

Instrument and Tissue Handling Techniques

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Surgical skills:

- instrument handling,
- tissue dissection and manipulation,
- suturing,
- knot tying,
- hemostasis,
- wound closure.

Surgical Principles Attributed to Halsted

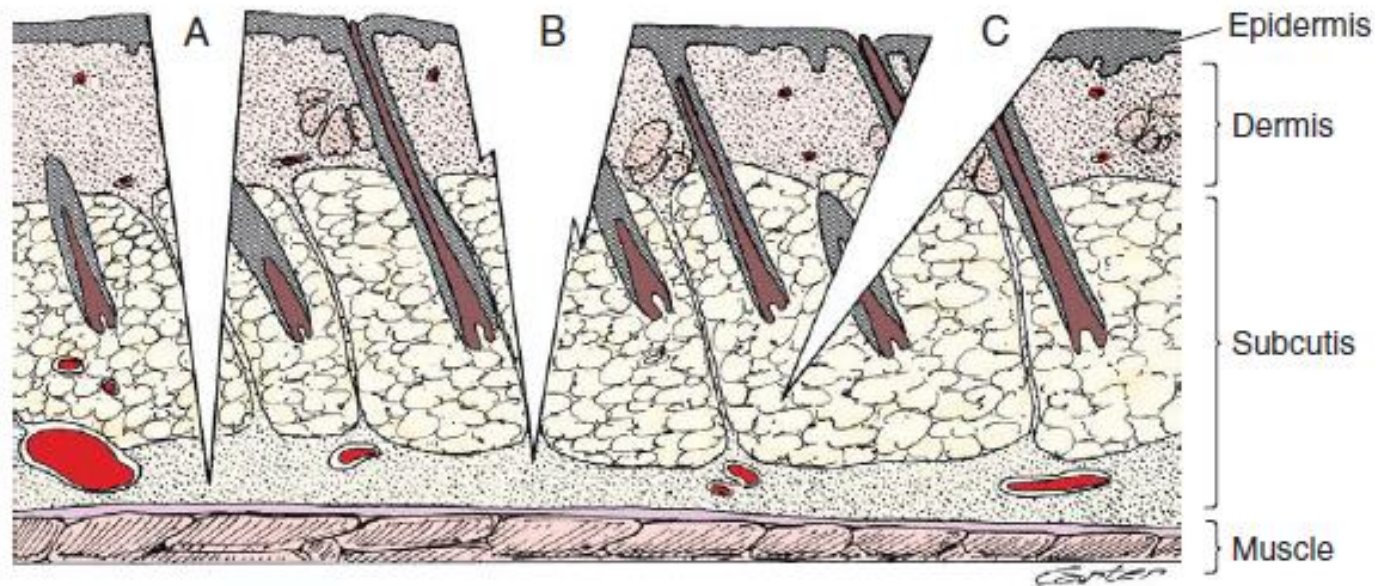
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|--|--|
| • Handle tissue gently | تعامل مع الأنسجة برفق |
| • Control hemorrhage meticulously | السيطرة على النزيف بدقة |
| • Observe strict aseptic technique | التقيد بتقنية التعقيم الصارمة |
| • Preserve blood supply to tissues | الحفاظ على تدفق الدم إلى الأنسجة |
| • Eliminate dead space | القضاء على الفضاء الميت |
| • Appose tissues accurately with minimal tension | تقابل الأنسجة بدقة وبأدنى حد من التوتر |

- USE OF CUTTING INSTRUMENTS

- Scalpel

- Scalpels are used to make incisions in the skin and other tissues.
- Scalpel incisions result in less crushing of tissue compared with scissor incisions.
- Full-thickness skin incisions attained with a single sweep of the scalpel blade are the goal

- الهدف هو إجراء شقوق جلدية بسمك كامل باستخدام مسحة واحدة لشفرة المشرط



A full-thickness skin incision made perpendicularly with the scalpel is the goal

- When tissues are incised, the scalpel handle is usually held in one of two ways:
- fingertip grip or pencil grip (Figure 18-2).
- The fingertip grip places the maximum length of the blade edge in contact with the tissue. It offers the greatest accuracy and stability in making long incisions, as movement is performed by the whole arm.
- The pencil grip, which uses finger motion, is more accurate for short, delicate maneuvers.



- Four motions of the scalpel's cutting edge may be used in surgery: sliding, pressing, sawing, and scraping.
- Slide cuts yield precise depth, length, and control of direction and are used most commonly for making skin incisions.
- Press cuts or stab incisions are useful for opening fluid-filled chambers or making initial entry into a body cavity.
- Pressure and motion occur in the same direction with a press cut, but depth is poorly controlled.

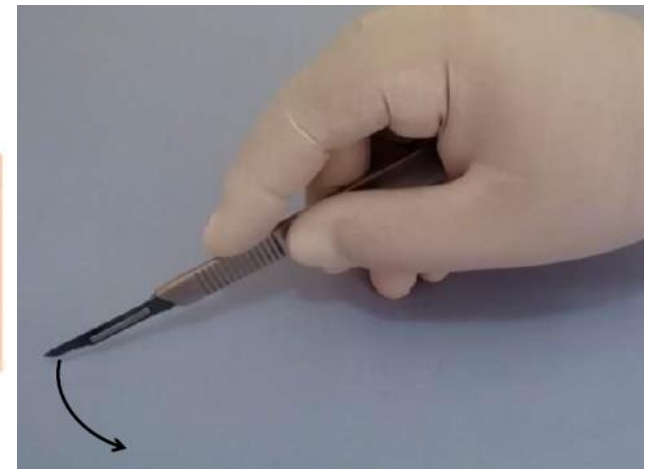
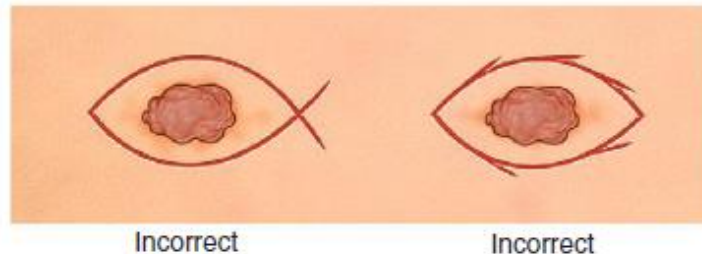
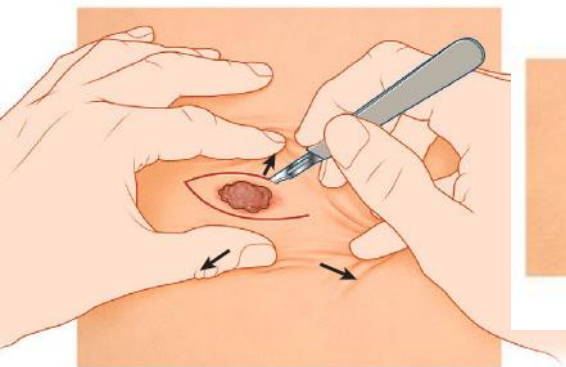


