

## Short Review – Historical Article

### Hernia management through the ages: an evolutionary journey from ancient times to modern innovations

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The history of hernia surgery spans across ancient civilizations and evolves through various historical periods, reflecting advancements in medical knowledge and surgical techniques. This article explores the evolution of hernia surgery practices, ranging from ancient Egypt to modern times, highlighting key developments and prominent surgeons who contributed to the field.

*Hernia surgery in ancient Egypt.* There is limited information on hernia surgery in ancient Egypt, as the surgical repertoire was limited, and bone abnormalities were more common than soft tissue injuries. However, the ancient Egyptians practiced medicine with highly professional methods and had advanced knowledge of anatomy and surgery, leaving us with some of the earliest evidence of surgical techniques, tools, and reasoning. Nevertheless, their surgeries were performed with crude tools and techniques that physicians had to refine over time. The first treatise on surgery was written by Imhotep, the vizier of Pharaoh Djoser, priest, astronomer, physician, and architect, during the first monarchic age around 2700 BCE. The inguinal hernia was described in an ancient Egyptian papyrus dating back to 1500 BC, The Ebers Papyrus. This was an ancient Egyptian medical text, that described the reduction of hernias. Furthermore, physicians in ancient Alexandria used tightly fitting bandages to treat inguinal hernias in 900 BC, as depicted in a Phoenician statue. There is no specific information on hernia surgery and therefore, it is unclear if hernia surgery was performed in ancient Egypt.

*Hernia surgery in ancient Greece.* Hernia

surgery was performed by ancient Greek doctors, as hernias were a common problem among other surgical entities. The term "hernia" comes from the Greek word "hernios," meaning "bud" or "offshoot". Although there is no clear evidence of hernia surgeries being performed in ancient Greece, surgical intervention is described in ancient scripture as well as demonstrated in sculpture and other forms of record. There are two known examples of hernias depicted in ancient Greek sculpture. However, most ancient Greek sculptures depict idealized human forms, often of Greek gods and goddesses, and are not intended to be realistic portrayals of physical ailments.<sup>1</sup>

*Inguinal hernia in Roman Empire.* Reports of inguinal hernia can be traced in the books of the Greek nobleman Celsus who gave a detailed view of the anatomy of hernia, as well as Heliodorus, the first doctor to ever describe incarcerated hernia. Furthermore, they both presented methods for its treatment, with the first proposing removal of the testicle and the latter proposing amputation of the hernia sac. Galen, the most famous physician of Roman time, whose work influenced and dominated Western medicine for ages, also dealt with hernia, proposing a concept for the pathogenesis of it, coming from a rupture of the peritoneum. Ileus was first related to incarcerated hernia by Aretaios of Cappadocia who lived approximately 100 A.D..<sup>2,3</sup>

*Inguinal hernia in the Byzantine Empire.* Aetius of Amida (502-575 A.D.) was the first Byzantine physician to deal with inguinal hernia. In his medical compendium, Tetrabiblos, he observes

that inguinal hernia is more often in women and proposes conservative treatment with bandages and drugs before proceeding to surgery if necessary. The surgery technique he applied is described in his books. Paul of Aegina, a physician who lived approximately a century later, also described inguinal hernia treatment in his work *Epitome*. There, he proposes two methods, one surgical and one involving cauterization of a triangle area around the hernia with its base towards the groin. The latter was preferred among physicians at the time as it had a lower recurrence rate, despite leaving an ugly scar. Two of the greatest physicians of the Byzantine Era, Theophanes Chrysobalantes (10<sup>th</sup> century A.D.) and Ioannes Actuarius (14<sup>th</sup> century A.D), in their works, describe conservative, pharmaceutical methods to treat hernias rather than surgery. However, surgical treatment of hernias was very common especially in the later years, as there was a special category of surgeons called celotomes that performed exclusively that kind of operation in the hospitals called 'Xenones'. Famous Arab physicians, Rhazes, Haly Abbas, Avicenna, and, Abulcasis adopted the surgical methods for hernia treatment applied by their Byzantine colleagues.<sup>4</sup>

