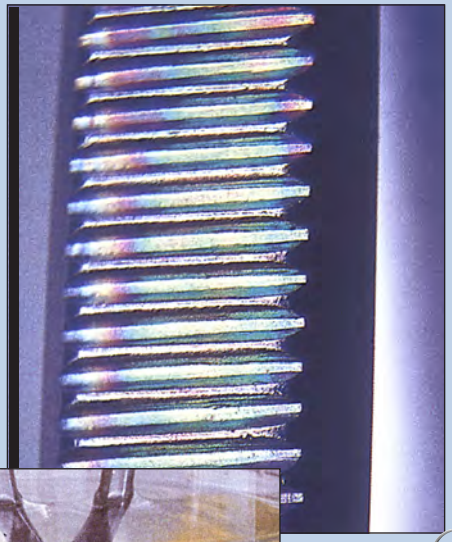
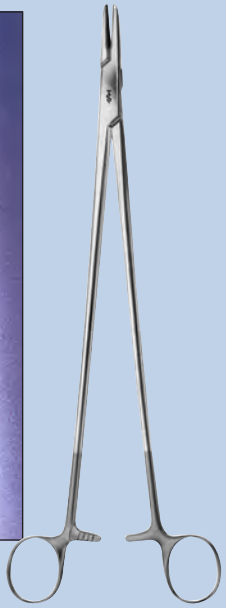
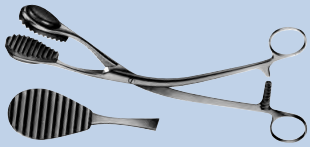
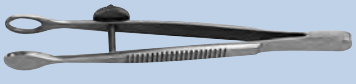
INSTRUMENTS

Cleaning Maintenance and Identification







SHOOF VET

Introduction

Instruments represent a significant material asset within the overall investment of a veterinary clinic.

The information in this brochure, is intended to help preserve the functional capability and value of the instruments over many years through correct care and maintenance.

When inquiring about the meaning of terms like 'high-grade steel' or 'stainless steel' very often the assumption is that high-grade steel is an indestructible, extremely resistant material. In veterinary clinics, numerous users expect that instruments of high-grade steel have to be everlasting. In fact, high-grade steel can be susceptible to many different kinds of mechanical, thermal or chemical attacks.

Understanding of the material and its characteristics, together with knowledge regarding correct handling, will result in achieving trouble-free, long-lasting use of instruments.

A very limited number of stainless steel types can satisfy the requirements asked for by the user of surgical instruments. Due to their special alloy, high-grade steels used for surgical instruments are characterised by the fact that they form specific passive layers as a protection against corrosion. These protective layers can, however, be damaged by external influences which will harm the instruments. Only to a limited extent are high-grade steels resistant to the attack of aggressive waters, (e.g. with a high chloride content). In particular, chloride ions can cause pitting or even stress corrosion cracking.

To maintain the value and functional capabilities of the instruments, the user must provide continuous care and correct maintenance.

When producing surgical, microsurgical and dental instruments, the manufacturer will use the materials most suitable for the purpose for which the instrument is intended.

Therefore, first of all, stainless and hardenable chromium steels with a chromium content of approx 13% are used. Instrument characteristics, such as a smooth and homogeneous surface, a matte or mirror finish, and a hardened condition can be achieved with steels.

Instrument steels, listed in national (DIN) and international (ISO) standards, are generally resistant to chemical and thermal stress as occurring in veterinary practices, but are, on the other hand, very sensitive to stress corrosion and chloride induced pitting.

Apart from the hardenable stainless chromium steels, non-hardenable chromium steels with modified chromium content and rust and acid resistant chromium-nickel steels are used.

Preparation for disinfection and cleaning

Disinfection of soiled instruments not only helps to preserve the instruments themselves but also serves to protect those persons responsible for their transportation and cleaning. Wherever possible, instruments should be disinfected and cleaned immediately after use.

Any soiling left to dry will make eventual cleaning much more difficult and could result in damage to the instruments. If necessary, instruments should be taken apart, allowing the disinfectant to cover all surfaces.

