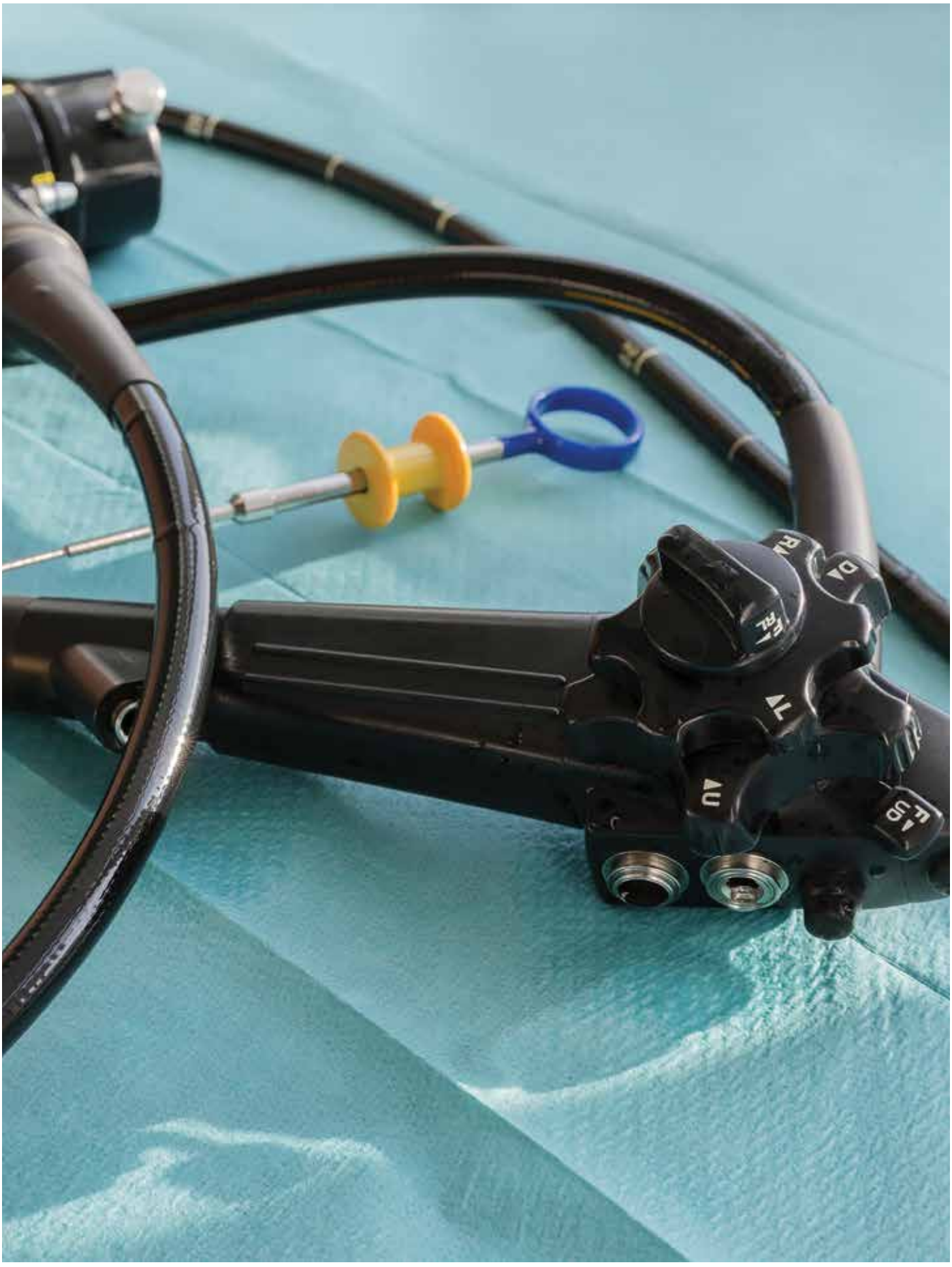
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CIS Self-Study Lesson Plan
Lesson No. CIS 259 (Instrument Continuing Education - ICE)

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Laparoscopic Instrumentation

LEARNING OBJECTIVES

1. Define minimally invasive surgery (MIS) and identify the different types of procedures
2. Discuss the basic types of laparoscopic instruments/equipment
3. Review the care and handling processes for laparoscopic instruments

Instrument Continuing Education (ICE) lessons provide members with ongoing education in the complex and ever-changing area of surgical instrument care and handling. These lessons are designed for CIS technicians, but can be of value to any CRCST technician who works with surgical instrumentation.

