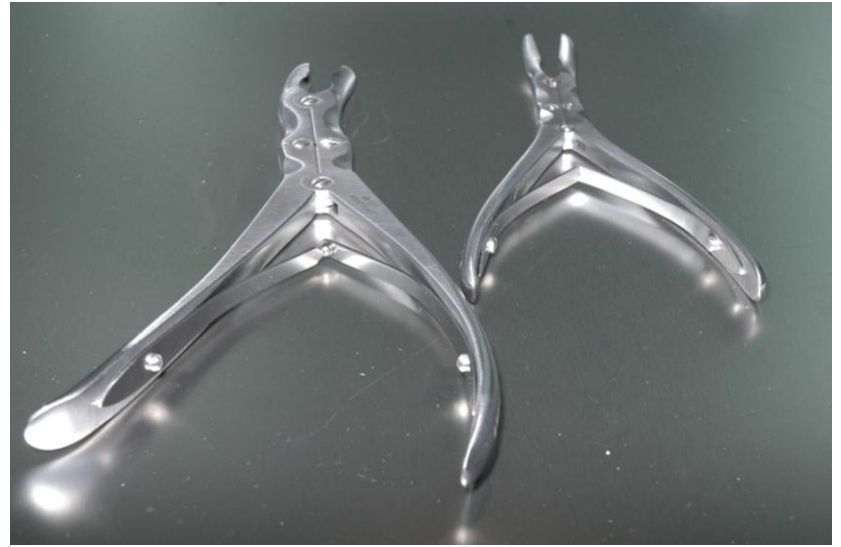
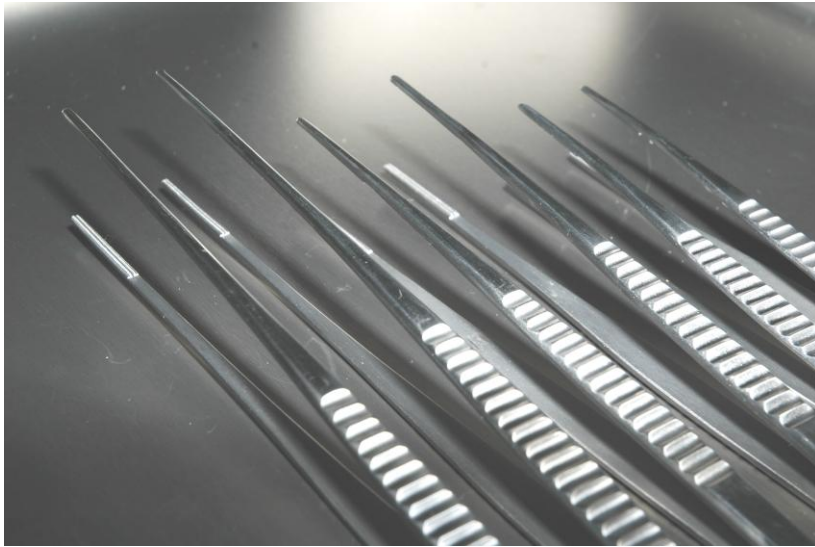


A Surgical Instrument Primer



Manufacturing, Maintenance, & Varieties of Surgical Instruments

Topics

- Manufacturing of Surgical Instruments
- Maintenance of Surgical Instruments
- Variety of Surgical Instruments

Objectives

- Learn Something New
- Ask Questions
- Engage!

Manufacturing of Surgical Instruments



History

- Surgical instruments have been manufactured since the dawn of pre-history
- An explosion of new tools occurred with new surgical procedures developed in the 19th and first decades of the 20th century

Where Are They Made?

- Majority are made in Germany
- Cottage industry
- Most are hand-crafted
- New locations in Pakistan, Eastern Europe, China

Tuttlingen, Germany



Types Of Materials

- Stainless Steel
- Chrome Plated Brass
- Tungsten Carbide
- Titanium
- Aluminum

Stainless Steel

- Approximately 20 different grades that make up surgical instruments
- Two levels of quality:
 - Ward Quality
 - OR Quality
- Stain-less...not stain-proof!

Chrome Plated Brass

- Brass is softer and used for some products
- Chrome plating to protect against oxidation
- Chrome flakes off and can harm other instruments or stay in patient!