For disinfection of the instruments, either autoclaving or chemical disinfection can be used.

Autoclaving is preferable providing the instruments are suitable for treatment in this manner.

Remnants of corrosive caustic agents and medicines such as silver nitrate, iodine, albothyl and mercury have to be removed immediately.

Instruments should not be soaked in physiological saline solution as prolonged contact causes pitting and rust.

Undue 'dropping' can cause damage to the instrument. Hard metal tips on scissors may be chipped, or small delicate clamps can be deformed. In order to avoid this, carefully handle the instruments after use.

To avoid encrustation and corrosion, in case of removal in dry condition, the instruments must be cleaned. For effective cleaning, hinged instruments have to be opened (such as scissors, clamps, gouge forceps).

Instruments which are subject to machine treatment have to be immersed into a combined disinfecting and cleaning agent.

For removal in wet condition use only non-corrosive agents in prescribed concentrations. ***Water alone is not sufficient!*** The instruments have to be fully covered by the solution.

Instruments should never be left overnight before cleaning as the risk of causing permanent damage increases with the length of time between use.

Manual disinfecting and cleaning

For manual preparation, instruments have to be immersed into a combined disinfecting and cleaning solution with proven disinfecting effect.

The instructions of the manufacturer should be strictly followed regarding concentration, temperature and induction time. Special attention has to be paid to the manufacturer's instructions with regards to material compatibility of instruments not made of high-grade steel.

Encrustations on surgical instruments

Use fresh disinfecting and cleaning solutions every day.

The following problems may occur due to using the same solution for too long:

- risk of corrosion due to soiling
- risk of corrosion due to increasing concentration caused by evaporation
- decrease of disinfecting effect due to excessive dirt concentration.

Instruments with a narrow lumen (tubings, cannulae) or with cavities are generally difficult to clean. Take care that the passages are free and that the inside is completely in contact with the solution.

If powdered products are used, completely dissolve the powder first. Then immerse the instruments. Undissolved particles may lead to clogging of the narrow lumen and discolouration of the instruments.

After chemical disinfection and cleaning, the instruments must always be rinsed well under running water. Any residue has to be removed manually ***(no metal brushes, no scouring agents!).***

In order to avoid water spots, a final rinsing with demineralised water is recommended. Finally, the instruments have to be dried immediately.

Water on the surfaces of elastic instruments made of rubber or plastic may cause white spots to appear which can only be removed by drying.

If, after manual cleaning, instruments are chemically disinfected instead of being sterilised, a separate disinfectant has to be used.

The instruments must then be rinsed thoroughly with sterile demineralised water.

The main causes for damage are:

- metal brushes
- scouring agents
- too much exertion
- dropping or knocking

Ultrasonic treatment

Corroded instrument

Ultrasonic treatment is particularly suitable for cleaning instruments of high-grade steel. Delicate instruments (micro-surgical instruments, dental instruments) can be carefully and thoroughly cleaned by ultrasonic treatment.

Ultrasonic treatment is a suitable method to effectively remove encrustations.

Steps to ensure optimum efficiency of ultrasonic treatment:

1. Fill the bath up to the markings.

2. Add a suitable cleaning and/or disinfecting agent to the water.

3. Temperature above 40°C promotes degassing and cleaning

4. No protein coagulation occurs at higher temperatures if a suitable cleaning agent is used.

5. When using disinfecting and cleaning agents make sure that the concentration and temperature are correctly maintained.

Even with a properly prepared bath, faults can arise. These can be avoided by observing some principle rules:

- Instruments have to be completely covered by the cleaning solution. Non-immersed instruments will not be cleaned.
- Hinged instruments, e.g. scissors, have to be opened.
- An excessively dirty solution in the ultrasonic bath decreases the cleaning effect and increases the risk of corrosion. Depending on the frequency of use, the solution has to be renewed at regular intervals.
- Ultrasonic treatment times of approx. 3 minutes have proved to be efficient for cleaning at frequencies of at least 35KHz.