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THE USE OF LAPAROSCOPIC INSTRUMENTS FOR MINIMALLY INVASIVE surgery (MIS) has increased significantly across the world in the 20th century. MIS procedures allow the surgeon to perform a procedure without using a large incision. The advantages for the patient include smaller scars, less pain, faster healing, decreased hospital stays and less time off work. Despite these benefits over conventional surgical methods, processing complex laparoscopic instrumentation does pose some challenges for instrument technicians.

OBJECTIVE 1: DEFINE MINIMALLY INVASIVE SURGERY AND IDENTIFY THE DIFFERENT TYPES OF PROCEDURES

Unlike traditional (open) surgical procedures where the surgeon made a large enough incision to directly view the organ of interest, laparoscopic surgery involves the use of video cameras, rigid telescopes and long, thin instruments. Laparoscopic instruments in MIS procedures allow the surgeon to manipulate internal organs, and the video camera and rigid telescopes allow visualization inside the body; all of this is done through a tiny incision no greater than an inch long.

There are a variety of surgeries performed routinely through MIS procedures. Many types of specialty procedures (e.g., gynecological, thoracic, urological, and general) are performed using laparoscopic instruments. Laparoscopic cholecystectomy (lap chole), performed to remove the gallbladder that maybe be acutely or chronically inflamed, is the most commonly-performed procedure using laparoscopic instruments.

Other procedures that use laparoscopic instruments include the following:

1. Laparoscopic appendectomy, commonly known as a lap appy, is performed to remove the appendix. This is normally performed as emergency surgery for acute appendicitis.
2. Laparoscopic vaginal hysterectomy, commonly known as a LAVH, is performed to remove the uterus and uterine fibroids, and to treat endometriosis and oncological conditions.
3. Pelvic laparoscopy, also known as pelviscopy, is performed primarily for diagnostic procedures, and for gynecological and general specialties.

OBJECTIVE 2: DISCUSS THE BASIC TYPES OF LAPAROSCOPIC INSTRUMENTS/EQUIPMENT

The working ends of many laparoscopic instruments appear the same as their general surgery counterparts. The

differences in these instruments are the handles and long, thin shafts.

Instrument design has changed dramatically over the years. First-generation laparoscopic instruments were designed as a single unit that could not be disassembled, thereby, creating a major challenge for Central Service (CS) professionals to clean and inspect. Those concerns were expressed to instrument manufacturers and the issue was addressed. In second-generation instruments, a design change was made to provide a flush port. The flush port made the instrument a bit easier to clean; however, the cleaning process was still quite difficult. Third-generation instruments are still complex, although they feature multiple parts that can be disassembled for cleaning. These third-generation instruments may consist of two or three parts, including an instrument insert, handle and insulation tubes. Many facilities may have all three generations of instruments in the same set, so it is important to know how to process instruments from each generation.

Laparoscopic handles can be either ratcheted or non-ratcheted, and with or without rotary capabilities. They can also be bipolar or monopolar and may be detachable or permanently attached to the shaft. Figure 1 shows an assortment of handles.

Some patterns of laparoscopic instruments have detachable disposable distal tips. It is important that CS professionals are able to identify the difference between disposable and reusable tips.

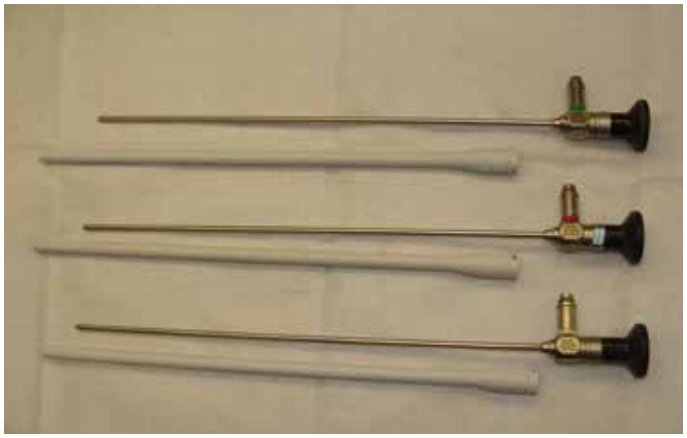
A variety of laparoscopic instruments provide different functions for the surgeon, such as scissors; forceps (bipolar, grasping and atraumatic); retractors (endoscopic); needle holders; electrodes; and suction-irrigation cannulas. Because the incision for laparoscopic procedures is so small, the surgeon requires instruments for visualization and transmission of light to the surgical site, such as rigid telescopes, cables and video cameras. The Operating Room (OR) maintains and houses halogen

FIGURE 1: Laparoscopic handles

FIGURE 2: Laparoscopic instruments

FIGURE 3: Camera

FIGURE 4: Telescopes



or xenon monitors that are used with this equipment during the procedure. Visualization instruments are constructed of glass rods, fiber optics, lenses and materials that can easily become nicked, scratched, dented, and/or broken. These instruments are expensive to purchase and improper handling can lead to high repair or replacement costs. Figure 2 shows an assortment of laparoscopic instruments. Figure 3 shows one type of camera. Figure 4 shows telescopes used in laparoscopic surgery.

