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Surgical Instruments: Care, Preventative Maintenance, and Repair

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Surgical Instrument Care: Preventative Maintenance and Repairs

Speaker Biography

- Peter Daigle CSPDT
- 24 years experience and is currently supervisor of sterile processing in Connecticut.
- Current president to the IAHCSMM Connecticut Chapter of sterile processing.
- Helped pass the sterile processing bill in Connecticut.

- Instructor of sterile processing at Tunxis Community College.
- Wrote articles on decontamination that was published in the Outpatient Surgery Magazine, also it was referenced in the CBSPD technician book.
- On the AAMI ST 79 work group

Objectives

- Different types of instrument damage
- Importance of a preventative maintenance program (PM)
- Testing of different types of surgical instruments
- Factors that results in instrument damage

Objectives

- When dealing with surgical instruments, there is never any room for compromise.
- Every instrument that goes in a set or single pouch, must be in perfect working order. If not it can potentially have a negative impact on the patient.
- The instruments must be inspected and tested for functionality on the assembly table before further processing.
- Think about, who the instruments are going to be used on……. Mom, Dad, loved one etc……

Objectives

- Surgical Instruments represents a major dollar investment for the facility.
- The IFU's must be followed for every instrument to be processed.
- Instruments must be used for their specific purpose.
- Instruments that are no longer functioning can be repaired by a vendor saving the facility money from ordering a new one.

Types of Damage

- There are two types of instrument damage

1. Immediate damage impairs the instruments function. A forcep with bent tips or dulling scissors can render an instrument unusable or impact it's performance.

2. Long-term damage shortens the instruments useful life. Instruments exposed to saline can lead to pitting or corrosion making the instrument unrepairable.

Preventable Damage

- With proper care and handling, most surgical instruments will be useable for 20 years or more. Ways to prevent damage to Instrumentation:
  - Use instruments only as intended
  - Never dump instruments from tray
  - Keep instruments as clean as possible during use
  - At the end of the procedure, instruments should be placed in their containers

Preventable Damage

- Never place heavy instruments on delicate items
- If protective container is used, place instruments in their designated locations
- Do not stack instruments
- Protect delicate instruments with tip protectors (per IFU)
- Place heavier instruments on the bottom of the container when assembling
- Do not use a metal bristle brush on surface for cleaning. This will ruin the passivation layer.
- Set up a preventative maintenance program with a repair company

Preventative Maintenance Program (PM)

- Departments should set up a PM program with their repair vendor.
- A PM program will keep surgical instruments in good working order, sharps will be sharpened, and a closer inspection of instruments to ensure that they are not pass their use life.
- The program should be on the needs of the facility
- A numbering system should be set up on the sets and record keeping taken to keep track of what sets were sent out last.

Preventative Maintenance Program (PM)

How to Identify Issues and Test Instruments

- **Scissors**: are cutting instruments are often referred to as sharps. Scissors should be used for their intended use or damage can occur.
  1. Look for any dings or chips in the blade
  2. Never run your fingers across the blade

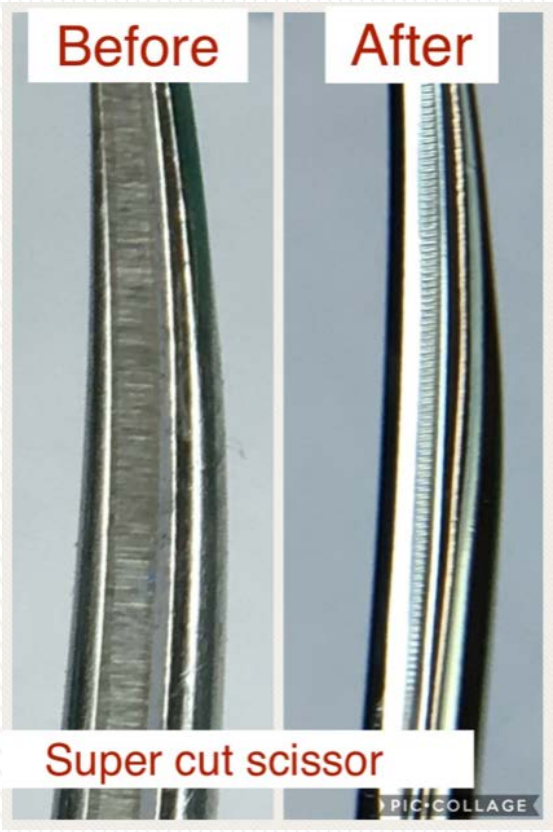
  Testing- Use a piece of latex to test
  - a) make sure not to put any tension on the latex
  - b) Just use the distal third of the blade
  - c) Burrs will catch the latex and pull it
- Remember that the latex test is just a guideline. Most scissors should cut the latex easily.