After ultrasonic treatment, the instruments have to be thoroughly rinsed either manually or by machine. Rinse with clear water of at least drinking quality or, better still, with demineralised water in order to avoid water spots.

The instruments should then be thoroughly dried.

To avoid damage, microsurgical instruments have to be deposited on special racks.

Care and maintenance

Instruments with joints or ratchets should be treated with suitable ***lubricating agent*** during the cleaning process.

These lubricating agents prevent the friction of metal on metal and preserve smooth function of the instruments thus avoiding corrosion by friction.

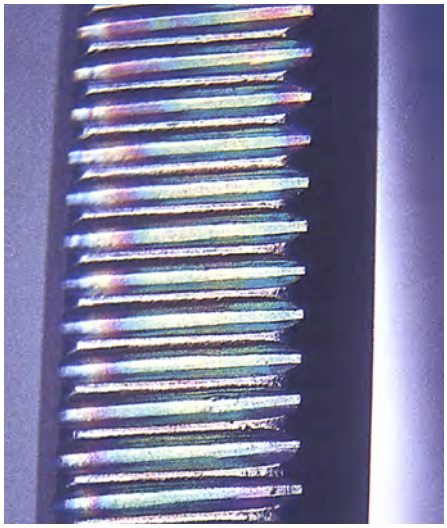
Regular use of such agents prevents 'sticking' of the hinged parts.

Inspection

After each cleaning, the instruments have to be macroscopically clean, i.e. ***free of visible protein remnants and other contamination.***

Prior to functional inspection, surgical instruments with movable parts should be cooled down thus avoiding metal friction leading to corrosion. Before carrying out functional inspection, oil any instruments with joints, ratchets or threads.

Instruments with non-traumatic toothing have to be specially inspected, and, if necessary, manually reclean the non-traumatic toothing.



Annealing colours iridescent silicate coating.

Worn out or damaged instruments should be removed for repair or replacement. Corroded instruments should be discarded immediately as these can cause contact corrosion even on a perfect surgical instrument.

Possible causes of stains or spots:

- Insufficient mechanical or manual cleaning
- Unsuitable cleaning, disinfecting and care agents
- Failure to observe the dosage instructions for cleaning, disinfecting or care agents
- Remnants of cleaning and disinfecting agents - insufficient rinsing
- Poor water quality
- Residues in the sterilising steam, when steam quality is not in accordance with recommendations
- Remnants of medications, marking pens or chemo-indicators
- Procedural faults e.g. not cleaning brand-new surgical instruments prior to sterilisation.

To avoid permanent damage, instruments with remnants on the surface have to undergo a special treatment. The method of treatment is adapted to the cause of the stains. In order to avoid damage and subsequent corrosion due to metal friction, under no circumstances use metal brushes or metal sponges to remove stains.

Each surgical instrument is designed for a specific purpose. Inspection has to be carried out to ensure that they still function as they should.

Faultless surgical instruments should not be packed together with instruments having damaged surfaces. Older instruments with chipped chromium and/or nickel coating may cause discolouration or corrosion on high grade surgical instruments (discard such instruments or pack them separately).

Sterilisation

Follow the sterilisation instructions of the manufacturer. Sterilising accessories as well as sterilising packings have to meet the requirements of both the instruments as well as the sterilising method used.

Normally, autoclaving is performed with saturated water steam at 134°C. In special cases a temperature of 121°C can be used for a longer time.

Sterilisation procedure has to be standardised suitably for the goods to be sterilised. Sterilising packings have to meet the valid standards with regard to quality and application of the packings and have also to be applicable to the procedure selected.

Steam used for sterilisation has to be free from any contamination and should neither impede the process nor do damage to the steriliser or the goods to be sterilised. Otherwise rust parts from the conducting system may cause corrosion or a too high content of silicic acid may lead to discolouration of the instruments.

