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Intraoperative endoscopy: An important adjunct to gastrointestinal surgery☆

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ABSTRACT

Flexible endoscopy has become an increasingly important skill for gastrointestinal (GI) surgeons, and there is no setting more important than the intraoperative setting for surgeons to employ endoscopic techniques during the course of surgical procedures performed on the GI tract. Endoscopic confirmation of pathology before initiating surgery, intraoperative anastomotic evaluation and margin assessment, and combined laparoscopic-endoscopic approaches to patient care are just a few examples emphasizing the need for surgeons to perform GI endoscopy as a routine adjunct to foregut, bariatric, and colorectal procedures. Intraoperative endoscopy adds value in the operating room and holds the promise of improved surgical outcomes by providing useful clinical information important to point-of-service decision making that allows surgeons to address technical concerns before they manifest as post-operative complications.

1. Introduction

Much has been written in recent years about the flexible endoscope as a platform for natural orifice surgery and other exciting advancements in surgical endoscopy. These developments notwithstanding, most patients undergoing gastrointestinal (GI) surgery now and in the foreseeable future will be treated using laparoscopic or open surgery. Incorporating intraoperative endoscopy as a routine adjunct to GI surgery represents an opportunity for surgeons to improve outcomes for their current patients while preparing themselves for the myriad innovations based on the flexible endoscopy platform that 1 day may constitute a significant portion of their GI surgery practice.

When intraoperative endoscopy is performed during abdominal surgery, the surgeon is afforded an immediate opportunity to evaluate the surgical reconstruction. Would not all surgeons prefer to evaluate a freshly created gastric bypass for anastomotic leak immediately, using intraoperative upper endoscopy, when a leak could be addressed in minutes during the index operation rather than waiting for the results of a contrast swallow study scheduled for the next day. Routine intraoperative endoscopy is expected to improve the safety of GI surgery procedures by identifying potential postoperative complications intraoperatively, when their immediate correction precludes their postoperative manifestation and represents an important adjunct to all operations of the GI tract.

2. General considerations

2.1. Training and credentialing

Performing intraoperative endoscopy requires education and training in each of the procedures to be offered. Competency may be achieved through formal training during surgical residency, fellowships, or appropriately structured alternative pathways designed to confer the knowledge and skills required to perform high-quality endoscopy. Educational programs such as the Fundamentals of Endoscopic Surgery developed by the Society of American Gastrointestinal and Endoscopic Surgeons provide all endoscopists with a sound didactic foundation combined with skills measurement utilizing a validated assessment tool. Surgeons who perform intraoperative endoscopy should be credentialed for these procedures in a manner consistent with professional society guidelines and uniform institutional standards.

The surgeon also should have a complete understanding of the additional risks introduced by combining an endoscopic procedure with the operation in progress so that appropriate measures can be taken to ensure patient safety during the procedure, and a heightened awareness for complications, albeit uncommon, should be maintained perioperatively.

In addition to surgeon preparedness, the operating room staff also must be experienced in the setup, use, aftercare, maintenance,

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and troubleshooting of endoscopic equipment and the adjunctive tools commonly utilized during endoscopic procedures. Some institutions arrange for dedicated endoscopy nurses to assist these procedures whereas others train operating room personnel in these methods. Whatever methodology is selected, arrangements should ensure appropriate staffing to the level required to provide optimal service to the patient and assistance for the surgeon.

2.2. Patient preparation and consent

Whenever intraoperative endoscopy is planned as a potential adjunct to surgical intervention, the surgeon should educate patients about its value and the opportunity to improve the surgical outcome, as well as potential hazards and any special preparations that would be necessary. No additional preparation other than maintaining themselves nil per os before surgery usually is required for patients undergoing foregut procedures where transoral endoscopy serves as an adjunct to esophageal, gastric, and small bowel surgery. Despite the increased risks of pulmonary aspiration, emergency operations are rarely delayed because the patient has a full stomach; however, this finding would very likely preclude the performance of intraoperative endoscopy as part of some emergency procedures.

The role of mechanical bowel preparation before colon surgery has been questioned in recent years with infection rate, cost, and patient compliance being the focal points in the debate. The routine planned use of intraoperative colonoscopy during operations of the colon and rectum obviates this debate; if intraoperative colonoscopy is to be performed safely and effectively, preoperative mechanical bowel preparation is required.

2.3. Selecting endoscopic equipment

Although endoscopic equipment routinely may be used in other areas of the facility, like in the GI endoscopy suite, operating rooms should have access to equipment dedicated for intraoperative use. In this way, patient care is not delayed, time under anesthesia is not prolonged waiting for equipment to become available, and the surgeon is not distracted from the routine performance of surgery while additional equipment is being maneuvered into place for later use. In addition, as the endoscope might be needed at the beginning and the end of the operation, and in many circumstances throughout the procedure, the endoscopic equipment should be made available to the surgeon from the outset and for the entire duration of the planned procedure.

The most basic mobile endoscopy cart capable of facilitating intraoperative diagnostic endoscopy is equipped with a central processing unit and light source, video monitor, upper endoscope, and colonoscope. More typical setups include still image and video recorders, a networked computer for documentation in the electronic medical record, carbon dioxide insufflation devices, dedicated electrosurgical units designed for endoscopy that include argon plasma coagulation, and a variety of endoscopes and compatible therapeutic accessories such as snares, clips, forceps, electrosurgical devices, and injection needles. It is noteworthy that carbon dioxide insufflation is an important adjunct to intraoperative endoscopy, especially during laparoscopic surgery, because its more rapid absorption lessens the risk that distended bowel would interfere with the primary surgical objective or force conversion to open surgery. Figure 1 displays an equipment cart suitable for performing the full range of intraoperative endoscopy.

When an institution is selecting endoscopes to purchase for intraoperative use, it must consider the types of surgical procedures where intraoperative endoscopy would be utilized. For example, if the institution mainly performs surgeries for benign and malignant foregut disorders, such as antireflux surgery, Heller myotomy, and esophagogastric resections, then a standard gastroscope is likely to constitute a reasonable purchase, as it is what would be used during these procedures and it can also be used to inspect low rectal and left colonic anastomoses. Institutions where specialists in inflammatory bowel disease frequently refer patients for minimally invasive small bowel surgery might prefer the pediatric colonoscope instead, as it can be passed transorally for intraoperative enteroscopy, used as an upper endoscope if needed, and can be used for complete colonoscopy as well. When prepared properly, almost any flexible endoscope can be used transabdominally as well. Most institutions find that having access to a variety of endoscopes facilitates a broad range of operations where intraoperative endoscopy is utilized, although a gastroscope and pediatric colonoscope in combination cover most basic needs.

Fig. 1. Fully equipped mobile endoscopy cart for performing intraoperative endoscopy; includes carbon dioxide insufflation device.