

## Basic surgical instruments

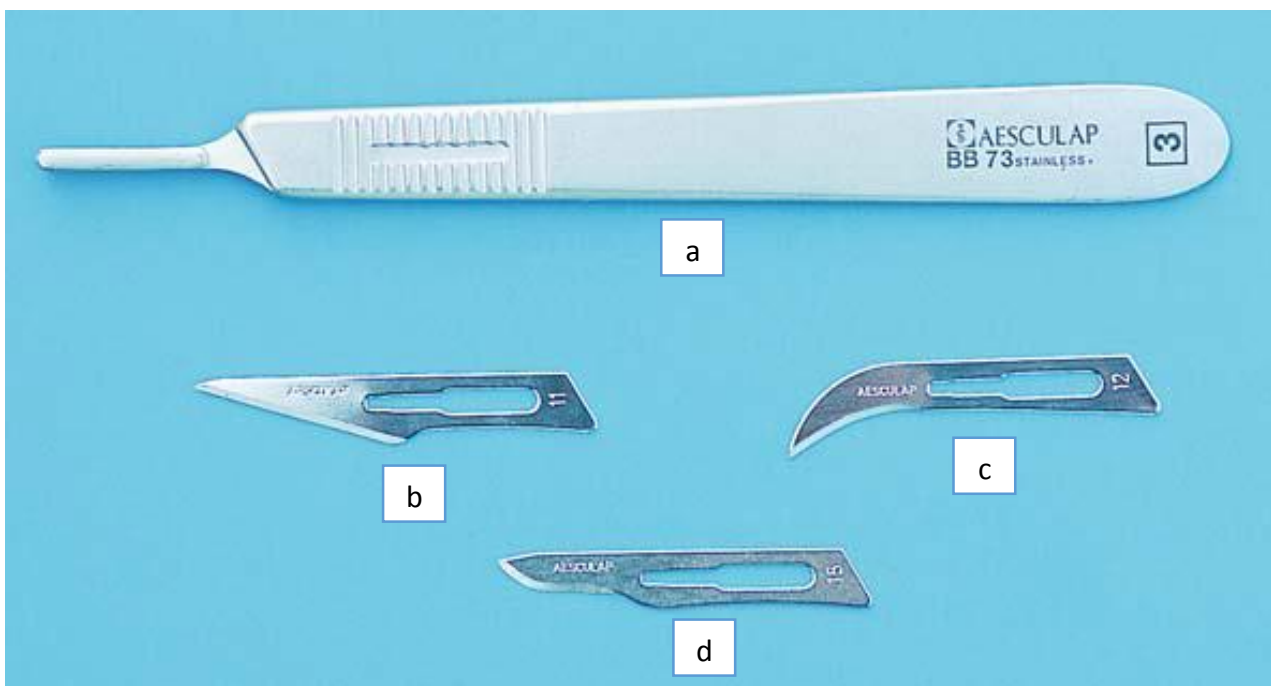
### 1- Instruments to incise tissues

Many surgical procedures begin with an incision. The primary instrument for making incisions is the scalpel, which is composed of a handle and a sterile, very sharp blade.

Most commonly used handle for oral surgery is the **No. 3** handle. The tip of a scalpel handle is configured to receive a variety of differently shaped scalpel blades that are inserted onto the slotted portion of the handle. (*fig. 1a*)

The most frequently used scalpel blade for intraoral surgery is:

- **No. 15 blade:** The blade is small and is used to make incisions around teeth and through soft tissue. The blade is similar in shape to the larger **No. 10 blade**, which is used for large skin incisions in other parts of the body. (*fig. 2d*)
- **No. 11 blade:** is a sharp-pointed blade that is used primarily for making small stab incisions as for incising an abscess to establish drainage. (*fig. 2b*)
- **Hooked No. 12:** blade is useful for mucogingival procedures in which incisions are made on the posterior aspects of teeth or in the maxillary tuberosity area. (*fig. 2c*)

