Evolution of cholecystectomy: A tribute to Carl August Langenbuch

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INTRODUCTION

Cholecystectomy is the commonest operation of the biliary tract and the second most common operative procedure performed today. Though the technique was developed a century ago by a German surgeon, Carl Johann August Langenbuch (Figure 1), it received little recognition till it became the gold standard for the definitive management of symptomatic cholelithiasis.

The history of surgery is laden with names of popular German surgeons like Kocher, Czerny, Courvouisier, and Mikulicz, but Carl Langenbuch is credited with having pioneered the concept and execution of the first gall bladder extirpation.

This paper recapitulates the history of the evolution of biliary surgery to the first cholecystectomy and is a mark of respect and tribute to the great German surgeon, Carl Langenbuch (1846-1901) on his death centenary.

THE HISTORY OF CHOOLELITHIASIS AND OPEN CHOLECYSTECTOMY

The first account of gallstones was given in 1420 by a Florentine pathologist Antonio Benevieni, in a woman who died with abdominal pain. Centuries followed with ever-increasing recognition of biliary colic. The description of attacks of biliary colic thronged the medical literature with numerous physicians and surgeons including Francis Glisson in 1658, reporting similar cases.

The first interaction of gallstones and surgery dates back to 1687 when Stal Pert Von Der Wiel, while operating a patient with purulent peritonitis accidentally found gallstones. Nonetheless, the treatment of symptomatic gallstone disease remained primitive and ineffective until the 18th century.

Jean-Louis Petit, the founder of gall bladder surgery in 1733 suggested removal of gallstone and drainage of the gall bladder, thus creating fistula in patients with empyema, which he successfully performed in 1743. Petit’s rigid criteria of surgical intervention was modified over the years. It included skin stimulants to provoke adhesion of the gall bladder to the abdominal wall and subsequent introduction of indwelling trocar to remove stones and bile from the adhered gallbladder to minimize peritonitis. Thus gall bladder surgery continued till 1859, when J. L. W Thudichum proposed a two-stage elective cholecystostomy. In the first stage, the inflamed gall bladder was sewed to the anterior abdominal wall through a small incision, which served as a route for the removal of gall stone at a later stage.
later date. At around the same time, on July 15, 1867, Dr John Stough Bobbs from Indianopolis, Indiana while operating on a patient with suspected ovarian cyst found an inflamed and adhered sac containing "several solid ordinary rifle bullet" like structures. He opened the sac, which incidentally happened to be the gall bladder packed with multiple gallstones. He removed the gallstones and left the gall bladder in the abdomen after closing the defect in the gall bladder (cholecystostomy). The patient recovered and outlived Dr. Bobbs.

Marion Simms must be credited with designing, perfecting and performing the first cholecystostomy on a 45-year-old woman with obstructive jaundice in 1878. Though the patient died on the eighth postoperative day due to massive internal haemorrhage, it paved the way for Theodor Kocher to perform the first successful cholecystostomy in June 1878. While others had busied themselves with the product of the disease, it was Carl Johann August Langenbuch who observed that these measures were only temporary and rallied to find a definite solution for the disease.

At that time biliary colic was more a medical problem and ordinary surgeons were inadequately exposed to the problem. Langenbuch at the age of 27 was appointed director of the Lazarus hospital in Berlin. It was here that he came across a large number of such patients because of his unique position.

By this time two animal experiments by Zambecarri in 1630 and Teckoff in 1667 had shown that the gall bladder was not essential to life. Moreover, physicians were of the opinion that the gall bladder itself gave rise to stones. Langenbuch kept pondering over these ideas. He developed the technique of cholecystectomy through cadaveric dissection and on July 15, 1882 he successfully removed the gall bladder of a 43-year-old man who was suffering from the disease for 16 years.

Langenbuch found two gallstones and a chronically inflamed and thickened gall bladder. The patient was discharged uneventfully from the hospital after six weeks.

His initial report appeared in 1882 but was ignored. This new cholecystectomy was debated against the already established cholecystostomy.

An audit performed in 1886 showed 39 cholecystotomies with a mortality of 27 per cent against 8 cholecystectomies with a mortality of 12 per cent. By now Langenbuch's cholecystectomy had convinced more and more surgeons worldwide and by 1897 nearly 100 operations with a mortality rate of less than 20 per cent were performed. By the turn of the century it was established that cholecystectomy could guarantee permanent relief from pain whereas cholecystostomy gave a permanent fistula and not a pain-free state. Langenbuch died on June 9, 1901 of neglected appendicitis but the path showed by him led to further advancement and modification in biliary surgery.