Tungsten Carbide

- Harder material than stainless steel
- Originally used for jaws of needle holders
- TC presence is indicated by gold handles

Titanium

- Lighter, stronger, and more tactile than stainless steel
- Non-Magnetic...important for needle drivers
- Blue anodization indicates titanium

Aluminum

- Very light and strong metal
- Used primarily for sterile containers
- Alkaline detergents must be buffered for use with aluminum

Passivation

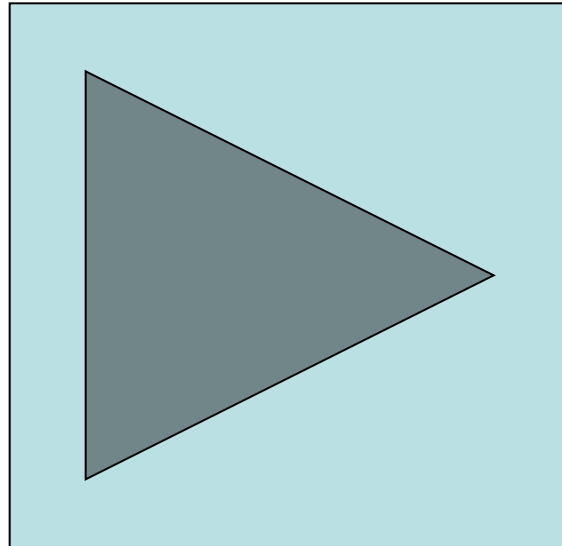
- To make inactive or less reactive
- Primary means of protection from corrosion
- Chromium enrichment

Marking Of Instruments

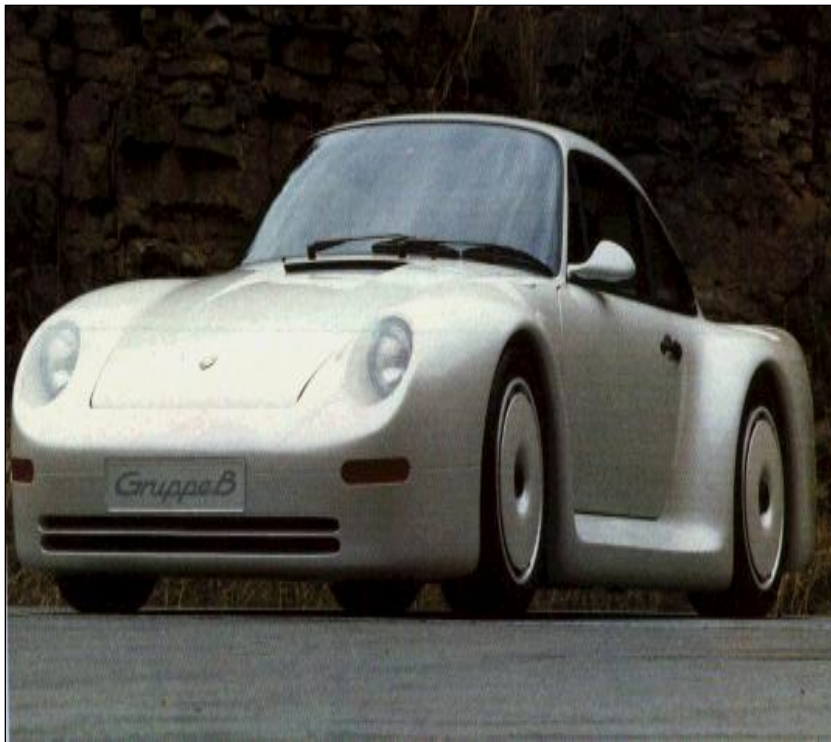
- Metal Stamping
- Acid Etching
- Laser Etching



Video



Maintenance Of Surgical Instruments



Pre-Cleaning

- Soaking after use in water
- Use of a gel or foaming spray to start the cleaning process
- **NEVER** let blood or other soil dry on
 - Blood is alkaline and therefore damaging to stainless steel



Cleaning

- Enzymatic detergent or buffered alkaline detergent
- Ultrasonic cleaning for small crevices
- Manual washing of delicate items
- Machine washing for all others!



Steam Sterilization

- Cannot sterilize an instrument that is not clean
- Water quality is important
- Careful...not all instruments are appropriate for steam sterilization!

Surface Changes And Corrosion

- Annealing colors, black tints or water spots
- Pitting corrosion
- Stress corrosion
- Fretting & crevice corrosion
- Contact corrosion
- Surface corrosion

Colors, Tints and Spots

- Discoloration- no permanent damage or destruction of instruments or units
- Due to the bad quality of water supply – deposits
- Water spots caused by minerals in rinsing water or sterilization steam
- Sterilizer overloading



Pitting Corrosion

- Can appear on surgical instruments, endoscopes, surgical motor line and parts of breathing systems
- Caused by active chlorides or halide ions
- Holes develop on the surface of the instruments



Stress Corrosion

- Cracking in surgical instruments
- Causes can be in the manufacturing process or in incorrect handling
- Due to tiny quantities of chlorides in water



Fretting and Crevice Corrosion

- Due to chemical or mechanical destruction of the natural passive coating of the high quality steel
- Due to lack of sufficient lubrication



Contact Corrosion

- Metallic contact of instruments and unfavourable cleaning and rinsing conditions
- Can occur if stainless steel instruments get in contact with non-stainless goods



Surface Corrosion

- Acid or alkaline solutions may cause laminar corrosion
- Any kind of corrosion leads to rust on steels.