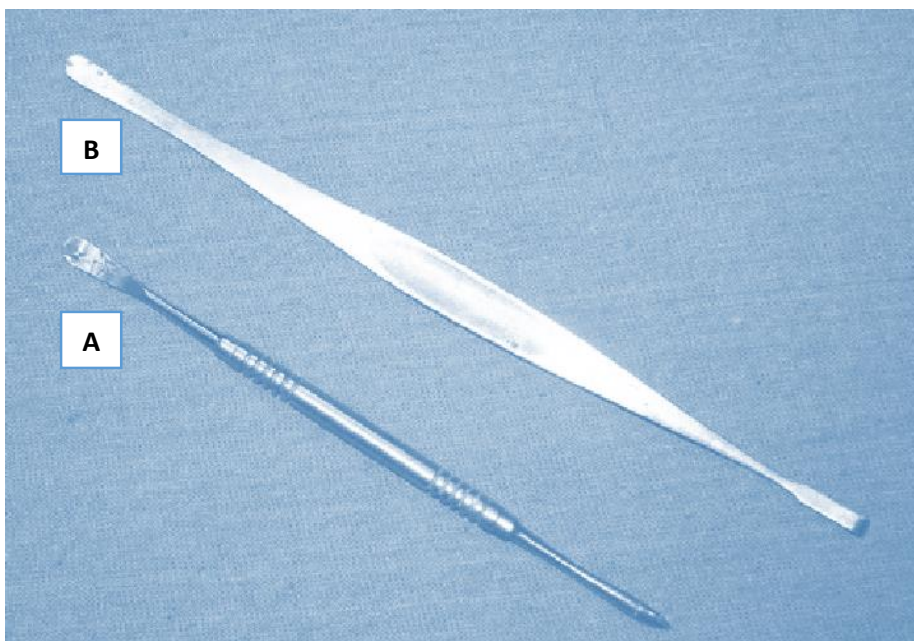


**Fig1:** a- No. 3 handle, b- No. 11 blade, c- No. 12 blade, d- No. 15 blade

## 2- Instruments for elevating mucoperiosteum

After incision the periosteum should be reflected from the underlying cortical bone in a single subperiosteal layer with a periosteal elevator which mostly work by push stroke. The elevators that is most commonly used in oral surgery is the **No. 9 Molt** periosteal elevator and **Howarth** periosteal elevator (*Fig. 2*).

- The pointed end is used to begin the periosteal reflection and to reflect dental papillae from between teeth,
- The broad, rounded end is used to continue the elevation of the periosteum from bone.
- Used for detachment of muscle insertion
- Can also be used as a retractor of the mucoperiosteum flap.



**Fig 2:**

**A:** The No. 9 Molt periosteal elevator

**B:** Howarth periosteal elevator

**No. 9 Molt** has a sharp, pointed end and a broader, rounded end is typically used to reflect tissue by two methods:

- The first method, the pointed end is used in a **twisting, prying motion** to elevate soft tissue, most commonly when elevating a dental papilla from between teeth
- The second method involves the **push stroke** in which the side of the pointed end or the broad end of the instrument is slid underneath the periosteum, separating it from the underlying bone.

### 3- Instruments for controlling haemorrhage:

When pressure doesn't stop the bleeding from a large artery or vein. An instrument called a *hemostat* (artery forceps) is useful. Hemostats come in a variety of shapes; they may be small and delicate or larger and are either straight or curved (*Fig. 3*)



**Fig 3**

(A) Superior view of the hemostat used for oral surgery.

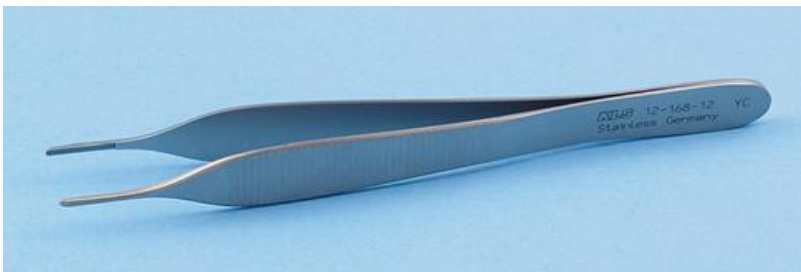
(B) Oblique view of the curved hemostat. Straight hemostats are also available.

A hemostat has long, delicate beaks that are used to grasp tissue and a locking handle. The locking mechanism allows the surgeon to clamp the hemostat onto a vessel and then let go of the instrument or let an assistant hold it.