How to Identify Issues and Test Instruments

Super Sharp Scissors- Are identified with black finger rings. One edge of the blade will have serrations.

Tungsten Carbide Scissors- Are identified with gold finger rings. The scissor will have tungsten carbide edges.

Super Sharp Scissor the left has not been repaired correctly. The one on the left with the serrations was correctly repaired.



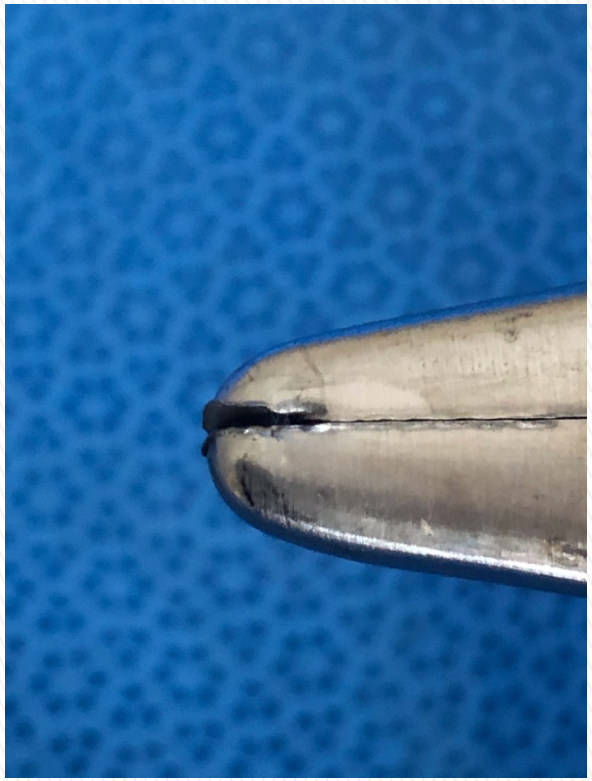
How to Identify Issues and Test Instruments

- **Rongeurs:** are manually operated instruments used for cutting or biting bone. Rongeurs are also referred to as double action. Mostly used in orthopedic and neurosurgical cases.
  1. Tips should be inspected to ensure cutting surface meets evenly
  2. Ensure that it opens and closes easily
  3. Ensure that all the screws are tightened. If place in the ultrasonic machine the screws can come loose.
  4. Check for cracks near the screw.

  Testing- Use a business card to ensure the cutting ability of the rongeur.
  - Only use the tips of the jaw when testing
- Rongeurs must be used for their intended use
- Difficult to clean and decontaminate due to their design

How to Identify Issues and Test Instruments

Rongeur with flat cutting surface



Damaged rongeur that was used to remove a pin

How to Identify Issues and Test Instruments

- **Kerrison Rongeurs:** are manually operated instruments used for cutting or biting bone used in spinal surgery where the cuts needs to be precise in a restricted area. They come in single or double action.
  1. Inspect for dings and dents in jaw
  2. Ensure it opens and closes smoothly
  3. Check springs are not cracked
  4. Ensure that all the screws are tightened. If place in the ultrasonic machine the screws can come loose.
  5. Lubricate per IFU's

How to Identify Issues and Test Instruments

- **Kerrison Rongeurs Con't**

  Testing- Test cutting with a business card making sure to test top and sides.

- Kerrisons come in ejector take apart models or in one piece models. They are very difficult to clean due to their design. The technician needs to thoroughly educated on how to take apart and reassembly of the ejector.
- Kerrison Rongeurs are indicated for cervical and lumbar procedures. To prolong the life they must be used as intended.

How to Identify Issues and Test Instruments

Take Apart Kerrison

Non Take Apart Kerrison

Non Take Apart Kerrison Being Repaired

How to Identify Issues and Test Instruments

- **Curettes and Osteotomes**: are used to shave or remove sections of bone

  1. Look for any flaws on the edges such as dings or dents

  Testing- using a syringe rub the using end of the instrument along side the syringe. Look for thin shards coming off the handle of the syringe.

