

INSTRUMENTS IN ORTHOPAEDICS



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Basic Surgical Instruments

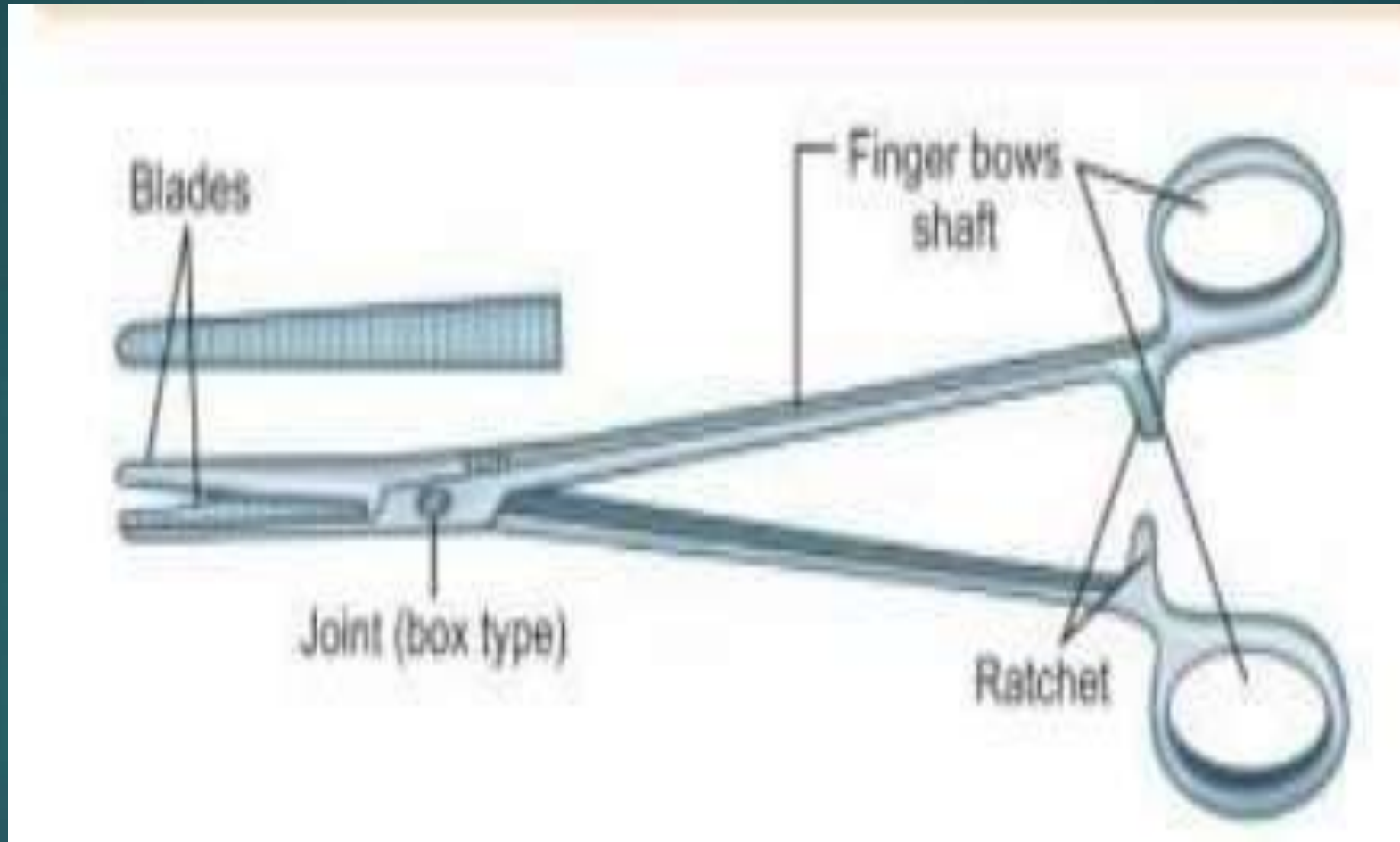
Basic instrument categories used for all orthopedic surgeries are:

- Forceps
- Scissors Retractors
- Periosteal elevators
- Rongeurs
- Nerve hooks
- Curettes
- Dissectors and probes.
-



FORCEPS

Parts



Cheatles forceps

No lock

Heavy metallic with curved blades

Used to pick sterilized instruments & drapes to avoid touching

Transferring from one tray to another

Kept in savlon



Sponge Forceps



- π Used to hold gauze sponge to “mop up” the surgical site
- π Jaws are serrated



1x2 Toothed Tissue Forceps

- Single toothed on one side; fits between two teeth on the other side
- Available as 1x2 or 2x3 or 3x4
- Used to hold tough structures like skin while suturing.
- Used to hold scalp while scalp suturing.



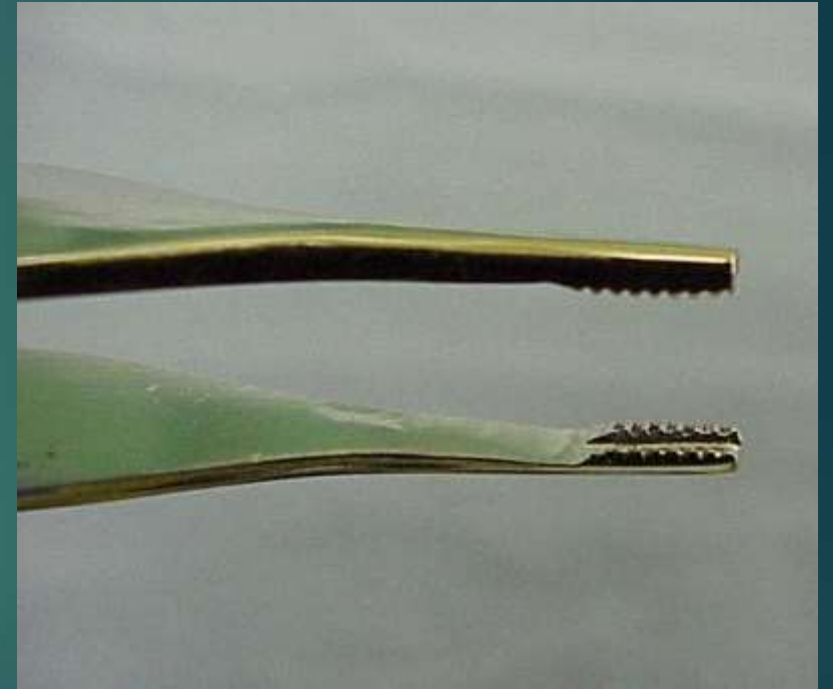
Plain Thumb Forceps



- Used to gently move tissues out of the way during exploratory surgery
- Used to insert packing into or remove objects from deep cavities
- Used to hold delicate visceral organs
- Used to hold blood vessels and nerves while dissecting.

Brown-Adson (thumb) tissue forceps

Adson-Brown Tissue Forceps are for holding and manipulating delicate tissues. These forceps have wide, flat thumb grasp area that is commonly serrated



Adson (thumb) tissue forceps are thumb forceps used for holding dressing materials such as cotton and gauze during surgical procedures, changing dressings, or packing wounds.

They have a wide thumb grasp for increased precision and control.



Artery forceps / haemostat

- Small → mosquito / Halsted
- Medium → spencer well
- Large → bailey forceps

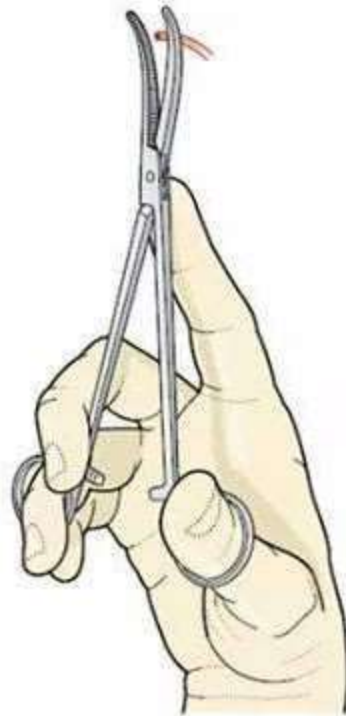
Suturing
Catch hold of bleeding points
Straight/curved



Curved Mosquito Hemostat

- Used to hold delicate tissue
- Used to compress bleeding vessels
- Jaws are fully serrated





When applying curved haemostatic forceps to capture bleeding vessels, prefer to have your hand supinated, and with curved forceps, have the convexity down, and ensure the tips just project beyond the vessel.

Kocher (Oschner) hemostatic forceps

With tooth & transverse
serrations

Can be straight / curved

Used to hold meniscus during
meniscectomy.



Allis tissue forceps

Used to hold skin while raising skin flaps.



Babcocks forceps

Used to pick up appendix during appendectomy.

Used to hold delicate visceral organs.

Less traumatic



LAHEY RIGHT ANGLED FORCEPS/CLAMP

Used to pass ligatures around nerves or tendons before division.



LISTERS SINUS FORCEPS

No lock

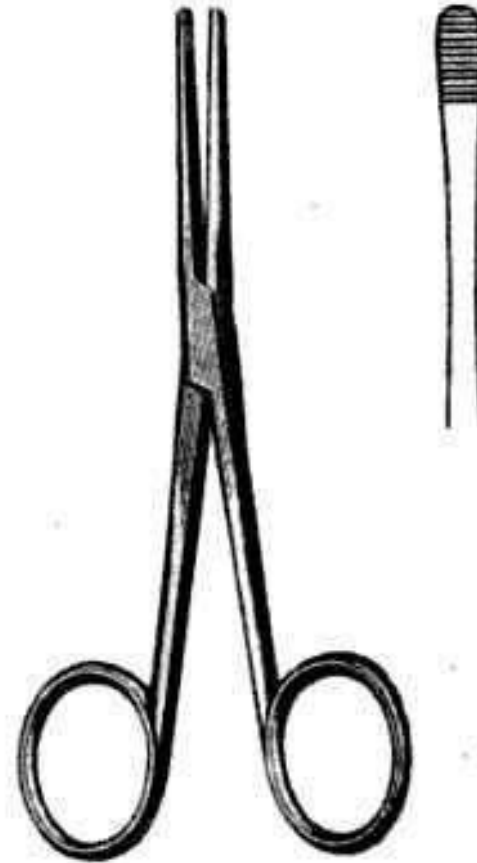
Prevents permanent damage to neurovascular bundle.

Used for I/D of abscess by Hiltons Method.



What is *Hilton's method* for drainage of abscess ?

During drainage of abscess situated in important areas like axilla, groin there is chance of injury to the underlying major vessels and nerves if adequate care is not taken. In drainage of abscess in such location the skin and the subcutaneous tissues are incised with a knife. The deep fascia is not incised with a sharp knife but is pierced by thrushing a sinus forceps through the deep fascia and the sinus forceps is then opened up to enlarge the opening in the deep fascia for easy drainage of pus. This is *Hilton's method* of drainage of abscess.



Lister's sinus forceps.

Listers mosquito

VS

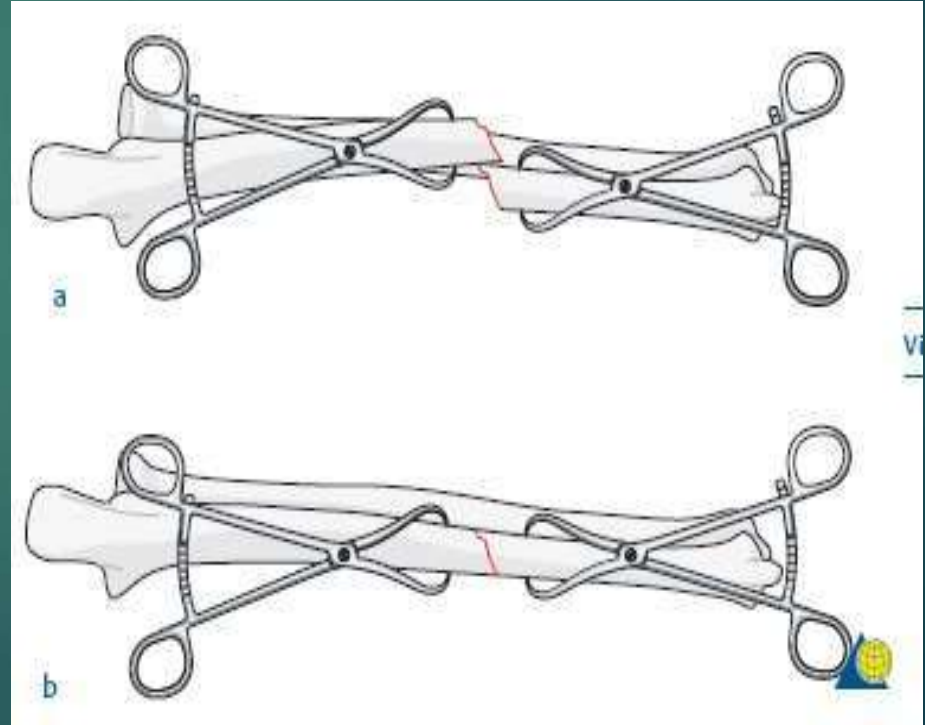
No lock



Pointed Reduction Forceps

Are available in two sizes - small and large.

Ideal to grip and manipulate large bone fragments.



