Elevators

Elevators are single-bladed instruments designed for specific purposes delivering maximum mechanical advantage with minimum efforts to force a tooth or root along the line of withdrawal.

Elevators are used for luxating (loosening) the teeth before application of forceps making extraction easier, subsequently avoiding complications like fracture of crowns, roots, and bone especially in cases with badly carious teeth and teeth with heavy filling.

They are also used to remove fractured or surgically sectioned roots, to split teeth which have had grooves cut in them, as in separation of roots, and to remove small amounts of bone to create point of application for the beaks of forceps, or removal of interseptal bone.

In impacted teeth, malposed teeth, retained roots and other cases when grasping the tooth by forceps is in applicable so the elevators is the instrument of choice in such cases.

Elevators have three components:

- Handle: It is of generous size for proper grip and delivering adequate but controlled force. Handle can be a continuation of the shank or at a right angle to the shank.
- Shank: It connects the handle with the working end or blade of the elevator. It is strong enough to transmit the force from the handle to the blade.
- Blade: It is the working end of the instrument and transmits the force to the tooth, bone, or both to achieve the desired action. The working side of the blade is either concave or flat.

Types of elevators

1-straight elevator

Elevator in which the blade, shank, and the handle are straight. The working blade or end is blind and round, there are many types and sizes of straight elevators.

2-Coupland's chisel (elevator)

It is similar to straight elevator but the working end is sharp and straight cut, used for chiselling of bone to create point of application or to split of teeth. It's of different sizes, size 1, size 2, size 3. Depending on the width of the working end.

3-Cryer's elevators

In this type the working blades are sharp, pointed and triangular in shape just like a claw, forming an angle with the shank of the elevators. These are pair instrument mesial and distal (right & left) designed to fit the root surface on mesial and distal surface. It's mostly used for removal of retained root of the lower molar and for elevation for impacted teeth after surgical exposure of the bifurcation of the tooth.

4- Winter's elevator

In which the working end is the same that of Cryer's elevator but the handle is in right angle to the shank so it is called winter's (T-bar) cross-bar handle elevator. Winter's elevators are very powerful and great force maybe applied or generated (sufficient to fracture the mandible) so the use of this elevator should be with great care to avoid fracture of the jaw.

5- Apexo elevators

The working blade is long, the margins are sharp, we have 3 Apexo, 2 angled and 1 straight (mesial, distal, straight). The blade forming an angle with the shank, this elevator is used mainly for removal of apical fragments of root deeply present in the socket of the lower jaw especially molars. We push it between the socket and the root to loosen the fractured tip and remove it from the socket.

6-War-wick James elevators

It is a light duty elevator. It's like Cryer's elevator, also we have two angled (mesial and distal) and one straight. The blade is short and the end is rounded and the handle is flattened, it's used for extraction of retained roots, deciduous teeth, anterior lower teeth extraction, and where there is less resistance area. e.g. extraction of upper wisdom tooth.

Mechanical Principles of using elevators

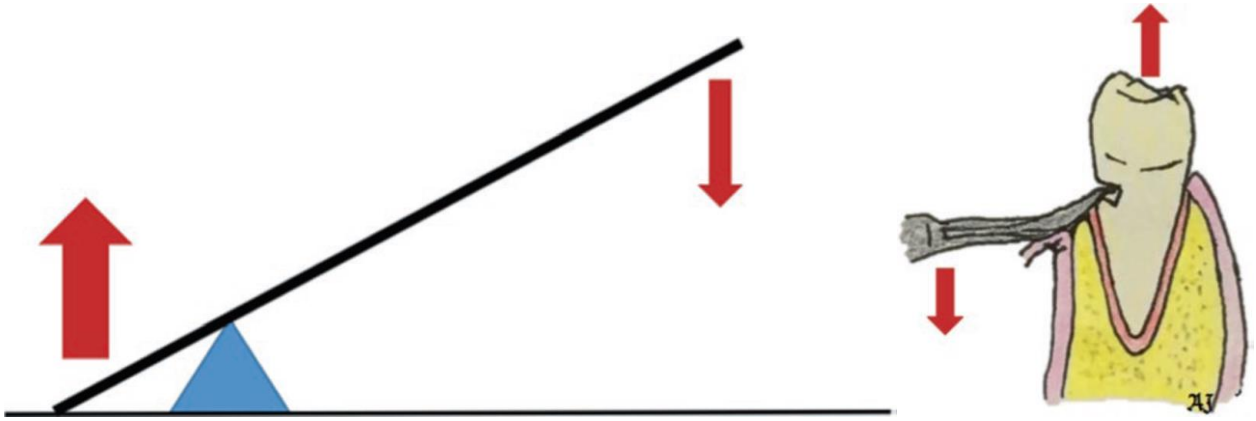
The removal of teeth from the alveolar process requires the use of the following mechanical principles and simple machines: the lever, the wedge, and the wheel and axle. And the combination between them