Rust and Corrosion Removers

- Removes rust, stains, spotting and corrosion
- Routine use enhances life and efficiency of instruments
- Will not harm quality stainless steel



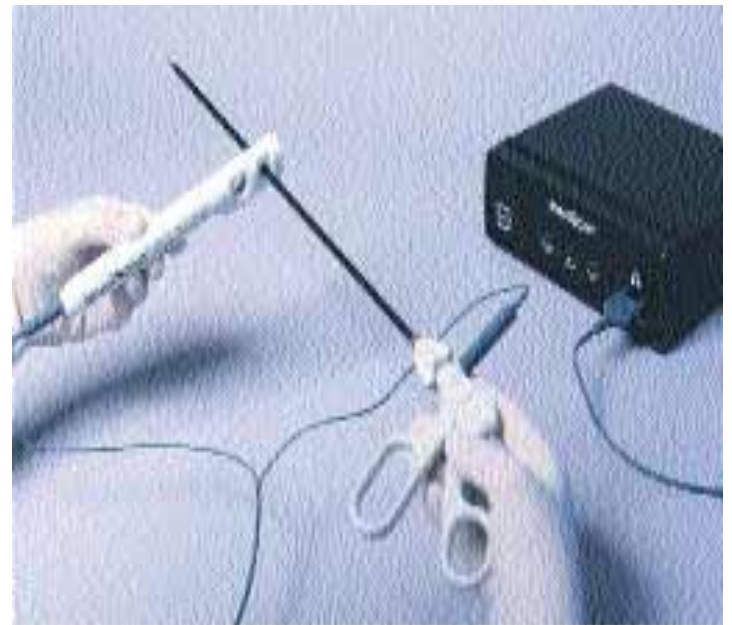
Lubricants

- Reduce damage from stiff or grinding instruments
- Done after cleaning and disinfecting
- Types: milk, silicone, oil
- Needs to be steam penetrable, water-soluble



Insulation and Continuity Tester

- Locates potentially dangerous tears and cracks of laparoscopic instruments
- Tests electrodes, scissors, forceps, bipolar cables, bayonet forceps