Speedlock bone reduction forceps



Needle Holder



- Used to hold and pass a suturing needle through tissue
- Has groove to hold needle within jaws
- Criss cross striations
- Length of blade = length of box joint

Mayo-Hegar needle holders



Towel Clamp



- Adds weight to drapes and towels to ensure they stay in place
- Allow exposure of the operative site

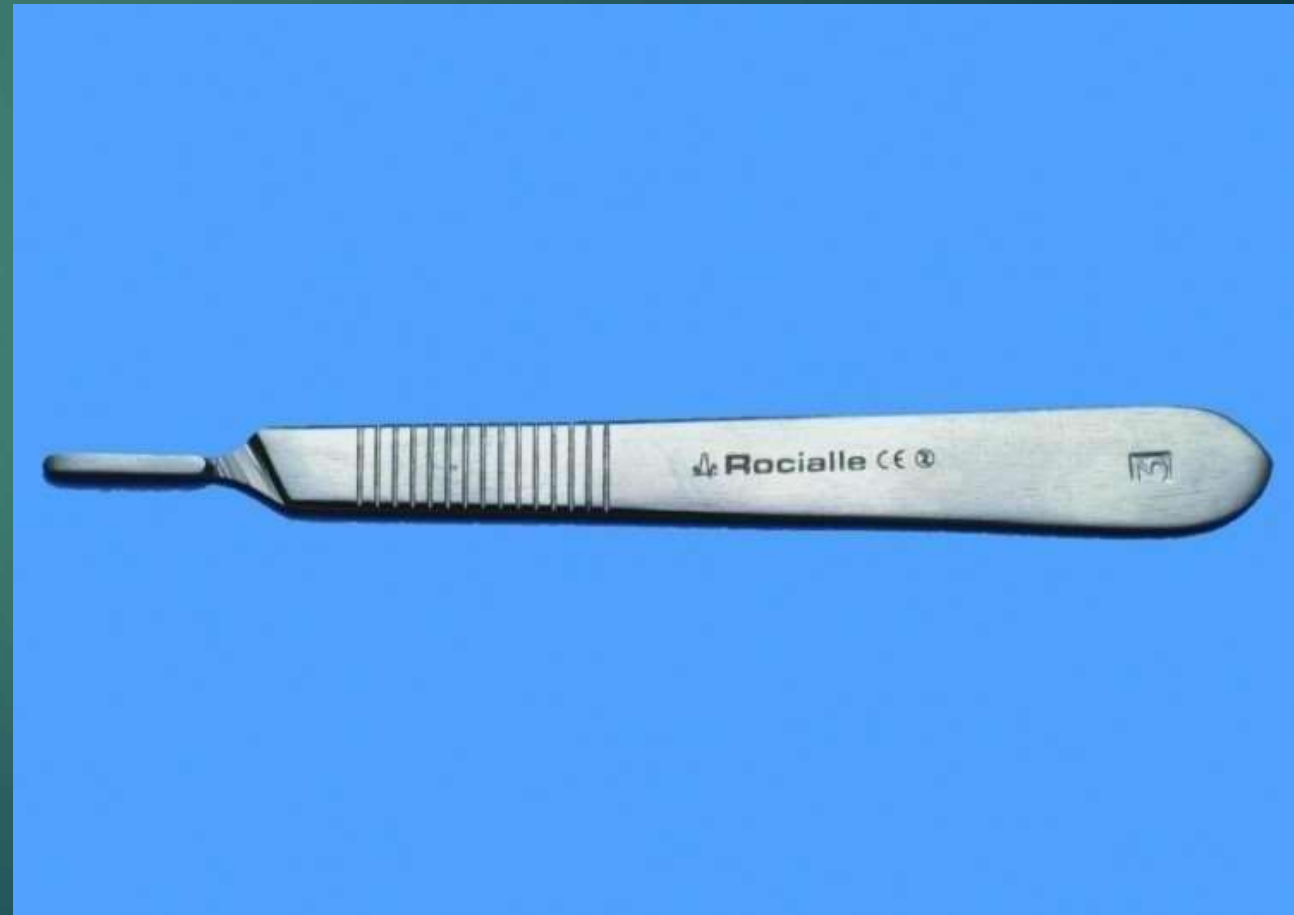
Backhaus towel clamps



BP handle /Bard parker
handle

Blades 10,11,12and 15 fit in B.P handle 3.

Blades 18,19,20,21,22, 23
and 24 fit in B.P handle 4.



Scalpel Blades



Commonly used knife blades. A, no. 11 blade; B, no. 15 blade; C, no. 10 blade.

Table 1. Deciding Which Blade to Use

Blade Size	Optimal Setting for Use*
No. 11	Draining an abscess, performing a shave biopsy
No. 15	Performing a biopsy, making incisions < 5 cm, any incisions on the face
Nos. 10, 20	Making incisions longer than 5 cm, debriding wounds

* This table describes the optimal knife blade to use if you have a choice of sizes. If you do not have the luxury of choice, any blade can be used for almost any situation.



Hold the scalpel for making a long smooth incision. Draw the belly of the knife, not the point, from your nondominant to your dominant side. If you are cutting along a sagittal plane, cut from far to near



SCISSORS

Sharp/Sharp Scissors

- Used to cut and dissect tissue
- Both blade tips are sharp




Blunt/Blunt Scissors


- Both blade tips are blunt
- Can be curved or straight



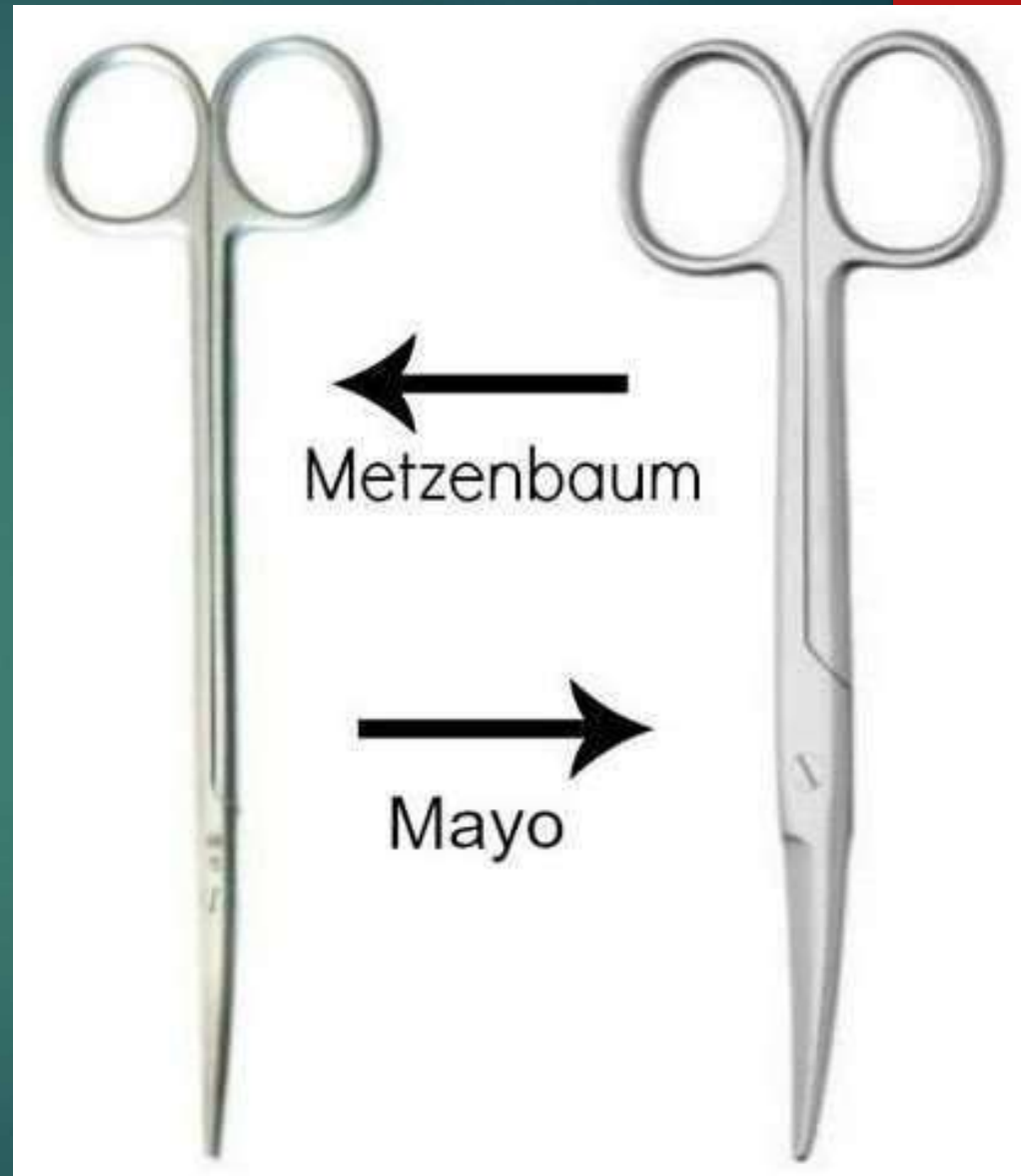
Mayo dissecting scissor (top)
Metzenbaum scissor (bottom)



- 
- **Mayo scissors** have semi-blunt ends, a feature that distinguishes them from most other surgical scissors.
 - **Straight-bladed Mayo scissors** are designed for cutting body tissues near the surface of a wound.
 - Curved-bladed Mayo scissors allow deeper penetration into the wound than the type with straight blades.
 - The curved style of Mayo scissor is used to **cut** thick tissues such as those found in the uterus, muscles, breast, and foot.

- 
- **Metzenbaum scissors** are surgical scissors designed for cutting delicate tissue and blunt dissection. The scissors have a relatively long shank-to-blade ratio.
 - Blades can be curved or straight.
 - The blade tips are usually blunt.

MAYO SCISSORS



LITTAUER SUTURE CUTTING SCISSORS



HEATH SUTURE CUTTING SCISSORS

Used to cut sutures on skin and mucous membrane.



Sharp/Blunt Scissors



- Used to cut and dissect fascia and muscle
- One blunt tip and one sharp tip

Suture scissors (blunt blunt)



Lister Bandage Scissors



- Used to remove bandages and dressings
- Probe tip is blunt; inserted under bandages with relative safety

