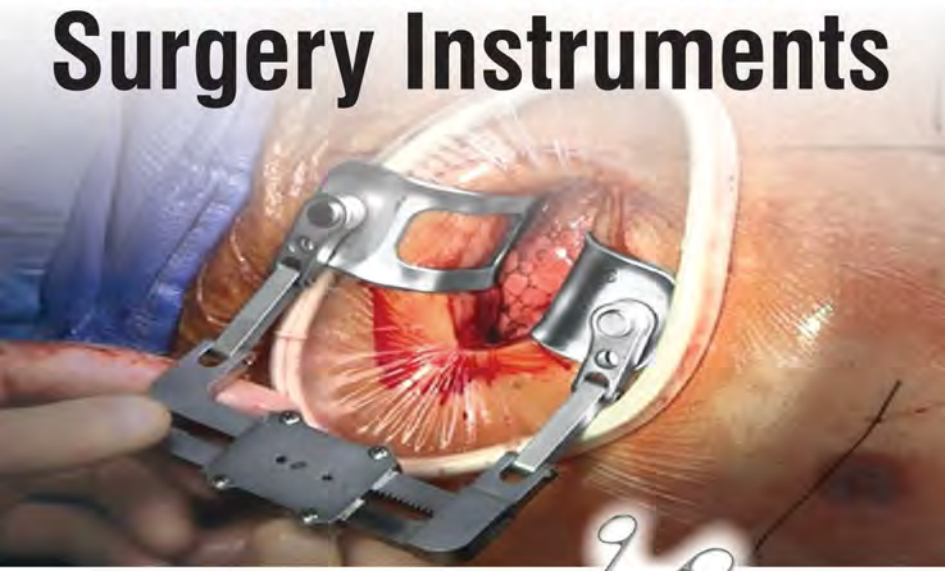
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Manual of CARDIAC Surgery Instruments





PRASHANT SHAH

Forewords
MP Naresh Kumar
S Rajan

JAYPEE

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CHAPTER

4

Forceps

HISTORY

Howard A Kelly (1858–1943)

First professor of gynecology and obstetrics at John Hopkins, Howard A Kelly (Fig. 4.1) assisted in fostering many surgical techniques and procedures involving the female reproductive and genitourinary tract. Kelly clamp is one of the most widely used and known surgical instrument.[1,2]



Fig. 4.1: Howard A Kelly

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William Wayne Babcock (1872-1963)



Fig. 4.2: William Wayne Babcock

William Wayne Babcock (Fig. 4.2) was recognized for his contribution in the field of colon and rectal surgery. He developed clamp which is widely used in many surgical specialties.[3]

- In any surgery forceps are used mainly to hold tissue for traction or apposition
- Ideal tissue forceps depends upon the tissue it has to handle
- It should have good grip with minimal tissue trauma
- Length of the forceps depends upon the depth of the area of surgery
- Forceps can be spring action type or lock type with 3 or more ratchets (catch, clamp and crush).

FORCEPS TYPES

Different forceps are described below.

Spencer Wells Hemostatic Forceps

They are curved and straight, transverse serrations, and are available in different sizes (Fig. 4.3).

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Fig. 4.3: Spencer wells hemostatic forceps

Uses in Cardiac Surgery

- To catch the bleeder
- To hold pericardial margin
- Holding other end of suture material (For this purpose tip has to be covered with soft rubber).
- Used as a blunt dissector

Kocher's Hemostatic Forceps

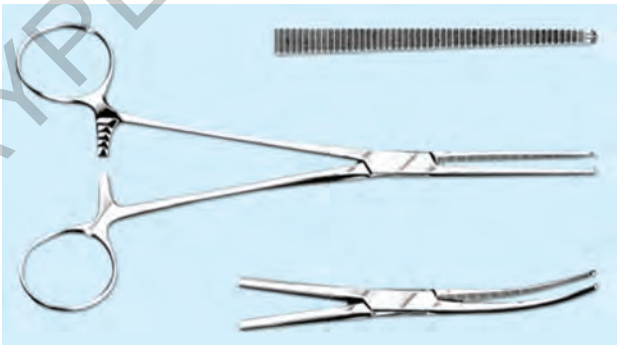


Fig. 4.4: Kocher's hemostatic forceps

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- This has longer blades than artery forceps with teeth at the tip which helps holding tough tissue (Fig. 4.4)
- Curved and straight type.

Uses in Cardiac Surgery

- Leaflet holding in mitral valve replacement
- In constrictive pericarditis, it helps holding pericardium
- Holding steel wire ends during sternotomy closure.

