ENDODONTICS

Lecture 5

Applications of radiography in Endodontics:

There are many applications of radiographs in endodontics which are as follows:

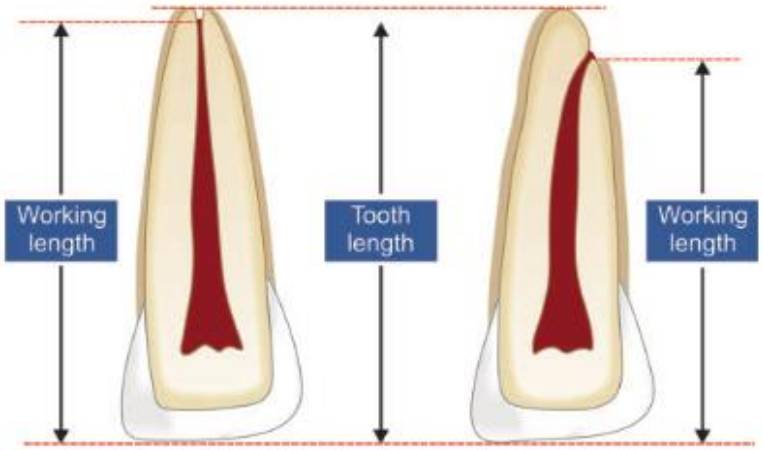
1) Aid in the diagnosis and localization of hard tissue alteration of the tooth (sclerosis and resorption) and periradicular structures.
2) Determine the number, location, size, shape and direction of roots and root canals.
3) Estimate and confirm the length of root canals prior to instrumentation.
5) Determine the relative position of structures in facial or lingual dimensions.
6) Confirm the position and adaptation of the filling points.
7) Evaluate in recall films the success or failure of endodontic treatment.

Determination of the Working length of teeth:

The working length is the distance from a coronal reference point to a point at which canal preparation and obturation should terminate.

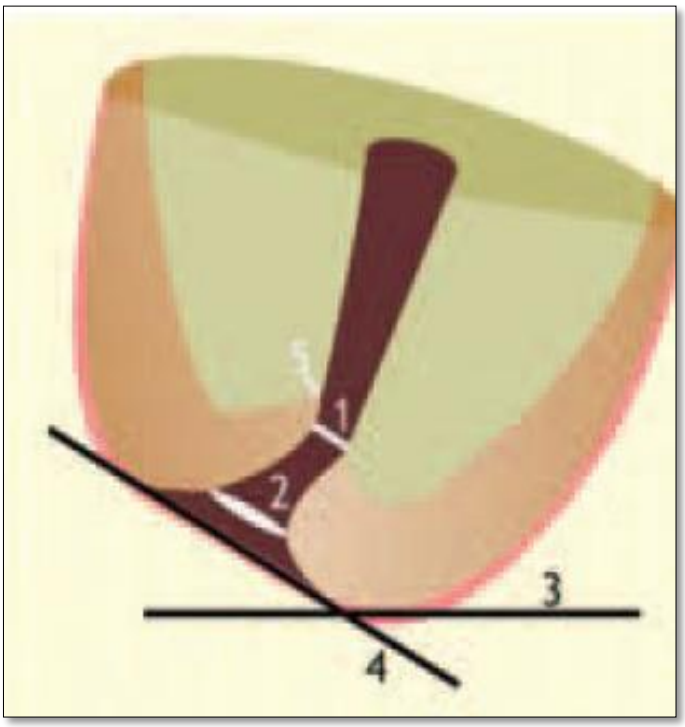
Objective of the working length

To establish the length of the tooth at which the canal preparation and subsequent obturation are to be completed. The apical end of the root canal is the CDJ, which is usually 0.5-1mm short of the radiographic apex. Sometimes the apical foramen is laterally positioned so it would be more than 1 mm from the radiographic apex.



Figs. 17.6 CDJ need not to terminate at apical constriction. It can be 0.5–3 mm short of the apex.

Anatomy of the root apex



1- **Apical constriction:-** It is the apical portion of the root canal having the narrowest diameter. This position may vary but is usually 0.5 to 1.0 mm short of the center of the apical foramen.

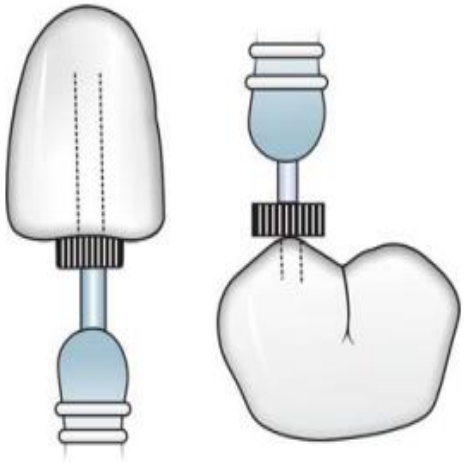
2- **Apical foramen**: **-** It is the main apical opening of the root canal. The foramen is generally not in the center and may even be situated on the lateral side of the root.