Due to heating and cooling down during the sterilisation process, a surgical instrument with a closed ratchet may suffer from tension stress which causes stress cracking in joints or deterioration of the clamping force. Therefore, such instruments have to be sterilised either in open condition or ***closed on the first ratchet only.***

Sterilisation

After sterilisation, instruments have to be stored dry until used again. Instruments, as well as the inner covering of sterilised goods, have to be absolutely dry after having cooled down to room temperature.

Excessive condensation during sterilisation is avoided by observation of the recommended maximum weight for loaded perforated trays.

Drying is facilitated by wrapping the perforated trays in a cloth within the container or external paper packing.

If heavy sets are unavoidable, the instruments should be distributed among several perforated trays.

Treatment of brand new instruments

Packings of brand new instruments need to be removed and instruments have to be stored in dry rooms, open to air. Temperature fluctuations may otherwise lead to condensation within the plastic packing and thus corrosion.

Instruments should not be stored in cupboards or rooms where chemicals are kept which can produce corrosive vapours.

Prior to first use, brand-new instruments have to be prepared. First remove any protective caps or foils. Cleaning, rinsing, lubrication, inspection and sterilisation have to be carried out according to the procedures previously described.

Elastic instruments have to be kept in their original packing and stored in a dry, cool and dark place.

In addition to wear through use, elastic instruments are prone to aging even when in storage.

Water preparation

Discolourations on surgical tweezers.

Instruments must have certain characteristics in order to fulfil their function e.g. cutting ability of scissors, clamping force of clamps and forceps. Only a very limited number of steels meet these requirements. Unfavourable water composition can, therefore, have a detrimental effect on such steels.

Ordinary water contains dissolved salts. The amount of salts contained varies depending on the water purification process. Evaporation of water leaves remnants of salty encrustations (lime). Of all water components, chlorides have to be regarded as the most potentially damaging because in higher concentrations they cause pitting on instruments.

In general, the danger of chloride induced pitting rises with:

- increasing chloride content
- increasing temperature
- decreasing pH-value
- longer induction time
- rougher instrument surface
- insufficient drying

With a chloride content up to approx. 120mg/l(corresponding to 200 mg/l NaCl = sodium chloride) the possibility of pitting is low but rises rapidly with increasing chloride content.

Low concentration of other components can cause brown, blue, grey-black or rainbow coloured discolourations. Such discolouration can be caused by contact with the elements, iron, copper, manganese, magnesium and silicon in the water. Generally, there is no corrosion. By immersing or rubbing the instruments with suitable products containing acid (follow the instructions of the manufacturer) such discolouration can be removed to a great extent. In addition to the natural water components, sometimes there are rust particles in the water. When preparing the instruments, such rust particles deposit on the instruments and cause rust spots (extraneous rust) followed by corrosion.

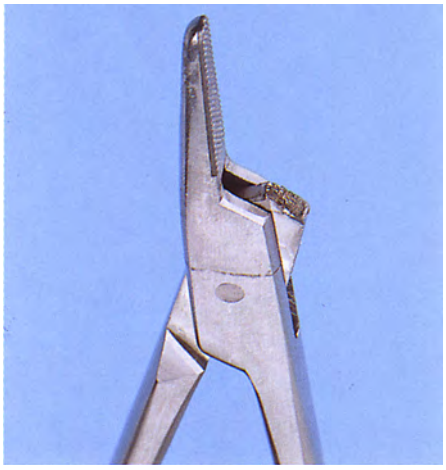
Make it a basic rule to use demineralised water for final rinsing.

Important points to remember

- Brand new instruments have to be cleaned prior to the first sterilisation.
- Instructions for use have to be strictly observed.
- Strictly adhere to dosage, induction time and temperature of disinfecting and cleaning.
- Used instruments have to be treated as soon as possible.
- Open joints on instruments prior to preparation.
- Use proper accessories for cleaning.
- Do not overload autoclaves and ultra sound devices. Avoid rinsing shadows as well as wave shadows.
- Never use metal brushes or metal sponges for manual cleaning.
- Rinse thoroughly and carefully after cleaning. Where possible, use demineralised water.
- Dry sufficiently after rinsing.
- Worn, corroded, deformed, porous or otherwise damaged instruments have to be sorted out.
- Each preparation of instruments with joints need a treatment with a care agent based on paraffin oil (this does not apply to flexible endoscopes and accessories).
- Prior to sterilisation, only close the first ratchet on instruments.
- **Sterilisation is no substitute for cleanliness!**

Surface changes, corrosion and aging

Discolourations on surgical forceps.



