Modern technology has produced tremendous innovations in ophthalmology over the last several decades, yet the creation of precision ophthalmic surgical instruments still requires old-fashioned craftsmanship. Quality is not something that’s added after production, but an integral part of every phase of the production process from shaping the steel to final finishing under the microscope.

The skill of highly trained craftsmen and the time devoted to every detail is directly reflected in the quality of the instrument and its price. The purchase of quality instruments represents a significant investment for the surgeon or the surgical facility. To protect that investment, it is important for everyone who handles these delicate eye instruments to be well informed about proper procedures for care and handling.
The care of delicate surgical instruments should start as soon as you receive them. Reputable instrument manufacturers make every effort to supply you with perfect instruments, but they're only human. Therefore, each instrument should be removed carefully from its container and examined under magnification, preferably a microscope, to ensure that it is in perfect condition. If a problem is found, you should notify the manufacturer immediately. Once the instrument has been examined and accepted, it should be cleaned before placing it in the sterilizing tray.

Most surgical instruments today are made of stainless steel. Stainless steel is an alloy, consisting of various elements that make it extremely resistant to staining and corrosion. Remember, however, that the phrase “stainless steel” really means that these steels “stain less.” They are not “stain-free” or “stain-proof.”

Of the many different types of stainless steel, those used for surgical instruments generally fall into two basic categories:

- **300 series steel** (austenitic) contains no carbon and is considered the most stain-resistant of all steels. However, because it doesn’t contain carbon, it can’t be hardened. It is commonly used in hospitals for sinks, basins and sterilizing containers. In ophthalmology, it is typically used for making eye speculums and handles for instruments, such as hooks, retractors and knives.

- **400 series steel** (martensitic) contains a small percentage of carbon and thus can be hardened. The percentage of carbon content determines its hardness; the more carbon, the higher the attainable hardness. Steels with a lower percentage of carbon are typically used for making forceps, needle holders and hemostats. Steels with a higher percentage of carbon are used for scissors and cutting instruments. That explains why forceps and needle holders tend to be more resistant to staining than scissors.

400 series steel must be heat-treated to attain the desired degree of hardness. For instance, if a pair of scissors were produced from 400 series steel, but not heat-treated properly, its cutting edges would become dull very quickly.

During the manufacturing process the steel is milled, filed, ground, polished and brushed, all of which disrupts the steel surface. After final finishing, the instrument is exposed to an electropolishing process to reseal its surface. This process greatly enhances the ability of the instrument surface to resist corrosion.

Materials

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New Instruments

The care of delicate surgical instruments should start as soon as you receive them. Reputable instrument manufacturers make every effort to supply you with perfect instruments, but they’re only human. Therefore, each instrument should be removed carefully from its container and examined under magnification, preferably a microscope, to ensure that it is in perfect condition. If a problem is found, you should notify the manufacturer immediately. Once the instrument has been examined and accepted, it should be cleaned before placing it in the sterilizing tray.

Katena Eye Instruments . . .
Manual Cleaning

Thorough cleaning, rinsing and drying will contribute significantly to the useful lifespan of your instruments.

1. Do not allow medicines, irrigating solutions (saline) or protein residue to dry on instruments. Immediately after surgery, rinse all instruments in the surgical tray with distilled or demineralized water, including those that were not used.

2. Do clean instruments with a mild soap solution and gently scrub stubborn stains with a soft toothbrush, paying particular attention to joints, box locks and serrations, which are prime locations for corrosion to develop.

3. Do not use metal brushes, steel wool or abrasive powders that will seriously damage the surface finish of instruments, making them much more susceptible to corrosion.

4. Do thoroughly rinse instruments with distilled or demineralized water, followed by drying, before returning them to the instrument tray for storage. Instruments may be dried using a lint-free cloth or a hot-air blower.

Lubrication

1. Delicate microsurgical instruments should not require lubricating baths, however, it is strongly recommended that all moving parts, box locks, joints and catches be lubricated after cleaning. Always use lubricants that can withstand the high temperature of autoclaving, such as silicone or Teflon sprays. Never use ordinary lubricant oils as they can become gummy when exposed to autoclaving temperature.

2. If lubricating baths or dips are used, it is absolutely essential that the instruments be totally free of stains and corrosion. Covering corrosion on the instruments with a lubricating dip, especially in joints and box locks, seals in the corrosion and allows it to aggressively attack the steel during autoclaving, ultimately resulting in frozen or even cracked joints and box locks.
All microsurgical instruments should be inspected under magnification at the end of each surgical day to be sure they’re in perfect working condition. Damaged instruments (bent tips, misaligned jaws, etc.) should be removed from the set and repaired or replaced. It’s strongly recommended that an instrument in need of repair be returned to the original manufacturer so that it can be repaired by an instrument-maker who is thoroughly familiar with that particular instrument. Local repair shops or services generally are not equipped to perform repairs on delicate instruments under the microscope.

