HISTORY OF ANTISEPTIC SURGERY
Journey to clean surgery

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Key Contents

Definition of antiseptic surgery
Origins of antiseptic surgery
Germ-theory
Listerian revolution

Learning Objectives

To understand the meaning of antiseptic surgery
To explain timeline of development of antiseptic surgery
To describe role of different people in evolution of antiseptic surgery

Key words: Antiseptic surgery, Joseph Lister, Semmelweiss, Carbolic Acid.

Surgery has evolved over centuries, but only few have changed the surgical practice drastically. In ancient times pus was considered sign of healing and blood stained clothes and hands of surgeons were sign of pride for them. In late nineteenth century the concept of clean surgery began to evolve and within a century there was a paradigm shift from pus to asepsis which changed how surgery is performed for ever.

**Antiseptics** (from Greek: anti, "against" septikos, "putrefactive"[2]) are antimicrobial substances that are applied to living tissue/skin to reduce the possibility of infection, sepsis, or putrefaction.

**Origin of antisepsis**

Ignaz Semmelweiss was a Hungarian doctor who worked in the maternity clinic at the Vienna General Hospital. The hospital had two delivery rooms, one staffed by female midwives and the other by medical students. Over 12% of the women whose babies were delivered by the doctors died of childbed fever, more than three times as many as those delivered by midwives. Semmelweiss realised that his medical students often went straight from dissecting a dead body to delivering a baby without washing their hands first. He wondered if they were carrying the cause of the disease on their hands from the corpses to their patients.

Then another doctor cut himself while dissecting a body, and died of an infection with symptoms identical to those of childbed fever. Now Semmelweiss was convinced that the deadly fever was caused by an infectious agent. He insisted that the medical students wash their hands in chlorinated lime before they went onto the maternity ward. Eventually he insisted that they wash their hands between each patient as well. Within 6 months the death rate for Semmelweiss’s patients had dropped to a quarter of the original figure. In 2 years it had dropped to just over 1%.

Semmelweiss could not get other doctors to accept his findings, in spite of all the evidence he collected. Many doctors thought that pain and suffering during and after childbirth was God’s punishment to women. It was also hard for many doctors to admit that they themselves might have killed their patients instead of curing them.

Hand washing was much more difficult in the 19th century that it is today. There was no running water in the buildings. All the water was cold and the chemicals used to wash in, such as chlorinated lime, eventually damaged the skin on the hands.

Without understanding the cause of infectious diseases Semmelweiss had discovered a key factor in preventing the spread of pathogens which is just as
important now in the 21st century as it was in the 19th century.

Germ theory
The work of people like Jenner and Semmelweiss led doctors and scientists to think that perhaps infectious diseases were caused by an infectious agent or 'germ'. This was the germ theory of disease. It took a very long time for this idea to be accepted. Much of the work that led to a wide acceptance of the germ theory is down to Louis Pasteur, helped by the development of microscope techniques by people such as Robert Koch which made microorganisms visible and identifiable. Pasteur made a number of important steps forward.

Many people at the time believed that living things could arise from non-living things by the action of God – a theory known as spontaneous generation. Pasteur was convinced that any growths that appeared, such as mould on food as it goes bad, were from microscopic organisms already present in the air.

Three of Pasteur's daughters died of infectious diseases. He did a lot of work on these diseases, confirming that they were caused by germs (microorganisms) and developed vaccines against a number of these diseases. His work influenced Joseph Lister, who wrote and thanked him for his help.

Listerian revolution
Joseph Lister was a Scottish surgeon who picked up the work of Louis Pasteur and used it to change the success rates of surgery. In 1865 Lister read about Pasteur’s work on how wine went bad because of microorganisms in the air.

Lister was convinced that microorganisms in the air were also the cause of the infections which killed up to half of his patients after they had successfully survived surgery. The open wounds made it easy for the germs to get into the body.

Lister had heard that carbolic acid had been used to get rid of a cattle parasit in fields, and to treat sewage. He decided to see if it could also stop wounds becoming infected. He started to clean the wounds of his patients with carbolic acid, and soak the dressings in antiseptic liquid as well. In the years from 1864-66 the death rate for Lister’s surgical patients was 45.7%. Between 1867-70, when he introduced his new antiseptic treatment, this fell to 15%.

Lister went on to develop an antiseptic spray which was used in operating theatres during surgery to keep the wound clean. This spray was not used for long though, because carbolic acid actually damages the tissues and breathing it in causes many problems. More successful was the special dressings he developed which contained carbolic acid to keep the wound clean but a barrier to keep it away from the flesh so it didn't cause any damage.
Lister's work revolutionised surgery once his aseptic techniques were accepted. Although the antiseptics and disinfectants used have changed, aseptic surgery is still the basis of saving millions of lives.

When most women had their babies at home, looked after by women in the family or a local midwife, serious infections after the birth were quite rare. But in the late 18th and 19th century doctors began to deliver babies more often, hospitals set up maternity wards and the problems began. Soon after giving birth many women developed a range of symptoms including severe pain, high fever, inflammation of the womb, vomiting and convulsions. Death usually followed within 5 days. This dreadful illness, known as childbed or puerperal fever, killed many women who had a baby in hospital.

Nobody really understood why this was happening. Until Lister introduced the use of 'antiseptic' surgery (in 1867) surgeons were largely unaware that the high death rate during operations was caused by the spreading of infection from the surgeons, attendants, and environment to the patient on the table. Lister found that spraying the immediate area of the operation with carbolic acid reduced the death rate. It was unpleasant for the surgeon to operate under a fine mist of carbolic, but it changed the face of surgery. For the first time surgeons could successfully undertake operations in the body cavities.

With the damaging chemical effects of carbolic acid on tissues, Lister's antiseptic technique was eventually supplanted by aseptic surgery, which has included the use of sterile gloves, introduced serendipitously by William Stewart Halsted because of the marked dermatitis his surgical nurse Miss Hampton (later his wife) developed from the carbolic acid solution used to clean the instruments.

Ernst von Bergmann is credited with introducing steam sterilization under pressure for treating instruments and all other medical equipment used for a surgical patient. Ernst von Bergmann (16 December 1836 – 25 March 1907) was a Baltic German surgeon. He is a pioneer of aseptic surgery.

By 1879 the surgeons of Great Britain and Europe were widely employing the antiseptic method and that year Lister received an overwhelming ovation at the International Medical Congress in Amsterdam. As late as 1882 at the annual meeting of the American Surgical Association, America's most prestigious
References

1. ἀντί, Henry George Liddell, Robert Scott, A Greek-English Lexicon, on Perseus.