How to Identify Issues and Test Instruments

- Osteotomes before and after repair

How to Identify Issues and Test Instruments

- **Hemostats:** are referred to as clamps or forceps. They consists of ring handles, shanks, box locks, and jaws. They are primarily used for clamping tissues or blood vessels.
  1. Ensure that the jaws close evenly with no gaps
  2. Make sure that the box lock is not cracked or any other part of the instrument. If it is it is unrepairable.
  3. Make sure tips are not bent or broken.
  4. Make sure the hemostat opens and closes easily. If not, lubricate per IFU's.

How to Identify Issues and Test Instruments

- **Hemostats Con't**

Testing- close the hemostat on the first ratchet. Holding the instrument at the tips, and gently tapping the handle on the table. The instrument should not open. If it does it needs to be sent out for repair.

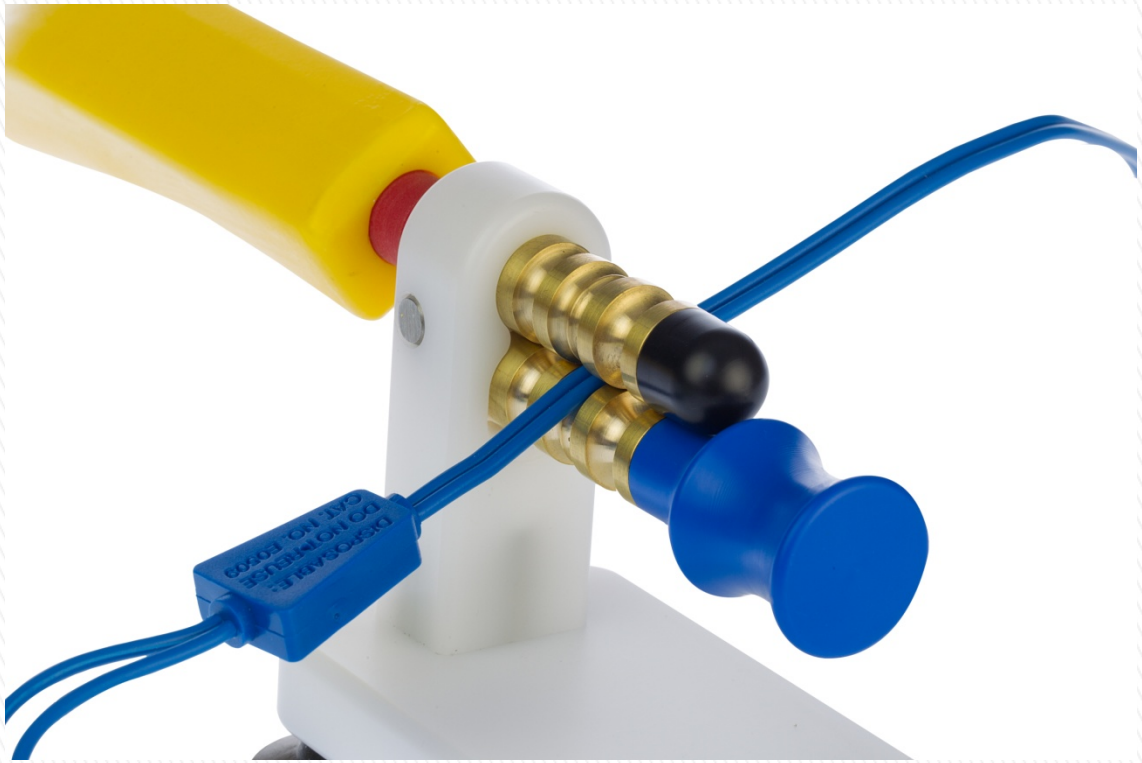
How to Identify Issues and Test Instruments

- **Forceps:** are used to firmly grip tissues and not damage it.
    1. Use a lighted magnifying lamp to check for missing teeth
    2. Tips meet together evenly
    3. Make sure that there are no cracks in the forcep
    4. Make sure the forcep is not sprung

Testing- If the forcep has insulation and Mono or bipolar cord it must be tested using a “lap tester”. It is crucial that a lap tester is used for the safety of the patient and operative team. If there is a hole in the insulation it can be sent out for repair and be reinsulated. This testing should be used on every mono and bipolar cord used.