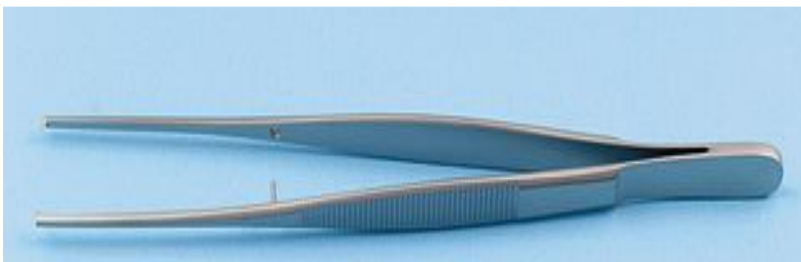
In addition to its use as an instrument for controlling bleeding, the hemostat is especially useful in oral surgery to remove granulation tissue from tooth sockets and to pick up small root tips, pieces of calculus, amalgam, fragments, and any other small particles that have dropped into the wound or adjacent areas. However, it should never be used to suture.

**4-Instruments used to grasp tissues:**

- **Adson forceps (or pickup):** These are delicate forceps, with or without small teeth at the tips that can be used to hold tissue gently while stabilizing it. When this instrument is used, care should be taken not to grasp the tissue too tightly to avoid crushing it. Toothed forceps allow tissue to be securely held with a more delicate grip than untoothed forceps. *fig 4 a*
- Longer forceps that have a similar shape are the **Stillies forceps**. These forceps are usually 7 to 9 inches long and can easily grasp tissue in the posterior part of the mouth. *fig 4 a*

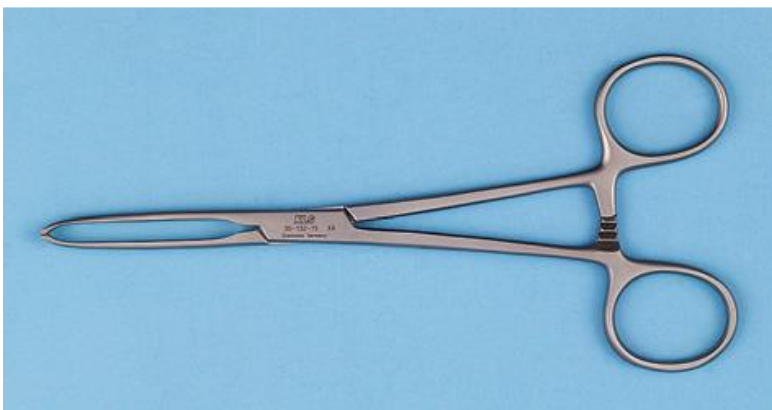
**Fig 4 a:**

Adson forceps

**Fig 4 b:**

Stillies forceps

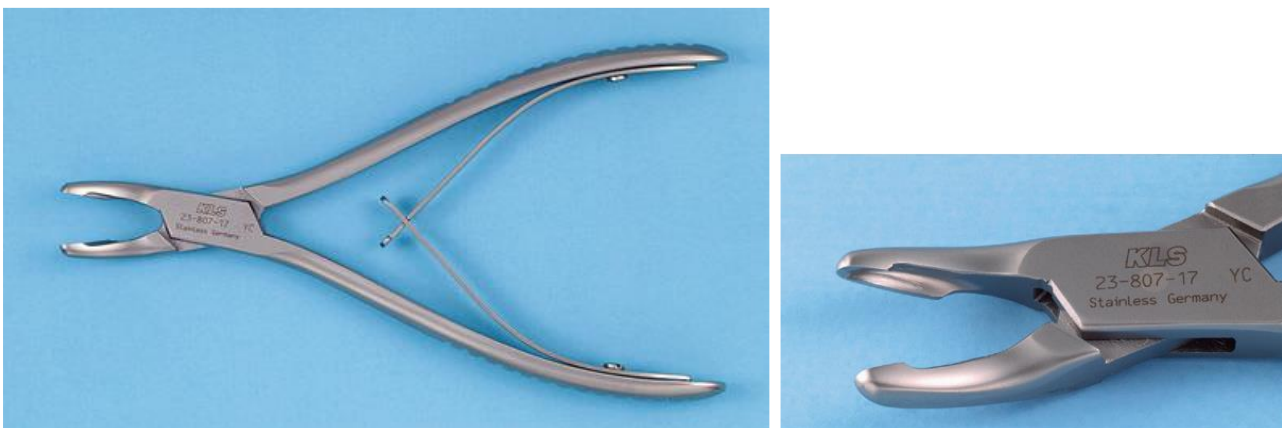
- When removing larger amounts of tissue or doing biopsies, such as in an epulis fissurata, forceps with locking handles and teeth that will firmly grip the tissue are necessary. In this situation, the **Allis tissue forceps** are used. *Fig. 4c*