Figure 18-3 A, Use of a reverse press cut incision to make initial entry into the peritoneal cavity. B, A press cut incision into a fluid-filled structure. (Modified from Toombs JP, Clarke KM: Basic

- Sawing (e.g., transecting a ligated pedicle) allows continuation of a cut without removal and reinsertion of the blade. The novice surgeon may use a sawing motion when incising the skin. Such poor technique leads to unnecessary tissue trauma and, frequently, to delayed wound healing.

تسمح حركة المنشار (على سبيل المثال ، قطع السيقان المربوطة) باستمرار القطع دون إزالة النصل وإعادة إدخاله. قد يستخدم الجراح المبتدئ حركة المنشار عند شق الجلد. يؤدي هذا الأسلوب الرديء إلى إصابة الأنسجة غير الضرورية ، وفي كثير من الأحيان إلى تأخير التئام الجروح.

- Scraping is a method of separating tissue layers.
- القشط هو طريقة لفصل طبقات الأنسجة.
- The latter two motions are used selectively by experienced veterinary surgeons
- Stabilize tissues when incising with a scalpel by using the tips of the thumb and forefinger of the nondominant hand to tense adjacent tissue



- **Scissors**
- **Scissors are used to cut or dissect tissue and to cut inanimate objects, including paper drapes and suture material. Cutting of inanimate objects should be limited to specific instruments.**

Three forces are used when cutting with scissors: closing, shearing, and torque.

تستخدم ثلاث قوى عند القطع بالمقص: الإغلاق والقص وعزم الدوران.

a. Closing force causes the blades to come together;

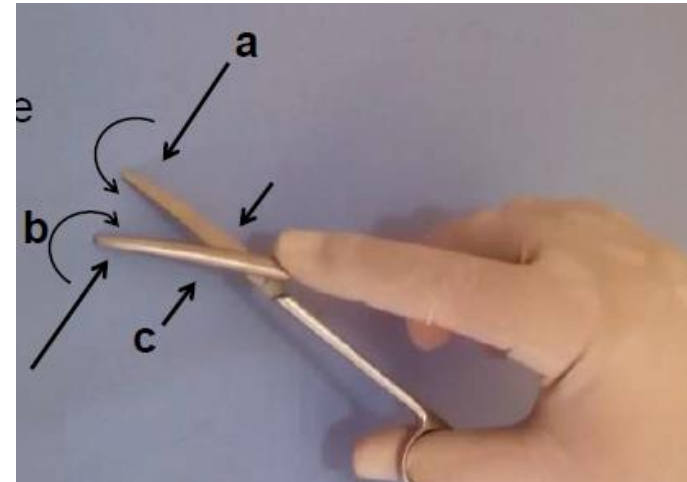
تؤدي قوة الإغلاق إلى تجمع الشفرات معًا

b. torque rolls the leading edges of each blade inward to touch the other

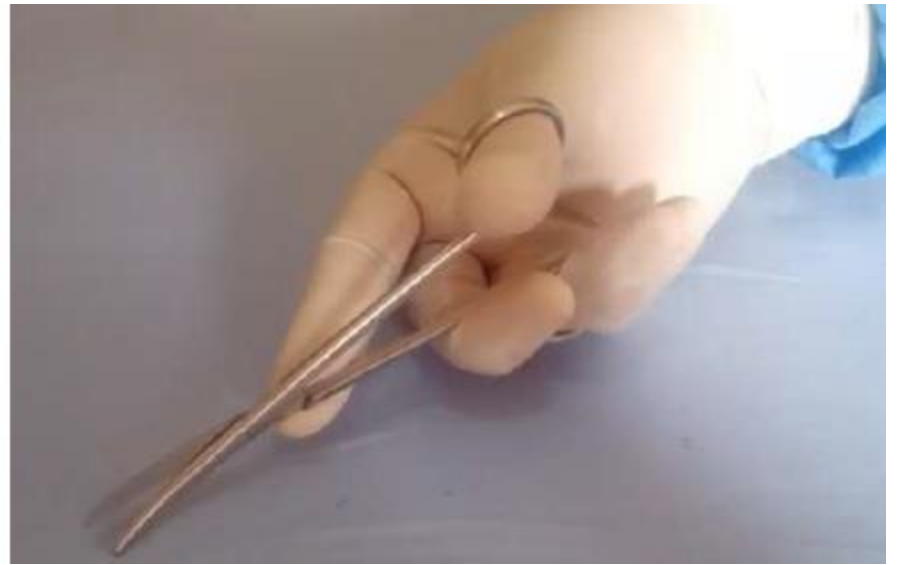
يقوم عزم الدوران بتدوير الحواف الأمامية لكل شفرة إلى الداخل للمس الأخرى

c. shearing force pushes one blade flat against the other during closing

تدفع قوة القص إحدى الشفرات نحو الأخرى أثناء الإغلاق



- The gripping motion of scissors
- A tripod grip is recommended when using scissors, because it provides maximal control.
- A tripod grip is achieved by inserting the tips of the thumb and ring finger through the rings and placing the index fingertip near the fulcrum
- يتم تحقيق قبضة حامل ثلاثي القوائم عن طريق إدخال أطراف الإبهام والبنصر من خلال الحلقات ووضع طرف الإصبع بالقرب من نقطة الارتكاز



The Thumb and Ring finger grip



The Thumb-Index finger grip is good for reverse cutting

- Curved scissors offer greater maneuverability and visibility, whereas straight scissors provide greater mechanical advantage for cutting dense tissue.