How to Identify Issues and Test Instruments

Forcep Insulation Testing



Mono or Bipolar Cord Testing

How to Identify Issues and Test Instruments

- **Needle Holders:** are used to hold the suture needle while suturing. Needle holders with gold rings have tungsten carbide inserts to hold the needle better.

  1. Close the needle holder tightly. Then hold it up to the light. If the jaws are worn light will pass through the tip of the needle holder.
  2. Perform ratchet test similar to the hemostat.
  3. Make sure it opens and closes easily

How to Identify Issues and Test Instruments

- **Needle Holders Con't**

  4. Inspect tungsten carbide insert for cracks or missing pieces. If so need it can be replaced.

  5. Check for any cracks on the instrument.

Testing– Carefully place a suture needle in the jaw and close tightly. With another needle holder grab the suture needle then twist and pull. If the needle moves then the needle holder has to go out for repair.

How to Identify Issues and Test Instruments

- **Suction Tubes**: are used to remove blood, tissue, and fluids from surgical site to allow the surgeon a clear view.

  1. Ensure that there are no cracks on the instrument

  2. Inspect the distal end of the suction especially fraziers. While being used the surgeon can nick the end leaving a rough surface. It is critical not to put the suction back in the set.

How to Identify Issues and Test Instruments

- **Laparoscopic Instruments:** are used for a surgical procedure performed through very small incisions.
    1. Ensure the handle is working and the jaws open and close.
    2. If the instrument has a rotating jaw ensure that it rotates
    3. Make sure slide lock grasper is working
    4. Inspect for any cracks on the instrument using a light magnifying lamp
    5. Inspect for any visual defects of the insulation and make sure the insulation didn't shrink from the grasper

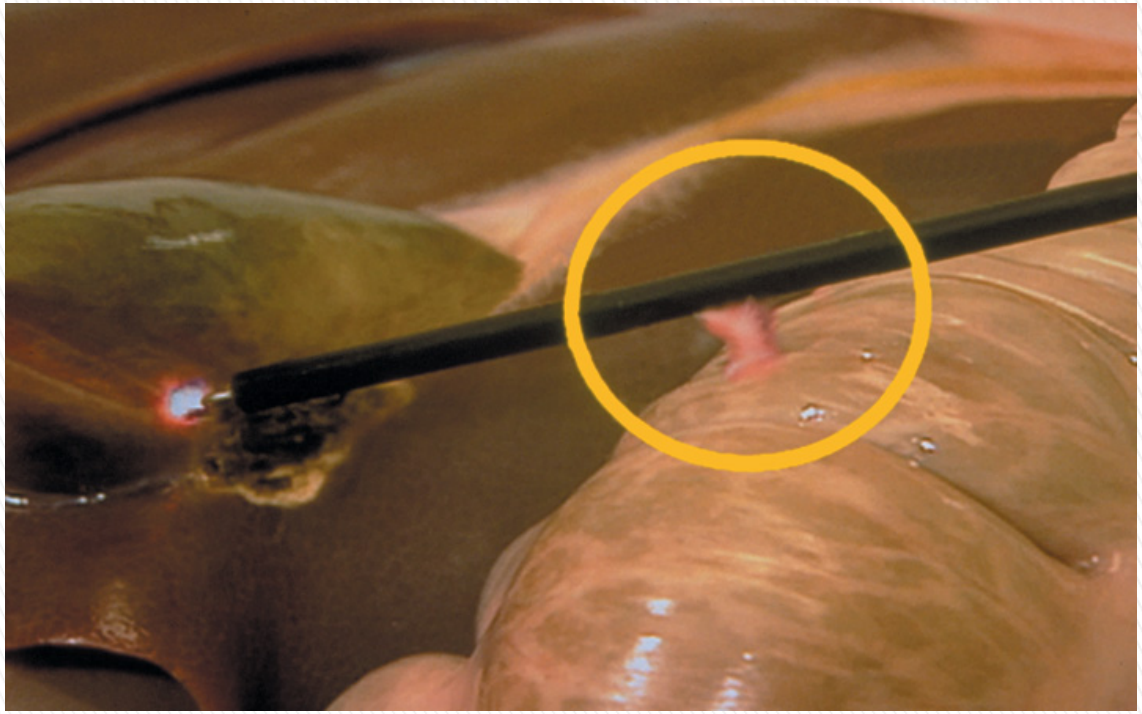
How to Identify Issues and Test Instruments

- **Laparoscopic Instruments Con't**

  Testing- Insulation must be tested for every instrument every time it is used using a "lap tester". It is crucial that a lap tester is used for the safety of the patient and operative team. Holes in the insulation might not be seen by the naked eye. If the insulation fails it can be sent out for repair and be reinsulated. This testing must be recorded during the assembly process.

