SELF-STUDY SERIES

Cleaning, inspecting and maintaining laparoscopic instruments

by Matt Rudolph, CCSVP

T
oday’s healthcare calls for reducing patient discomfort, helping to assure fewer complications and offering surgical options with shorter recovery times. This patient-centered environment provides an opportunity for surgeons to develop progressively less invasive laparoscopic surgical procedures. In turn, new minimally invasive methods often require more complex surgical tools. Since sterile processing professionals must handle and disinfect these devices effectively, it is helpful to gain a deeper understanding of this type of instrumentation and the procedures for which they are used.

Laparoscopic instruments are used to perform minimally invasive surgical procedures. These very narrow instruments, usually just 5mm to 10mm in width, offer the primary advantage of smaller incisions, whereas “open surgery” is done through larger incisions and involves the hands of the surgeon utilizing traditional surgical instruments. The result of laparoscopy is shortened recovery times, reduced scarring and less pain. Shorter hospital stays also allow for laparoscopic surgery to be performed on an outpatient basis. Additionally, due to the reduced exposure of internal organs to possible contaminants, there is a reduced risk of hospital-acquired infections (HAI).

Types of laparoscopic surgery include removal of the gallbladder, appendix (appendectomy), adrenal glands, spleen, colon or small intestine, as well as gastric banding, gastric bypass and hernia repair, to name a few. The earliest documented laparoscopic surgeries date back to the early 1900s and initially consisted of rudimentary designs. As technology evolved, cameras and video were added, leading us to today’s laparoscopy involving robotics and live surgeries broadcasted via the internet. The ability to perform these operations now allows the patient to return to normal activities faster, and with less likelihood of complications.

A laparoscope is a device with tubes, or lumens, that are inserted into a body orifice or a tiny incision to access structures or internal organs. Devices such as laparoscopes, arthroscopes and cystoscopes often have rigid tubes. Endoscopes such as angioscopes, bronchoscopes and hysteroscopes typically have more flexible lumens, and semi-rigid endoscopes such as ureteroscopes allow some movement.

Laparoscopic surgery, also called minimally invasive surgery or MIS, involves making one or more small incision(s) near the patient’s navel to allow a laparoscope to be inserted. Laparoscopy is also called “keyhole surgery” because surgeons use instruments manipulated from outside the patient’s body to perform the surgery rather than having their hands directly inside the body. There are also some procedures that combine the use of laparoscopic instruments with an enlarged incision to permit direct access to the surgical site. This is necessary, for example, when the size of the organ is too large to be removed through the trocar (a narrow hollow tube used to remove tissue).

A laparoscope contains a telescopic lens system that is typically connected to a video camera that projects images to one or more video monitors. It also includes a fiber optic cable system that provides “cold light” to illuminate the surgical site and the patient’s abdominal and pelvic organs. Several types of instruments (operating tips) including scissors, graspers, forceps and dissectors are used in the same manner as they would be used during an open procedure, but they are designed to fit through the trocar and extend into the abdominal cavity from the skin’s surface. Some laparoscopic dissectors and scissors also use monopolar or bipolar electrical circuits to cauterize tissue and reduce bleeding. Laparoscopic instruments may be disposable, reusable, reposable (reusable instruments with disposable cutting or coagulation tips) or a combination of these alternatives.

Laparoscopic devices also include such components as insufflation (inflating with gas) and suction-irrigation systems.
In addition, a multi-shelf video cart or ceiling-mounted equipment management boom holds a primary video monitor, light source, camera, printer and insufflator. A bi-polar electrosurgical unit, post-irrigation system and other equipment might also be included, and a second cart or boom with a second monitor is normally located on the opposite side of the operating room table to allow the surgical team on that side of the table to view the procedure. Monitors are connected through a cable system that carries the signals.

**Inspection, testing and cleaning**

Below are a few tips on laparoscopic instrument inspection, testing and cleaning. Note that traditional laparoscopic instruments include newer generations that can be completely disassembled, older second generation models that feature a cleaning port and first generation patterns that are very difficult to clean. With that in mind, it’s important to assess your laparoscopic instrument sets, promote thorough staff education and engage in a proactive preventive maintenance program with your instrument repair vendor to help identify your lap instruments and any potential issues. By sharing education with surgery and sterile processing departments, patient safety will increase and costs will decrease as a result of discovering minor repairs before they become major or worse — introduce potential liability issues.

To test laparoscopic insulation, visually inspect the entire shaft for any nicks or cuts. A laparoscopic insulation testing device can assist you with this step. This device will help detect compromised insulation. Next, pull back on the insulation from the distal tip toward the handle. If the insulation slides back, revealing a gap between the insulation and the distal tip, then the instrument is in need of re-insulation and should be removed from service.

To determine if the inner linkage is worn, stretched or fatigued, move the drive-ring back and forth. If the jaw does not move, the linkage is more than likely damaged and is in need of repair. Simply put, as the ring-handle moves, the jaw should move as well.

To flush and irrigate laparoscopic instruments, connect a syringe to the irrigation port. With the distal tip under water, draw water into the instrument shaft from the cleaning sink. Thoroughly flush solution in and out of the instrument shaft.