*Inguinal hernia in Dark Ages.* Although science didn't progress extensively during the Dark Ages, certain breakthroughs still appeared in hernia management. Celsus and Galen were disputed with William of Salicet (1210-1277) disagreeing with the testicle removal during hernia surgery and Guy de Chauliac proposing a different method for hernia pathogenesis and being able to recognize the difference between inguinal and femoral hernia. However, the latter applied a rather unorthodox method for the treatment of hernia including modifications in the patient's diet, use of laxatives, and bloodletting. Then a manual reduction of the hernia was performed, and a plaster was applied to hold it in its position. Mondino de Luzzi, a surgeon from Bologna, described a radical method for the cure of hernia in his book published in 1487, *Anothomia*.<sup>5,6</sup>

*Inguinal hernia in the Renaissance.* The Renaissance (15<sup>th</sup> and 16<sup>th</sup> centuries) is a period in

human history marked by great developments in science, art, architecture, politics, and medicine. Of course, the study of hernia and its treatment also made remarkable progress. Numerous surgeons and doctors performed herniotomies which became a common practice. Among them, Antonio Benivieni (1440-1502), Horace of Norsini, and, Caspar Stromyar performed numerous herniotomies which they later described in books they published. Pierre Franco (1505-1578) was the writer of a book called *Traite' des Hernies* that included surgery methods for the various forms of hernia including patients that suffered from monorchism, incarnated hernias, and hydrocele. Hydrocele treatment was also the subject of study by Marcel Cumanus and Zaeutus Lusitanus (1575–1642), doctors who proposed their own treatment methods for the disease, orchiectomy and drainage of its fluid after puncture with needles each respectively. The famous doctor Ambroise Pare' (1510-1590) performed surgery only for strangulated hernia preferring trusses for all other instances. The anatomy of the inguinal canal was first described by Gabriello Fallopius.<sup>7</sup>

*Anatomic Description of the Area.* Study of hernia anatomy was extensive in the centuries that followed. Anatomists such as Antonio Scarpa (1747-1832), Pieter Camper (1722-1789), Franz Hesselbach (1759-1816), Antonio de Gimbernat (1734-1817), August Richter (1742-1812), Sir Astley Paston Cooper (1768-1841) described various anatomical structures, significant for hernia anatomy and formation, some of whom were later named after them. It was the same era when the theory of the hernia formation by peritoneum rupture was disproved (F. Ruysch) and direct inguinal hernia (L. Heister), congenital hernias (A. Haller) the ileopubic tract (J. Cloquet), and the femoral sheath and canal (J. Gay) were firstly described. Eventually, a very detailed description of the inguinal canal and other anatomical structures related to inguinal hernias was formed. The invention and proposal of new methods for hernia treatment also continued. Jacques Beaulieu (1651-1719) was a doctor who performed over 2000 hernia operations during his travels from

Amsterdam to Rome, which was enough for his name to stay in history.<sup>8,9</sup>

### **Inguinal hernia repair**

**Bassini's method.** Edoardo Bassini (1844-1924) was born and raised in Pavia, Italy where he also studied medicine to become a surgeon. After his graduation, he enlisted in the army and participated in 2 battles not as a doctor but as a soldier. In one of his battles, in 1867, he was severely wounded in the right groin by a bayonet. He later developed an infection in the wound and a fecal fistula which were successfully treated by Luigi Porta, chief of the surgical clinic of Pavia, when he returned home. In the years that followed he served as the assistant of Porta and worked with famous doctors such as T. Bilroth, B. Langenbeck, J. Nussbaum, J. Lister, and T. Spencer-Wells. During the 1880s he worked in the University of Padua. There he had unlimited access to human cadavers which he used to understand the anatomy of inguinal hernias and create a method for its treatment. After years of research, Bassini finally achieved the first ever successful inguinal hernia repair on December 23, 1844. His technique included cutting the transversalis fascia from the internal inguinal ring to the pubic tubercle, after dividing the cremasteric muscle, and ligating the hernia sac eventually reconstructing the inguinal canal. He continued to apply his method, Bassini's method, leading to 262 herniorrhaphies in 216 patients with no reported deaths and only a 2,7% recurrence, a success rate of 97 percent. His work was recognized in the medical community as it had the best results in comparison to any other method proposed until then.<sup>10,11,12</sup>