Stress corrosion cracking

Surface changes are visible appearances. Normally, this refers to all kinds of instruments and units, independent of the material. In particular, this refers to removable residues such as adhering or already encrusted remnants from operations or other soilings. Through cleaning using special basic cleaning agents, such surface changes can be completely removed without doing any harm to the instruments.

Yellow-brown to dark-brown blister-like spots show on sterilised instruments and units made of metal and are mistaken as rust. In most cases, such residue can contain high degrees of chlorides which then lead to chloride induced pitting on parts made of stainless steel if the spots are not removed immediately. Such residues are usually found on those places with difficult access for cleaning.

Annealing colours, black tints or water spots appear mostly on metallic instruments and units and hardly ever on rubber or plastic products.

In general, discolourations do not show clearly defined edges. Flowing colour shadings or deep and uniform staining (black colourings) can appear. Discolouration does not permanently damage or destroy the instrument or units. Causes can either be the bad quality of water used for cleaning or autoclaving as well as inadequate machine cleaning and installations for steam supply. The only remedy is to check the technical equipment, in co-operation with the manufacturer of cleaning, sterilisation and steam supply equipment and also together with the manufacturer of disinfectants or cleaning agents.

Water spots are similar in appearance. However, normally they show sharply defined edges and are caused by too high a concentration of minerals e.g. lime or organic substances in rinsing water or sterilisation steam.

The remedy is to use demineralised water for final rinsing.

Overload sterilising equipment may cause increased condensation and consequently increased stains during sterilisation - therefore avoid overloading.

The term corrosion refers to metallic material only. Corrosion is specific to materials and occurs on various metals in different appearances. Almost always the corrosion leads to permanent damage or even destruction of instruments and units.

Any kind of corrosion on surgical instruments and units can only occur due to inductions of water, aqueous solutions or steam. Following is a description of the most important kinds of corrosion and their effect, in the sequence of their frequency of appearance:

i) Pitting corrosion refers only to metallic materials. Pitting can also appear on stainless steels of which not only most surgical instruments are made, but also endoscopes, (although fewer in number), surgical motor line, and parts of breathing systems. With all types of steel, pitting is mainly caused by active chlorides (chloride induced pitting). Other halide ions (iodides, bromides) have the same effect. Non-ferrous metals such as copper and aluminium alloys can also be damaged by

Surface changes, corrosion and aging

Contact corrosion due to preparation on a brass rack

Fretting corrosion due to insufficient treatment with oil

pitting, however, other electro-chemical causes may also be the reason.

Pitting means that holes have developed on the surface of the instruments. These holes indicate rust and, with continuous corrosion, get rapidly bigger and destroy the instrument within a short time.

Pitting can only be avoided if instruments which have been in contact with chlorides, or other halide ions are cleaned immediately after use. Operation debris also contains chlorides which lead to pitting should these remnants stay long enough on the instrument.

Attention also has to be paid to the quality of water used for cleaning and disinfection, especially with regard to its chloride content.

ii) Stress corrosion cracking normally occurs only in steels used for surgical instruments; it can have considerable effects on the life span of the instruments.

The causes of this type of corrosion can lie either in the manufacturing process or in incorrect handling.

In order to avoid damage, it is absolutely necessary that during the complete cleaning phase, all instruments are kept in open condition.

In order to avoid damage such as stress cracks in the joint and a reduction of clamping force, when sterilising such instruments, only close the first ratchet. This prevents stress forces from occurring while heating and cooling during the sterilising process.