When soaking laparoscopic instruments, placing them vertically in a soaking cylinder allows fluid to enter at the distal tip and rise up. Fluid will seek its own level, and this, in conjunction with the use of an enzymatic cleaner, will assist with the cleaning process.

As with all surgical instruments it’s beneficial to begin the cleaning process as soon as possible after surgery. Allowing blood to dry on or inside these complex instruments only makes the process of removing it more difficult prior to sterilization. The use of an enzymatic or moisturizing spray to help prevent blood from drying will start the cleaning process. If the instrument can be disassembled, follow the manufacturer’s instructions and learn how to properly disassemble, thoroughly clean and reassemble the device. The use of cleaning brushes will allow you to manually remove debris from instrument channels and will greatly assist you in the cleaning process. When cleaning any laparoscopic instrument shaft, note that the cleaning brush should always enter the proximal (handle) end and then completely exit the distal tip to effectively clean.

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Laparoscopic instrument sharpness test standards

To test sharpness of a standard laparoscopic scissor, blades should cut cleanly through one-ply thickness of facial tissue. Blades should open and close smoothly and be free of nicks and burrs. If the cutting action of the scissor snags or tears the tissue as it cuts, the instrument should be removed from service and sent for repair.

To test sharpness of a laparoscopic hook scissor, blades should cut cleanly through a standard, ¼-inch wide rubber band. Blades should open and close smoothly and be free of nicks and burrs. Again, if the cutting action of the scissor snags, binds or tears the rubber band as it cuts, the instrument should be removed from service and sent for repair.

Laparoscopic scissor and grasper testing and inspection

First, be sure that the laparoscopic scissor or grasper has been fully decontaminated and is safe to handle. Begin with an overall visual inspection of the instrument, including a thorough inspection of the insulation. Open and close the laparoscopic instrument to evaluate the action for smooth, proper operation. Learn to identify where cracks can occur and where blood and bioburden can be found. (See images top of next column.)

Education and preventive maintenance

This lap grasper was sent in to Spectrum Surgical Instruments for linkage repair. Upon evaluation, damaged insulation was removed, which revealed trapped bioburden. The instrument was photographed to help provide education to the customer.

Partner with your instrument repair vendor to establish a proactive approach to preventive maintenance. The benefits will pay high dividends in the way of instrument cost savings and improved patient safety due to the potential reduction of readmissions from hospital-acquired infections. Improved patient safety begins with education and the ongoing training of your staff to learn how to properly clean, inspect, test and identify potential issues, especially with hard-to-clean instruments such as laparoscopic instruments before they reach the operating room and come into contact with the patient. A successful preventive maintenance program will focus on specialty instrumentation, including rigid and flexible endoscopes, power equipment and laparoscopic instrumentation. The bottom line is that effective preventive maintenance paired with well-rounded staff education will help promote improved patient safety, reduce costs and insulate instrument budgets by helping to prevent costly repairs and replacement.

Matt Rudolph, CCSVP, Vice President, Education and Learning/Chief Customer Advocate has 20 years of experience in sales and training, including surgical instruments, surgical instrument accessories and the surgical repair process. Mr. Rudolph has extensive knowledge relating to the operating room theatre, sterile processing department, surgical technology and bloodborne pathogens. Having conducted more than 450 lectures worldwide, Mr. Rudolph has considerable expertise in delivering educational programs, which includes:

- 5th Middle East International Symposium in Riyadh, Saudi Arabia
- The Ohio State University Veterinary Hospital: Introduction to Small Animal Surgery
- International Association of Healthcare and Materials Management: Cleveland, Tri-State and Mid Ohio Chapters
- Stautzenberger College: Technician Accreditation Course

Actual blood/bioburden found inside an atraumatic lap grasper
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Circle the one correct answer:

1. Laparoscopic instruments are used for ____________ surgery.
   A. Open surgery
   B. Minimally invasive surgery
   C. Invasive surgery

2. Laparoscopic surgery cannot be done on an outpatient basis.
   True or False

3. Which generation laparoscopic instrument is easiest to clean?
   A. First generation
   B. Second generation with cleaning port
   C. Third generation take-apart

4. When testing laparoscopic insulation, if the insulation slides back, revealing a gap between the insulation and the distal tip:
   A. This indicates that the insulation is pliable, flexible and in good working condition
   B. The insulation will need to be replaced soon
   C. The instrument is in need of re-insulation

5. To test the linkage-function of a laparoscopic instrument, simply move the drive ring handle back and forth.
   A. True
   B. False

6. When cleaning laparoscopic instruments, the cleaning brush ____________.
   A. should only be used to clean the exterior
   B. must enter and completely exit the distal tip
   C. should not pass all the way through the instrument

7. To effectively flush and irrigate laparoscopic instruments:
   A. Soak the instrument in a basin overnight
   B. Connect a syringe to the irrigation port and flush thoroughly with solution
   C. Run the instrument under running water

8. One-ply thickness of facial tissue is used to test sharpness of a laparoscopic scissor.
   A. False
   B. True

9. A standard ____________ can be utilized to test the sharpness of a laparoscopic hook scissor.
   A. fingernail
   B. pencil eraser
   C. ¼-inch rubber band

10. Instrument education promotes which of the following?
    A. Improved patient safety
    B. Cost savings
    C. Reduction in costly instrument repairs and replacement
    D. All of the above

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