CHAPTER 2

History of Endoscopic Surgery

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During the past few years, endoscopic surgery has become the standard for many operative procedures. Today's minimally invasive surgical techniques can achieve results equal to or better than older techniques, while reducing postoperative pain, shortening postoperative convalescence, and reducing cost.

Nearly every surgical discipline is affected by this combined explosion of creativity and technology. Plastic surgery has only recently begun to adopt these new technologies. Therefore the appropriate role of endoscopic surgery in plastic and reconstructive surgery may be put in perspective by reviewing the history of this modality as it occurred in other surgical disciplines.

History

The word endoscopy comes from two Greek words, "endo" meaning "inside" and "skopein" meaning "to examine." Endoscopy is the visual examination of the interior of a body cavity, structure, or hollow organ. Hippocrates II (460–375 BC) wrote about examining the rectum using a speculum to inspect the affected area. In Pompeii, a vaginal speculum was found. The first record of a mirror being used to reflect light into an internal organ is credited to Abulkasim (936–1013 AD), an Arabian physician. He used the device to inspect a cervix. In 1519 Aranizi focused and projected sunlight through a spherical glass filled with water to view a patient's nasal cavity. He used the device to inspect a cervix. In 1519 Aranizi focused and projected sunlight through a spherical glass filled with water to view a patient's nasal cavity. On overcast days he recommended artificial light to achieve the same purpose. The first reported attempt to visually examine the interior of the urethra is credited to Bozzini, a Frankfurt physician. In 1805 he used a candle as a light source and a tube as an endoscope: the complex apparatus he invented became the first light transmitter.

Desormeaux, considered the father of cystoscopy, developed the first serviceable urethroscope and cystoscope in 1835. In 1874 Stein modified existing cameras to construct a "photoendoscope" to record images of bladder pathology. Nitze developed a "train of lenses" and constructed the first endoscope in the 1870s. However, the external diameter of the scope was greater than the effective optical diameter causing significant limitations to its practical value.

The first person to introduce endoscopic inspection of the abdominal cavity was a Petrograd gynecologist named Ott. In 1901 Kelling, a surgeon from Dresden, reported using a cystoscope to inspect the peritoneal cavity of a dog after first insufflating the peritoneal cavity with air. He called his procedure "celioscopy." In 1910 a Swedish physician named Jacobaeus was the first to use an endoscopic technique in humans and reported 115 abdominal and thoracic examinations in 69 patients. In 1911 Bernheim, from Johns Hopkins University, was the first to use laparoscopy in the United States. One of the two patients on which he reported had a carcinoma of the pancreas with obstructive jaundice, and Bernheim commented that laparotomy confirmed the findings of the laparoscopy in that no metastases were identified with either examination. In the second patient, he was able to rule out a gastric ulcer and identify the presence of chronic appendicitis. This report documents the entry of laparoscopy into the United States.

In 1914, the Italian inventor Roccavilla designed an instrument that permitted the source of light to remain outside the abdomen. This marked the birth of our present-day light source. Roccavilla's contribution decreased the risk of thermal injury to tissue. The next major advancement was the invention of a new lens.
system for oblique viewing. In 1929 the German hepatologist, Kalk, introduced a 135° lens system and the dual-trocars technique. A landmark paper was published in 1937 by an American internist, John C. Rundock, one of the earliest reports of laparoscopic biopsies. Schindler produced in 1932 the semiflexible gastroscope that depended on a series of short-focus lenses to allow flexion to 30° with retention of most of the image. Anderson published a report in 1937 that advanced the procedure of coagulation laparoscopic sterilization. In 1941, two gynecologists, Power and Barnes, reported performing tubal sterilization.