Retractors

- Self retaining
- Handheld

SELF RETAINING RETRACTORS

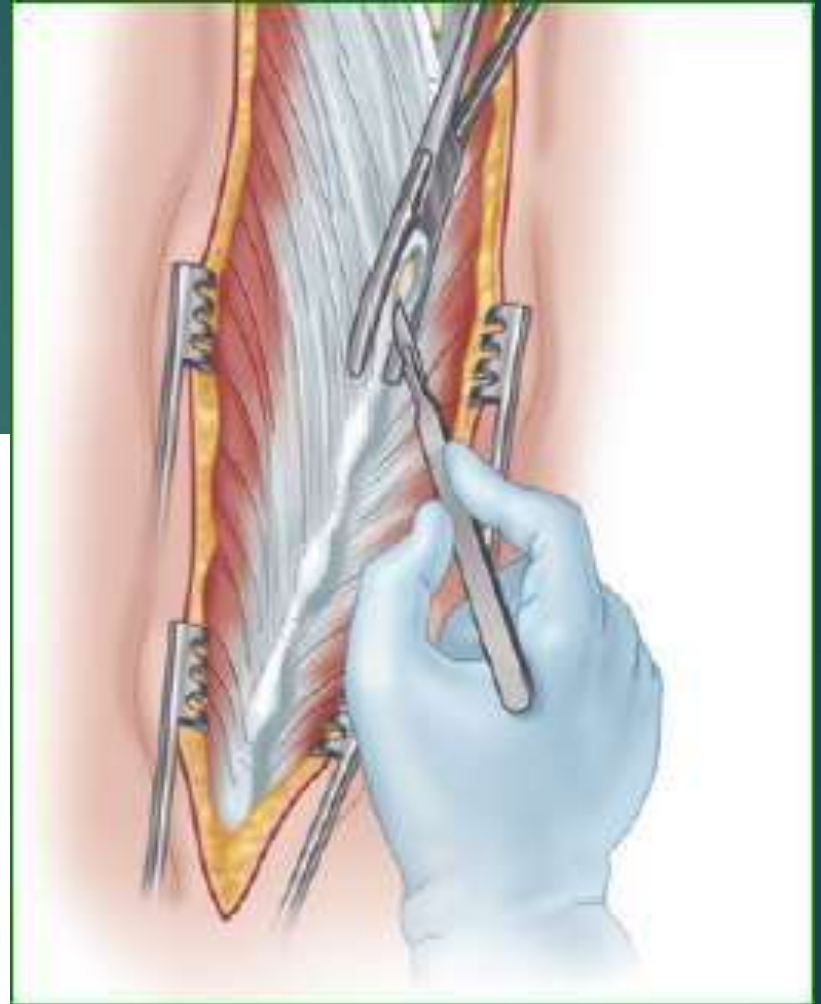
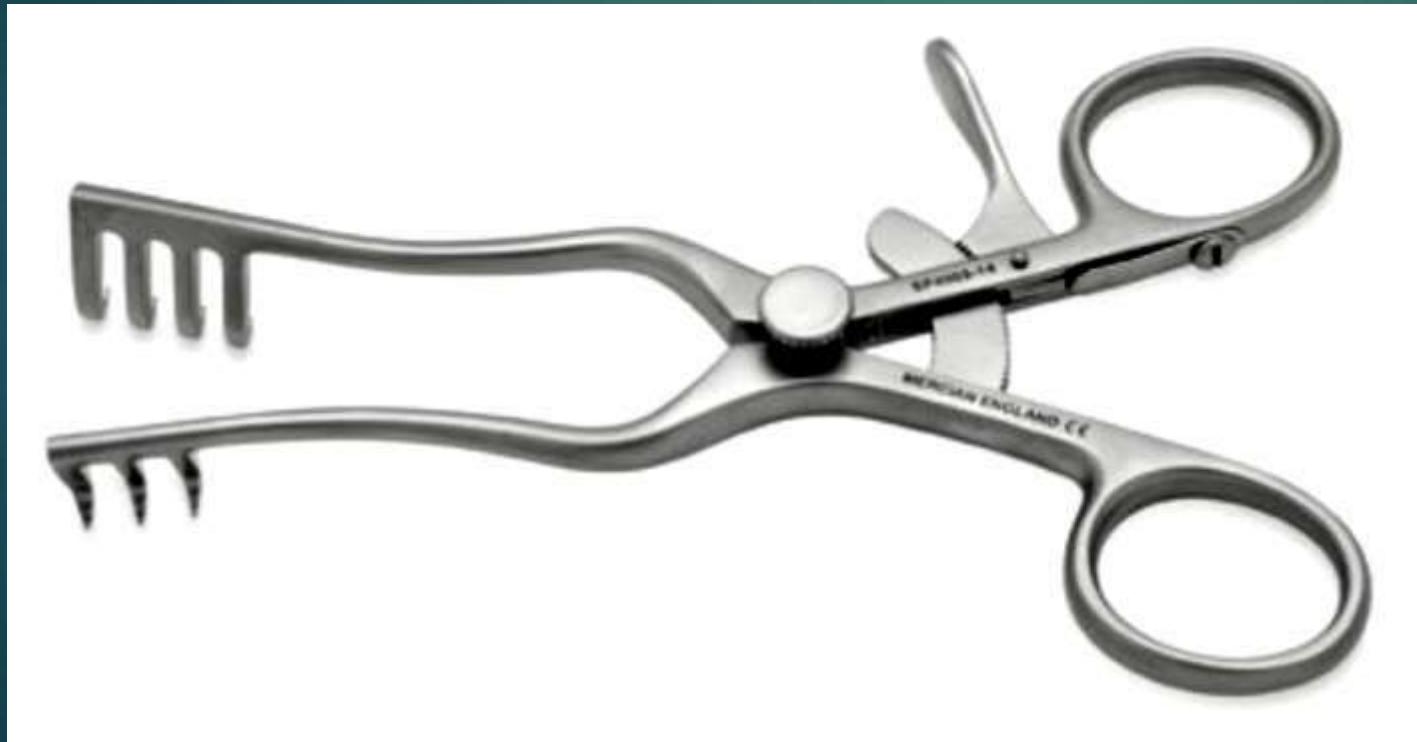
- Weitlaner
- Adson
- Derrico
- Mollison
- Charnley

The type of retractor used depends on the depth of the incision.

- Initially , Weitlaner retractors of different lengths are used for retraction of the skin and muscle.
- As the wound deepens and lengthens, the Derrico retractor or Adson Cerebellar retractor may be used.

Weitlaner self retaining Retractor

- 14cm/5½" length
- 3 x 4 Blunt prongs
- Prong depth 18mm



Derrico retractor is longer to accommodate a longer incision.



Adson Retractor

- 33cm/13" length
- 4 x 5 Blunt prongs
- Prong depth 32mm
- Jointed arms



Adson Cerebellar retractor

Mollison Self-retaining Retractor

- 1-2 levels hemi- laminectomy
- 14cm/5½" length
- 3 x 4 Blunt prongs
- Prong depth 18mm

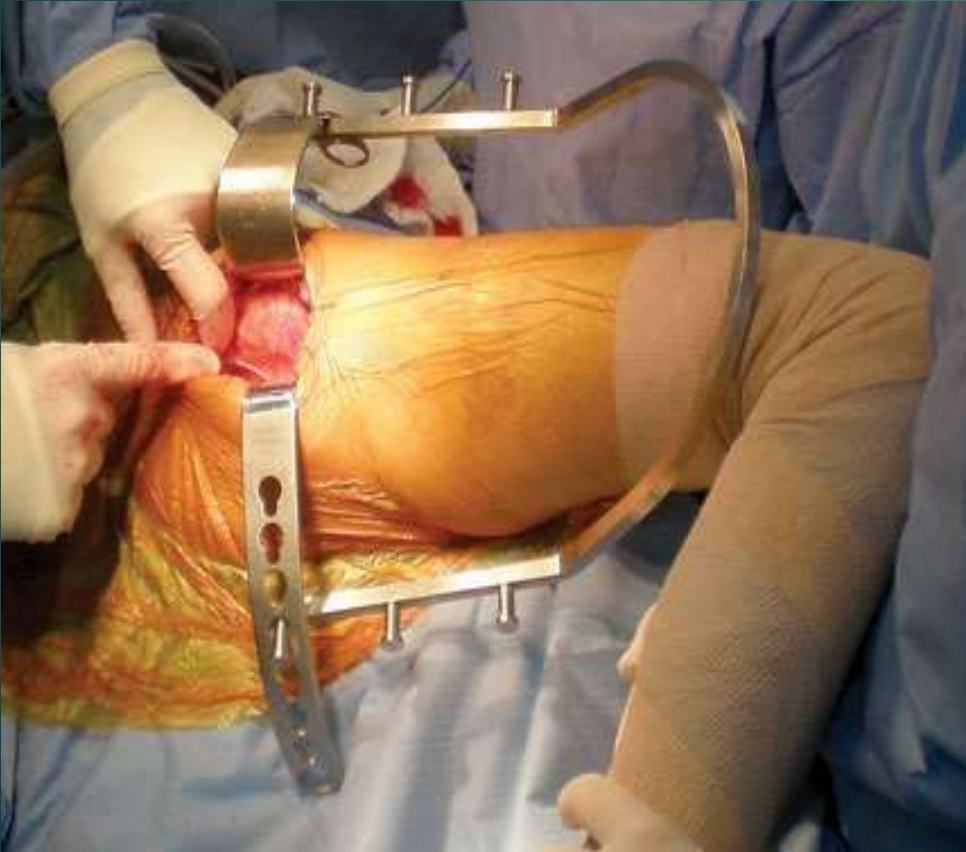


Charnley Retractor

Also be known as the Initial Incision Retractor.

Is a self-retaining retractor, most commonly used during arthroplasty of the hip.

It is used when initial incisions are made and maintains exposure of the hip area so the surgeon has an unobstructed view.



HAND HELD RETRACTORS

Commonly used when obtaining bone from the iliac crest for bone fusion in the spine.

- Army Navy retractor
- Meyering retractor
- Taylor retractor
- Langenbeck
- Volkmann Catspaw.
- Czerny Retractor.

ARMY NAVY RETRACTOR

- An **Army-Navy retractor**(manual) is used to retract shallow or superficial incisions.



Meyerding Retractor

22.5cm/9" length

Meyerding Handheld Retractor is frequently used to hold back tissue and muscle in spinal and neurosurgical procedures such as laminectomy.

Blade size

50mm x 16mm

75mm x 25mm

90mm x 50mm



Taylor Hip Retractor

19cm/7½" length

Depth
70mm
85mm
100mm



Langenbeck Retractor

Used to retract skin, superficial fascia

21.5cm/8½" length

Blade size

22mm x 6mm

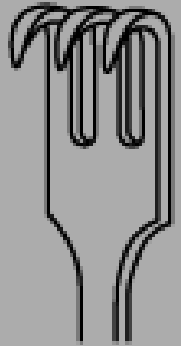
45mm x 13mm

65mm x 25mm

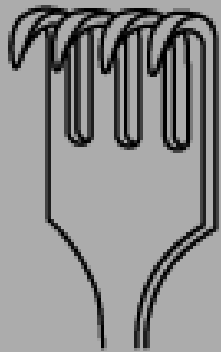
90mm x 20mm



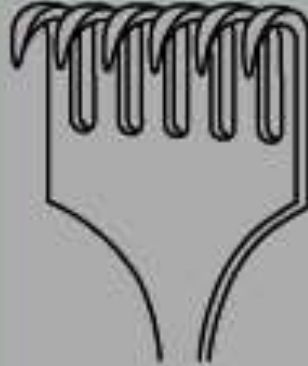
Volkman Catspaw Retractor



15 x 15mm
3 Prong



15 x 20mm
4 Prong



15 x 30mm
6 Prong



- **CZERNY RETRACTOR**
- is used to retract shallow or superficial incisions.

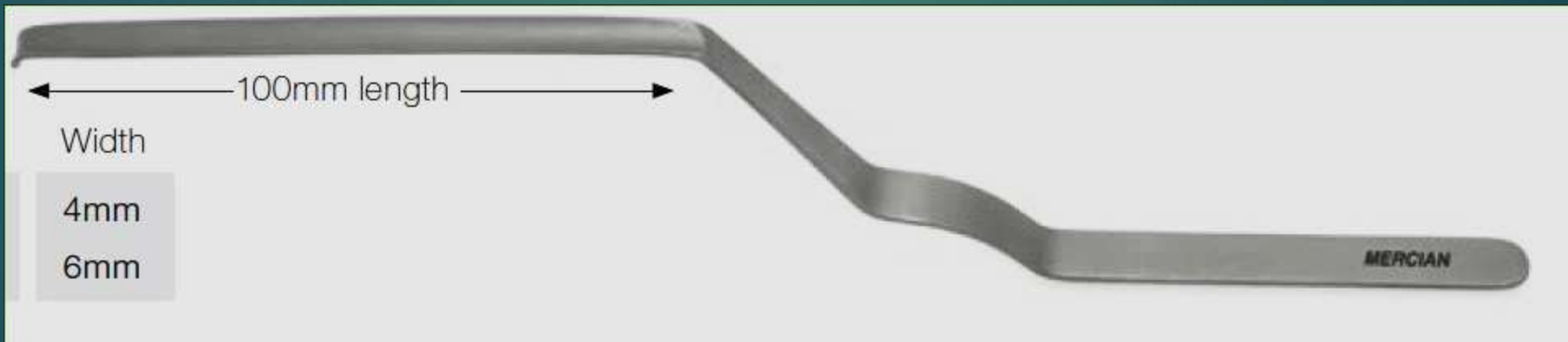


Nerve Root Retractor

- Used to retract nerve roots near the disc in laminectomies.
- Nerve root retractors have a crooked design so they can be placed deep in the wound.
- Derrico nerve root retractor
- Caspar nerve root retractor.

Caspar Bayonet Nerve Root Retractor

24cm/9½" length



O'Connell Nerve Root Retractor

- .21.5cm/8½" length



COBB ELEVATOR

- Used to elevate and push the muscle away from the bone to allow visualization of the spine.
- The Cobb elevator has various lengths of handles and sizes of paddles.

COBB ELEVATOR



Kerrison rongeur

Used to remove bone from smaller areas of the spine.

- Variable jaw lengths including 1 mm, 2 mm, 3 mm, 4 mm, and 5 mm.
- Two jaw slants (40 and 90 degree).
- Two types: Forward biting and backward biting.



Kerrison rongeur







Pituitary rongeurs, are used to remove disc and tissue in small spaces.

Their features include:

- Can be used for straight, up, and down biting
- Available in several jaw widths, including 2 mm, 3 mm, and 4 mm.
- Proper length of shaft to accommodate spinal procedures

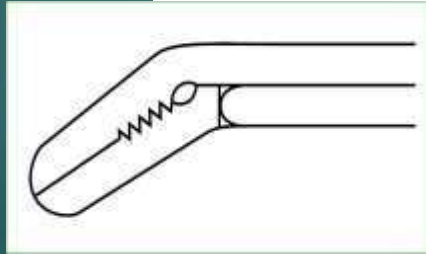
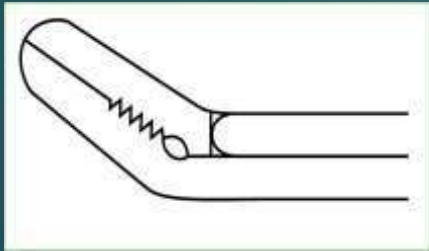
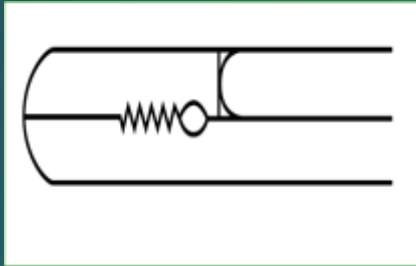
Pituitary Rongeurs





Caspar Toothed Disc Rongeur

Serrated/toothed jaws to help remove disc and tissue.





Serrated jaw



NERVE HOOKS

- Used to explore areas around the delicate nerves .

Three main nerve hooks are:

- **Dandy blunt nerve hook**, which has a short and blunt design.
- **Cushing Gasserian blunt nerve hook**, which is longer in length.
- **Weary Black nerve hook**, which has a thinner and more pointed design.