• يوفر المقص المنحني قدرة أكبر على المناورة والرؤية ، بينما يوفر المقص المستقيم ميزة ميكانيكية أكبر لقطع الأنسجة الكثيفة.



- Scissors are used for dissection of two types: sharp or blunt
- يمكن إجراء تشريح حاد عن طريق إجراء قطع تقليدي
- Blunt dissection is accomplished by inserting the closed tips of scissors into lax tissues and then opening and withdrawing the points to break down connections and define important structures.
- Blunt dissection, in general, should be minimized, as excessive dead space and tissue trauma may result.
- Metzenbaum and Mayo scissors are used to cut and dissect tissues; utility or operating scissors are usually used to cut inanimate objects. Metzenbaum scissors are reserved for more delicate tissues.
- مقصات Mayo أكثر ثباتًا وتستخدم على الأنسجة الضامة الرقيقة.



A, Curved Mayo; B, curved Metzenbaum; and C, operating (utility) scissors.

- Other Cutting Instruments
- The most controlled cut with bone-cutting chisels and osteotomes is induced by a mallet.
- Holding the cutting instrument by using a **palmed grip** in the nondominant hand helps guide the direction of the cut.
 - يساعد إمساك أداة القطع باستخدام قبضة اليد في اليد غير المهيمنة في توجيه اتجاه القطع.



- Curettes are held in a pencil grip and are manipulated by using back-and-forth rotating motions or pulling strokes.
- Periosteal elevators are usually manipulated by using a controlled pushing stroke.
- عادة ما يتم التلاعب برافع السمحاق باستخدام ضربة دفع مسيطر عليها.
- Bone-cutting forceps are manipulated by using a palmed grip with the dominant hand.
- يتم التعامل مع ملقط قطع العظام باستخدام مسكة قبضة اليد باليد المهيمنة.

curette:



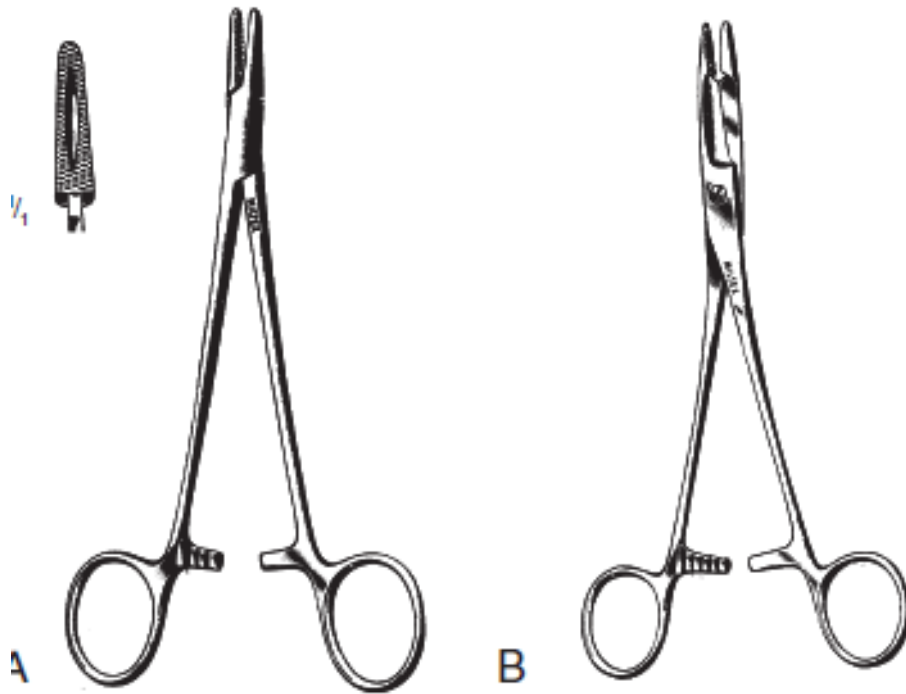
Bone-cutting forceps



periosteal elevators:

USE OF GRASPING INSTRUMENTS

- Needle Holders
- used only on inanimate objects. Combination needle holder and scissors (e.g., Olsen-Hegar) may be preferred by solo surgeons because of the potential for enhanced efficiency
- تستخدم فقط على الأشياء غير الحية، قد يفضل الجراحون المنفردون ماسك الإبرة والمقص Olsen-Hegar



A, Mayo-Hegar and B, Olsen-Hegar needle holders.

Four grips may be used in manipulating the needle holder:

thumb–ring finger (tripod), thenar, palmed, and pencil grip.

- The thumb–ring finger (tripod) grip provides for precise needle grasping and release and is well suited for delicate work.

