

THE SURGICAL GLOVE & ASEPTIC TECHNIQUE: A Brief History

G. STEPHENS – 2025

Have you ever wondered who the first nurse to wear the surgical glove was? Well, read on and you will know this remarkable piece of ‘tidbit’ information.

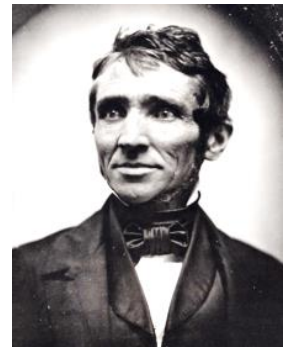
A ‘time-line’ for the surgical glove story starts at about 1500 BC when archeologists discovered balls of rubber in a section of Mexico known as the ‘OLMEC civilization, and the inhabitants were known as ‘The Rubber People’.

1770 - The Englishman Joseph Priestly observed that rubber was particularly good at rubbing off pencil marks from paper, hence the name “rubber.”

1776 - Charles Marie de La Condamine, a Frenchman, is credited with the introduction of rubber samples to Europe.

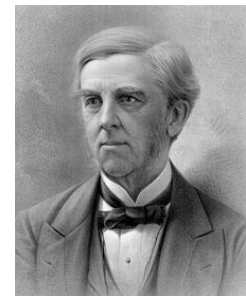
1839 - Charles Goodyear (December 29, 1800 – July 1, 1860) was a self-taught chemist and manufacturing engineer. An American, he discovered the method of vulcanization of rubber which was the first rubber processing procedure. He received patent number 3633 from the United States Patent Office on June 15, 1844.

He treated crude rubber with sulphur and subjected it to heat. This process made the rubber less plastic and increased its strength and durability. In the 19th century rubber was widely available and was being used for a number of commercial and industrial uses.

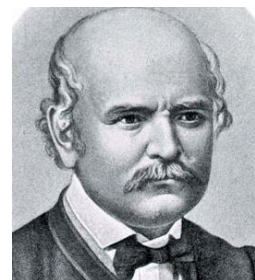


During this same time period the conception of preventing infection of patients was beginning to be a serious concern within the medical profession, thus a few advances will be discussed here and will be connected to the use of the sterile gloves used in surgery.

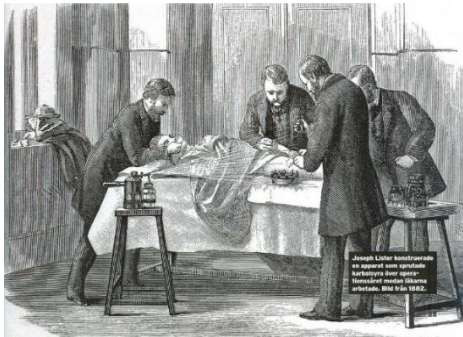
1843 - Prevention of Puerperal Fever: reported by Oliver Wendell Holmes, of Boston, this could be prevented if doctors practiced personal cleanliness. Most of the surgeons at this time, did not wash their hands between procedures or carry out even the most basic of hygienic practices. (O. W. Holmes, 1809-1894, was a physician, professor, inventor & poet and a Harvard graduate)



1847 – Dr. Ignaz Semmelweis (1818-1865), of Vienna, insisted the medical students and professional doctors wash their hands in an antiseptic disinfectant (chlorine) solution before examining patients, and the maternal death rate radically declined. Unfortunately most physicians mocked him as being a ‘quack’ because all he did was wash his hands and he ended his life in a mental institution and his theory died with him. Thus many more women died of Puerperal Fever.



1867 - Antiseptic Techniques: Joseph Lister proposed that 5% carbolic acid solution (or phenol) be sprayed on instruments and wounds, and that surgeons wash their hands before and after operations with this solution. He published a paper: “Antiseptic Principles of the Practice of Surgery”.

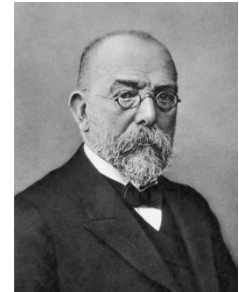


The introduction of the use of carbolic acid would also be indirectly responsible for the development of surgical gloves through a sequence of *chance events, which occurred at Bellevue Hospital, Boston.* (Reference this phrase later in the story)

Joseph Lister spraying a patient with carbolic acid during a surgical procedure.

1876 - Lister was so convinced about the importance of preventing infection that he traveled to the United States and demonstrated his ideas. He impressed many physicians who attended his lectures including Dr. William Halsted, of Boston.