NERVE HOOKS



Dandy blunt nerve hook



Cushing Gasserian blunt nerve hook

Weary Blunt Nerve Hook

- 19.5cm/7¾" length
- 6mm fine tip length



DISSECTORS/ Elevators:

Used to elevate tissues or raise a depressed or sunken piece of bone or to separate soft tissues away from nerves and vessels.



Howarth Elevator



MacDonald Elevator/Dissector

Bone curette

It is used to scrape away and remove fibrous tissue and other debris from bone.

It may also be used to scrape and remove small portions of the bone itself.



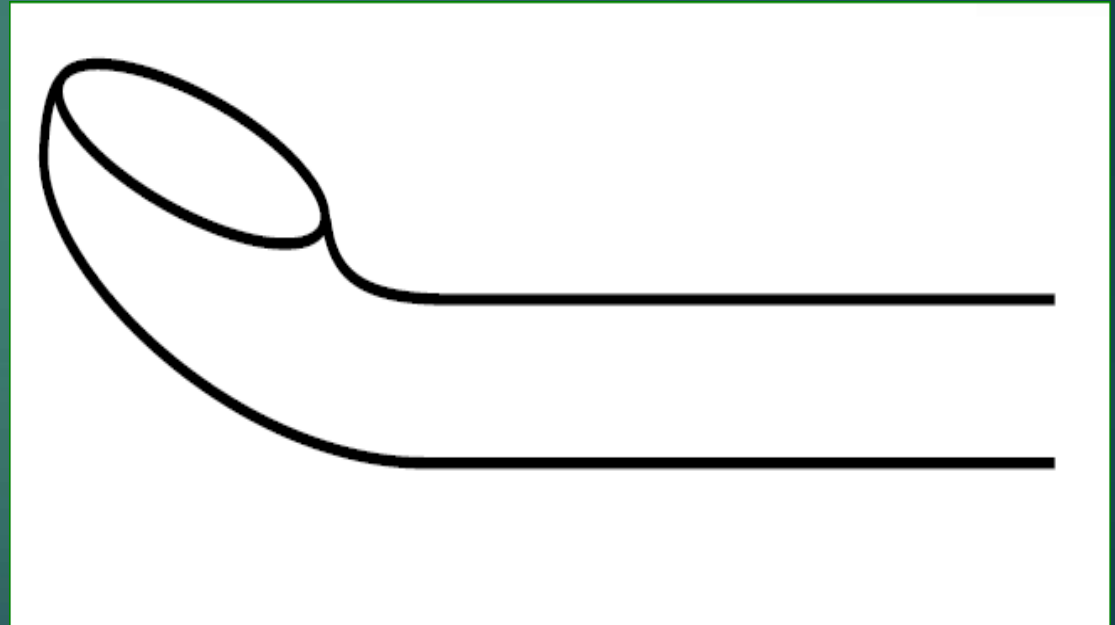
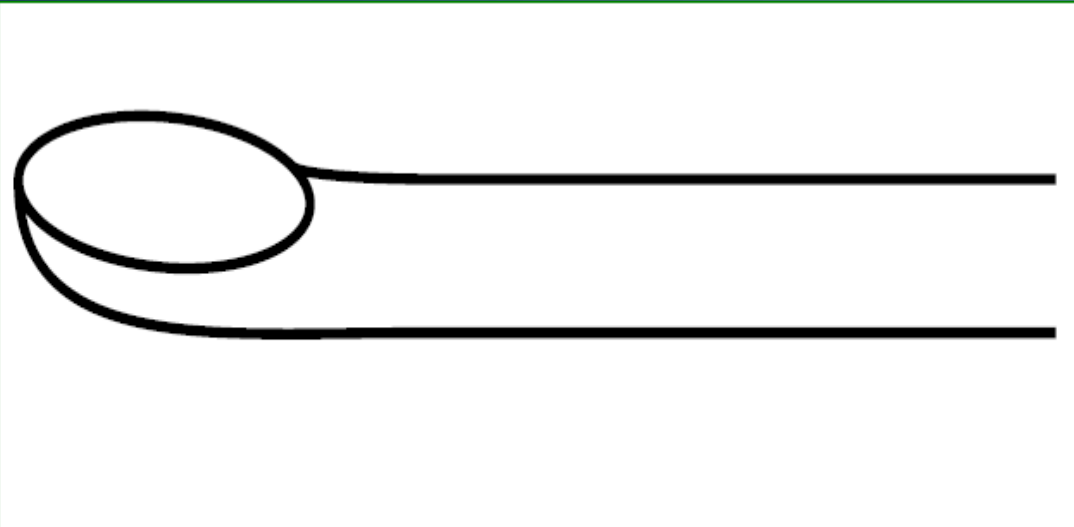
Volkman Double Ended Curette



SPINAL CURETTES

Uses to scrap, shape and clean bone.

- Available with various sizes of cups.
- Curettes can be straight or angled.



SPINAL CURETTES



Osteotome / Chisels / Gouges

- Used to cut, scrape, clean, scoop or sculpt the bone.
- They differ in the type of tip.
- Osteotome are beveled on both surfaces.
- A chisel has one beveled edge.
- Gouges have a cupped tip to scoop out bone material.
- They are used with a mallet.



Stille Osteotome



Lexer Osteotome

Chisel



Capener Lamina Gouge



Mallet

Lamina Spreader

- To aid in widening the space between the lamina.
- To hold the disc spaces open.



Pedicle awl – To perforate outer cortex of pedicle



Straight Awl

Pedicle Probe- Straight with ball tipped)

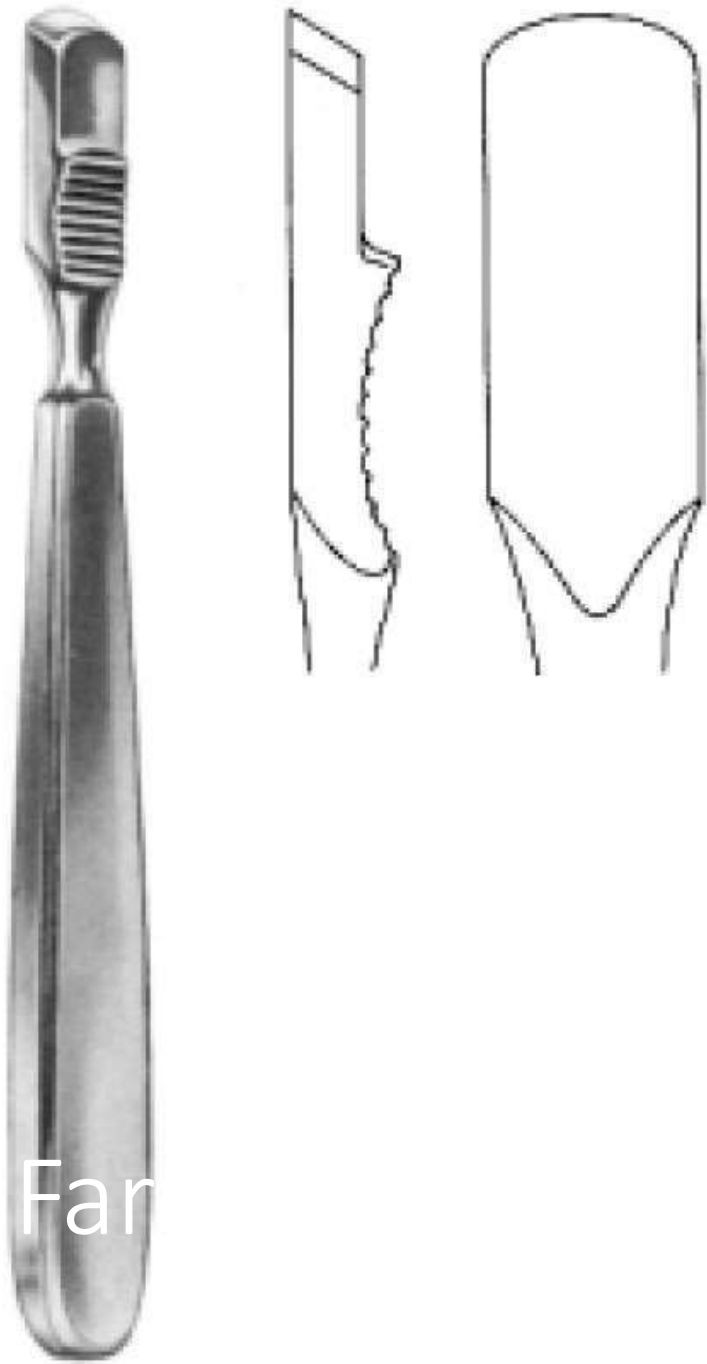
- Used to sound the pedicle for any cortical breach in all four quadrants.
- Also used to confirm whether there is any penetration to vertebral body anteriorly during pedicle screw fixation.



Periosteal elevator (Freer)

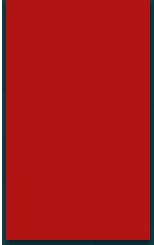
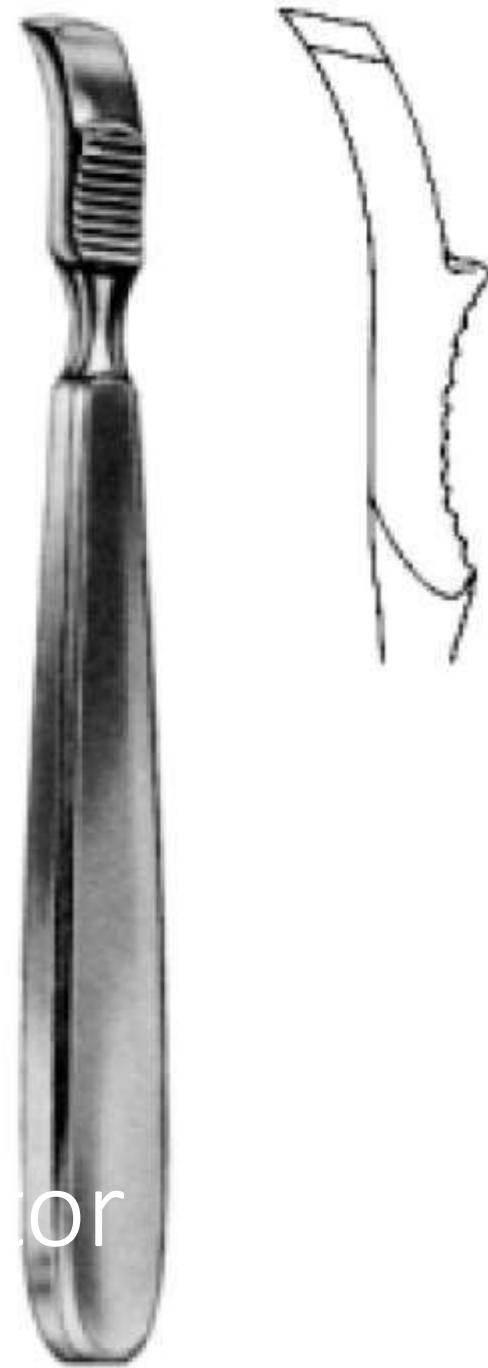
Periosteal elevators are mainly used to lift full thickness soft tissue flaps





Far

teal Elevator



AO Periosteal Elevator



Mc Donalds Periosteal Elevator



Bone cutter and Bone Nibbler

Used to reshape the bone during osteotomies, amputations.



Skin Hook

- Flat end is a blunt retractor
- Three-prong end may be sharp to dull
- Used to retract small incisions or secure a skin edge for suturing



RAMPLEY'S SWAB HOLDING FORCEPS

CURVED



STRAIGHT



TOWEL CLIPS

DOYENS' CROSS ACTION TYPE



BACKHAUS' CORNER CLIP



BARD PARKER'S HANDLE



DISSECTING FORCEPS

PLAIN

TOOTHED



HAEMOSTATIC FORCEPS

- Spencer Well's curved
- Spencer Well's straight

- Kelly's curved
- Kelly's straight



LANGENBACH'S RETRACTOR



MAYO'S SCISSORS

- Mayo's Blunt pointed straight
- Mayo's Sharp pointed straight
- Mayo's Curved scissors
- Mcindoe scissors
- Metzenbaum scissors

KOCHER'S FORCEPS

STRAIGHT



CURVED

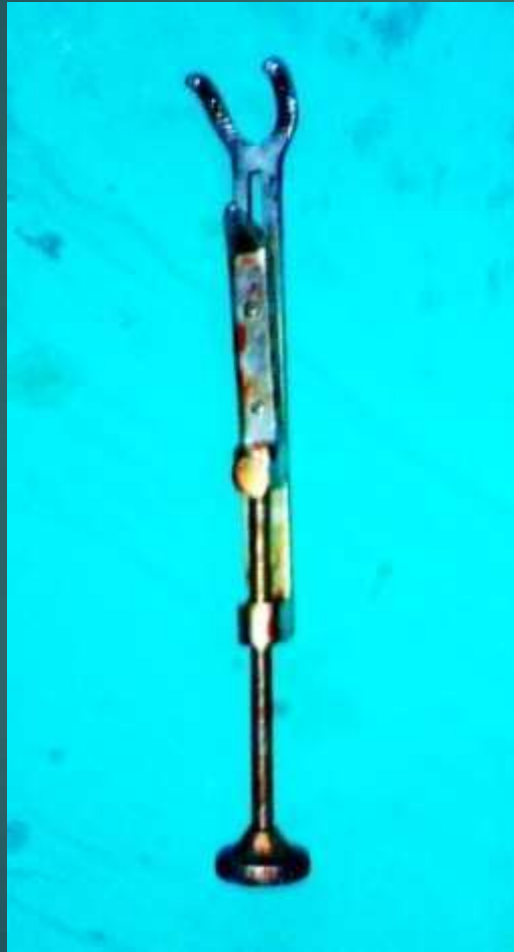


NEEDLE HOLDER

- Long,
- Small,
- Medium
- sized curved and straight needle holder.