How to Identify Issues and Test Instruments

Laparoscopic Testing



Result of Insulation with Hole in Instrument

How to Identify Issues and Test Instruments

- **Retractors:** are used to hold an incision open or to hold other organs or tissue out of the way during surgical cases. There are many type of retractors which are used for specific purposes.

  1. Inspect retractors for any cracks, missing screws, broken welds, levers, burrs, nicks, and loss of plating. More attention should be given to malleable retractors.
  2. Make sure all ratchets or thumb screws are working on all self retaining retractors.
  3. Use a lighted magnifying lamp to inspect for any defects.

How to Identify Issues and Test Instruments

- **Retractors Con't**

  Testing- To test certain retractors put on a pair of examination gloves. Hold the retractor above a white piece of paper. Aggressively rub the instrument over the paper. If there metal flakes on the paper remove the retractor from service.

How to Identify Issues and Test Instruments

- **Lenses and light cords:** are used in to go deep inside the body for a procedure. These items are used in conjunction with laparoscopic instruments.

    1. Make sure that there are no cracks in the eyepiece, and objective lens.
    2. Make sure that the telescope is not bent
    3. Hold the lens to the light and make sure it is not foggy
    4. Make sure that there is no visual damage to the light cord.

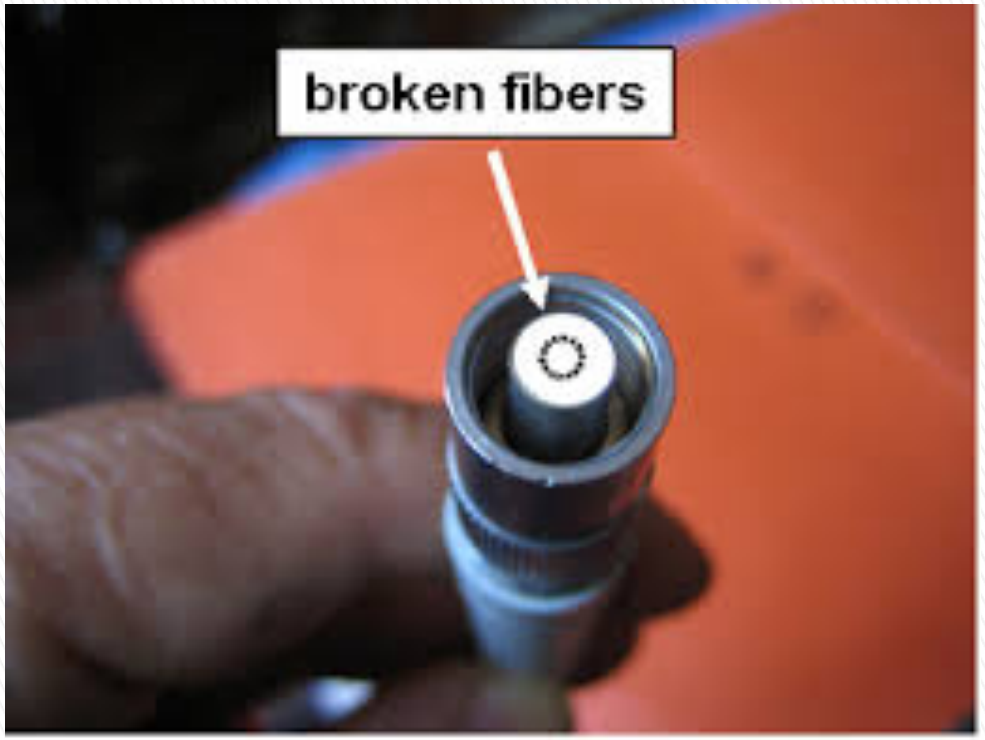
How to Identify Issues and Test Instruments

- **Lenses and Light Cords Con't**

  Testing–hold the lens 3 inches above a printed piece of paper. Move it carefully closer about one-quarter inch. The writing on the paper should be visible. Manufactures currently offer a scope tester to be used for testing.