OBJECTIVE 3: REVIEW CARE AND HANDLING PROCESSES FOR LAPAROSCOPIC INSTRUMENTS

It is important for instrument technicians to be competent in regard to the care and handling of laparoscopic instruments.

Upon receipt in the decontamination area, laparoscopic instruments should be separated according to the wash process that will be used. Any disposable tips left on the instruments should be discarded. Some instruments must only be manually cleaned, whereas other instruments may be mechanically cleaned after manual preparation. The device manufacturer's written Instructions for Use (IFU) for disassembly and cleaning should be carefully followed to help ensure the instruments are properly cleaned and not damaged. During disassembly, care should be taken to ensure all small parts (screws, nuts and washers) are contained to prevent loss. Many parts are non-interchangeable; these parts should be kept together to allow correct assembly after cleaning.

Laparoscopic instruments should be presoaked in the type of solution recommended in the manufacturer's IFU. Instrument technicians should ensure all cannulated instruments are filled with the solution. Whenever possible, cannulated instruments should be soaked in the vertical position to help keep the cannulations filled with the solution. If instruments cannot be soaked in this manner, the cannulations should be filled with a solution-filled syringe while the instrument is totally immersed and in the horizontal position. Solution should continue being added through the cannula until no air bubbles are seen exiting the end of the instruments. If air bubbles are left inside the cannula, they will prevent the soaking solution from coming in contact with all areas of the inner cannula. For second-generation instruments, it is important to flush with a syringe filled with the soaking solution because brushes do not fit through the flush port to the inside of the instrument. Flushing should continue until the exit solution is free of debris.

After soaking, technicians should carefully clean the instruments as instructed by the IFU. When cleaning any laparoscopic instrument with a cannula, it is important to choose the appropriate size brush to ensure contact with the inner walls of the lumen. The brush must also be long enough to go through the entire cannula and exit the opposite end. (See Figure 5.)

Instruments such as cameras, light cords and telescopes should be manually cleaned carefully, without immersing the instrument, unless otherwise stated in the IFU. Care should be taken not to drop or bump these instruments because they damage very easily.

All cleaned instruments should be rinsed thoroughly with tap water and then undergo a final rinse with treated water. Second-generation instruments should be flushed with the final rinse water until all cleaning solution is removed. Instruments that can be mechanically cleaned should be processed in the type of equipment and the cycles approved by the IFU. If using an irrigating ultrasonic cleaner or an irrigating manifold for a washer-disinfector, it is essential that the instruments are correctly attached to the irrigation lines. Technicians should ensure the instruments are placed in the equipment in such a way that they do not bump against each other and damage the insulation. If an ultrasonic cleaner is used, it is important to rinse the instruments before they are placed into a washer-disinfector. Instruments should be

FIGURE 5: Laparoscopic cleaning brush

FIGURE 6: Electronic insulation tester

lubricated in accordance with the IFU.

Inspection and testing is required for all laparoscopic instruments. This includes inspection for cleanliness, damage to the instrument, and functionality. Instrument technicians should carefully inspect for cleanliness all outside surfaces and lumens of each instrument. The black insulation requires especially careful inspection because residual soil is difficult to see. Special attention should also be given to spatulas and hooks, which are also very difficult to clean. The IFU should be reviewed and followed to help ensure proper inspection for inner shaft cleanliness for all second-generation instruments. Instruments that were disassembled for cleaning should then be reassembled. *Note: After assembly, if the handles or the instrument linkage appear loose or the distal jaws do not open when moving the handles, the instrument may not have been assembled correctly or the linkage could be damaged. If the instrument does open and close, but the linkage seems loose, the linkage may be damaged and the handle should be sent out for repair. During assembly, technicians should carefully inspect the insulation for nicks, holes or other damage. If damage is found, the insulated piece should be sent out for repair. Technicians should open and close all instruments to ensure the distal end opens and closes smoothly, and all ratchets should be checked to ensure the instrument locks appropriately. Reusable scissors should also be checked for sharpness using single-ply tissue paper. Flexible retractors should be checked to ensure they articulate properly.*

Insulated instruments should be checked for electrical leakage each time the instrument is processed. Technicians should gently pull down the insulation at the distal collar; if the insulation moves, the instrument should be sent out for repair. Electronic testing devices can detect microscopic holes in the insulation that could allow electrical leakage during use and harm to the patient. Figure 6 shows one type of electronic testing device.