LOWMAN'S BONE HOLDING FORCEPS



BONE HOLDING FORCEPS



MALLET (Bone Hammer)



BONE CHISEL



BONE GOUGE



BONE OSTEOTOME



BONE NEBULER



BONE CUTTER



PERIOSTEUM ELEVATOR(Farabeauf's)



BONE SCOOP



PLATE BENDER



JACOBSONS BONE – HAND DRILLER



CERCULAGE WIRE(ss wire)



BONE SAW



K wire, Schanz pin, Steinman pin



HIP PROSTHESIS

FEMORAL PART of THR/PHR



AUSTIN- MOORE IMPLANT



DHS



DCS



Interlock & K - nail



Semitubular, DCP, LOCKING, LCDCP



Semitubular, DCP, LOCKING Plates, LCDCP,



screws





Pins and nails

Circular in cross section

Steinmann pin **n**o threads

- Skeletal traction
- Compression arthrodesis



Denham pin middle thread

- Skeletal traction in osteoporotic bone to prevent slipping

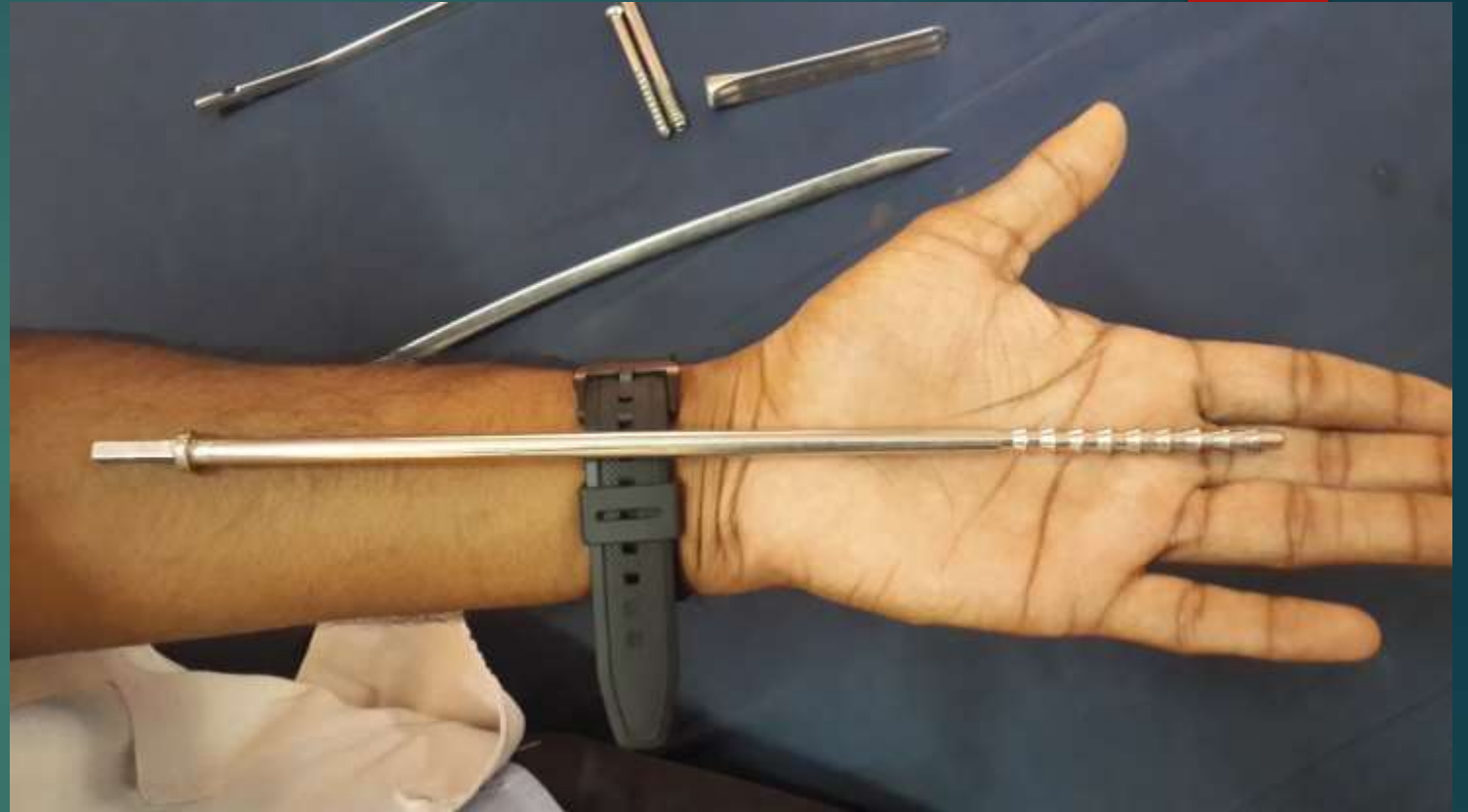


Schantz pin thread at ends

- External fixator



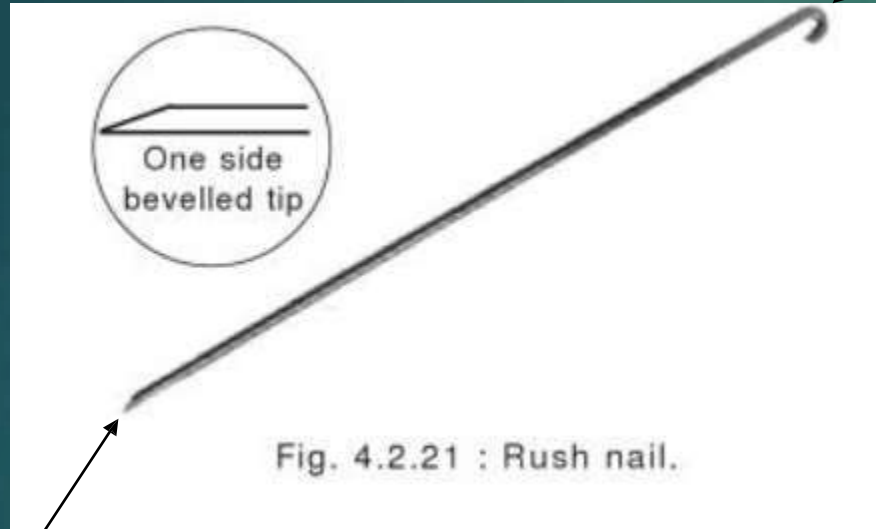
Harrington rod



Blunt with threads at one end but each is far apart

- Spine #
- Scoliosis
-

Rush nail



Hook for extraction

For easy insertion



Indication

- # humerus fibula

Disadvantage

- Chance of rotation due to circular cross section



Square cross section

Intramedullary nail for forearm bones

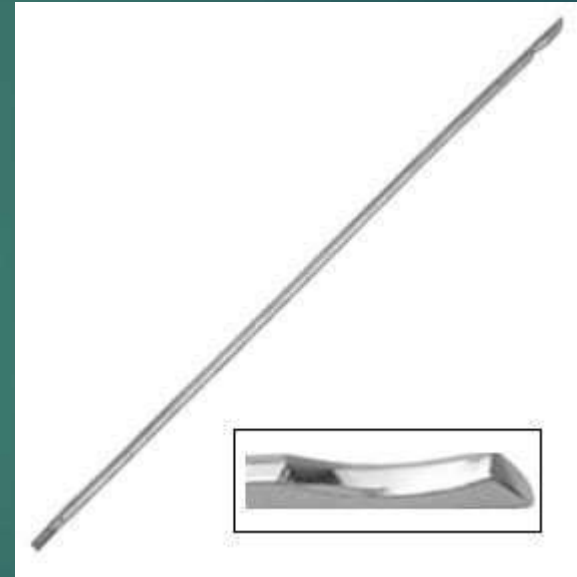
Ulnar square intramedullary nail



Radius square nail



R SHAPED



RADIUS square nail



Kuntscher cloverleaf intramedullary nail /k nail****

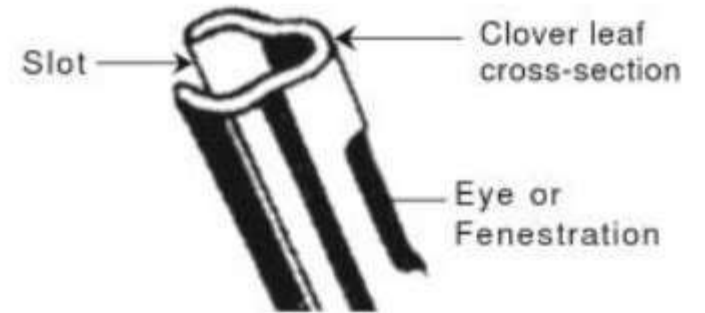
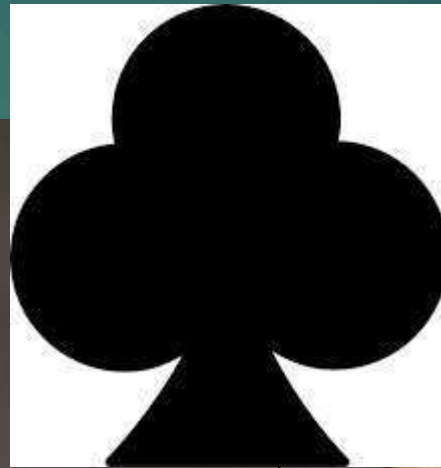
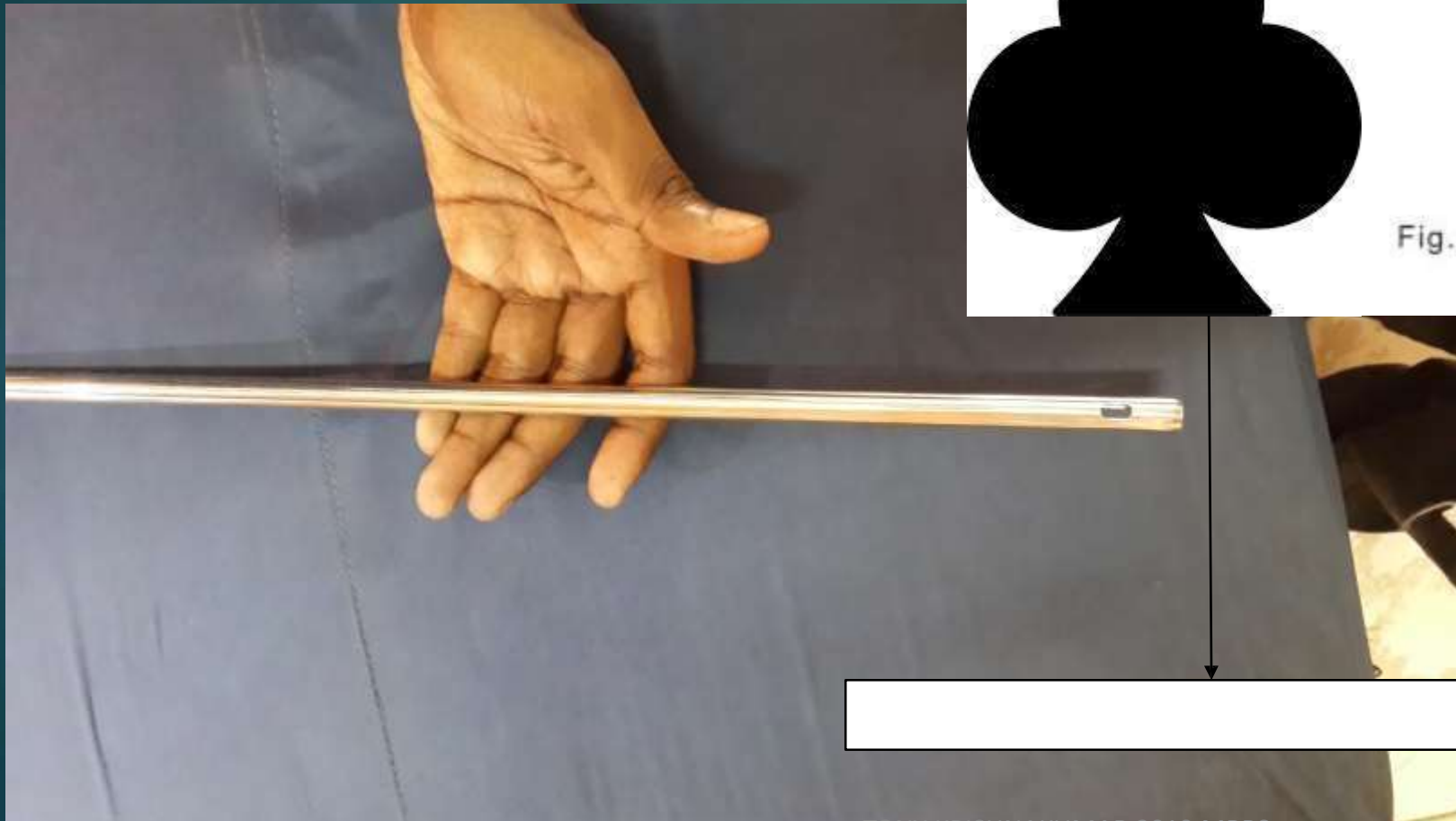
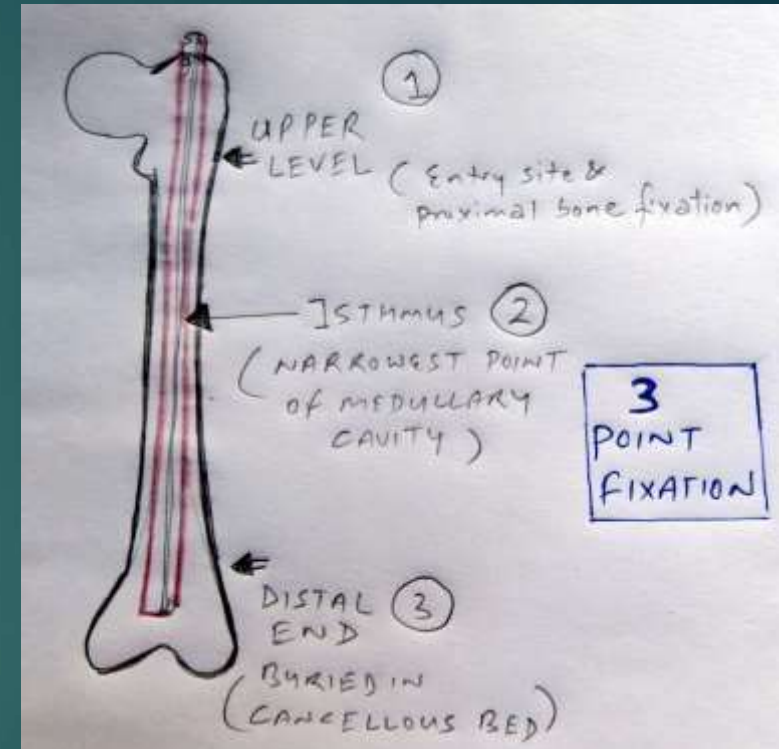