Allis Tissue Forceps

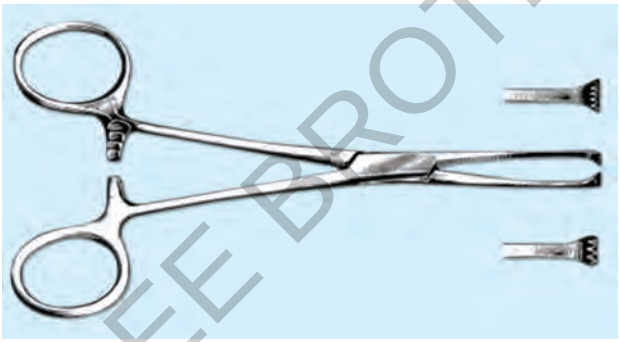


Fig. 4.5: Allis tissue forceps

- This instrument has straight blades which are slightly curved with the tip having interlocking teeth (Fig. 4.5).

Uses in Cardiac Surgery

- Holding pericardial edge
- Holding leaflet in mitral valve replacement.

Kelly Forceps

- Longer 8" Instrument with straight or curved blade
- Transverse serration in the blade (Fig. 4.6).

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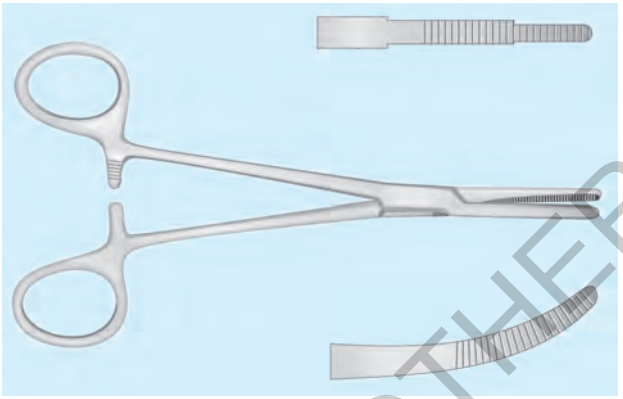


Fig. 4.6: Kelly forceps

Use in Cardiac Surgery

- Placing intercostal drainage tube
- Passing tube through incision for mediastinal tube
- Same like artery forceps.

Mixter

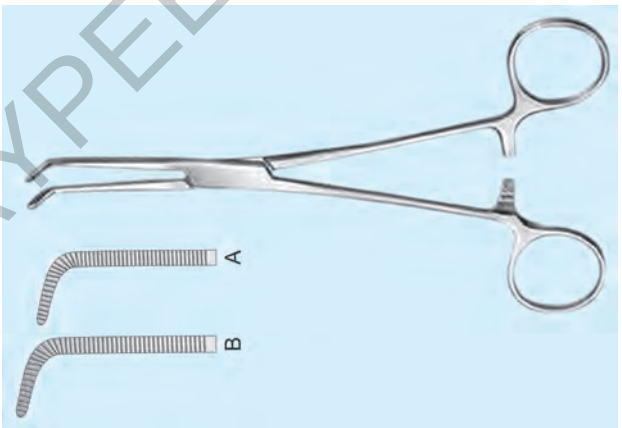


Fig. 4.7: Mixter

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- Right angle curved blade with transverse serrations (Fig. 4.7)
- Different length available with tip blunt to sharp.

Uses

- Encircling of any vascular structure is useful
- SVC, IVC, Aorta, femoral artery, femoral vein, vertical vein, and PDA encircling
- Tying thymus after dividing into middle
- Stabilizing aorta during aortic cannulation
- Testing mechanical value disc movement after valve replacement surgery
- Retracting subvalvular apparatus during mitral valve repair.

Care During Use

- During encircling vascular structure movement of mixture should be gentle and it should be circular not perpendicular to vessel, to avoid injury to posterior wall of vessel.

Gerald Forceps

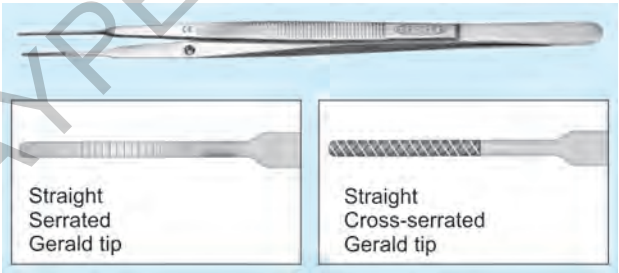


Fig. 4.8: Gerald forceps

- This is a forceps with finer tip having transverse serrations. Serrated finer grip (Fig. 4.8)

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- Tip of the forceps can be tooth , nontooth or cross serrated also. Diffrent sizes are available.

Use

- During intracardiac suturing like ASD closure, VSD closure, TOF repair it is used for sutures 5/0 or 6/0
- Dissection of MAPCA, PDA, Pulmonary artery
- Proximal anastomosis of graft in CABG.