Repairs

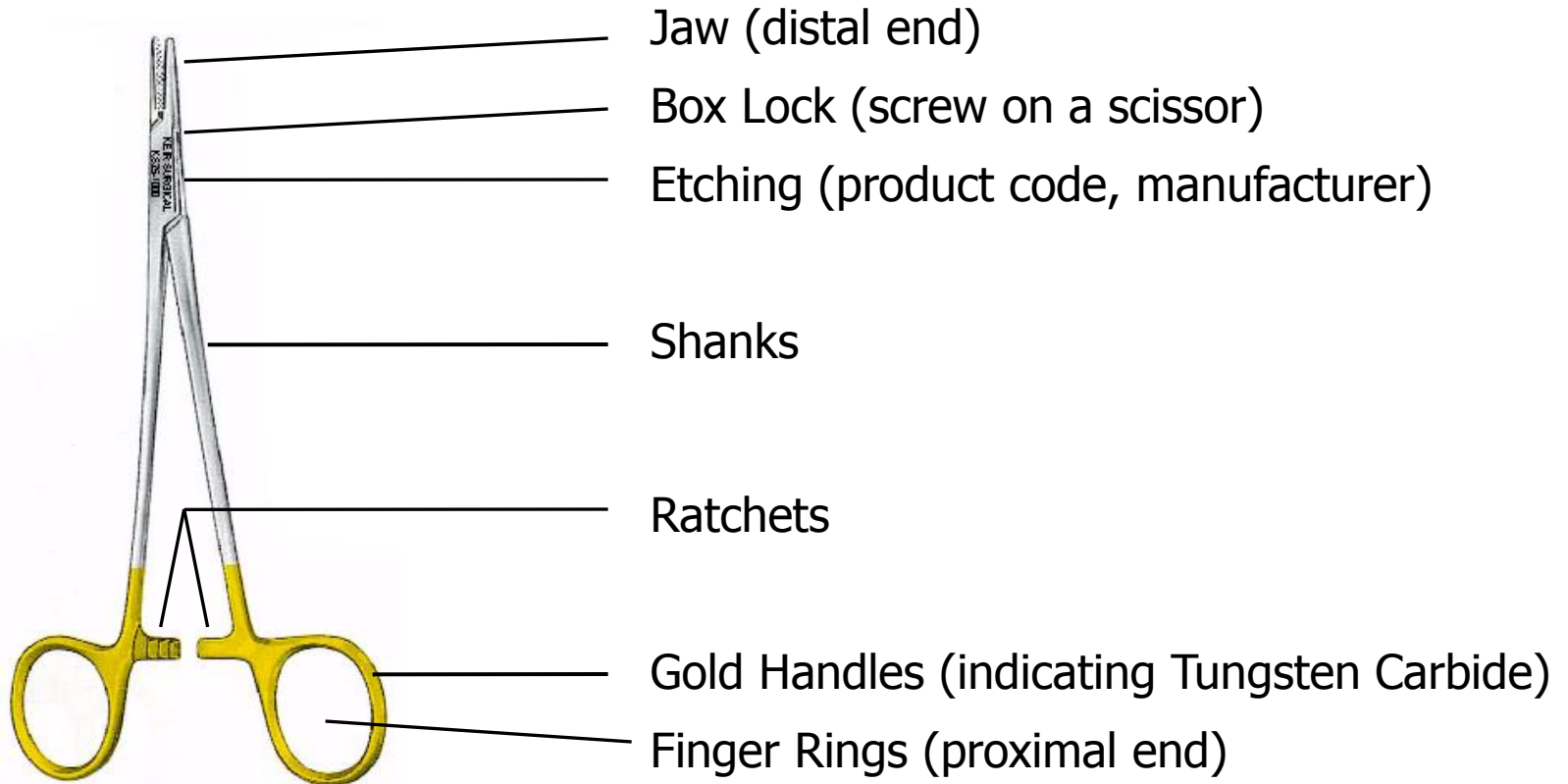
- Choose a reputable company who repairs only surgical instruments
- Choose a company who inspects, re-assembles, adjusts, tightens, re-aligns, sharpens, refinishes, tests, cleans and lubricates each instrument



Surgical Instrument Varieties



Parts of an Instrument



Basic Functions

- Any surgical instrument will generally complete one of the following functions:
 - Cut
 - Clamp/Hold/Grasp
 - Retract/Dilate
 - Suction/Irrigation