Fig. 4.2.18 : Blunt hollow end with clover leaf cross-section and eye.



Kuntscher cloverleaf intramedullary nail /k nail

- Indication
 - # shaft of femur, humerus tibia
- Ideally
 - In a young patient with
 - # at junction of upper & middle 1/3rd (narrowest portion)
 - no comminution
 - Transverse /short oblique #



Longitudinal slit
occupies
anterolateral part
of femur



2 eyes for removal on
posteromedial part of
femur

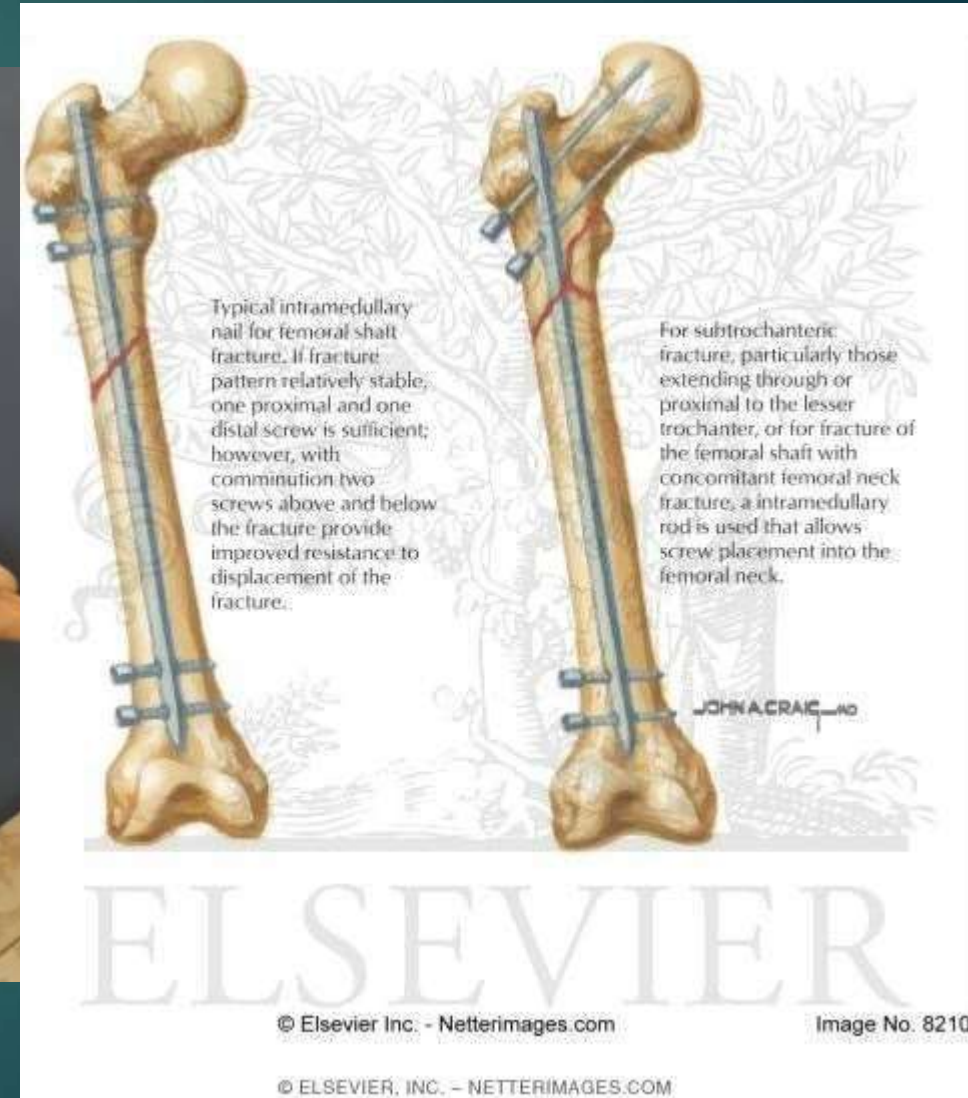
K nail can be introduced by

- Open (retrograde) method
 - Open # site with a gluteal incision
 - 100% redn but no hematoma formation
- Closed (anterograde)method
 - # site is not opened only gluteal incision
 - Hematoma formn + bur not perfect reduction

Interlocking intramedullary nail



Comminuted # humerus tibia



V nail

- Used for # tibia

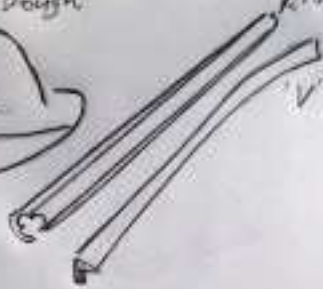


Antibiotic loaded
Cement Dough



X nail for femur

V nail for tibia



CEMENT DOUGH
APPLIED UNIFORMLY
OVER THE NAIL
EXCEPT EYELETS



← INFECTED
AREA DEBRIDED

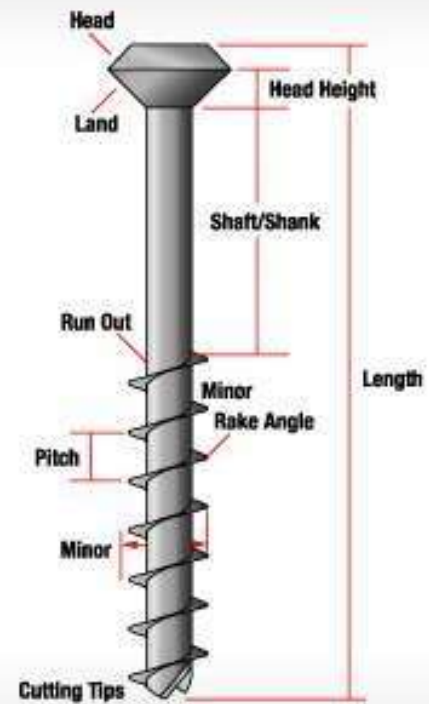
INSERTION
AFTER SIZE
CHECK

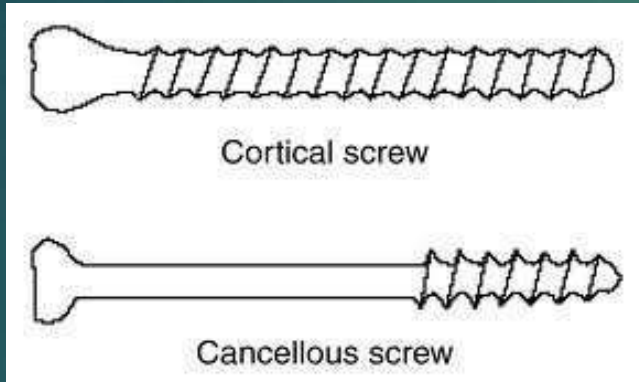
Moore's pin



neck of femur in children
other screws may cause disruption
of growth plate

Screws





- Cortical screws
 - More threads
 - Pitch and lead is less
- Cancellous
 - Less number of threads
 - Pitch and lead is more

SCREWS

CORTICAL

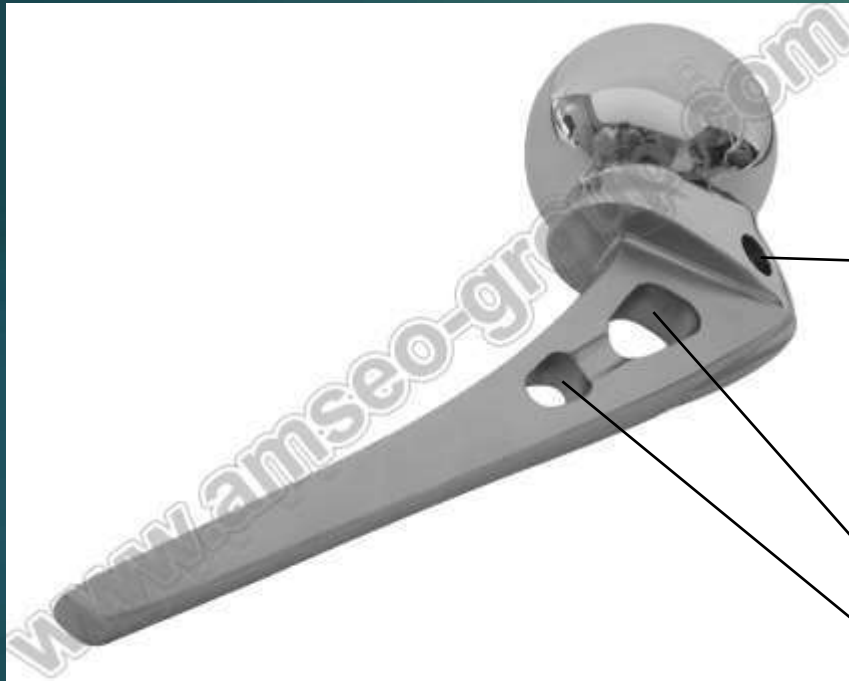
- Fully threaded
- Used for diaphyseal #
- 3.5 mm
 - Radius ulna fibula
- 4.5mm
 - Humerus tibia femur

CANCELLOUS

- Partially threaded
- Used for metaphyseal & diaphyseal #
- 4mm
 - Medial & lateral malleoli
- 6.5mm
 - Condyles (tibial femoral)
 - # neck of femur

Prosthesis

Austin moore prosthesis ****



Eye
for removal

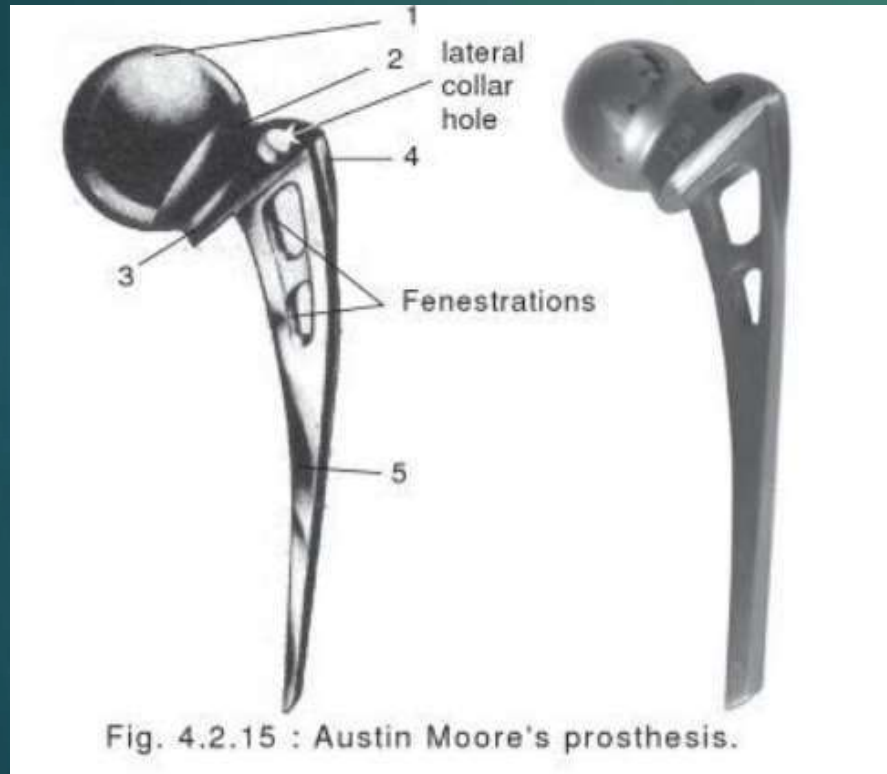
Fenestrations
• For detecting direction in x ray
graft