**Fig. 4d: Comparison of Adson beaks (right) with Allis beaks (left)****Fig. 4c:** Allis tissue forceps.

**5-Instruments for removing bone includes:****A- Rongeurs (Bone Cutter)**

Also named bone nibbler, this instrument has sharp blades that are squeezed together by the handles, cutting or pinching through bone. Rongeur forceps have a rebound mechanism incorporated so that when hand pressure is released, the instrument reopens. This allows the surgeon to make repeated bone-trimming actions without manually reopening the instrument Fig. 5 The two major designs for rongeur forceps are:

- The side-cutting and end-cutting rongeurs are more practical for most dentoalveolar surgical procedures that require bone removal.
- The end-cutting forceps can be inserted into sockets for the removal of interradicular bone and can also be used to remove sharp edges of bone.

**Fig. 5** Rongeurs**B-Chisel and mallet:**

Chisel have a sharp monobeveled working end used to cut bone , bibevelede called osteotome , may be used for splitting bone or teeth. **fig.**

Cutting of bone by chisel need to be used by applying force and by the use of mallet. A mallet with a nylon cover or facing will exert less shock to the patient, also its less noisy.



**B- Surgical burs and hand piece:**

This is the technique that most surgeons use when removing bone for the surgical removal of teeth. Moderate-speed, high-torque handpieces with sharp fissure and round burrs remove cortical bone efficiently. When large amounts of bone must be removed, as in torus reduction, a large-bone burr that resembles an acrylic burr is typically used.

burs can be used with angle or straight hand piece which should have an accepted speed and torque to remove bone efficiently and should always be used with irrigation by distilled water or saline to prevent damage to the bone by heat generation during cutting.

Any handpiece that is used for oral surgery must be completely sterilizable. The handpiece should have high speed and torque. This allows rapid bone removal and efficient sectioning of teeth. **Fig. 7**

The handpiece must not exhaust air into the operative field, which would make it improper to use the typical high-speed air-turbine drills employed in routine restorative dentistry. The reason is that the air exhausted into the wound may be forced into deeper tissue planes and produce tissue emphysema, a dangerous occurrence.

**C- Bone file:**

Final smoothing of bone before the completion of surgery is usually performed with a small bone file (**Fig. 8**). The bone file is usually a double-ended instrument with small and larger ends. The bone file cannot be used efficiently for removal of large amounts of bone; therefore it is used only for final smoothing. The teeth of most bone files are

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arranged in such a fashion that they properly remove bone only on a pull stroke. Pushing this type of bone file against bone results only in burnishing and crushing the bone and should be avoided.