  For light cords hold one end up to the light. Look into the other end. If the light goes through it can be put back into service. If there are black dots then the fiber optics are bad and needs to go out for repair. Manufactures currently offer a fiber optic tester to be used for testing. It is important to follow the IFU's for testing.

How to Identify Issues and Test Instruments



Lens Tester

Broken Fiber optics in Light Cord

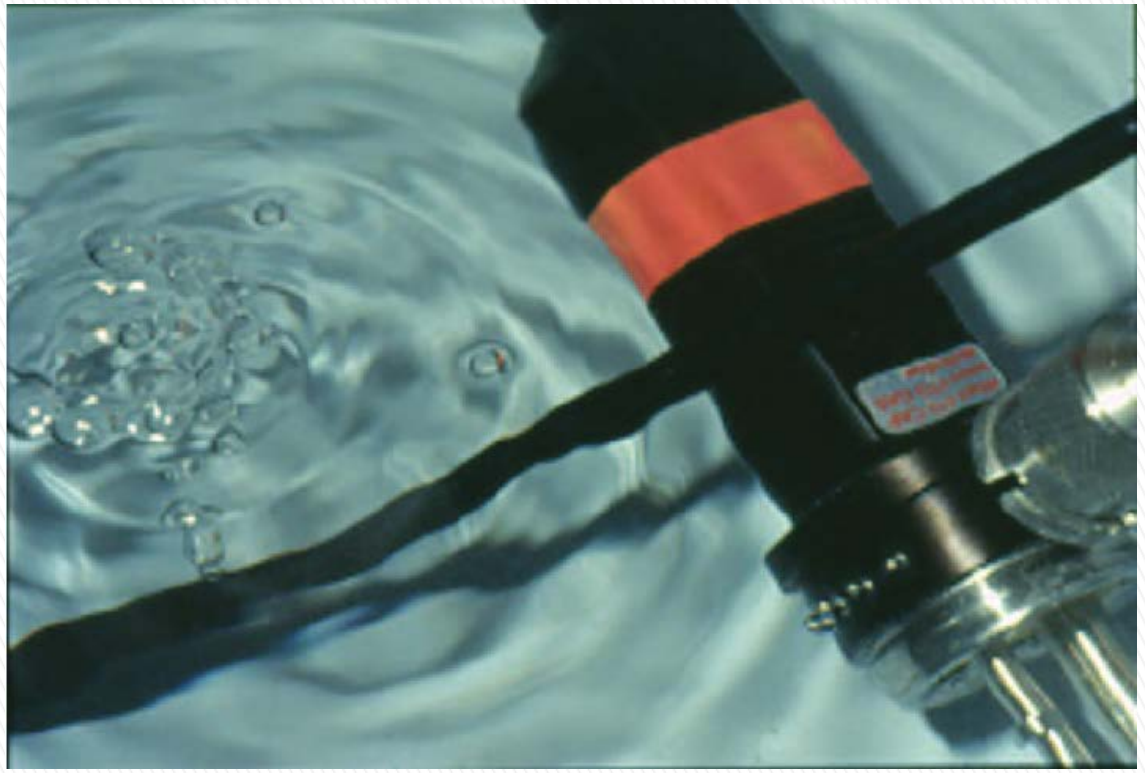
How to Identify Issues and Test Instruments

- **Flexible Endoscopes:** are used in to go deep inside the body for a procedure.
    1. Using a lighted magnifying lamp check for cracks or defects.
    2. Ensure that the endoscope is moving properly using the lever at the proximal end.
    3. Visualize through the eyepiece to make sure it is not cloudy if possible.

Testing- Is required for every scope. If there is any breach in the insulation and the leak test fails it must immediately go out for repair. There are 2 methods of leak testing. The wet or dry method. The IFU's for which form of testing and proper handling of a failed scope to go out for repair should be followed.

How to Identify Issues and Test Instruments

Dry Method of Leak Testing



Wet Method Failed Leak Test

Care and Handling of Instruments

- Lubricant can be used on instruments that are stiff. This is accomplished through the washer/disinfector or manually. If it is done manually the IFU's for the lubricant and instrument must be followed. The lubricant must be water soluble. It also must be kept in a bin with a cover labeled as such with the date that is was poured in the assembly area (Check IFU for expiration date). The instrument must never be soaked in the lubricant. It should be dipped in it. After this process the instrument should not be wiped or rinsed off. Doing so will negate the process. There after check the instrument again for stiffness. Repeat the step if need be.