Ultrasonic Cleaning

The best method for thoroughly cleaning delicate micro-instruments is to use an ultrasonic cleaner. It is superb for dislodging debris that has settled into box locks, joints and serrations, as well as obstructions in cannulas and needles. Ultrasonic cleaning is recommended for all stainless steel instruments at the end of each surgical day or after a number of surgical procedures as indicated by the appearance of the instruments. Use the following step-by-step approach:

1. Follow instructions supplied by the manufacturer of your ultrasonic cleaner and use cleaning solutions recommended for stainless steel. Do not use common household detergents as they produce excessive foam and may leave an undesirable coating on the instruments. Always use demineralized or distilled water for ultrasonic cleaning.

2. It is strongly recommended that the water for ultrasonic cleaning be heated to maximize its cleaning effect. Water temperature of approximately 150°F (65°C) is adequate for this purpose. Some ultrasonic cleaners come with built-in heaters, however, if your unit doesn’t have a heater, you may use an immersion heater or heat the water in a separate stainless steel container.

3. For best cleaning results and to avoid damaging delicate instrument tips, instruments should be placed in a wire or perforated plastic basket and suspended in the cleaning solution. Instruments must be totally submerged in the cleaning solution but should not be in contact with each other. If you use ultrasonic cleaning regularly, a cleaning cycle of approximately 5 minutes should be adequate; however, stubborn stains may require additional time.

4. After cleaning the instruments, thoroughly rinse them under running water, then follow with a final rinse in a clean bath of demineralized or distilled water. Dry instruments with a hot-air blower or a lint-free cloth before returning them to storage. Cleaning and rinsing solutions should be replaced frequently.
Protective Tips

Microsurgical instrument tips can be damaged easily during handling and storage. Always keep a protective cover on delicate tips when the instrument is not in use. Soft silicone tubing with adequate wall thickness and inside diameter will provide good protection for instrument tips. Color-coded tip guards in various sizes also are available for this purpose.

Storage

To avoid unnecessary handling, it is recommended that the instruments be stored in the same container in which they will be sterilized. Such a sterilizing case must be of adequate size to accommodate a set of instruments. Instruments should be placed in the tray without contacting each other. Each instrument must be firmly seated in the tray to prevent movement and possible damage during handling. Because instruments vary a great deal in size and shape, sterilizing trays that are lined completely with soft silicone mats having multiple flexible prongs are ideally suited for this purpose. Delicate knives, hooks and spatulas should be placed in a built-in stainless steel rack for additional protection.

Diamond knives should always be stored and sterilized in a separate container. Follow manufacturer’s instructions for care and handling.

Sterilization

Sterilizing is not cleaning. Instruments must be thoroughly cleaned and rinsed in distilled or demineralized water before sterilization.

Stainless steel surgical instruments can be sterilized effectively with any conventionally accepted method, such as steam autoclaving, dry hot air, ethylene oxide gas, chemical or cold disinfectants. The methods least harmful to delicate microsurgical instruments are gas and dry chemical sterilization; however, these are not the most practical because of the long time-cycle required. Heat or steam sterilization is a more practical method because it requires less time. Following a strict regimen of thorough cleaning and preparation of instruments prior to sterilization is of utmost importance. Regardless of which sterilization method is used, always follow instructions supplied by the manufacturer of the sterilizer.

In conclusion, despite the many words that have been written in this booklet, and others before, when it comes to the cleaning and care of delicate microsurgical instruments, there’s simply no substitute for “Tender Loving Care.” Practice it at all times.
The best way to store, protect and sterilize delicate eye instruments is in a case specifically designed for that purpose. Katena offers a variety of cases, made of plastic, stainless steel or aluminum to accommodate one instrument or a complete set.

Plastic cases are best suited for single or small groups of instruments. They are inexpensive and have a limited lifespan. Stainless steel and aluminum cases are more costly, but last for many years of active use. All cases include autoclavable silicone mats with a series of nubbins to hold each instrument in place. The mats, or nubbins, may be cut with scissors to accommodate instruments of unusual shape for best protection. All cases and mats are perforated to facilitate drainage.

Larger stainless steel and aluminum cases feature racks to hold and protect such delicate instruments as IOL manipulators, phaco spatulas and various cannulas.

**Sterilizing Cases**

- **Sterilizing case**: Autoclavable plastic with silicone mat. Base, lid and mat are perforated for steam penetration.
  - **K9-2020 small**, accommodates 2-3 instruments.
  - **K9-2025 medium**, accommodates 4-6 instruments.
Helpful hints:

- Instruments with curved or angled tips should be placed into the silicone mats with tips pointing downward.
- Use protective tip covers whenever possible.
- Do not allow instrument tips to be in contact with the walls of a case.
- Before closing the lid, gently touch the nubbins with the palm of your hand to be sure no instrument tips are protruding upward.
Points to Remember

- Stainless steel “stains less.” It is not “stain proof.”
- Do not allow blood, tissue or saline (BSS) to dry on instruments.
- NEVER USE SALINE (BSS) FOR RINSING INSTRUMENTS.
- Always use demineralized or distilled water for final rinsing.
- Metal brushes and abrasive powders are a “no-no.”
- One ultrasonic cleaning a day will keep the stains away.
- Thoroughly dry instruments with a lint-free cloth or a hot-air blower before storage.
- Lubricate joints and box locks after cleaning.
- Use protective covers for delicate tips.
- STERILIZING IS NOT CLEANING.

…and don’t forget, practice “Tender Loving Care.”