The lever is a mechanism for transmitting a modest force (with the mechanical advantages of a long lever arm and a short effector arm) The small force and large movement transformed to small movement and large force by the lever, this occur when The tooth is elevated out of the socket utilizing purchase point and the bone acts as a fulcrum.

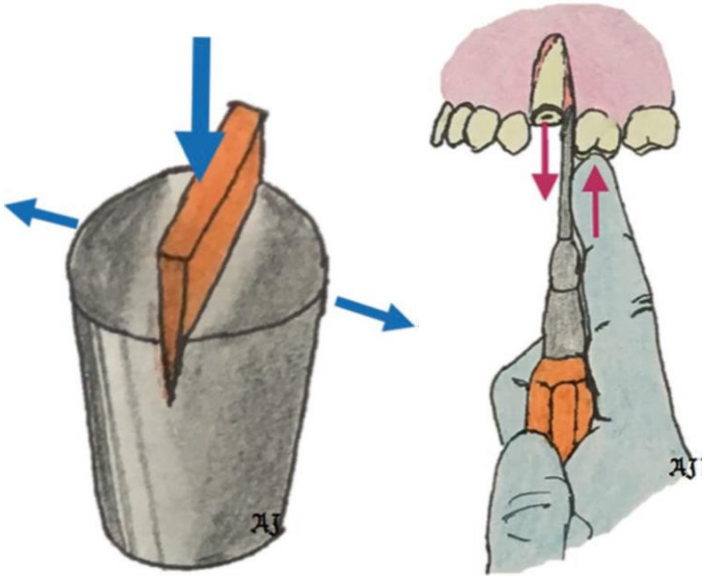
The wedge principle is also useful when a straight elevator is used to luxate a tooth from its socket. A small elevator is wedged into the periodontal ligament space, which displaces the root toward the occlusion and thus out of the socket.

This principle is useful also in using forceps. the beaks of extraction forceps are usually narrow at their tips; they broaden as they go superiorly. When forceps are used, there should be a conscious effort made to force the tips of the forceps into the periodontal ligament space at the bony crest. as the beaks of the forceps are pressed apically on the root, they will help force the tooth out of the socket.