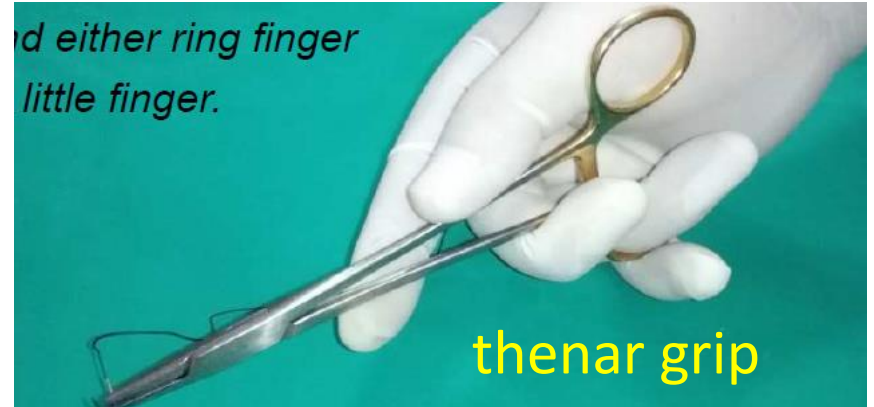
توفر قبضة الإبهام والبنصر (الحامل ثلاثي القوائم) إمساكًا دقيقًا للإبرة وتحريرها وهي مناسبة تمامًا للعمل الدقيق.

- When the thenar grip is used, the needle holder is grasped between the ball of the thumb (thenar eminence) and the ring finger

Thumb and ring fingers are in the ring of Needle Holder.



and either ring finger
little finger.



- The palmed grip is the strongest grip, provides the greatest needle pressure and control in dense tissue, and provides for maximal wrist rotation; however, needle release and grasping often require adjusting to another grip, as neither ring is immediately accessible to fingertips.
- The pencil grip is best suited for needle holders with spring handles (e.g., ophthalmic needle holders). It allows needle control with fine digital movement.



The palmed grip



The pencil grip

• Forceps

• بشكل عام ، يتم استخدام الملقط بطريقتين مختلفتين: للإمساك بالأنسجة أو الفصل الاعمى.

• يتم استخدام معظم الملقط إما لإمساك الأنسجة (على سبيل المثال ، ملقط نسيج Allis أو Babcock ، ملقط Kocher ، ملقط Doyen المعوي) أو للفصل الاعمى (على سبيل المثال ، ملقط الزاوية اليمنى).

• Three types of forceps are described: crushing, noncrushing, and hemostatic.

Crushing-Type Tissue Forceps

• كل من ملاقط نسيج Allis و Babcock لهما مستوى قبضة عمودي على اتجاه السحب. كل منها له تأثير

• سحق على الأنسجة ويجب عدم استخدامها على الأنسجة المقرر أن تبقى مع المريض.

• Kocher forceps يمكن استخدامه على الأنسجة الأكثر كثافة التي سيتم استئصالها.

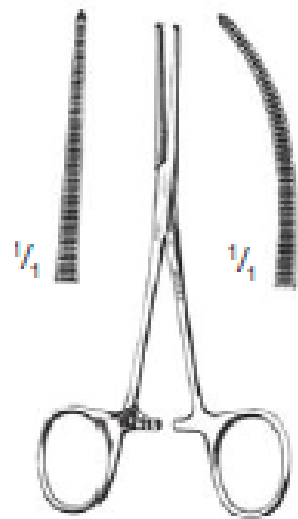
• Crushing-type tissue forceps are most suitable for static tissue holding during dissection around the secured tissue.



Babcock

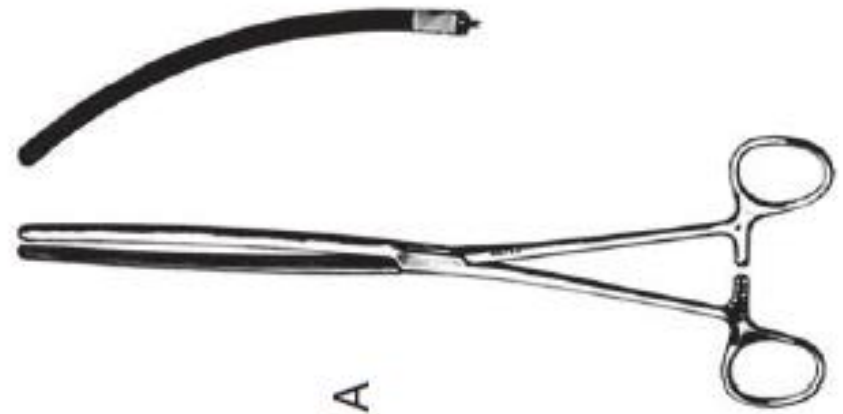
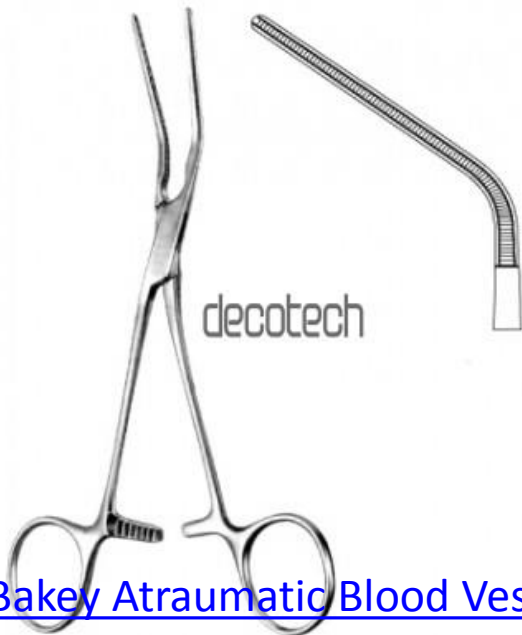


Allis



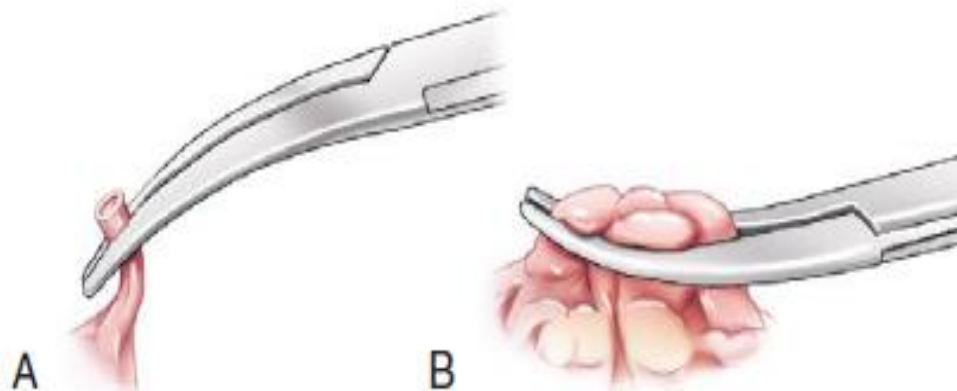
Ochsner-Kocher forceps.