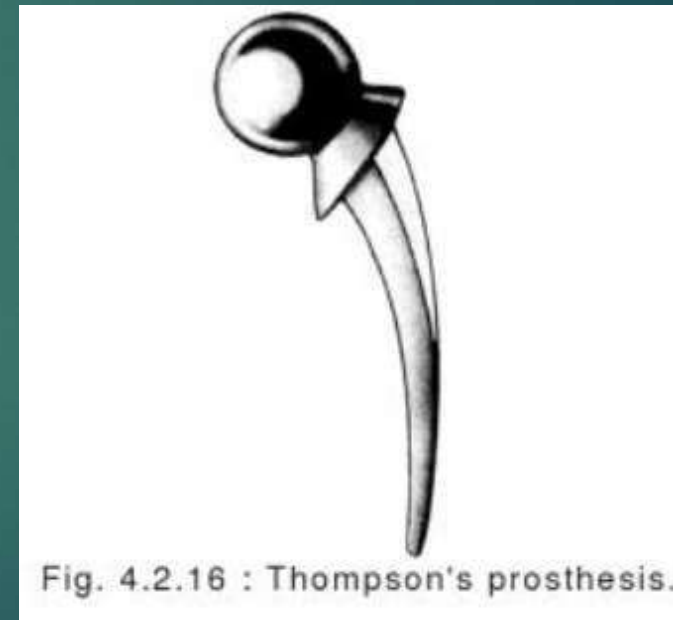
- Indication

- Intracapsular # neck of femur(transcervical & subcapital #)
 - With little bit of intact neck

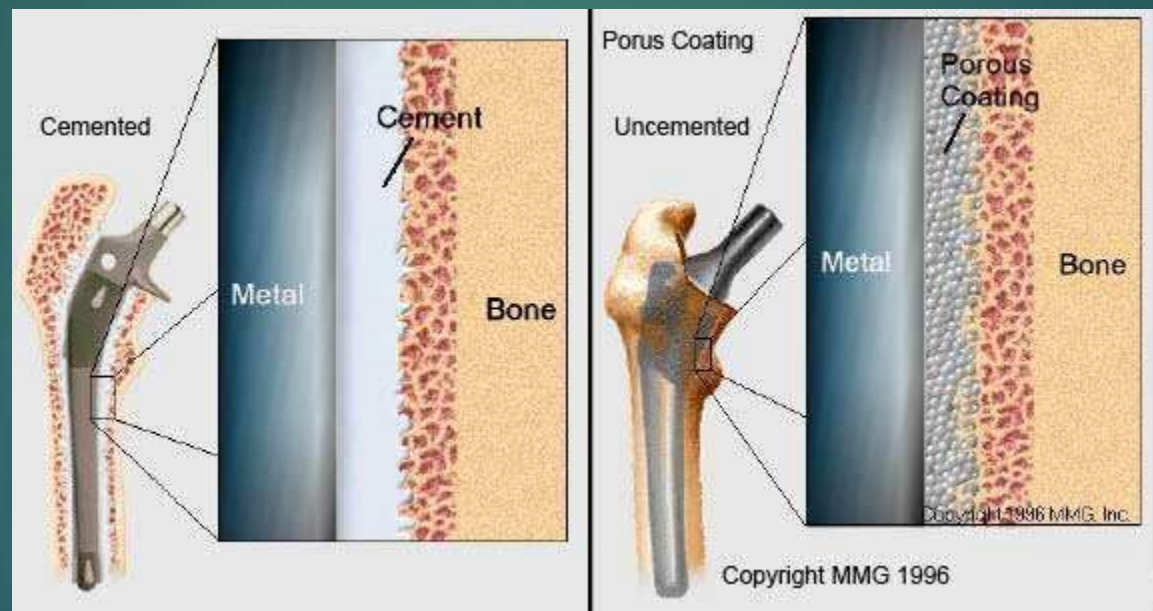
Austin moore prosthesis



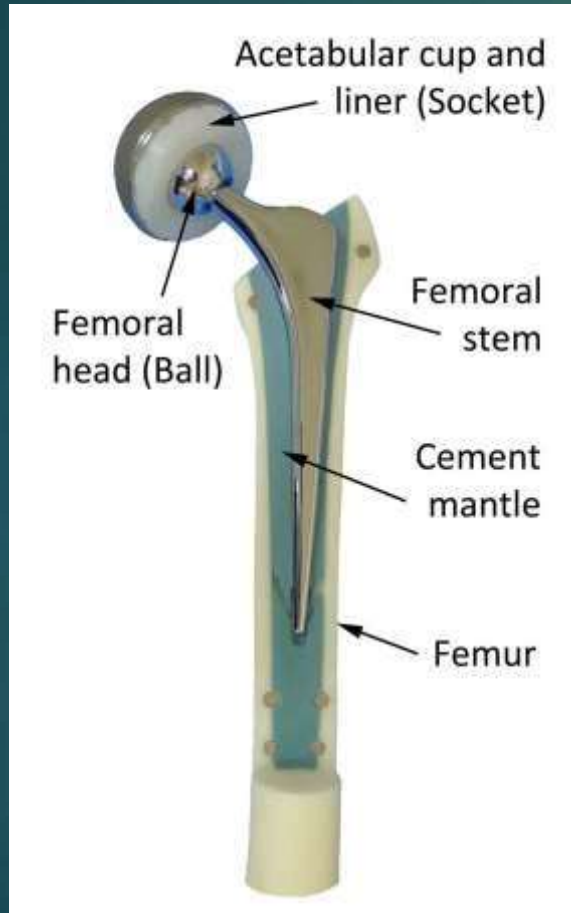
Thompsons



Basal # neck of femur with no neck



Bipolar prosthesis (2 heads)




Used in young individuals to reduce wear & tear

Bipolar prosthesis (2 heads)



Indication

same as AM prosthesis

- 
- Complications
 - Sciatic n injury
 - Loosening
 - Infection

Chisel & osteotome

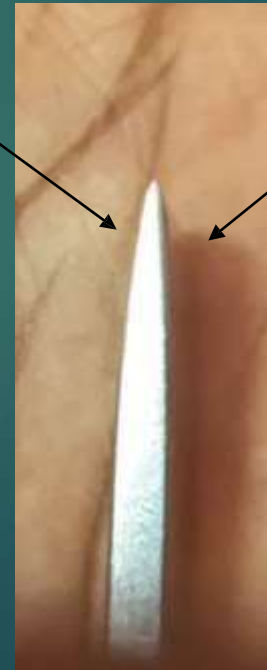
Chisel

- one edge beveled
- used to chip the bone.



Osteotome

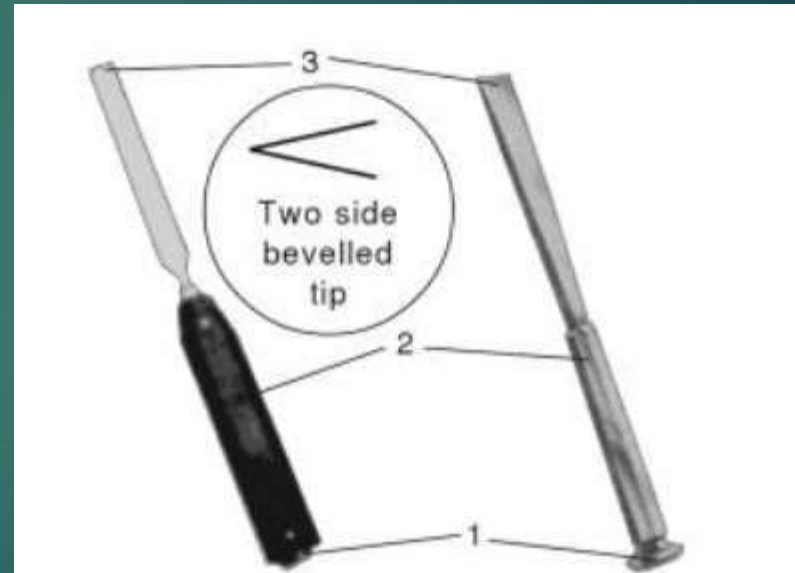
- both the edges beveled.
- used to cut /divide the bone.



Chisel



Osteotome



Chisel & osteotome



Periosteal elevator





Bohler stirrup***

- Used for skeletal traction

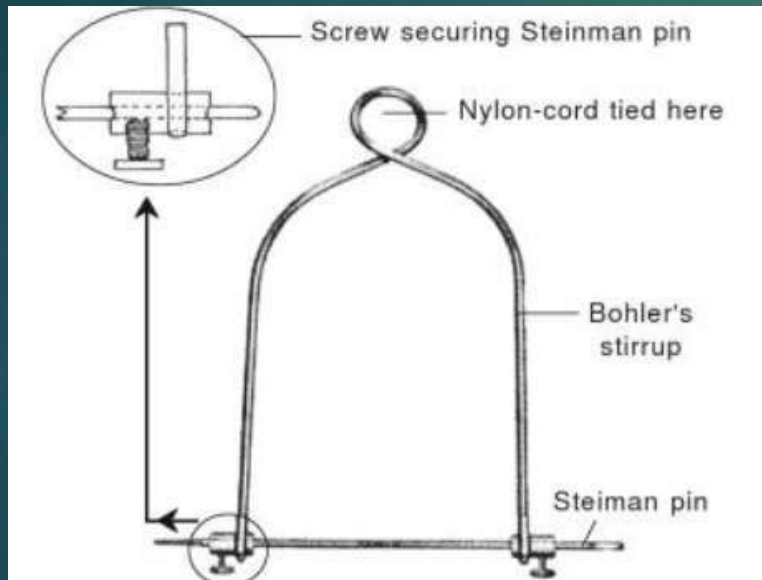
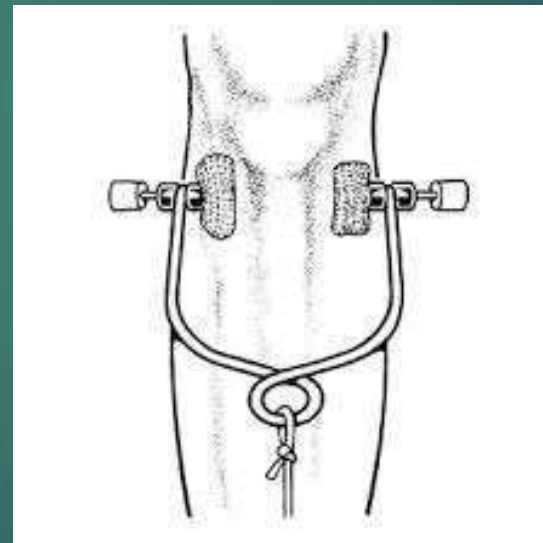
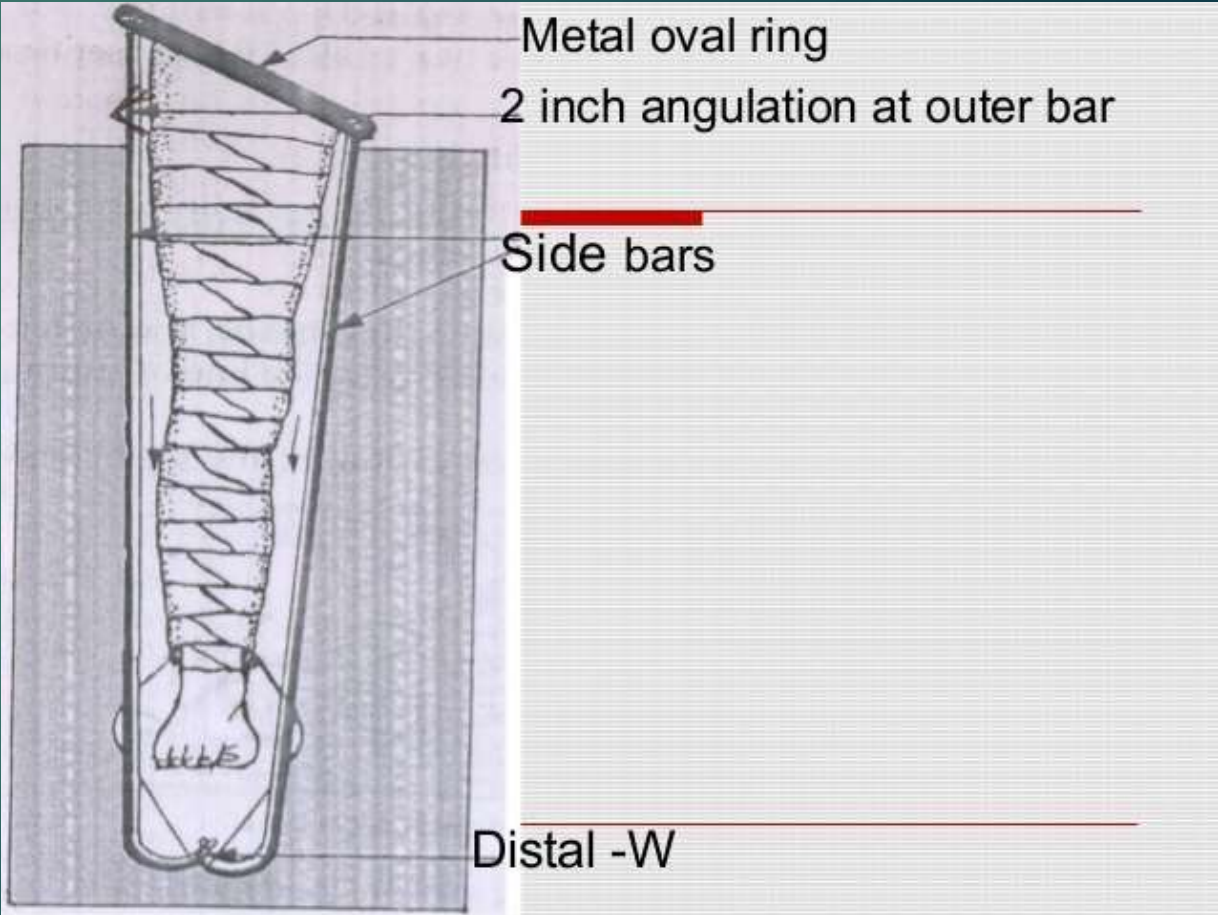


Fig. 4.1.3 : Bohler's stirrup with Steinman-pin in-situ, securely fixed by screws.



