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HISTORY AND APPLICATION OF LAPAROSCOPIC EQUIPMENT

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Abstract
This article outlines several advantages of laparoscopic surgery. It demonstrates that laparoscopic instruments provide surgeons with broad visibility and the ability to manually control working instruments through small incisions, which are designed to safely work in confined spaces while maintaining visual guidance and control.

Keywords: Laparoscopy, surgery, invasive, abdominal plane, equipment, health care, monitor, trauma, engineer

Introduction

Laparoscopic surgery, often referred to as minimally invasive surgery (MIS), is a surgical technique that allows access to the abdominal or pelvic cavity through small incisions using specialized instruments and a video camera.
Laparoscopy has a number of advantages over traditional open surgeries.
Firstly, it is a less invasive procedure, meaning it requires fewer incisions and wounds, which reduces the risk of bleeding, infection and pain after surgery.

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Secondly, thanks to better visualization of the surgical field, laparoscopy allows for more precise and less traumatic work by the surgeon.

Another major advantage of laparoscopy is the rapid recovery of patients after surgery and a shorter hospital stay.

The origins of laparoscopic technology date back to the early 20th century. In 1901, German surgeon Georg Kölling performed the first experimental laparoscopy on a dog using a modified cystoscope.

Fig. 1. German surgeon Georg Kelling

Soon after, in 1910, Swedish physician Hans Christian Jacobæus performed diagnostic laparoscopy on humans. This field developed slowly until the late 20th century, when advances in optics, video technology, and instrument miniaturization, largely driven by biomedical engineering, allowed laparoscopy to be widely adopted in general and specialized surgery. The first laparoscopic studies were conducted in the 1980s.

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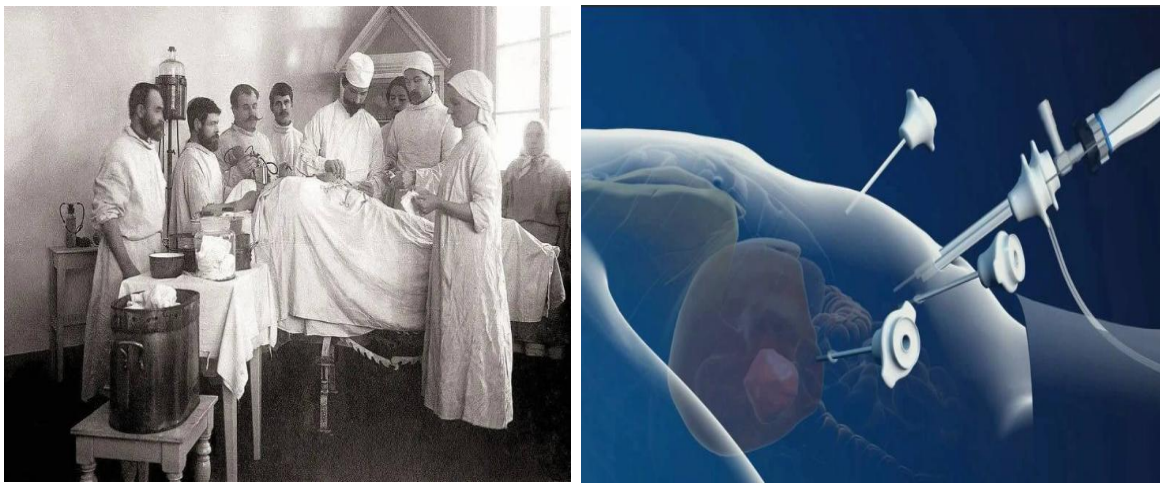

Fig. 2. The process of surgery in the 19th century

Pioneers of laparoscopic surgery, such as the German surgeon Klaus Kahl, began experimenting with the use of hollow instruments and cameras to perform surgeries through small incisions. Among the first successful interventions was laparoscopic cholecystectomy—the removal of the gallbladder.

This method was first used in the late 1980s and quickly gained popularity. With the development of laparoscopic technology in the 1990s, video-assisted surgery became possible, allowing surgeons to see the surgical site on a screen.

Laparoscopic instruments, such as video laparoscopes mounted on stands, provided surgeons with a wide field of view and the ability to control the working instruments manually while manipulating them through small incisions.

Laparoscopic equipment includes several basic components: a laparoscope (a fiber-optic camera system); trocars (cannulas for accessing instruments); insufflators (for inflating the abdominal cavity with CO 2); light sources; and various surgical instruments such as scissors, graspers, and cauteries.

These tools are designed to allow safe operation in confined interior spaces while maintaining visual guidance and control.

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For biomedical engineers, laparoscopic equipment represents a significant advancement in medical device innovation. This includes mechanical design, optical systems, electronics, and patient safety technologies. The development, maintenance, and improvement of such devices depend on a clear understanding of their clinical applications and technical functions.

Laparoscopy has become the standard of care for procedures such as gallbladder removal, hernia repair, and gynecological surgeries, providing benefits for both patients and healthcare efficiency. As healthcare continues to demand safer, faster, and more effective interventions, the role of biomedical engineers in the development, maintenance, and improvement of laparoscopic systems remains critical.

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