**Halsted's method.** William S. Halsted (1852-1922) proposed a method similar to Bassini's at Johns Hopkins Hospital Bulletin in 1890. His technique includes the removal of the majority of veins in the spermatic cord, relocating the vas deferens beneath the skin, and sealing the components of the abdominal wall (except peritoneum and skin) with single-layer interrupted mattress stitches. In 1903 he presented a new

method, Halsted II, very similar to the one Ferguson published three years earlier. His new method involved repositioning the hernia sac's neck, precise removal of any dilated veins in the spermatic cord, incorporating the cremaster muscle and transversalis fascia, and employing three sets of interrupted silk sutures along with a row of catgut, creating an overlapping layer repair for the affected area.<sup>13,14</sup>

**McVay's method.** American surgeon Chester McVay (1911-1987) tried to design his hernia repair technique as Bassini and Halsted's methods often failed. He theorized that this happened due to the suture of the conjoined tendon to the weak inguinal ligament. His method included separating the hernia sac from cord structures, followed by suturing the weakened abdominal wall. The Cooper's ligament is utilized to anchor the repair. This method reinforces the area and prevents hernia recurrence through strategic tissue manipulation and ligament fixation.<sup>15</sup>

### **Modern techniques**

**Shouldice's method.** Shouldice inguinal hernia repair, designed by Dr. Edward Shouldice in 1945, is considered the best non-mesh technique. It involves a tension-free approach, utilizing four layers of sutures to sew distinct anatomical structures in four layers and therefore, reinforce the abdominal wall. This way, a low recurrence rate of about 1% is achieved. It is performed under local anesthesia.<sup>16</sup>

**Lichtenstein's method.** Lichtenstein inguinal hernia repair, pioneered by the Lichtenstein Hernia Institute in 1984, is a tension-free mesh repair. The hernia is separated from the cord structures and reinserted into the abdominal cavity. The wall opening is then sutured, and a mesh patch is positioned in the inguinal canal to reinforce the abdominal wall, preventing herniated tissue protrusion. The mesh helps achieve a low recurrence rate and reduces postoperative pain. The operation is performed under local anesthesia.<sup>17</sup>

**Laparoscopic methods.** Laparoscopic inguinal hernia treatment includes two methods, the

Transabdominal Preperitoneal (TAPP) approach and the Totally Extraperitoneal (TEP) approach. The difference between the two techniques lies in the port placements site and in the fact that in the TAPP approach, the peritoneum is incised. In general, both methods involve making small incisions near the hernia site. A camera and specialized instruments are inserted, allowing the surgeon to view and repair the hernia from within. The hernia is usually reinforced with a mesh, reducing recurrence risk, and the small incisions lead to quicker recovery and less postoperative discomfort.<sup>18,19</sup>

### Conclusion

Inguinal hernia is a medical entity known since antiquity. The journey through the annals of history reveals a fascinating evolution in hernia surgery techniques, from the enigmatic practices of ancient Egypt to the introduction of laparoscopic methods that added a layer of innovation, allowing for minimally invasive surgeries and accelerated recoveries. As we reflect on this historical tapestry, it becomes evident that the progress of hernia surgery mirrors the broader human journey of advancement. From ancient mysteries to contemporary precision, each epoch contributed to a cumulative pool of knowledge that has transformed hernia surgery into a refined and sophisticated discipline. This historical voyage underscores the resilience of the medical profession in its pursuit of improved patient care and the unwavering commitment to alleviating human suffering across the ages.

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