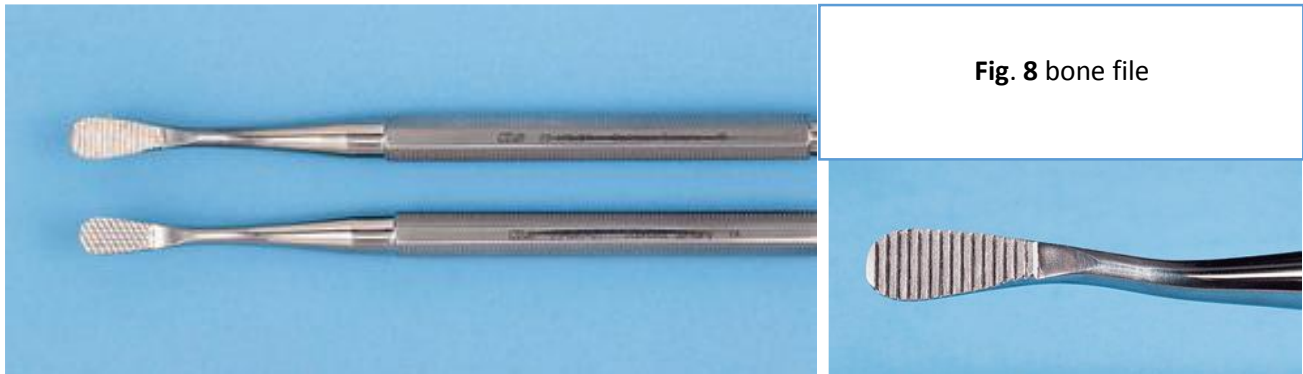


Fig. 8 bone file

### 6- Instruments used for Removing Soft Tissue from Bony Cavities

The curette commonly used for oral surgery is an angled, double-ended instrument used to remove soft tissue from bony defects (**Fig. 9**). Its principal use is to remove granulomas or small cysts from periapical lesions, but the curette may also be used to remove small amounts of granulation tissue debris from a tooth socket.



Fig.9 surgical curette

### 7-instruments for retraction of soft tissues:

A variety of retractors have been specifically designed to retract the cheek, tongue, and mucoperiosteal flaps to provide access and visibility during surgery. Retractors are also used to help protect soft tissue from sharp cutting instruments. There are different instruments used for these purposes **Fig. 10** such as:

- a- **Right-angle Austin retractor and broad offset Minnesota retractor.** These retractors can also be used to retract the cheek and a mucoperiosteal flap simultaneously. Before the flap is created, the retractor is held loosely in the cheek. Once the flap is reflected, the retractor edge is placed on bone and is then used to retract the flap.

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- b- **kilner retractor**: its double ended with different sizes and widths ,and it's held against or at the angle of the mouth ,to retract the cheek away from the operative area
- c- **The Henahan and Seldin retractors** are other types of instruments used to retract oral soft tissue. Although these retractors may look similar to a periosteal elevator, the leading edge is not sharp but, instead, smooth; these instruments are not typically used to elevate the mucoperiosteum.
- d- **No. 9 Molt periosteal elevator** can also be used as a retractor for small flaps. Once the periosteum has been elevated, the broad blade of the periosteal elevator is held firmly against bone, with the mucoperiosteal flap elevated into a reflected position.
- e- **Mouth mirror**: The instrument most commonly used to retract the tongue during routine exodontia is the.
- f- **The Weider tongue retractor** is a broad, heart-shaped retractor that is serrated on one side so that it can more firmly engage the tongue and retract it medially and anteriorly



Fig. 10

- a. Austin retractor
- b. Minnesota retractor
- c. Weider retractor
- d. kilner retractor
- e. Henahan (top) and Seldin (bottom) retractors



**8-Instruments for suturing:**

**a. Needle Holder**

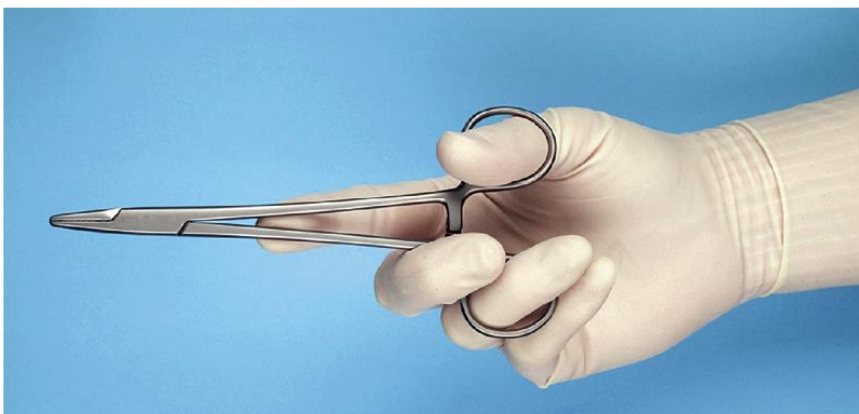
The needle holder is an instrument with a locking handle and a short, blunt beak. For intraoral placement of sutures, a 7-inch (15-cm) needle holder is usually recommended. The beaks of a needle holder are shorter and stronger than the beaks of a hemostat. The face of the shorter beak of the needle holder is cross-hatched to permit a positive grasp of the suture needle. The hemostat has parallel grooves on the face of the beaks, thereby decreasing the control over needle and suture (*Fig. 11*). Therefore the hemostat is not an instrument used for suturing.