In 1952 Fourestier et al. introduced the “cold light” fiberglass light source that provided intense lighting at a low temperature, free of potentially traumatic heat. In 1953 Hopkins introduced a rod-lens system that gave a much clearer, brighter image and truer color. The flexible gastroscope was introduced by Hirschowitz and coworkers by 1957. This was followed by the development of fiber-optic sigmoidoscopic and colonoscopic instruments, which began in the United States and Japan after 1960. The truly dramatic advances in laparoscopic instrumentation and techniques were made by Kunt Semm in the mid-1960s. He pioneered the development of an automatic abdominal insufflator and pressure monitor as well as an irrigation system, the endo-loop applicator, hook scissors, a tissue morcellator, and the pelvitrainer. In 1967 Patrick Steptoe wrote the first textbook on laparoscopy in English. At the same time he and Edwards pioneered in vitro fertilization, thus opening the door for the laparoscopy of infertility.

The next major breakthrough was the invention of the computer-chip video camera in 1986 that enabled assistants and others in the operating room to view the progress of the operation and to help more effectively. More complicated operations could thus be performed, paving the way for the development of laparoscopic cholecystectomy. Mouret of Lyons is credited with performing the first human laparoscopic cholecystectomy in 1987. In 1989 Reddick et al. were the first to use laser energy to coagulate and dissect the gallbladder and first developed the technique of laparoscopic cholangiography.

Recently, laparoscopy has been used to perform some rather unconventional procedures in the area of gynecology and surgery including the following: uterine nerve ablation to treat dysmenorrhea; repair of prolapsed fallopian tubes; laparoscopic presacral neurectomy; laparoscopic closure of perforated ulcer; anterior seromyotomies; posterior truncal vagotomies; preperitoneal groin hernia repair using a mesh; laparoscopic bowel resections; and hiatal herniorrhaphy.

In urology, minimally invasive techniques have been used for: treatment of nephrolithiasis; ureterolithiasis; lymph node dissection; endoscopic performance of staged lymph node dissection; and endoscopic autotransplantation of cylinders of fatty tissue in the treatment of urinary incontinence in women and postprostatectomy incontinence in men. Endoscopic surgery of the thoracic cavity is becoming widespread, both as a diagnostic and therapeutic modality. In otorhinolaryngology, endoscopic sinus surgery has almost completely supplanted previous sinus drainage procedures. With the availability of better endoscopes, improved lighting, and increased instrumentation, the use of ventriculoscopy and ventriculotomy in the management of hydrocephalus is becoming increasingly more common among neurosurgeons, although experience is limited regarding neurosurgeons, although experience is limited regarding tumor resection with the ventriculoscope.

Endoscopic techniques in plastic surgery can offer real advantages to patients. Not only is it possible to reduce the length of the incision, but the location of the incision may be repositioned to a more aesthetically or functionally acceptable location distant to the actual site of surgical dissection. The improved hemostasis and preservation of the innervation afforded by superior visualization with magnification is an additional benefit. In 1984 Teimourian and Knoll described the technique of subcutaneous endoscopy and documented the presence of an intact neurovascular supply to the underlying skin. This lent support to the concept of suction lipectomy with the blunt cannula. Estes et al. reported on a pilot study that demonstrated the feasibility of performing endoscopic surgery on the fetus in situ. A lip incision was created and repaired using endoscopic microsurgical techniques in midgestation fetal lambs. In utero repair of several life-threatening malformations in the human fetus is now a clinical reality, yet fetal surgery still poses significant risks to both the mother and the unborn child. Endoscopic fetal surgery may solve the problem of preterm labor for in utero intervention by avoiding a large hysterotomy. This approach causes much less uterine trauma.

The clinical use of breast endoscopy was begun with Dowden and Anain. They described 50 breast endoscopies, in a period of 5 years, for internal endoscopic capsulotomy and evaluation of the breast implant. The accuracy was far superior to the mammogram or ultrasound. They reported no damaged implants or infections from the technique.

In 1992 Vasconez et al. presented laboratory investigation and clinical experience demonstrating the feasibility of endoscopic techniques applicable to aesthetic surgery of the face, including the cheeks, forehead, orbit, nose, and nasal septum. Coronal browlifting in 32 patients using the endoscopic technique was also presented. The endoscopic approach accomplishes division and weakening of the corrugators and procerus. And the elimination of the bicoronal incision is an obvious advantage.