for giving rectal enema.

Esmarch is also credited for devising numerous traction splints made of plaster of Paris for ankle joint stability and Esmarch scissors is still used for cutting bandages and plasters. He is also recognised for performing the first autologous blood transfusion in a case of exarticulation of the thigh at the hip joint, collected the blood that has been shed in a washbowl, defibrinated it and reinjected in the severed femoral vein.¹⁰

In orthopaedics, Esmarch in 1873 advised removal of free sequestra as a treatment of Chronic osteomyelitis. He described the Esmarch rubber tourniquet to avoid the massive haemorrhage which could occur otherwise when operating on cases of bilateral chronic osteomyelitis. Amputation of the hip joint for a malignant tumour of femur bloodlessly for the first time was published as ‘Amputation of the hip joint by Esmarch method’ by Dr Gibb in 1874 where only two ounces of blood was lost. [5]. Esmarch discovered the St John’s Ambulance association in 1881. Esmarch was the first to describe intracranial epidermoid tumours and devised a technique of bloodless surgery for penis. He was also the first to establish a connection between syphilis and general paralysis of the insane. Esmarch in 1889 believed that cancer was predisposed by syphilis.

Esmarch recognized the well-known phenomena of secondary hyperaemia that follows removal of the constricting band, and documented the phenomenon of reperfusion injury probably for the first time. He quoted “When the constriction bandage is removed at the end of the operation, the limb, which until then presented a deadly pallor, turns as red as a boiled lobster, and a very considerable haemorrhage occurs in the wound, because the walls of the blood vessels were in a state of paresis and had become flaccid from the continued pressure upon the vasomotor nerves; hence, they allow more blood to pass through them than in their normal condition. The consequence is that the blood gushes forth from the operating wound as from a sponge. The haemorrhage is of course, most violent if the constrictor is removed slowly, because the blood immediately enters

the arteries . . . but since it cannot return immediately through the veins, which are still compressed by the last turns of the bandage, venous congestion is likely to occur. Hence, it is necessary to remove the constrictor not slowly, but quickly”

Esmarch coined the term “Erste Hilfe “ in Germany which means First Aid.

The contribution of Esmarch towards the medical science continues even today after so many years of his death. Esmarch exsanguination technique is still being used to decrease blood loss during the treatment of extremity burns¹¹ and distal femoropopliteal bypass surgery for limb ischaemia.¹²

Vermilionectomy , an established procedure for the management of precancerous lesions of the lip and is often performed simultaneously with a lower lip resection for the treatment of a malignancy was introduced initially with illustration by von Esmarch. In 1855, Von Esmarch published an illustration of the von Langenbeck’s technique including a transposition flap of the chin.¹³

Esmarch had a typical display of his elegance in a theatrical grand pose, and he had a passion for new surgical instruments. From every surgical congress, he would return with new gadgets, itching to try them out and employing many of them in his operations.[14]

His never ending passion to save the wounded soldiers made him quote “How many there are every year who die a miserable death, and who might have been saved by prompt aid, had anyone been near who knew how to give it.”

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Legends to the Illustration

Figure 1- Johannes Friedrich August von Esmarch (1823–1908)