1882 - Microorganisms caused disease, effectively proven by a German bacteriologist Robert Koch (1842-1910). He discovered the TB bacillus, cholera bacillus in water and positive results for leprosy, bubonic plague and malaria. Known as the ‘Father of Microbiology’. Koch later won the Nobel Prize in 1905.

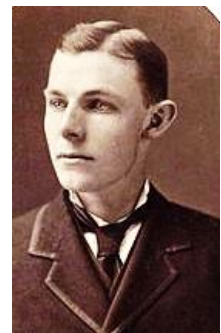


1883 - Gustav Adolf Neuber, a German surgeon who embraced Lister's



technique, sterilized instruments and the operative field and was the first to require sterile gowns and caps. In 1884 he first proposed the use of separate operating rooms for septic and non-septic surgery, stressing the need for complete cleanliness in all aspects of surgery. Neuber was an innovator in developing many new surgical procedures.

1884 - Halsted returned to New York City after studying in Germany and refused to perform surgery in the old theater at Bellevue. Instead, he built a tent on the grounds of Bellevue that featured a gas stove to boil instruments. Halsted was sold on Listerian techniques, which were still somewhat controversial.



A LOCAL STORY



Dr. P REID

Picture of the carbolic spray is from the Medical History Society NS Archives, Abby Lane. This particular one belonged to Dr. John Stewart of the VG and was a gift from Dr. Joseph Lister, a personal friend.

The first time the Carbolic Spray was used in Canada was in October, 1869 by Dr. A. P. Reid in the Victoria General hospital, Halifax, NS.

1893 - Dr. Bloodgood of Bellevue hospital began wearing gloves during hernia operations and soon became aware that patient's infection dropped about 50%. This amazed him so he published his findings - he was not surprised when he received ridicule, was laughed at and ignored. This was attributed to 'change – resistance' and the macho days of blood-encrusted coats: surgeons were supposed to embrace gore. Also a negative rational being gloves obliterated tactile sensation to the feel of different tissues, organs and diseased tissues. During his practice he was noted for many innovative practices especially in the treatment of cancer.



1894 - Dr. Lister became the first person to sterilize the rubber gloves used in surgery.

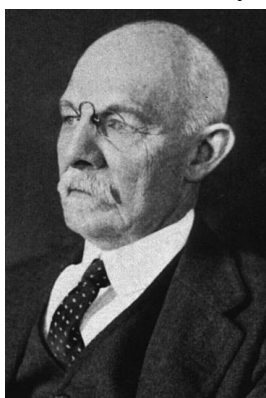
1897 - Jan Mikulicz-Radecki, (1850-1905) a Polish Austrian surgeon, was the first to use a surgical mask and also was a pioneer of using gloves during surgery. He was the first to perform: Pyloroplasty and a partial Esophagostomy and he invented the gastroscope. He was noted as one of the 'Fathers of Modern Medicine'.



We're finally at the point where it was mentioned that '*it was a chance event*' for nurses to use gloves in surgery.

William Halsted and Caroline Hampton

William Stewart Halsted (1852-1922) was one of the "Big Four" founding professors of the John Hopkins Hospital. He developed and introduced several important surgical procedures, including radical mastectomy for breast cancer (no longer performed) as well as the establishment of the first training program and residency system for young surgeons. His many innovations made John Hopkins Hospital the legend that it still maintains today. One such improvement was establishing an educational program that not only contained lectures but demonstrations in clinical settings and amazingly, he included these teachings to nurses. One such nurse was Caroline Hampton. In his surgeries he insisted on everyone using strict aseptic technique and this included wash their hands with soap and then dip them into a caustic solution of potassium permanganate, followed by a hot oxalic acid bath, followed by washing their hands again with a mercury-chloride compound. Oh what torture, as one can imagine what this did to one's skin!



William Halsted, pictured in 1922

ANOTHER LOCAL STORY - VGH in 1940's & 50's:

It seems everyone is determined to submit surgical folk to utmost torture because during this time period (1940's – '50's) and perhaps longer, the writer experienced a bit of this torture. After scrubbing the hands and arms above the elbow with a bristle brush and green soap for

10 minutes, by the large clock over the sink, and now with the skin almost raw, one had to dip arms up to elbows into a vat of pure alcohol for three minutes. Wish I could demonstrate all the ‘soft-toe’ dancing that occurred because the sting could levitate one to the ceiling. Then to proceed to the surgical room to receive a stiff hand towel that was supposed to dry your hands before gowning and forcing one’s hands into rubber gloves...they were sterilized with talcum powder inside, so when steam sterilized they would not stick together. The powder would go into lumps as the surgery progressed and your hands were sweating from fear that you would do something to make the surgeon ‘yell at you’ in not very ladylike language. You wanted to rip these gloves off, they were so uncomfortable and when finally removed after hours of suffering, your hands were so shriveled up they looked like 90 year old hands, never to be the same one thought the first time worn!