Care and Handling of Instruments

- During the manufacturing process the last step for the instrument is called the passivation process. This process uses chromium oxide that hardens on the instrument and acts like a protective layer. If the passivation layer is ruined it can ruin the instrument.
- Factors damaging the passivation layer include:

  Improper handling, using improper cleaning agents or chemicals, residues from reusable textiles, hard water deposits, and using the immediate use sterilizers. Ultrasonic cleaning also can ruin this layer.

Care and Handling of Instruments

- Other factors

  Spots on an instrument can be removed by wiping it with cloth or using and eraser. Please note if using an eraser the eraser marks must be removed.

  Utility water can also stain an instrument. Water contains high concentration of minerals. Rinsing with critical water eliminates such deposits.

  Drying will also decrease spotting on instruments. Instruments must be thoroughly dried with a non-linting towel. Air drying will allow spotting or rusting.

Care and Handling of Instruments

- **Other Factors Con't**

  Staining on the surface of the instrument can not be removed. One of the common cause of this is mixing dissimilar metals. This process is called electrolysis. This happens when surgical grade instruments are mixed with floor grade instruments.

  Black or rust colored stains can be caused by highly alkaline detergents.

  Using any strong substances such as acid or alkaline based solutions can lead to staining.

  If this occurs and investigation will have to take place to figure out the reason.

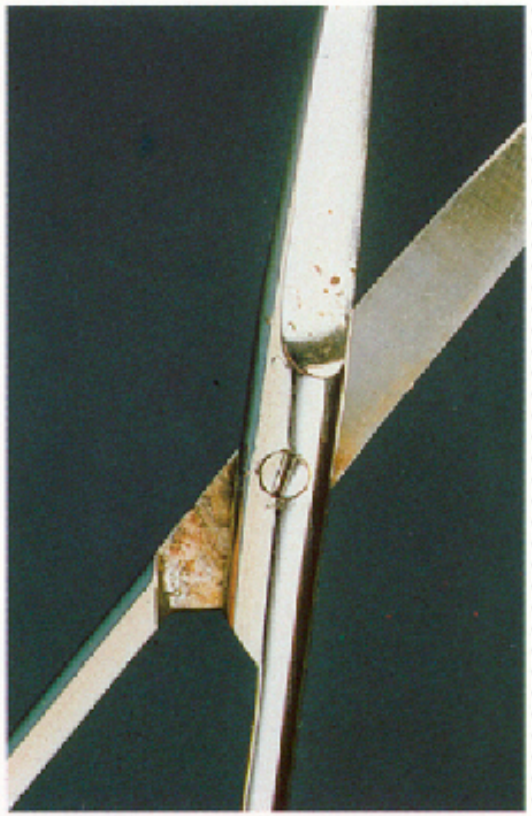
Care and Handling of Instruments

- **Other Factors Con't**

  Pitting is caused by exposure to blood, solutions containing chloride or bromide. Pitting is highly localized corrosion of stainless steel. This defect looks like black holes on the surface of the instrument. Once this happens the instrument is beyond repair. Making point of use cleaning a critical step to avoid this from occurring.

Care and Handling of Instruments

Pitting



Staining

Things to consider when choosing a repair company

- Company emphasizes quality and guarantees its services
- Company provides in-servicing and training
- They need to work around your schedule, not the other way round
- Turnover time and 7 days a week availability
- Inspection, preventive maintenance, and repair history reports provided
- CONVENIENCE (who is the customer)
- Communication with the customer

Things to consider when choosing a repair company

- Just because a repair technician has been repairing instruments for years doesn't necessarily mean that they are good.
- There are many repair companies in the market. Choosing the right one will benefit your department, surgical suit, and the patient
- Proper care, handling, and following IFU's will prolong the instruments useful life.

Resources

- AAMI ST79
- IAHCSMM Central Service Technical Manual (7th edition)
- CBSPD The Basics of Sterile Processing Text Book (7th edition)
- Instrument Reprocessing- Reprocessing of Instruments to Retain Value (10th edition)

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