**LAPAROSCOPY AND LAPAROSCOPIC CHOLECYSTECTOMY**

Langenbuch's open cholecystectomy remained the gold standard for symptomatic cholelithiasis for over a century. The only major change in the operation was the introduction of operative cholangiography for the detection of common bile duct stone by Mirizzi over 60 years ago. However, in the last decade, the introduction of laparoscopic techniques to perform cholecystectomy has revolutionized this procedure. The revolutionary nature of this procedure has been unprecedented in surgical history, and has been compared to such surgical mileposts as the development of vascular surgery and organ transplantation.

The earliest reference to laparoscopy dates back to biblical history. At that time classical Galenic medical tradition was based on the concept of maintaining homeostasis by balanced production and excretion of bodily wastes. Imbalance led to disease states. Classical restoration to normal balance was by means of purgatives and cathartics. Alternatively, surgically draining the abdomen of "bad humours" by means of trocar insertion was in vogue as described by Ezekiel and Celsus (25 BC – AD 50).

The term trocar, coined in 1706, was thought to be derived from “trocarter troise-quarts”, a three-faced perforator enclosed in a metal canula. Laparoscopic trocar-like instruments have been recovered from Roman ruins. Dimitri OH, a German gynaecologist, performed the first endoscopic examination (ventroscopy) in 1901, through an incision in the posterior vaginal fornix. He wore a head mirror to reflect light and augment visualization. Also, in 1901, George Kelling, a German surgeon, described “celioscopy” in a dog after peritoneal insufflation with air. Jacobeus of Sweden performed the first human...
celioscopy in 1910, in a patient with ascitis. Bernheim from the United States was the first surgeon to publish his experience in laparoscopy entitled “organoscopy” in the Annals Of Surgery, 1911.9,11

World War I halted the laparoscopic march until the mid-1920s when Kelling in 1923 rejuvenated “organoscopy”. He presented before the German surgical society his 22 years experience with diagnostic laparoscopy.12 Thus began the era of minimally invasive surgery. The pioneers of laparoscopy believed that this technique was an important adjunct to surgical practice. Nonetheless, inadequate technology limited their vision, both literally and figuratively. Light sources, danger of thermal burns to intra-abdominal organs, bowel perforation and vascular injuries posed very real risks and significantly limited the use of laparoscopy.

In 1929, Kalk, “father of modern laparoscopy” advocated refinement in the technique through the introduction of the Faroblique (135 degrees) lens system, separate pneumoperitoneum needle and a second puncture site.13 In 1938, Veress developed a needle with a spring-loaded obturator that allowed safe insertion and insufflation of the peritoneal cavity.13 Despite such advances in laparoscopic imaging and techniques, the troublesome problem of increased intra-abdominal pressure and thermal injury to the bowel associated with unipolar cautery severely restricted the use of the laparoscope. In 1952, Fourestier, Gladu and Valmire revolutionized laparoscopy with the introduction of a quartz rod to transmit an intense light beam distally along the telescope enabling photographic images.9,10,13 Closed circuit television was added in 1959.9,10,13 Another decade was required to overcome the dangers of the insufflation of the abdomen. In 1966, Kurt Semm introduced an automatic insufflator device capable of monitoring intra-abdominal pressure; he also developed thermo coagulation, designed a high-volume irrigation aspiration system, perfected the endoloop applicator, knot-tying techniques and instruments. He adapted numerous gynaecologic procedures to laparoscopic techniques. Beyond the realm of gynaecologic surgery, he performed omental adhesiolysis, bowel suturing, tumour biopsy and staging, and notably, incidental appendicectomy.9,13,14

Although interest was piqued, general surgeons still considered laparoscopy a “blind” procedure and thus did not incorporate it into the practice of general surgery.

By the late 1970s, gynaecologic surgeons had embraced laparoscopy thoroughly. General surgeons remained sceptical and staunchly supported traditional open surgery. Hasson’s introduction of trocar placement under direct vision in 1978 cleared much of the doubts among general surgeons who became more receptive to laparoscopic surgery.14 Liver biopsies were the first laparoscopic procedures attempted by general surgeons in 1982.15 Warshaw, Tepper and Shipley applied laparoscopy to the staging of pancreatic cancer in 1986, with a reported accuracy rate of 93%.16

Mouret from France17 performed the first human laparoscopic cholecystectomy. On that day in March 1987 as he was completing a gynaecologic laparoscopy on a woman also suffering from symptomatic gallstones, he shifted his laparoscope to the subhepatic area. Upon finding a comparatively free and supple gall bladder he decided to remove it laparoscopically instead of opening up. He performed the procedure successfully and the patient recovered without complications.17 Within two years, in the USA, the procedure was being adopted and because of the massive demand from the patients, standard traditional stages of scientific evaluation were bypassed. Finally, in September 1992 a NIH consensus conference held in Bethesda concluded that laparoscopic cholecystectomy was the treatment of choice for gall bladder lithiasis.18

REFERENCES