Duval Forceps

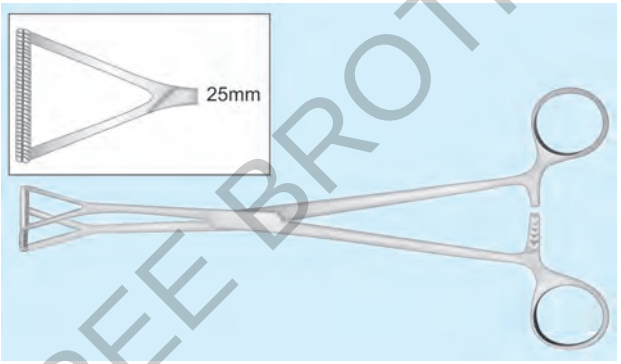


Fig. 4.9: Duval forceps

- Long blade with triangle at end (Fig. 4.9)
- Transverse serration.

Use

- Lung tissue holding during various procedure on lung, like decortication, pneumonectomy, lobectomy.

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Rumel

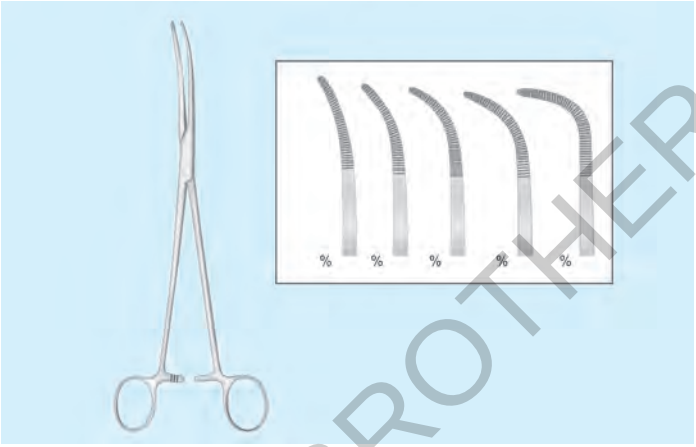


Fig. 4.10: Rumel

- It has long length of blade with transverse serrations. Different angulation blades are available. Blades are partially serrated and partially smooth (Fig. 4.10).

Use

Same like Kelly's forceps.

Russian Forceps

- This is a spring action forceps with round hole tip at end
- Toothed serration at tip of forceps (Fig. 4.11).

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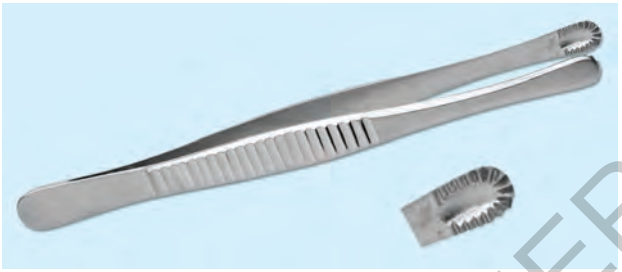


Fig. 4.11: Russian forceps

Use

- Removal of clot from LA or LV cavity
- During re-exploration cleaning pericardial cavity
- Holding pericardium in constrictive pericarditis
- Decortication of lung.

Vascular Forceps

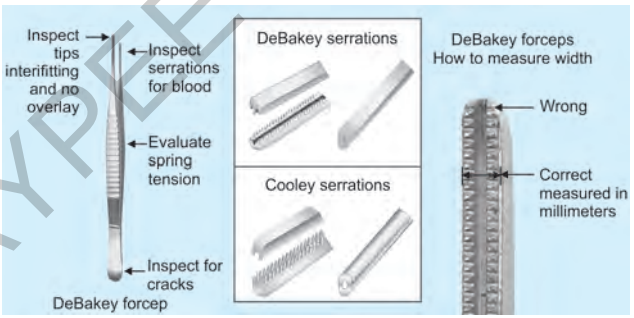


Fig. 4.12: Types of serration

- Different types of vascular forceps available with different patterns of serrations (Fig. 4.12)
- They are named according to pattern of serrations.

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Fine Serration

- Castaneda type
- Single row of fine serrations which are precisely meshed (Fig. 4.13)



Fig. 4.13: Fine serration

Use

Handling of small vessels.

Cooley's Type Serrations

- 2 × 2 vascular teeth
- In this type double row of finely serrated teeth arranged in opposing row.

Advantage

- Better grip of vessels
- Less tissue injury.

DeBakey Type Serrations

- 1 × 2 vascular teeth
- DeBakey type has two rows of finely serrated teeth on one blade and one row on the opposing blade.

Advantage

- Triangular, good grip
- Better approximation of tissue with less tissue injury.