Cutting Instruments



Cutting Instruments



No. 3



No. 3

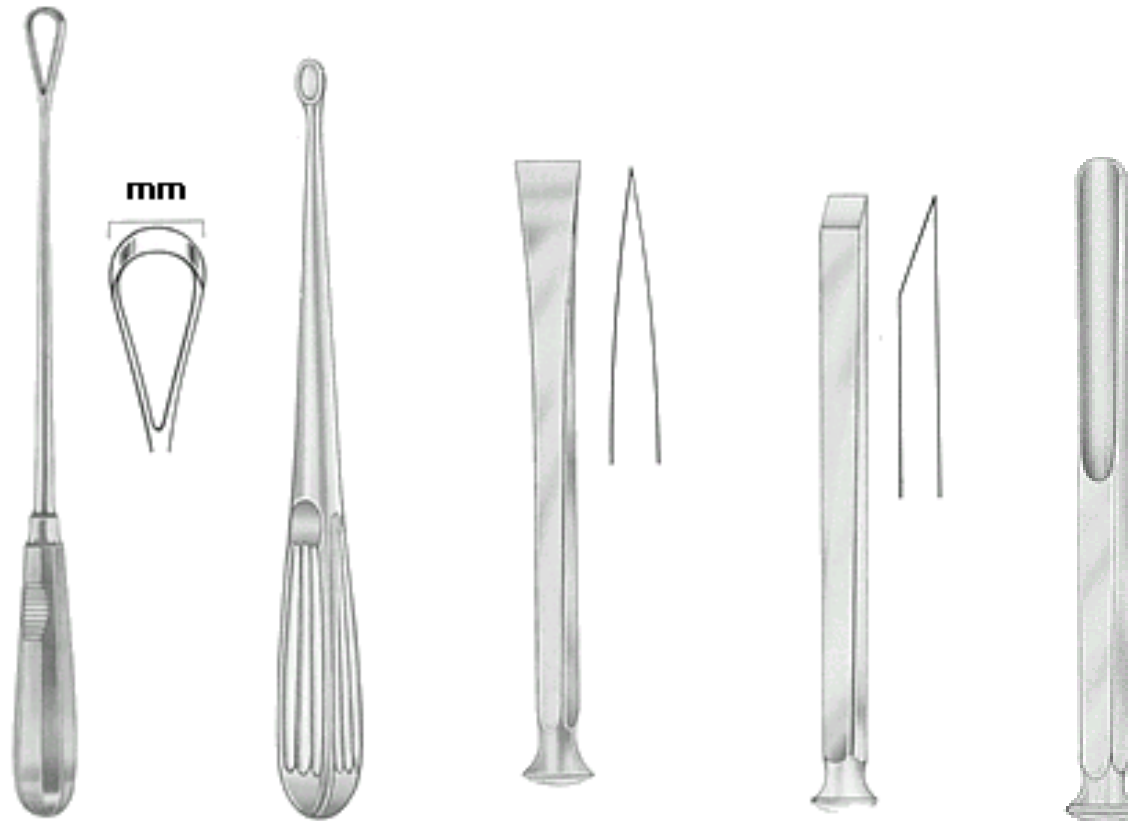


No. 4



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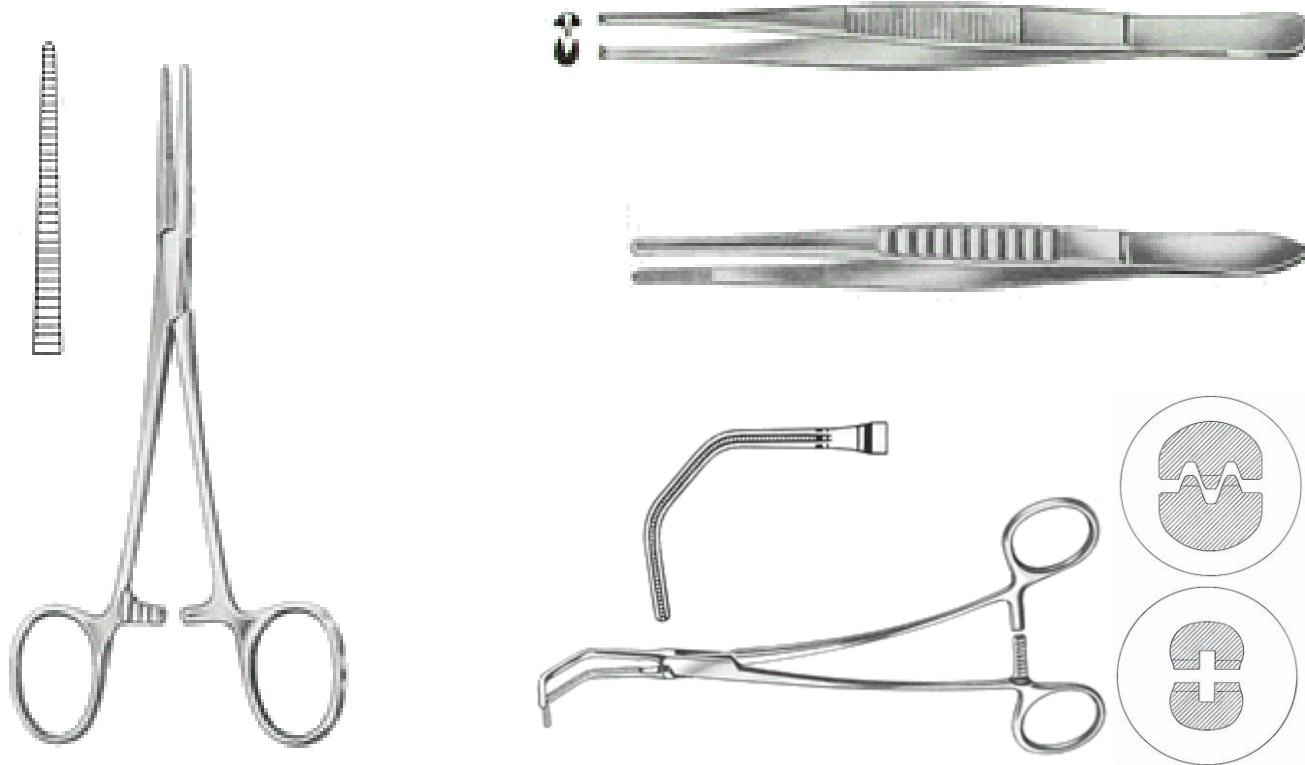
Cutting Instruments