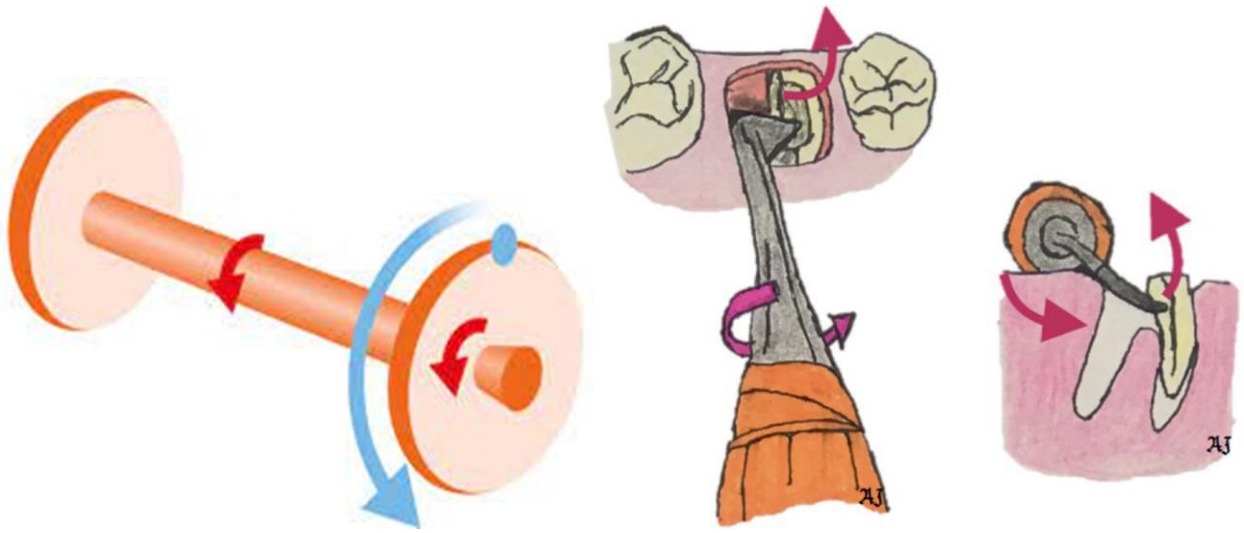
Wheel and axle, which is most closely identified with the triangular, or pennant shaped, elevator. When one root of a multiple-rooted tooth is left in the alveolar process, the pennant-shaped elevator, such as a Cryer, is positioned into the socket and turned. The handle then serves as the axle, and the tip of the triangular elevator acts as a wheel and engages and elevates the tooth root from the socket.



Lever



Wedge



Wheel and axle

Guiding principles for use of elevators:-

Before the application of the elevators we should have an idea about:

Line of withdrawal:-

Is the path along which the tooth or root will move out of its socket when minimal force is applied to it, and this line is primarily determined by root pattern (long axis of the tooth).

Point of application:-

Is the site on the root at which force must be applied to effect delivery, it is determined by the line- of withdrawal. We have buccal point of application, distal point of application, and mesial point of application.

The following rules should be observed when using elevators in general:-

- The Concave or Flat surface of the blade of the elevator should be facing the tooth or root which is to be extracted.

- ❖ The sharp edges of the working blades are placed between the alveolus and the root surface and gently rotated apically along the long axis of the elevator to luxate or displacing the tooth or root.
- ❖ Finger guards should be used to prevent any injuries to adjacent soft tissues by Slipping of the Elevator.
- ❖ Adjacent tooth should not be used as a fulcrum as it results in luxation of the tooth as well. It should only be used when it is to be extracted. Always used the interdental bone as the fulcrum or your finger
- ❖ Avoid the use of excessive force if the tooth/root is resist luxation, by gentle rotation, then stop, look for the obstruction for elevation and deal with it.
- ❖ If an application point is not present, then this should be created by careful removal of bone.
- ❖ The direction of force should be such that the roots are not directed toward major structures such as the maxillary antrum.
- ❖ An elevator should never be used "blindly" in the socket.

Complications of use of elevators:-

Careful and scientific work decrease complication. However, misuse or wrong application may lead to some complications, part of it may be serious:-

- Damage (luxation or Fracture) to adjacent tooth due to wrong application of force
- Injury to the soft tissues, like injury to the tongue, floor of the mouth, soft and hard palate, caused by slipping of elevator during its use
- Fracturing the Buccal or Lingual plate while elevation
- Fracture of the jaw especially the lower jaw at the angle of the mandible
- Fracture of Maxillary tuberosity during extraction of Maxillary third molar

- Displacement of the Root piece or third molar into Sinus or Antrum by applying wrong forces
- Mandibular molar displacement into the Mandibular canal or lingual space or pterygomandibular space by applying excessive force in the wrong direction
- Use of elevator in periapical area of abscessed tooth may cause spread of infection to the surrounding tissue .
- Tip of instrument (working blade) may be fractured and remain In the socket causing postoperative infection or delay healing, so always check the tip of instrument after use.