- Doyen intestinal forceps, as duration of application increases, induce tissue trauma. Digital intestinal occlusion by an assistant provides an alternative, seemingly less traumatic, method.
- Small size and atraumatic nature, various peripheral vascular forceps (e.g., patent ductus arteriosus clamp) may be used to achieve temporary intestinal occlusion in selected instances (e.g., feline subtotal colectomy).
- Cardiovascular forceps provide tissue occlusion without cutting or crushing the blood vessel wall.



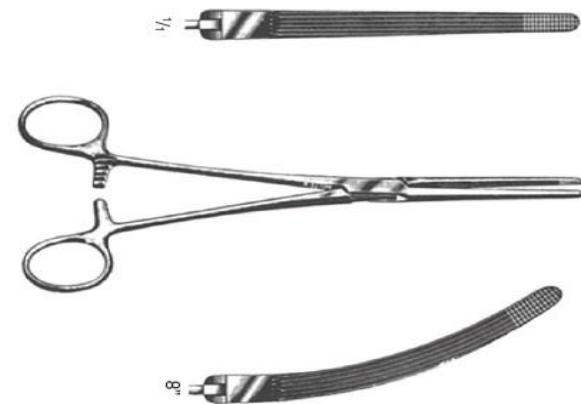
Doyen intestinal forceps

- Hemostatic forceps are used during surgical procedures, either to isolate bleeding points or to bluntly dissect tissue.
- Hemostats may be used in of two clamping techniques: either tip clamping or jaw clamping.
- In general, hemostats with transversely oriented serrations (e.g., Halsted mosquito, Crile, Kelly forceps) are designed to grasp small amounts of tissue with the tip of the forceps directed toward the open vessel.
- Forceps with longitudinally oriented serrations (e.g., Rochester-Carmalt forceps) are designed to grasp larger amounts of tissue (e.g., ovarian pedicle) with the jaw, such that the tip of the forceps is pointing away from the vessel.



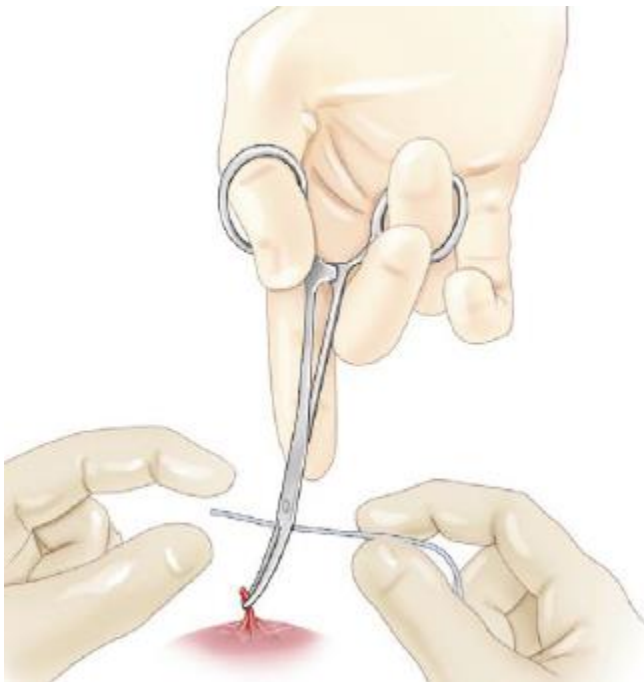
tip clamping

jaw clamping.



Rochester-Carmalt forceps

- jaw clamping facilitates placement of ligatures during tying, but it also results in increased tissue trauma.
- Use the dominant hand and a tripod grip to place the forceps most accurately and securely.
- Forceps with curved tips should be placed with their tips directed upward to facilitate ligation of bleeding points
- The tripod grip using the dominant hand is one option, a palmed grip using the nondominant hand may also be used