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DeBakey Forceps

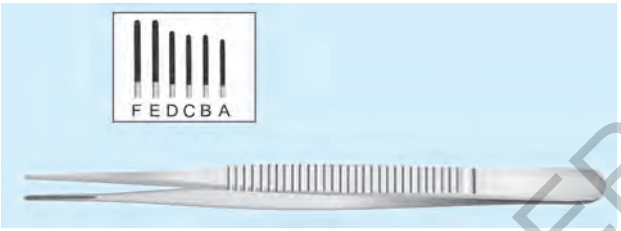


Fig. 4.14: DeBakey forceps

- Different length available
- Different jaw size available
- 1 mm for finer works on coronary arteries (Fig. 4.14)
- 2–3 mm for relatively bigger vessels.

CASTANEDA VASCULAR FORCEPS

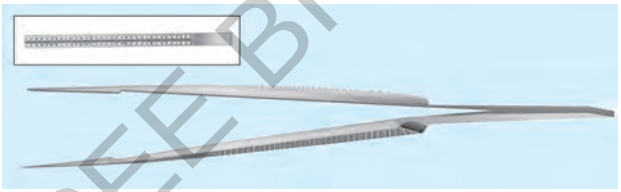


Fig. 4.15: Castaneda vascular forceps

- Fine serrated teeth jaw
- Different jaw and length sizes available (Fig. 4.15).

Cooley's Vascular Tissue Forceps



Fig. 4.16: Cooley's vascular tissue forceps

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- 2 × 2 Serrated jaw
- Different length and jaw sizes available (Fig. 4.16).

Ring Tip Vascular Forceps



Fig. 4.17: Ring tip vascular forceps

- This is a vascular forceps without serration with round-shaped tip (Fig. 4.17).

Use

- IMA preparation
- Anastomosis of IMA to LAD or diagonal vessel
- Whenever 8/0 prolene to be used for suturing, this forceps is useful.

Angle Vascular Forceps (IMA Forceps)

- Vascular forceps with curved blade with DeBakey type serration.
- Different angulation 90, 120, 140, available (Fig. 4.18).

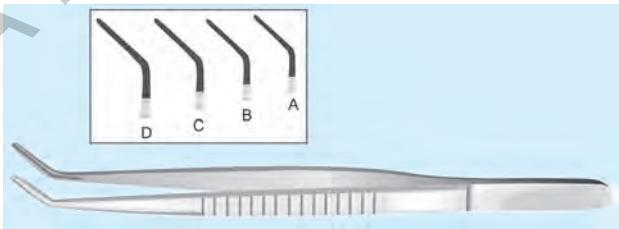


Fig. 4.18: IMA forceps

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Use

- IMA dissection
- Hemostasis below sternum
- MAPCA dissection in TOF, pulmonary atresia.

Daicoff Vascular and Needle Pulling Forceps

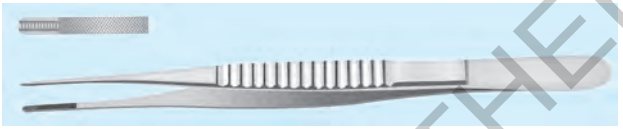


Fig. 4.19: Daicoff vascular and needle pulling forceps

- Jaw of this forceps has combination of cooley's serration at tips, finner criss-cross serration in rest of the area.

Uses

- Vascular forceps
- Needle pulling forceps.

Foss Tube milking Forceps

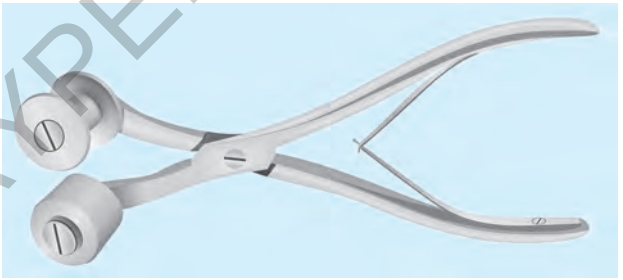


Fig. 4.20: Foss tube milking forceps

- This instrument has good grip with spring action at one end while other end has 2 cylindrical rotatable cuff (Fig. 4.20).

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Uses

- Milking the tube for prevention of tube block by blood clot.

Method

- Apply paraffin over chest drain, hold tube proximally with one hand while with the other hand hold tube with the instrument and slide out and release it.

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Salient Features

- Discusses commonly used instruments in cardiac surgery
- Instruments have been categorized according to their use
- Each instrument has been described with its special features, pictures and uses
- Cannulae used for cardiopulmonary bypass have been mentioned in detail
- Chapter on 'Sutures and Needles' highlights different types of sutures and needles in use today
- Is of good help to cardiac surgery students, cardiac operation theater (OT) nurses, and paramedical staff working in cardiac OT.



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