Caroline Hampton – A STORY OF LOVE & GLOVES

Caroline Hampton was a member of a prominent American southern family and the niece of Confederate General Wade Hampton III. She was an orphan at two as her mother died of TB and her father killed in the Civil War, so she was brought up by two aunts. She wanted an education so she could be independent and so entered nurse training at the New York hospital. Caroline apparently had great dexterity and a ‘cool, calm demeanor’, which made her a natural for her career in surgery as an operating room nurse. Soon after arriving at Bellevue hospital she was made Operating Room supervisor and Halsted’s scrub nurse.



She would have to handle the above mentioned chemicals regularly, and as a consequence, she developed severe contact dermatitis of her hands. As Hampton was considered by Halsted to be ‘*an unusually efficient woman and nurse*’, it disturbed him should she have to leave as his ‘*nurse in charge*’. So he approached Goodyear Rubber Company in New York, with his plaster casts made of Caroline’s hands and asked to have two gloves created of thin rubber with gauntlets that Hampton could use during surgery.

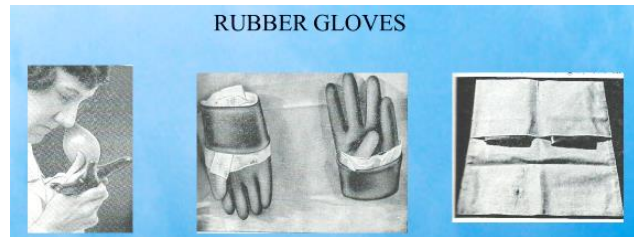
These weren’t the first gloves ever devised for medicine as was mentioned previously. The earlier gloves were shaped more like oven mitts than gloves and were crude, thick and clumsy and often made of sheep intestines, thus were not suitable for surgeons to use as dexterity and sensitivity was so essential.

Caroline’s gloves, in contrast, were relatively sleek and slender, covering her hands and forearms. They weren’t disposable, of course. They had to be pulled on over soapy hands and boiled between operations. But they worked brilliantly, as now, Caroline’s hands healed quickly.

Caroline Hampton, an operating room nurse, has been documented to be the first nurse to wear sterile gloves which occurred first in Bellevue hospital about 1892 and inspired all to do the same.

THE THIRD LOCAL STORY

The latex disposable gloves required a great deal of care which was the operating room nurse night duty if there were no surgeries. What a tedious job: after receiving a bag of gloves from the laundry, each glove was inspected for holes by having the glove full of air and each finger put by face to feel any air, then turned inside out to powder with talcum powder, reverse and make sure no talcum on the outside of the glove as this may cause patient wound problems. The cuff folded up to just below the thumb, a cloth inserted so when sterilized - would not stick. The glove then placed on a thin piece of brown paper or clot, making sure the gloves were - left glove to left and right glove on right, then folded and wrapped in 40 pound test brown paper with glove size marked on outside. Thus the outer paper could be opened by the circulating nurses, maintaining sterile technique, and then toss the gloves on the sterile sheet covering the 'double-ring' stand. This was a procedure well into the 1960's as the writer recalls.



We're still reaping the benefits of these innovations today, and certainly made use of them during the Covid epidemic of 2019 -2022.

To complete this 'glove and romance' story, Caroline and William married in 1890, shortly after he presented her with two pairs of rubber gloves made especially to fit her hand. They had a good marriage even though he had very fussy ways and fought an addiction to morphine, thus she had long hours alone. This did not deter her from advancing her interests as she developed a large garden, studied French and German and became quite fluent in both.



WILLIAM HALSTED - 1880

This supposedly simple innovation of Halsted's brought about an amazing technology which had a lasting impact on clinical practice, saving so many patients from surgical wound infections and even death.

The Evolution of the Modern Disposable latex Medical Surgical Glove

In 1964 the first disposable latex glove was manufactured by the Ansell Rubber Company by sterilizing them with gamma irradiation. Disposable surgical gloves are now the standard in the operating room and many surgeons would 'double glove' when performing procedures to reduce the danger of infection from glove failure or puncture. Gloves were still powdered to make donning of gloves easier, but this has been discontinued since 2016. Presently there is a non-latex glove option since the constant wearing of latex gloves has led to an increasing rate of latex allergies. Now widely used are the polyvinyl chloride and neoprene gloves.

It is remarkable how a small innovation can have such an impact on medical clinical practice as well as the general health of the population.