tripod grip



palmed grip

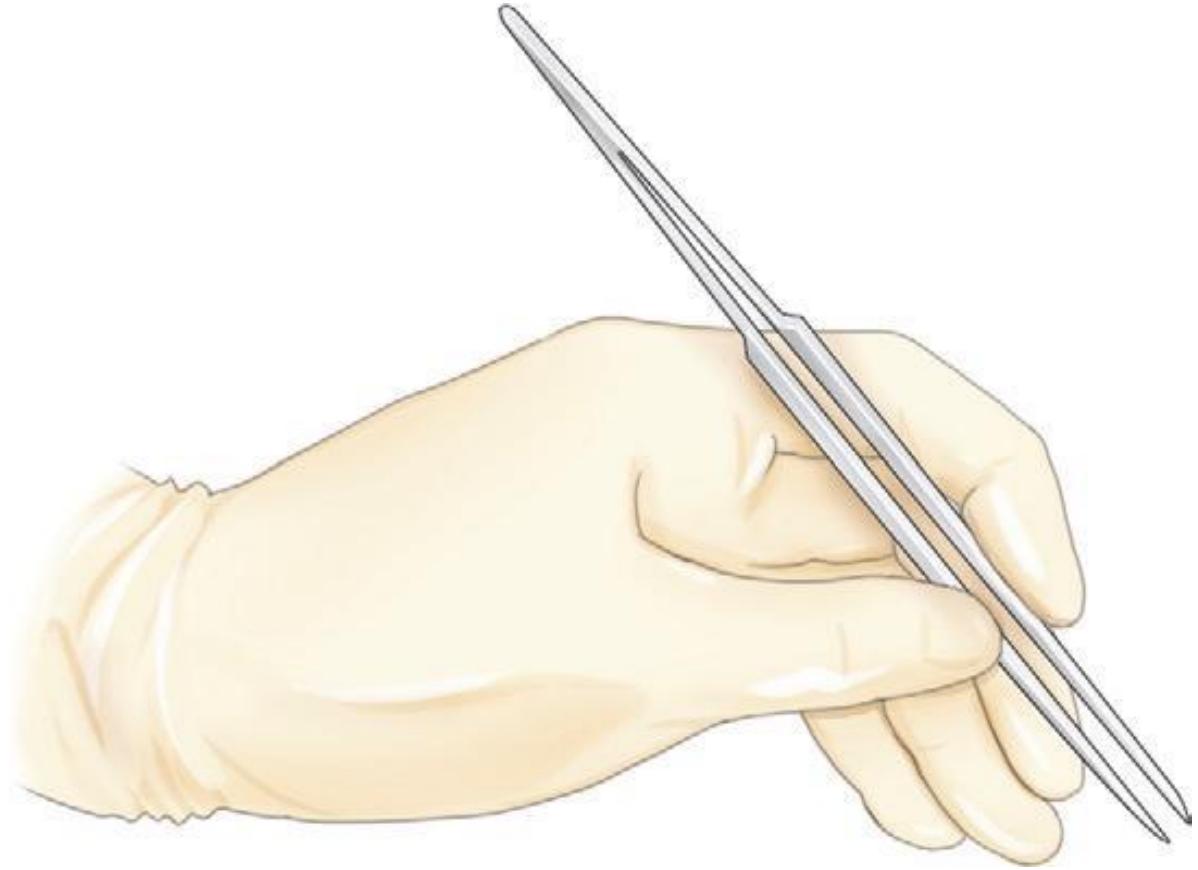
- يتم إجراء Blunt dissection خاصة حول الأوعية الدموية والتراكيب الأخرى بسهولة باستخدام ملقط قاطع النزف. غالبًا ما تساعد هذه الملاقط ذات الأطراف المنحنية المدببة في تحقيق هدف العزل التام للتراكيب التشريحية. الملاقط ذو الزاوية اليمنى مناسب تمامًا للعزل الأعمى حول الأوعية. عادة ما يتم توجيهه Blunt dissection بالتوازي مع الوعاء



Right-angle;

Thumb Forceps

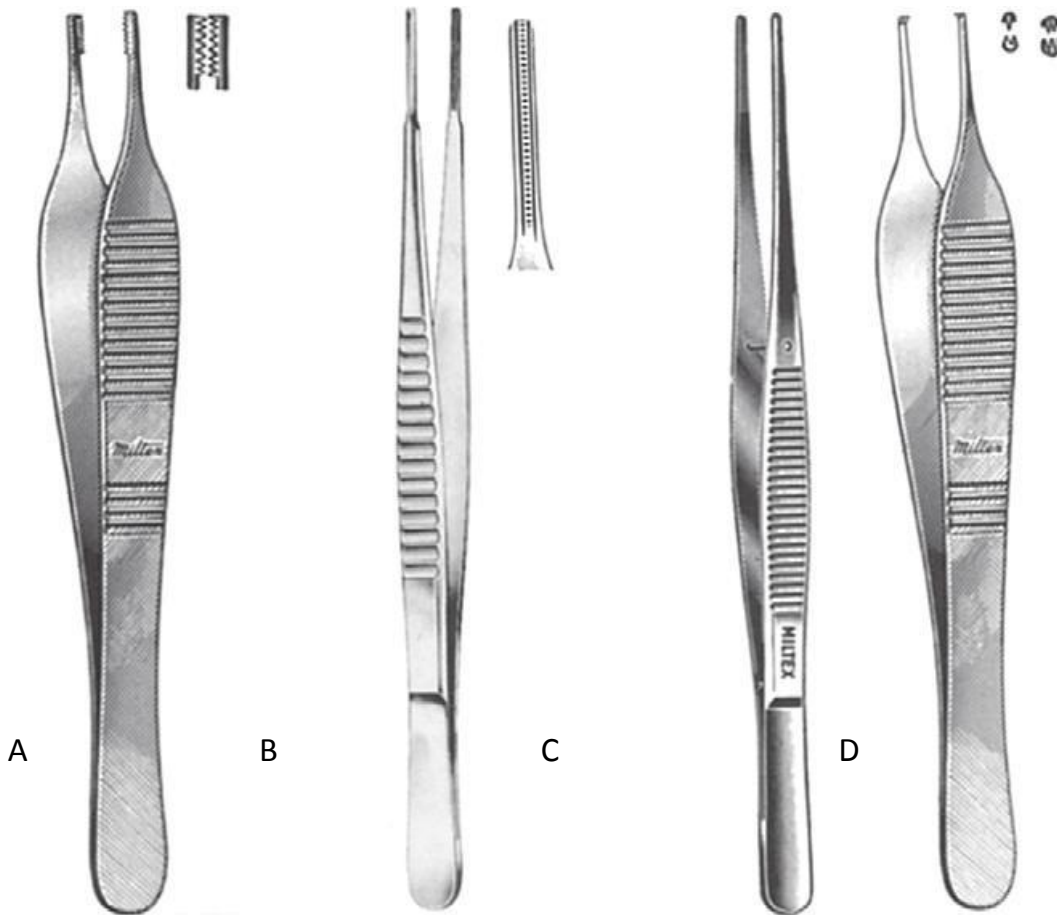
- They usually are used in concert with needle holders, scissors, or other forceps and are held in the nondominant hand
- enabling the operator to grasp tissue during dissection or suture placement



the proper way to hold a thumb forceps using the thumb and forefinger of the nondominant hand



- Method of holding thumb forceps in the palm of the nondominant hand when they are temporarily not in use



A, Brown-Adson; B, DeBakey, C, dressing; and D, Adson forceps.