Thomas splint

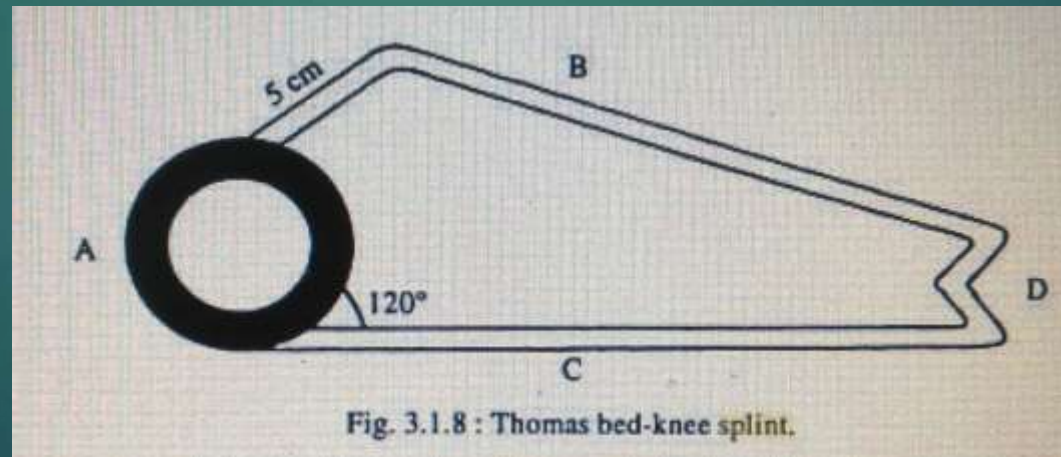


THOMAS KNEE-BED SPLINT

- Thomas splint.
- Devised by Hugh. Owen Thomas.
- Initially used for immobilisation for tuberculosis of the knee.

PARTS OF THOMAS SPLINT

- Consist of:
 - Ring
 - Medial bar
 - Lateral bar



USE

- Immobilisation of lower limb

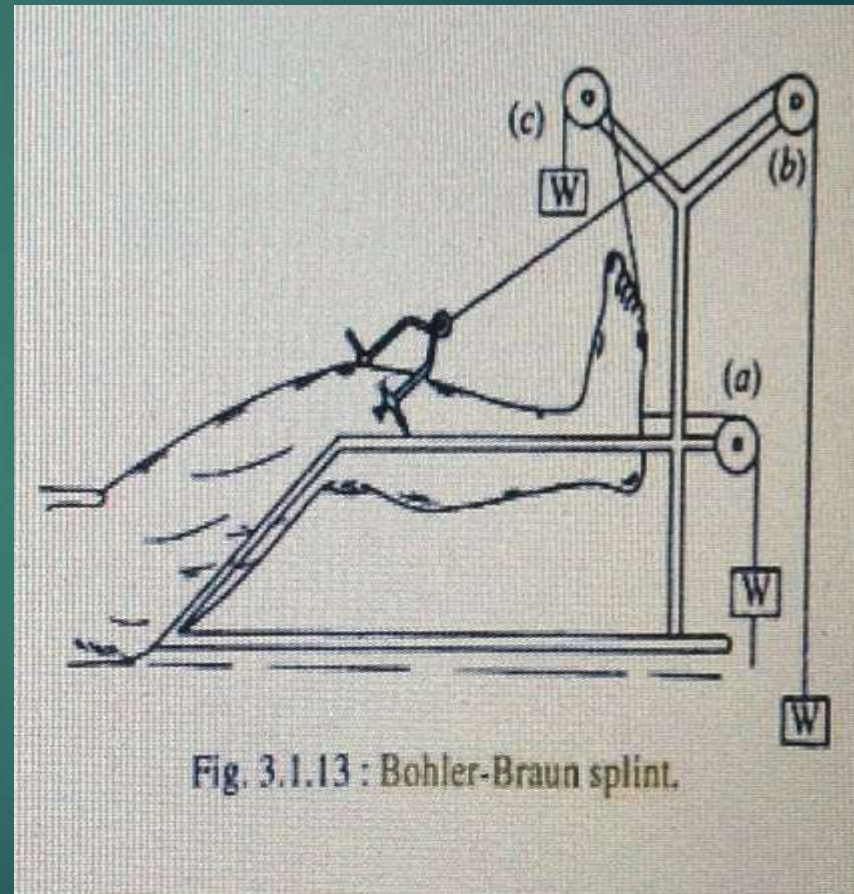
BOHLER BRAUN SPLINT



- Bohler's modification of braun splint.
- Consisted of only 1 pulley.



- Pulley a- calcaneal/distal tibial traction.
- Pulley b-distal femoral/proximal tibial traction
- Pulley c-change angle of traction



ADVANTAGES

- Angle of traction can be changed without changing traction arrangements.
- Simultaneous tractions possible.

DISADVANTAGE

- Not suitable for transportation.

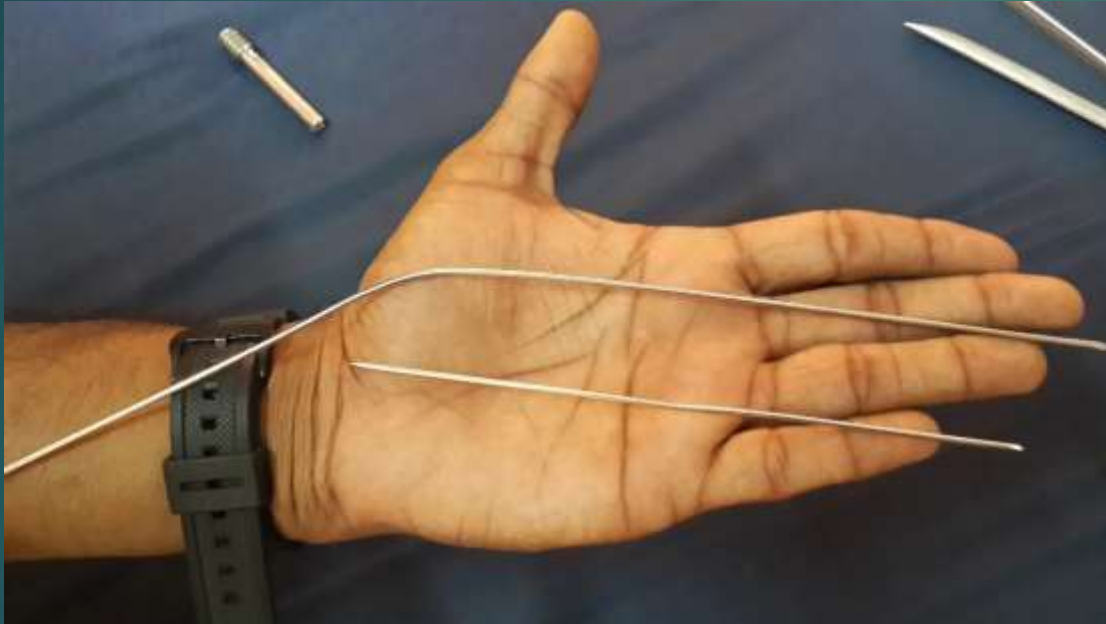
External fixator clamp



Steinmann pin

rod

K wire / kirschner wire



Small fragment fixation
Metacarpal # fixation
JESS
CTEV

Stapler



To Arrest growth of epiphysis on one side

- Correct genu valgum /varum

Arthrodesis

In OA (closed wedge osteotomy)

Bone nibbler



- Used for –

1. Smoothing the cut bone-end of amputation stump, or after removal of exostosis.
2. Sometimes used to cut calcar of femoral neck to desired length, before inserting prosthesis in hemiarthroplasty operation of hip.
3. Removing adherent soft-tissues from bone graft pieces, before placing them.

Joshi's external stabilization system (JESS) retractor



Screw for adjusting distance

Slot for k wire

Comminuted distal radius #
CTEV
distal tibial#

Charnleys compression device



Arthrodesis by compression

One slot for Steinmann
pin

Smith Petersen nail for trochanteric

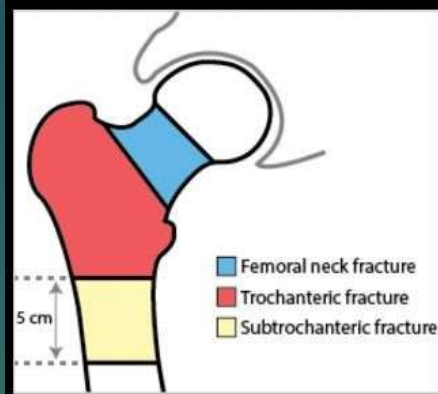


Jewett nail plate for trochanteric

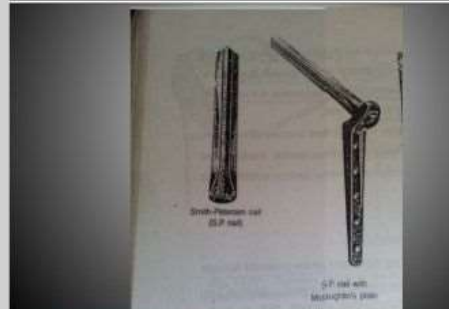


Mclaughlin plate





SMITH PETERSON NAIL WITH MCLAUGHLIN PLATE

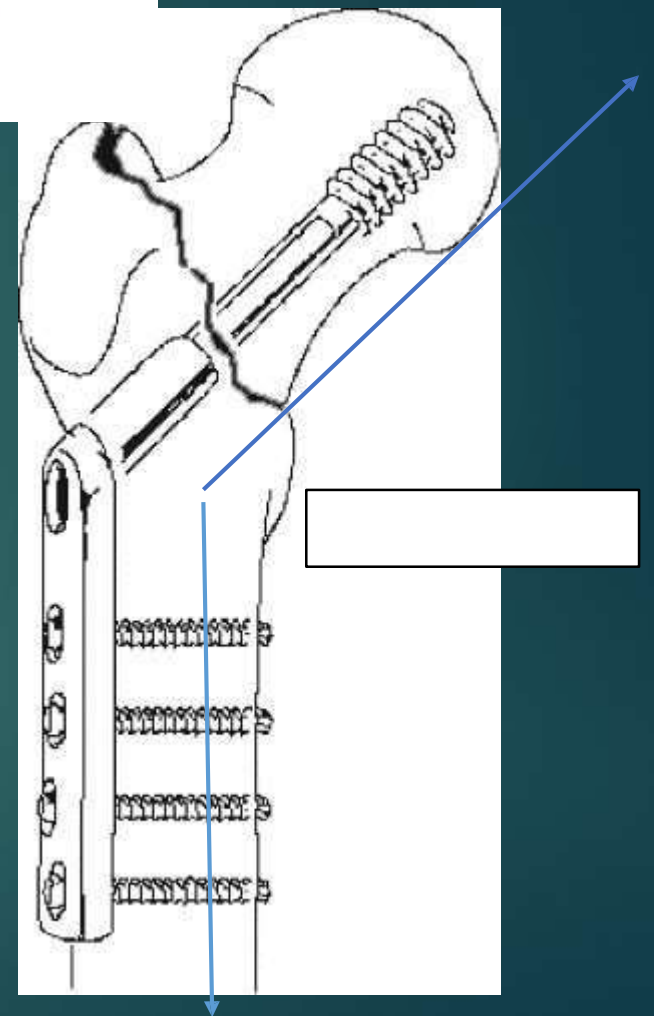


Smith Petersen nail for trochanteric #



Smith peterson Nail - For Neck of femur & Trochanteric # ... (Obv. that it can not be used for Subtrochanteric #)

Dynamic hip screw



Dynamic compression plate ***



Oval shaped

Dynamic condylar plate



Sherman plate



One third tubular plate

- Thin
- Mouldable
- distal ulna lower tibia
-



1/3 Tubular Plate