

“History of Surgical Instrumentation”

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Objectives:

At the end of the article, the reader will be able to:

1. Define surgical instrument
2. Discuss the process of developing a surgical instrument
3. Name the father of surgery

In the CS/SPD arena, surgical instruments are a fact of life. But what do we really know about where they came from and how they got their names? Curiosity about how we got these useful tools caused me to look at our history of instruments and this article is a result of that curiosity. What I learned about who is actually considered the father of surgery surprised me as I'm sure it will you.

A surgical instrument is a specially designed tool or device for performing specific actions or carrying out desired effects during a surgery or operation, such as modifying biological tissue, or to provide access or viewing it.¹ Surgical instruments have been designed and made throughout history in order to meet the need of the patient. Ancient Trephines were made in order to put holes in skulls to let out the evil spirits and to alleviate headaches and head traumas caused by wounds from battles. These rough trephines have been found in Neolithic sites dating back at least a million years ago.

In India, Sushruta, was considered the most important surgeon in ancient history. He is of-

ten described as the “father of surgery”. This was around 500 BC. He authored a text in which he describes over 120 surgical instruments, 300 surgical procedures and classified human surgery in over 8 categories. In Antiquity, surgeons and physicians in Rome and Greece developed many ingenious instruments that were made from iron, copper, silver or bronze. Some of these instruments includes; scalpels, tweezers, trephines, probes, curettes and other items. One can find displays of these early instruments in many different museums around the world as well as in some hospitals.

One of the first key players was Abu Al-Qassim Al-Zahrawi. He was the author of “Al Tasreefliman ‘Ajiza ‘an Al Ta’leef” which translated as “The Method of Medicine” and is often referred to as “Al-Tasreef”. This reference guide was written roughly after some 50 years of practice as a physician. This book or text was aimed at establishing the rules of thumb in practical medicine by emphasizing the “do” and “don’t” in almost every issue encountered and the solutions/treatments he provided or invented during his many years of practice. Along with this 30 volume guide there was a collection of over 200 pieces of surgical instrumentation. This is considered the earliest works and remained the single best medieval source on the matter until modern times. He is credited with “... transforming surgery into an independent science based on the knowledge of anatomy. His illustrations and drawings of the tools is an innovation that keeps his contribution alive, reflected in its continuous influence on the works of those who come after him.”²

Al-Zahrawi is credited with discovering that catgut used as internal stitching appears to be the only natural substance capable of dissolving and at the same time is still accepted by the human body.

As surgeons became bolder in their dealings with the human body, new instruments were again invented and designed. Amputation sets originated during this, the Renaissance period and post-Renaissance era, due to the increased severity of war-inflicted wounds by cannons, shot and shrapnel. However, it was only after the advent of anesthesia and surgical asepsis that new surgical instrumentation was invented to allow the penetration of heretofore, forbidden body cavities. These are namely, the thorax, the abdomen and the skull.

The search for new instrumentation continued as surgery continued to grow and come into its own. In the 1800's, Paris became the center of technology for surgical instruments. They were able to work with the Germans who were considered the craftspeople of the time. With the advent of stainless steel, instrumentation became part of what it is today. It was much easier for instrument craftspeople to build surgical instrumentation with the better quality of metals that the Germans invented. Tuttlingen, Germany became the center of skilled instrument making approximately 200 years ago. Tuttlingen still holds that title today.

Historically, the development of a surgical instrument is as follows:

1. The surgeon uses a common tool and/or adapts it for use in an operation. These tools came from weapons, butcher's

tools, items used in ritual body modification, cannibalism or torture, leather worker's and metal worker's implements. Even in modern times, surgical instruments are adapted from automobile shops, kitchens, aerospace and metal works industries to name just a few.

2. Then the instrument undergoes a period of change. This can be a material change so that the instrument is resistant to blood and normal saline, as these products can cause corrosion. The instruments must also be adapted so that the material the instrument is made of doesn't hold bacteria or is not prone to staining.
3. The instrument will then undergo a period of standardization so that the tools doing a similar job start to become of the same size and caliber.

As a result of the instrument crafters of early years, with the continued adjustments of surgeons coming afterward and the usage of better materials to make instruments, our quality and quantity of different surgical instrumentation is the best it's ever been.

We have several different classifications of instrumentation. Probably the most common would be the mechanical cutter class. This includes scalpels, trephines, drills, trocars and other such instrumentation. The scalpels or knives that were used in the early Neolithic Period were made from rock pieces. As man progressed, these knives were made of bone and eventually iron. In Medieval times, they became made of copper, bronze or brass. These either had to be cast, forged or cold-worked (pressed). The instrument makers of the era were considered craftsmen. The quality of the instrument was good but it was the elaborate ornamentation that proved to be most striking.

The purpose of the decorations were partly functional. They gave the surgeon better gripping power, but also, each craftsman used their talents to make instruments that were individual to the craftsman so that their instruments had the mark of the craftsman on them and were easily recognized by other craftsmen.

As we have become aware, new surgical techniques have created a need for improvements not just in the original instrumentation but also for entirely new instrumentation such as Laparoscopic Instrumentation. Today, computers aid in the manufacture of instrumentation but the skills of the instrument makers is still very necessary in order to turn an idea for a new instrument into something the surgeon can't wait to use.

1. Surgical instruments are specially designed for performing specific actions or carrying out desired effects during an operation.

True False

2. Ancient trephines were pins used in Orthopedic cases.

True False

3. In India, Hippocrates, was considered the most important surgeon in ancient history.

True False

4. Sushruta is often described as the "father of surgery".

True False

5. Instruments can be made from iron, copper, silver or bronze.

True False

6. Amputation sets were invented during the Renaissance period due to the increased severity of war-inflicted wounds by cannons, shot and shrapnel.

True False

7. Tuttlingen, Germany became the center for skilled instrument making approximately 200 years ago.

True False

8. The quality of surgical instrumentation is the best its' ever been due to better materials, continual surgeon adjustments and the early instrument crafters.

True False

9. The most common classification of surgical instrumentation is the retractor class.

True False

10. In Medieval times, knives were made of stainless steel.

True False

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