Cutting Instruments



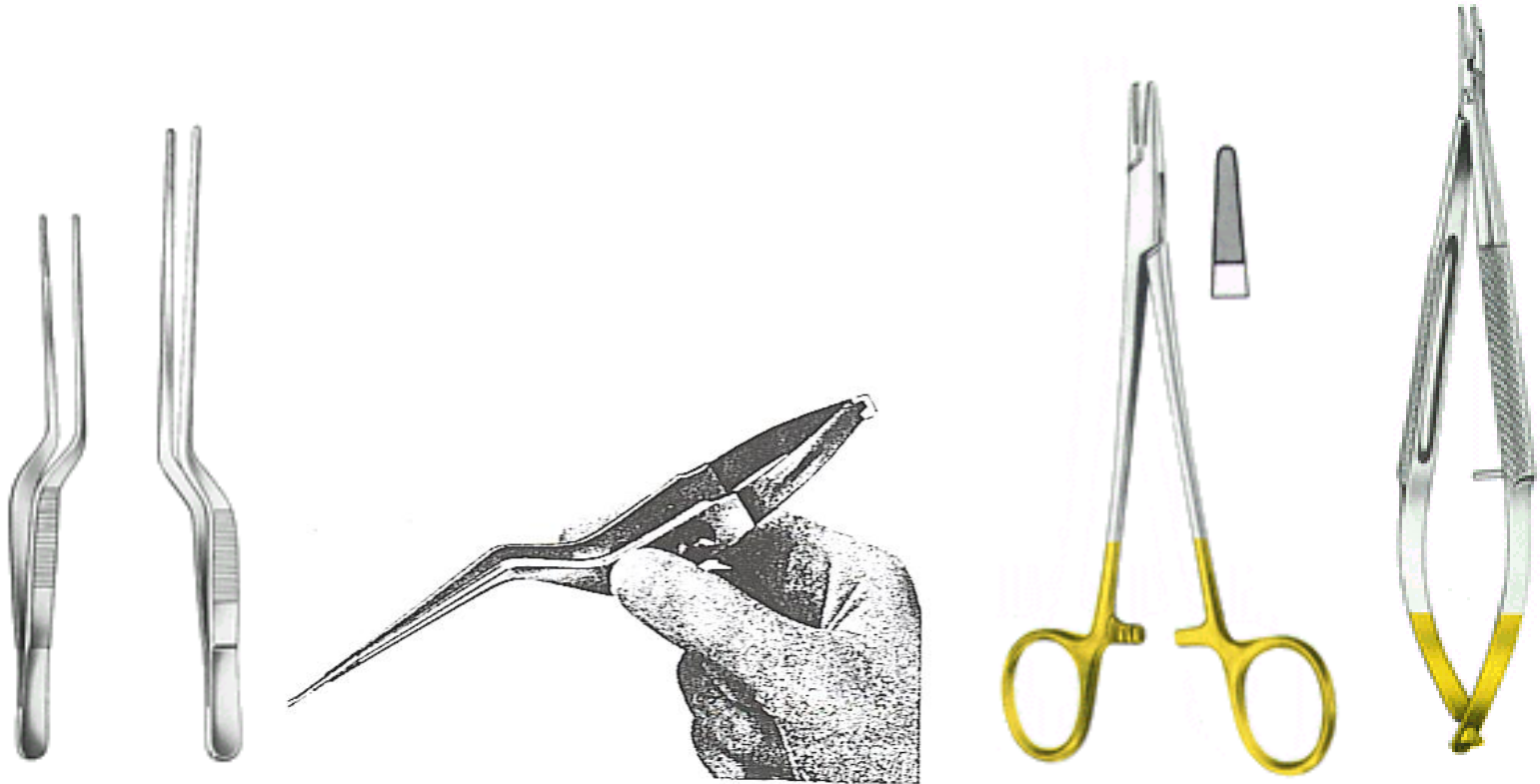
Clamping Instruments



Clamping Instruments



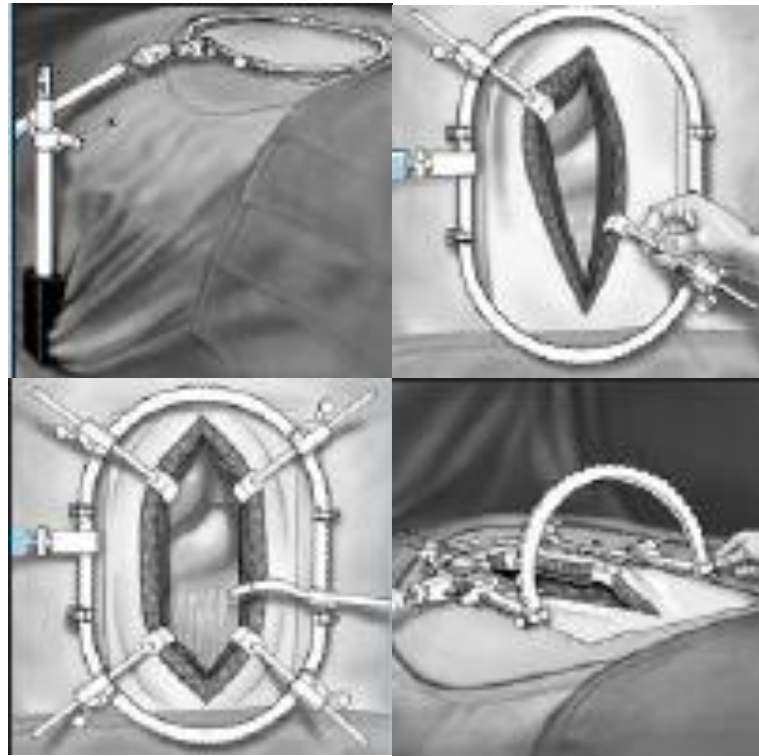
Clamping Instruments



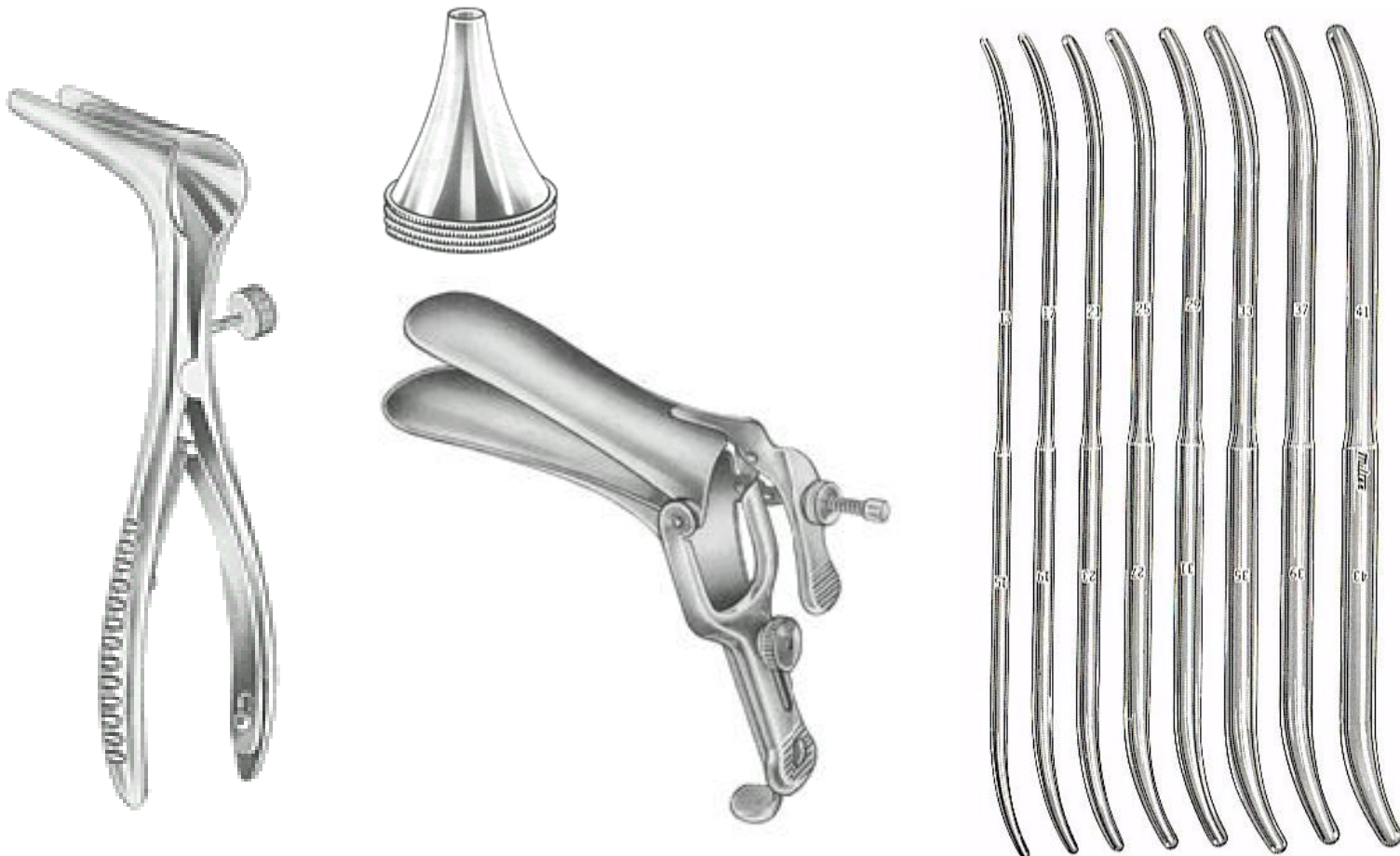
Retracting Instruments



Retracting Instruments



Retracting Instruments