Even tiny quantities of chlorides in the water may favour the forming of stress corrosion cracking.

iii) Fretting and crevice corrosion have almost similar causes. Both types of corrosion occur in narrow joints due to chemical or mechanical destruction of the natural passive coating of the high quality steel. In addition, due to lack of sufficient lubrication, metallic abrasion occurs in joint crevices and hinders smooth action of the instrument. In both cases, and together with humidity, rust blisters occur in the crevices.

iv) Contact corrosion can occasionally be observed when surgical instruments are machine cleaned. Metallic contact of instruments and unfavourable cleaning and rinsing conditions, e.g. tap water containing chlorides, can cause rust.

Particularly severe contact corrosion occurs if stainless steel instruments get in contact with non-stainless goods, such as needles or cutters. Chromium-plated instruments with chipped surfaces also cause contact corrosion.

v) With ***surface corrosion***, the total surface of a metal part is relatively uniformly attacked by chemical or other electro-chemical influences. The surface can show parts which differ in colour to undamaged surfaces. This corrosion takes the form of rust where steels are concerned.

Surface corrosion hardly ever occurs with instruments made of stainless steel.

Instruments, trays and containers of anodized aluminium require a preparation method suitable for the material. Acid or alkaline solutions may cause laminar corrosion which, especially on coloured parts, causes 'bleaching'.

Instruments and units of stainless steel or non-ferrous metal, protected by galvanically applied coatings, show surface corrosion only with damaged protective coatings.

Any kind of corrosion leads to rust on steels. Rust particles are transferred from one instrument to another during disinfection, cleaning or sterilising, so this ***transferred rust*** causes ***resultant corrosion*** on the second instrument. If corroding instruments are not separated, further preparation processes promote rust formation on other instruments.

Sterilising steam from rusty steam supply pipes may transport rust particles into the steriliser. This extraneous rust deposits itself on the inside of the sterilising chamber, on the packings, on instrument surfaces.

This extraneous rust also leads to ***resultant corrosion*** on instruments.

Aging mainly refers to rubber and latex materials used for flexible instruments, such as parts of endoscopes and breathing systems. Aging is a natural process occurring also during storing. The aging process is accelerated by the induction of dry heat with temperatures above 80°C, by stretching and overstretching when storing as well as by the action of light (e.g. sunlight, UV beams). Aging is visible on rubber by discolouration (brownish) or brittleness (cracks on the surface). Plastic also ages: it gets hard and becomes yellow. However, silicon cautchouc, also called silicon elastomer, does not age.

Another result of aging on rubber, latex and plastic is the so-called swelling which is caused by the penetration of liquid or gases to the surface.

Swelling can be reversible and occurs only temporarily by the induction of volatile solutions or propellant gases of sprays. This also applies if rubber and certain plastic get into contact with ether gases such as halothane. Irreversible swelling, however, occurs by contact with non-volatile oils (paraffin), vaseline and unsuitable disinfectants (e.g. phenol derivates). Silicon cautchouc reacts reversibly on propellant gases of sprays and ether gases; irreversibly on silicon oils and solvents.

Typical signs of swelling are soft sticky surfaces as well as damage to thin-walled instrument parts.

Instrument Cleaners

Endozime™
4 litre 203 723

A unique and powerful formulation of protease and amylase enzymes, solvents and buffers that is designed to clean instruments and endoscopes within 2-3 minutes. The 4L container will make up over 400L of solution.

Surgistain™
1 litre 207 482
4 litre 208 967

A rust and corrosion remover that not only renews the original finish of the instrument but also frees up box locks assuring articulation. It will also remove hard H20 scale and corrosion from stainless steel autoclaves. You won't believe it until you see it work! Surgistain is safe for use on all stainless steel. The 4L bottle makes up 20L of solution.

Orthozime™
4 litre 203 726

Specially created for orthopaedic instruments, Orthokleen dissolves and removes fat and proteins from instruments in two minutes. It is also extremely effective on standard instruments that are coated in blood and grease from surgery. The 4L container will make up over 450L of solution.