***Handling:***

To control the locking handles properly and to direct the long needle holder, the surgeon must hold the instrument in the proper fashion (*Fig. 12*). The thumb and ring finger are inserted through the rings. The index finger is held along the length of the needle holder to steady and direct it. The second finger aids in controlling the locking mechanism. The index finger should not be put through the finger ring because this will result in a dramatic decrease in control.



**Fig. 11**  
The hemostat (right)  
The needle holder (left)



**Fig. 12**  
The needle holder is held by using the thumb and ring finger in rings

**B-Needles:**

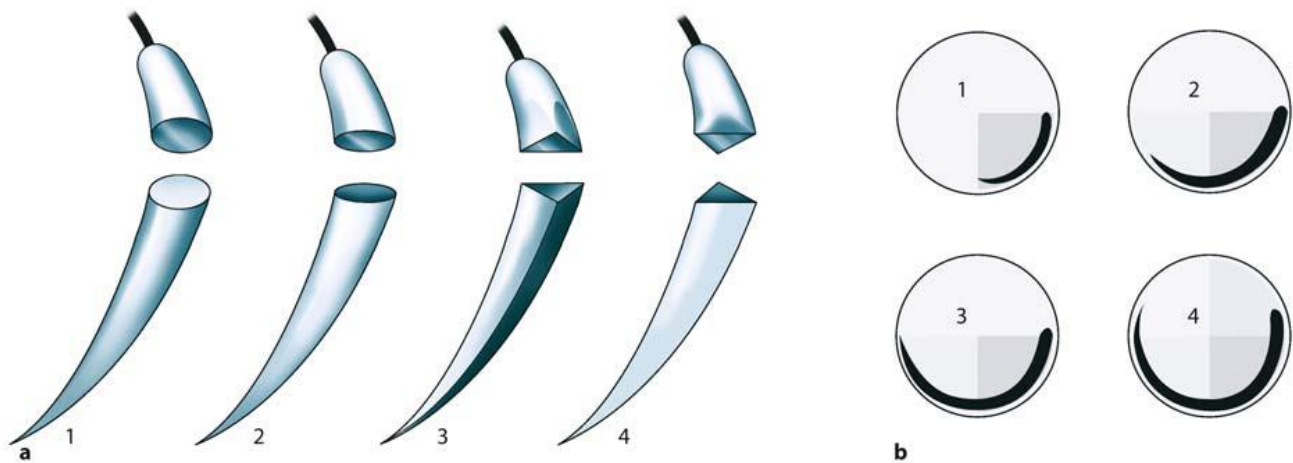
Most sutures come fused to needles in a pre-sterilized package, suture needles differ according to the shape of their cross section and their length, there are generally two types:

**1-cutting needle**, have a triangular cross section

**2-taper point**, which are round or oval in cross section.

According to the shape of the needles, straight needles are only used where tissues or areas of surgery are easily accessible and therefore they are not used in oral cavity because of the limitation of space in oral cavity, so curved needles are mostly used of a length of 21-25 mm or 3/8 or 1/2 (half circle) and this design allows the needle to pass through the limited area of suturing easily.

the cutting needle (triangular cross section) also called *traumatic needle* but it has a good advantage of being able to enter the tissues easily during suturing specially in tout areas like mucoperiosteum of the hard palate (keratinized mucosa) or skin where the tissue is difficult to penetrate the tapered needle is generally used for closing muscle or fascia that are easily penetrated.



**Fig. 12**

**a** Round tapered (1), oval tapered (2), cutting (3, triangular with one of the three cutting edges on the inside of the semicircle), reverse-cutting (4, triangular with two cutting edges on the inside of the semi-circle).