Telescopes should be inspected to ensure the distal end has a clear, unobstructed image. It is important to consult the IFU for the proper testing method for each different type of rigid telescope.

Technicians should ensure all instruments are dry prior to packaging, unless otherwise stated in the IFU. Instruments should be disassembled for sterilization, unless the IFU states the instrument can be sterilized assembled. If placing instruments in a tray designed for laparoscopic instruments, the instruments should be placed carefully in the tray, without bending the instrument shafts. Telescopes and cameras should be placed in protective trays to keep them from being damaged during sterilization and transport. Light cords should be coiled loosely to prevent damage.

It is important to select the appropriate packaging material for the sterilization method to be used. Most laparoscopic instruments and cords (and some telescopes) can be sterilized using steam; however, some of these instruments require special cycles, so the IFU must be followed for proper sterilization parameters. Many telescopes and cameras, and some instruments, must undergo a type of low-temperature sterilization. It is essential that technicians use the sterilization type and cycle recommended by the device manufacturer.

CONCLUSION

Laparoscopic instruments are complex instruments that require meticulous training for proper care and handling. Central Service professionals will more likely face additional challenges as these instruments continue to evolve in an effort to provide better patient care. Technician competency for laparoscopic instrumentation is critically important, as is diligent adherence to manufacturers' IFU.

RESOURCES

- Swenson, D. *Laparoscopic Instruments.* CRCST Self-Study lesson plan #130. IAHCSMM *Communiqué*, May/June 2013.
- Schultz, R. *How to Test & Inspect: Laparoscopic Instruments.* Spectrum Surgical 2009.
- Swenson, D. *Laparoscopic Instruments: Cleaning and Testing Methods.* CRCST Self-Study lesson plan #139. IAHCSMM *Communiqué*, November/December 2014.

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CIS Self-Study Lesson Plan Quiz - Laparoscopic Instrumentation

Sponsored by: AESCULAP ACADEMY

Lesson No. CIS 259 (Instrument Continuing Education - ICE) • Lesson expires January 2020

OBJECTIVE 1

1. Cameras and rigid telescopes used in minimally invasive surgery:
a. Allow the surgeon to manipulate organs
b. Allow the surgeon to view inside the body
c. Are cleanable using a neutral-pH chemical
d. All the above

2. A pelviscopy is performed mainly for diagnostic purposes.
a. True
b. False

3. Laparoscopic instruments can be used in:
a. Thoracic and urological surgeries
b. Appendectomy procedures
c. Vaginal hysterectomy procedures
d. All the above

4. First-generation laparoscopic instruments have a flush port for cleaning.
a. True
b. False

OBJECTIVE 2

5. The difference between laparoscopic instruments and general surgery instruments is:
a. The distal tips
b. The sterilization method used
c. Laparoscopic instruments have long, thin shafts
d. All the above

6. There are now three generations of laparoscopic instruments. Third-generation instruments cannot be disassembled for cleaning.
a. True
b. False

7. Laparoscopic handles:
a. Are insulated to protect the patient
b. May be single-use items
c. May be ratcheted
d. All the above

8. The distal tips of laparoscopic instruments may have disposable tips that can be cleaned and reused a limited number of times.
a. True
b. False

9. Instruments used for visualization during minimally invasive surgery may have:
a. Fiber optics
b. Glass rods
c. Lenses
d. All the above

OBJECTIVE 3

10. All rigid telescopes may be immersed for cleaning.
a. True
b. False

11. Laparoscopic instruments that can be mechanically cleaned do not need manual cleaning.
a. True
b. False

12. Cannulated laparoscopic instruments should be vertically soaked, whenever possible.
a. True
b. False

13. When cleaning first-generation instruments, it is important to use a brush that is long enough to fit through the entire shaft.
a. True
b. False

14. All laparoscopic instruments should be tested for electrical leakage before presoaking them in the decontamination area.
a. True
b. False

15. Spatulas and hooks should be carefully inspected for:
a. Cleanliness
b. Fiber optic damage
c. Clear distal images
d. All the above

16. If an instrument does not open and close smoothly after reassembly:
a. The linkage may be damaged
b. The instrument should be replaced
c. The ratchet will not work properly
d. All the above

17. Most cameras can be sterilized using a special steam cycle.
a. True
b. False

18. All laparoscopic instruments that can undergo steam sterilization have the same sterilization parameters.
a. True
b. False

19. Instruments soaked in the horizontal position should be flushed with a syringe and solution to remove any trapped air bubbles.
a. True
b. False

20. To check laparoscopic scissors for sharpness, technicians should use:
a. Single-ply yellow test material
b. Single-ply red test material
c. Single-ply tissue paper
d. None of the above

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