Brown-Adson thumb forceps stabilize tissue with minimal pressure.

DeBakey forceps are preferred for handling most tissues in body cavities because of their ribbed configuration

Nontoothed thumb forceps (e.g., dressing forceps) are designed to grasp inanimate objects, such as gauze sponges.

- Clamps
- To avoid a potential source of contamination, penetrating-type towel clamps should not be used to penetrate the overdrapes.
- Nonpenetrating instruments (e.g., Allis tissue forceps, Lorna- Edna towel clamps) are used instead.
- Penetrating towel clamps may be utilized to provide traction to tissues during excision. They also may be used to temporarily counteract tension across an incision during closure.

Lorna - Edna (nonpenetrating) clamp.



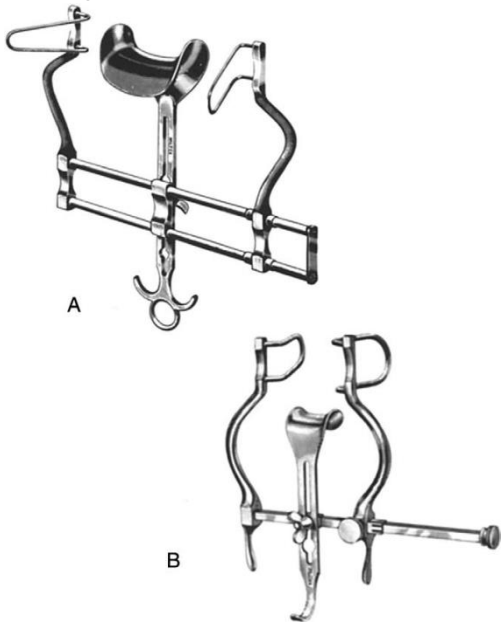
Backhaus (penetrating) clamp



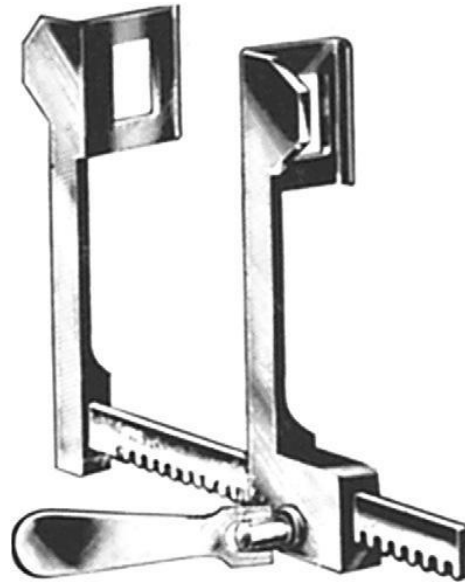
RETRACTORS

- Retractors help improve exposure by deflecting tissue away from the area of interest in the surgical field.
تساعد المُبْعِدَات في تحسين الوصول عن طريق إبعاد الأنسجة عن المنطقة المهمة في العملية الجراحية.
- Retractors are of two types: **basic exposure and minor variation**.
- Basic exposure retractors provide static, long-term retraction of the wound and are usually **self-retaining varieties**.
- Minor variation retractors provide short-term retraction and are usually **hand-held varieties**.

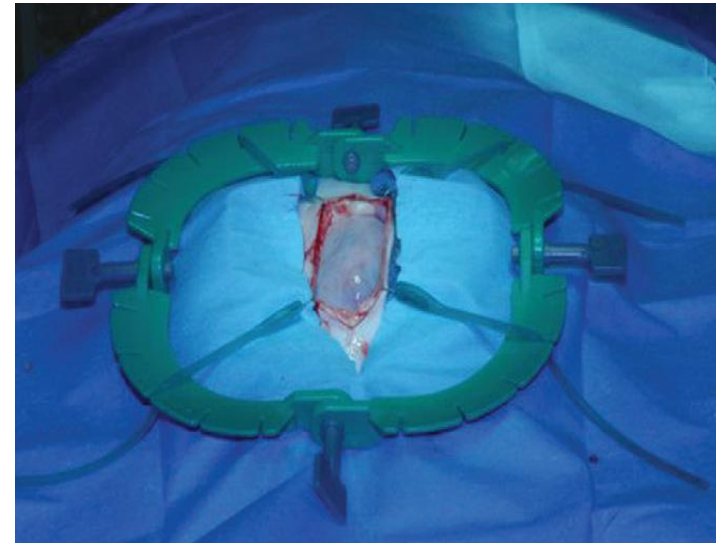
- both Balfour and Finochietto retractors should be selected to match patient size.
- Properly positioned ring retractors can be of great help to the solo surgeon during approach, performance, and closure of a surgical procedure



Balfour retractors with central “bladder blades.



A Finochietto rib retractor.



Ring retractors

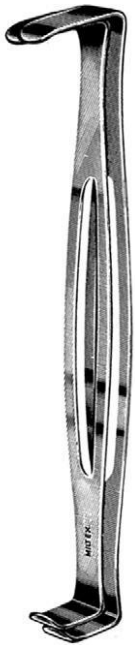
Excessive opening of a retractor to compensate for limited exposure may lead to excessive tissue trauma (ex. fractured rib).

The more common hazard of self retaining retractors is ischemia at the pressure point.