**b** Size of needle compared to regular circle: one-quarter of a circle (1), three-eighths of a circle (2), half a circle (3), three-quarters of a circle (4)

### C-Suture material:

Many types of suture materials are available and could be classified by size , resorb ability ,and whether or not they are monofilament or poly filament .Sutures are made of wide variety of materials and come in several sizes, each designed for a particular purpose

#### 1-size

Sutures are available in various sizes that range from one zero ( 1/0) to (11/0) eleven zero, increasing number of zeros means decreasing the suture diameter, the most size used in oral and maxillofacial surgery is size **3/0 and 4/0** ,the size of the suture usually expressed on the package e.g. 3/0 ,4/0, 2/0....the size 3/0 used most commonly in suturing oral mucosa, which is enough to prevent tearing of the oral mucosa and strong to withstand the tension placed on them intraorally.

#### 2.Resorbability:

- Non resorbable sutures like **black silk** sutures, **nylon**, **stainless steel**, those need removal of the suture postoperatively.
- resorbable sutures are made of materials that the body is capable of easily breaking them down, like **catgut** sutures and this is used for suturing deep structures like muscles, fascia, so these sutures does not require removal

For the resorbable sutures we have two types. Plain gut and chromic gut, the plain gut is subjected to rapid resorption or digestion by the proteolytic enzymes produced by the inflammatory cells, while the chromic catgut is treated with special chromic salts, to provide resistance for the proteolytic enzymes.

#### D-Scissors

the final instrument necessary for placing sutures are suture scissors ,the **suture scissor** usually have long handles, short cutting edge or beaks because main purpose is to cut suture during suturing or on the removal of sutures postoperatively (*fig. 13*), other types of scissors used in oral surgery are called **soft tissue scissors** or **operating scissors**: these scissors are used for cutting of tissues and for dissection or undermining of tissues during surgery , we mainly have two types of operating scissors (*fig. 14*):

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- 1- small, sharp, delicate ones used for fine work
- 2- Blunt nosed scissors: used for undermining soft tissues as well as for Blunt tissue scissors. Notice that these operating scissors should not be used for cutting sutures or other material because these materials make them blunt, and it became less effective for cutting tissues.

**Fig. 13**

Suture scissors should be held in the same fashion as the needle holder.

**Fig. 14** Soft tissue scissors are of two designs:

- Iris scissors (top) are small, sharp-pointed scissors.
- Metzenbaum scissors (bottom) are longer, more delicate scissors. Metzenbaum scissors are available as either sharp tipped (shown here) or blunt tipped.

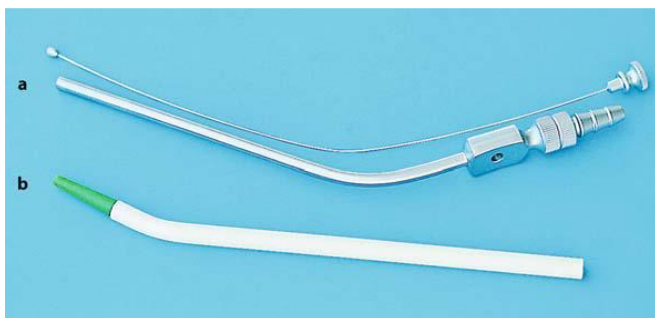
**10-instrument for irrigation and suction**

**A-instrument for suction:**

These instruments used to provide good visualization of the operative field by aspirating the blood, saliva and the irrigating solution (e.g. saline, distilled water) used during operation. In oral surgery a fine metal suction tips on vacuum pressure most used to perform such duty. The use of suction also is very important and most be used when we are working under general anaesthesia to prevent the possibility of aspiration of blood and other fluids by the patient. *Fig. 15*

**B-Instruments for irrigation:**

When we use hand piece and bur to remove bone its necessary to use irrigating solutions like normal saline to cool the bur and prevent bone damage by the heat generated during cutting of bone ,also irrigation will clean the area of surgery from small debris and chips during the surgical procedure and after finishing before suturing the area ,large plastic syringe with blunt 18 gauge needle is used for irrigation purposes ,the needle should be blunt and smooth so that no damage to the vital organs or soft tissues can occur ,the needle also preferable to be angled to have good and efficient direction of the irrigation fluid . *Fig. 16*



**Fig. 15**  
**a** Fergusson suction tip with wire stylet used as a cleaning instrument.  
**b** Disposable suction tip



**Fig. 16**  
**a** Special irrigation system for irrigating the surgical field with a steady stream of saline solution.  
**b** Regular plastic syringe used for the same purpose