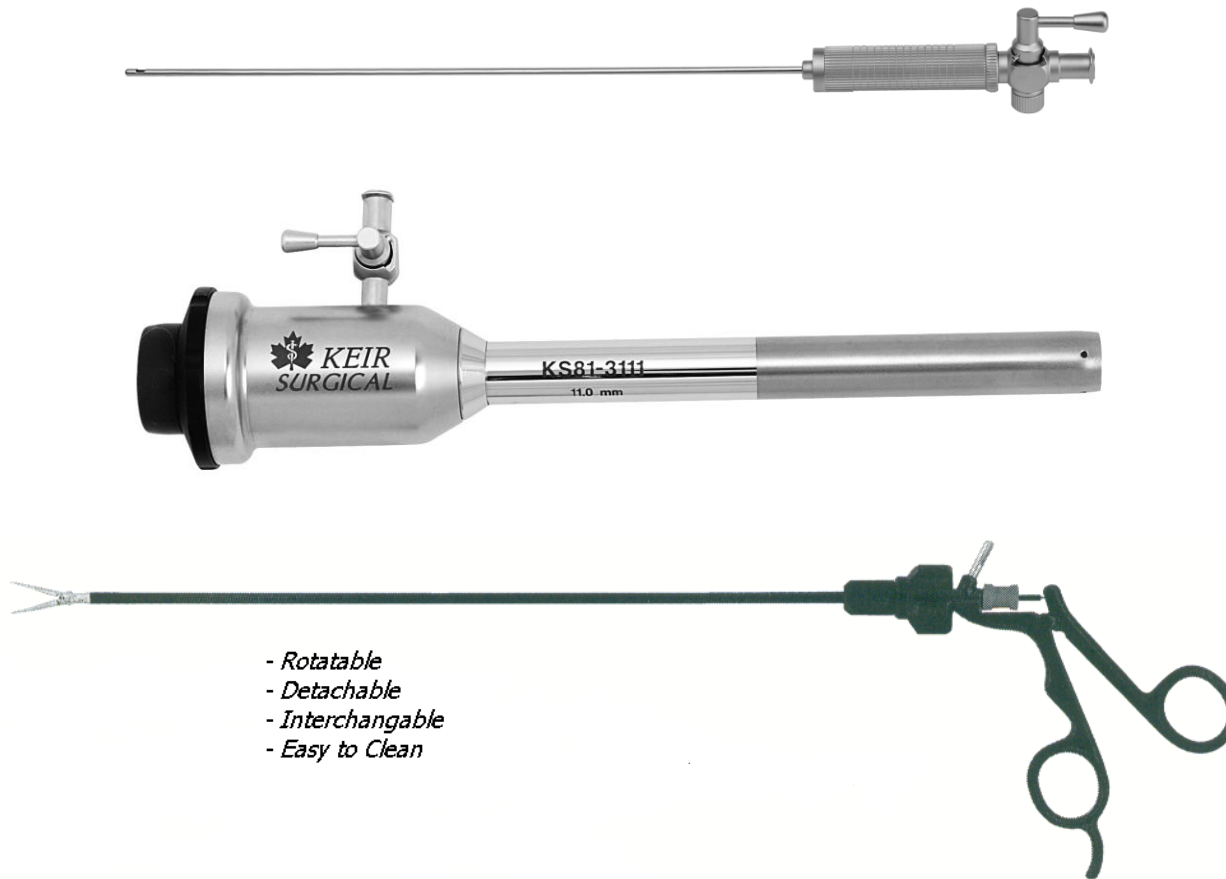
Suction Instruments



Endoscopy Instruments

- Endoscopic surgery less invasive than open surgery
- Specialized instruments to obtain access to operating sites
- Examples: Arthroscopy, Laparoscopy, Hysteroscopy, Cystoscopy, etc.

Laparoscopy Instruments



- Rotatable
- Detachable
- Interchangeable
- Easy to Clean

Summary

- What did we cover?
 - Where instruments are made.
 - What materials are used and why.
 - Considerations for proper maintenance.
 - Varieties of instruments and basic functions
 - Examples of instruments for open and Endoscopic procedures