3M™ Rapid Multi-Enzyme Cleaner
1 litre 203724 • 5 litres 203 725

It is essential to destroy all micro-organisms which can remain with both cold sterilising and autoclaving when instruments are not correctly pre-cleaned. By adopting a multi-enzyme approach such as 3M Epizyme there is absolute assurance that all instruments are optimally pre-cleaned. Its unique multi-enzyme formulation makes it effective in the high speed breakdown of fat, blood, mucous and saliva. 3M Epizyme can be diluted with all water temperatures, is bio-degradable and makes up to two hundred times the concentrate volume.

Instrument Lubricants

Instrument Lubricant Surgi-slip™
0.95 litre 207 483
3.8 litre 208 968

This instrument lubricant and rust inhibitor will prevent rusting, spotting and staining on all surgical instruments. It forms a protective barrier allowing the instruments to remain in excellent working condition. The 3.8L container will make up 38L of lubricant which can be stored. Do not exceed recommended usage as this may result in an 'oily' residue remaining on instruments.

Instrument Oil Aesculap Sterilit i
aerosol 300ml 203 734
dropper 50ml 203 733

Sterilit i is an ideal protective treatment for valuable instruments. Specially produced by Aesculap. Dropper oil is ideal for box locks, ratchets, etc prior to sterilization.

Refer to Shoof Veterinary catalogue

SHOOF V VET

Range of surgical instruments

Needle Holders

Hegar-Olsen

Gillies 160mm

Mathieu
(Standard Pattern)

Hegar-Mayo
(Medium Fine Pattern)

Tape 'n Tell

set of 8 colours 206 386

Coloured durable tape for identification or organisation of instruments by group, type, ownership, etc. The colour and adhesion is unaffected by autoclaving, boiling or cold sterilization. Great around the clinic, or out in the field.

Scissors

Metzenbaum

Baby-Metzenbaum

Blunt Blunt

Sharp Sharp

Mayo

Sharp Blunt

Scissors

The choice of scissors is usually down to the surgeon's preference. Generally Metzenbaum are used for delicate and blunt dissection, Mayo for cutting muscle and fibrous tissue.

Scissors - Delicate 90mm-120mm

90mm

105mm

110mm (Iris)

115mm
(Dissecting)

120mm

Intestinal Clamps

Baby-Kocher
130mm

Doyen 240mm

Intestinal Clamps

Used to clamp intestines without causing trauma.

Forceps - Tissue

Standard
1:2

Allis 5:6 teeth

Forceps Tissue

Tissue or 'rat toothed' forceps are used for grasping tissue such as muscle or fibrous tissue that can tolerate slight trauma.

Range of surgical instruments

Forceps - Haemostatic


Crile 140mm


Micro-Halstead 125mm


Pean Long Tip


Pean Short Tip


Kocher-Ochsner


Kocher 140mm


Baby Mosquito

Haemostats

Also called artery forceps, used to clamp blood vessels and tissue stumps. Some have toothed tips for added grip. Choice of size depends on size of tissue to be clamped.

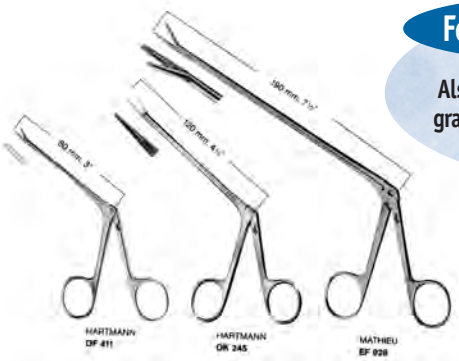
Towel Clamps


Schaedel 90mm


X-action


Backhaus

Forceps - Foreign Body



Hartman or Mathieu

Foreign Body Forceps

Also called alligator forceps. Used for grasping things in inaccessible places. Ears for example.

Forceps - Dissecting


Standard


Adson 1:2


Micro-Adson


Splinter Duro Grip


Cushing

Forceps - Dissecting

Used for holding tissue. Dissecting forceps are used for handling delicate tissue such as nerves or gut and for blunt dissection.

Scalpel Blades


size 10 11 15


size 22 23 24

Aesculap


size 22 23 24

Kruuse