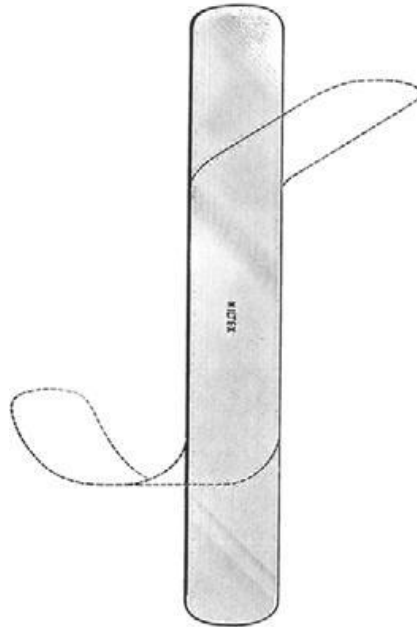
- Hand-Held Retractors
- Retraction using a Senn, Army-Navy, Green, or spay hook is often reserved for more superficial tissues (e.g., retracting subcutaneous tissue during abdominal wall closure)
- Malleable retractors are usually intended for use on tissues in body cavities.
- When the spay hook is used as a retractor, **the handle or the hook** may be used effectively to manipulate and protect tissues



Senn



Army-Navy.



malleable

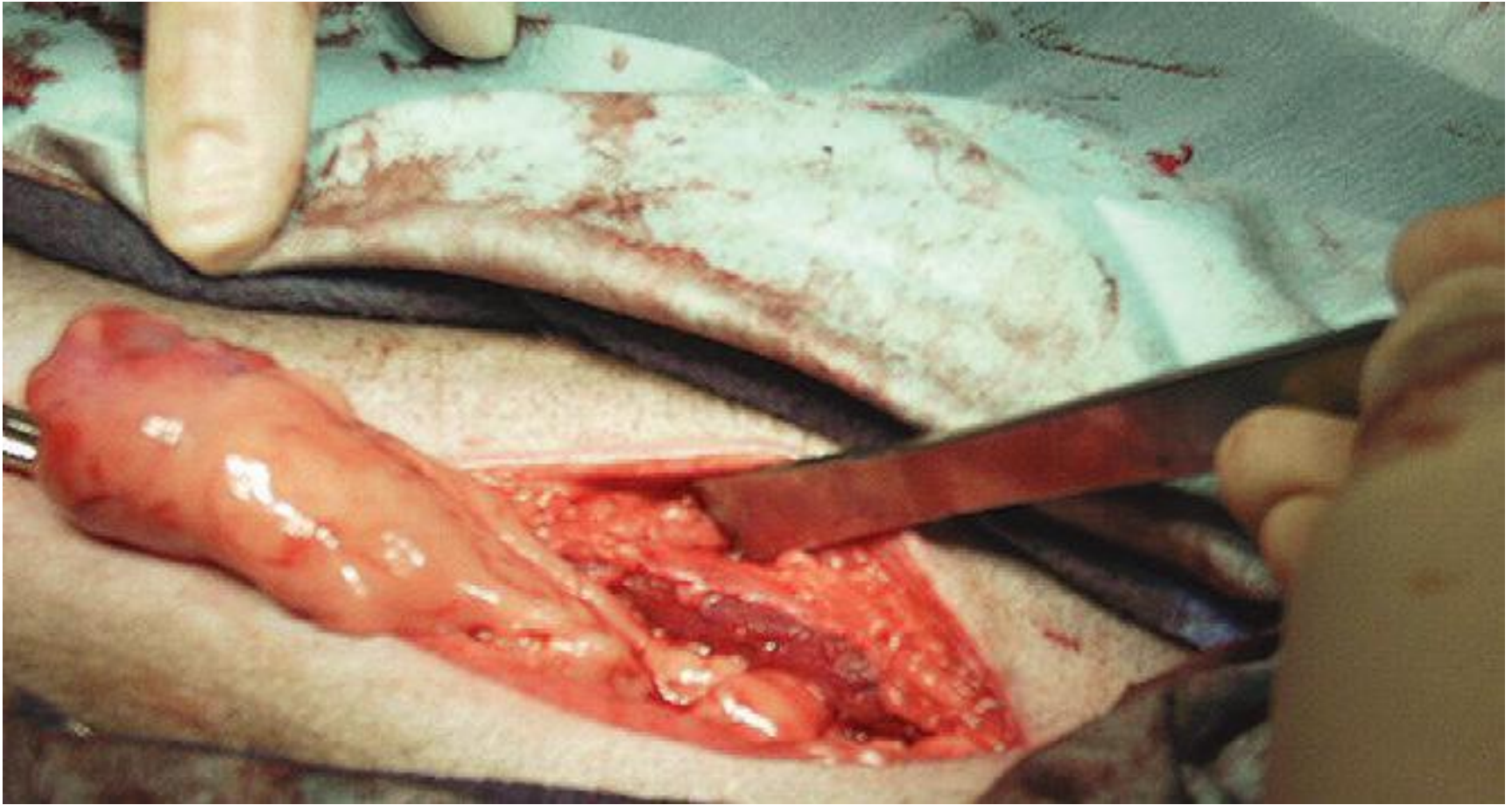


Hohmann retractors



spay (Snook) hooks





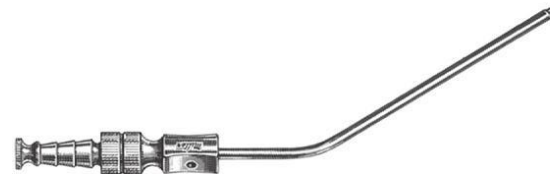
Use of a spay hook handle to retract tissue during surgery

- SUCTION USE
- **Suction** is used to remove blood and fluid from the surgical site. To reveal specific bleeding points for ligation or cautery.
- **Poole suction tips** have multiple openings and are best suited for use in body cavities.
- Both diffuse and point suction can be achieved with the Poole tip by covering or exposing the single-port inner cannula.
- Frazier suction tips are often used during neurosurgical and selected soft tissue procedures (e.g., bulla osteotomy).
- A finger port near its end is used to vary the suction delivered at its tip.
- The Yankauer suction tip may also be used



Poole suction tips

Frazier



Yankauer