3- **Radiographic apex**: - It is the end of the root determined radiographically.

4- **Anatomic apex: -** It is the end of the root determined anatomically,

5- **Cementodentinal junction:-** It is the area where the dentin and cementum are joined, the point of which the cemental surface terminates at or near the apex of the tooth.

Reference point: It is the site on the incisal edge or occlusal surface from which measurements are made. Usually it's the highest point on the incisal edge in anterior teeth & the tip of the cusp in posterior teeth. It should be:



1) stable,

2) easily visualized during preparation

3) will not change during or between appointment.

Methods for Determining Working Length

- Average root lengths from anatomic studies.
- Preoperative radiographs.
- Tactile sensation.
- Working length radiograph.
- Electronic apex locators.

Procedure of Working Length Determination

1- Examine preoperative radiograph & estimate the length of the tooth.

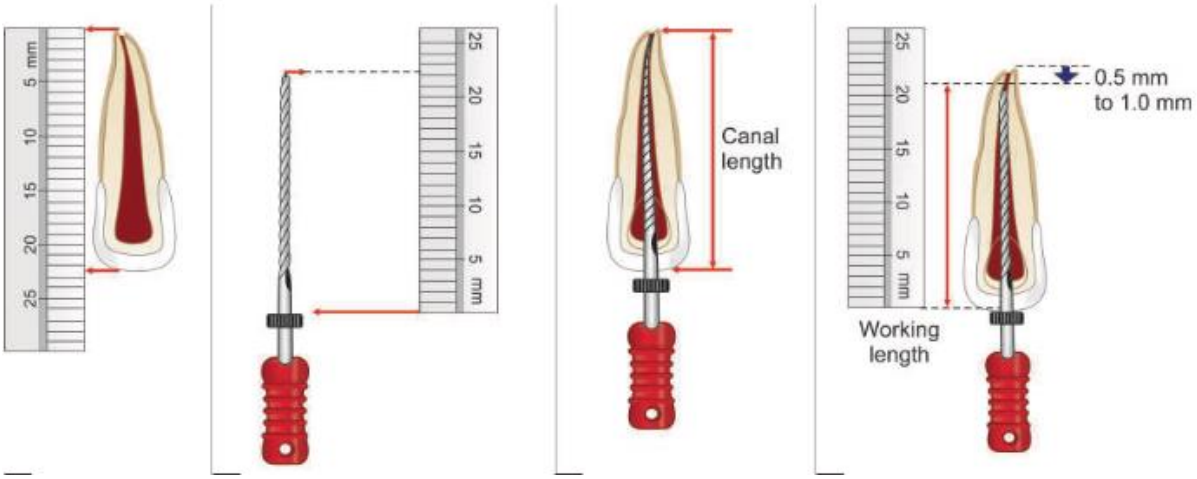
2- Know the average length of each tooth.

3- Place the file selected to be the correct initial width into the canal with it's rubber stopper set at the estimated working length.

4- Radiograph the tooth to verify the position of the instrument.

5- Readjust the file length according to the radiograph result.

Results are either fit, too long, or too short.



Note:

* Bisecting technique in x-ray can't measure the exact length of the tooth. The parallel technique is more accurate

*The radiographs should be repeated in the following stages of treatment to check the working length.

* Initial size: It is the first instrument used to fit the working length & has slight resistance.

* If the radiograph results are too long e.g. 3mm. long, here we have to subtract 4 mm. & take another radiograph.
* If the radiograph results are too short e.g. 3mm. short, here we have to add 2mm. & then take another radiograph.

Electronic determination of working length:-

The electronic principle is relatively simple and is based on electrical resistance to determine canal length.

Uses of apex locators:

1-They are useful in conditions where apical portion of canal system is obstructed by:
a-impacted teeth, b-zygomatic arch, c-excessive bone density, d-tori, e-overlapping roots, f-shallow palatal vault.
In such cases, they can provide information which radiographs cannot.

2-They are useful in patient who cannot tolerate X-ray film placement because of gag reflex.

3-In case of pregnant patients, to reduce the radiation exposure, they can be valuable tool.

4-They can also be used in children who may not tolerate taking radiographs, disabled patients and patients who are heavily sedated.

5-They are helpful in root canal treatment of teeth with incomplete root formation, requiring apexification and to determine working length in primary tooth.

Consequences of over-extended working length

- Perforation through apical construction
- Over instrumentation
- Overfilling of root canal
- Increased incidence of postoperative pain
- Prolonged healing period

• Lower success rate due to incomplete regeneration of cementum, periodontal ligament and alveolar bone

Consequences of working short of actual working length

• Incomplete cleaning and instrumentation of the canal

• Pain due to presence of pulpal remnants

• Underfilling of the root canal

• Incomplete apical seal

• Apical leakage leading to poor healing and periradicular lesion