

Endodontics

Lecture 1

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Endodontic Diagnosis

Diagnosis: It is the procedure that:

- 1- Accepts the patient.
- 2- Recognizes that he/she has a problem.
- 3- Determine the cause of the problem.
- 4- Develop a treatment plan to treat the problem.

Requirements of a diagnostician

- 1- Knowledge: A dentist must depend on himself and his scientific background.
- 2- Interest and curiosity: The dentist must be interested in solving the problem of the patient and curious about the result of the diagnosis.
- 3- Patience: The dentist needs time and patience to understand the reasons of the problem which not always are visible and needs some time and investigations to reveal the cause of the problem.

Systematic endodontic diagnosis

History

A complete medical history should contain the vital signs, give early warning of unsuspected general disease and find risks to the health patient (during treatment) and the dental staff.

Chief complain. It is a description of the dental problem of the patient.

Present dental illness. Pain is the main reason for the patient's complain. It ranges from dull to severe which indicates the severity of the problem. It may indicate the source which may be dental or the surrounding structures.

Medical history. It is very important in patients with medical problems that may interfere with the dental treatment as history of bleeding, heart diseases, diabetes. Any medications taken by the patient may affect the dental procedure as aspirin.

Clinical examination

Examining the patient clinically with the patient's history will make the diagnosis of the problem.

Vital signs

- 1- Blood pressure. The normal pressure is 120/80 mm Hg for patients under age of 60 years; 140/90 mm Hg for patients over the age of 60 years. Any pressure exceeding this limit needs consultation with the cardiologist before dental treatment.
- 2- Pulse rate and respiration. The normal pulse rate is 60-100 beats/minute and the respiration is 16-18 breaths/minutes. They may be elevated due to stress and anxiety.
- 3- Temperature. The normal temperature of the body is 37 °C (98.6 F). Any elevation in the body temperature may be a sign of general illness.

4- Cancer screen. This examination should include the face, lips, neck and intraoral soft tissues for lumps and white spots.

Extraoral examination

Inflammatory changes originating intraorally and observable extraorally may indicate a serious spreading problem. The extraoral examination includes the face, lips and neck which may need palpation. Painful and/or enlarged lymph nodes indicate the spread of the inflammation as possible malignancy. The extent and manner of jaw opening may give a sign of possible myofascial pain and dysfunction.

Intraoral examination

The oral vestibules and buccal mucosa should be examined for localized swelling and sinus tract or color changes. The lingual and palatal soft changes should be then checked. Finally the teeth should be inspected for a carious lesion, faulty restoration, loss of teeth, presence of deciduous or supernumerary teeth.

Pulpal evaluation

There are many tests that indicate the pulpal health state. These tests reveal the extent of the problem and give a clue about the treatment as irreversible pulpitis needs endodontic treatment whereas reversible pulpitis may need a normal filling.

Pain history

Initially, information on pain is obtained by asking questions regarding the current problem(s). This examination is subjective, frequently asked questions include:

- *Location.* Occasionally a patient may identify the location of the pain; however, one must be cautious as pulpal pain may be referred to a different area. Pain may be felt in any of the orofacial structures.
- *Type and intensity of pain.* The patient may describe pain in many ways. Examples include sharp, dull, throbbing, stabbing, burning, electric shock like, deep or superficial. The more the pain disrupts the patient's lifestyle because of its intensity, the more likely it is to be irreversible in origin.
- *Duration.* For how long after removal of the stimulus does the pain continue? The longer the pain continues after the stimulus, the more likely it is to be irreversible.
- *Stimulus.* Many different stimuli may initiate the pain, for example hot, cold, sweet, biting, posture. Alternatively the pain may be spontaneous. Special tests may be selected on the basis of what causes the main complaint.
- *Relief.* Pain-relieving factors, especially type and frequency of analgesics, antibiotics, sipping cold drinks.

Periodontal evaluation

The complete diagnosis is performed when examination is done to the tooth and surrounding tissues. The periodontal pathology as gingivitis and periodontal pockets may affect the pulp therefore periodontal treatment may be necessary before/with the endodontic treatment.

Clinical endodontic tests

These tests obtain the condition of the tooth's pulp and supporting structures. One test is not enough for a decisive diagnosis therefore a combination of tests is necessary.

Thermal tests.

It is divided to cold and hot stimuli.

1- Cold testing. It differentiates between reversible and irreversible pulpitis and identifying necrotic teeth. If a tooth is sensitive to a cold stimulus which subsides after removal of stimulus then the condition is reversible. If the sensitivity takes time more than few seconds then the condition may be irreversible. Teeth with calcified canals need more time for the cold stimulus to reach the pulp. Cold testing may be done by air blast, cold drink, ice stick or ethyl chloride.

2- Hot testing. The use of a hot stimulus can help locate a symptomatic tooth with necrotic pulp. Heated gutta percha stick or hot water may be used.

Percussion. This is used to find if the apical periodontium has been affected by the pulpal pathology. Any hard instrument may be used to tap the incisal/occlusal surface of the tooth.

Palpation. This test signals the further spread of inflammation from the periodontal ligament to the periosteum overlying the bone. This test checks for fluctuation and possible asymmetry of the surfaces around the tooth.

Mobility

A mirror handle is placed on one side of the tooth and a note made of the degree of movement: up to 1 mm scores 1, over 1 mm scores 2 and vertically mobile teeth score 3.

Occlusal analysis

It is important to examine suspected teeth for interferences on the retruded arc of closure, intercuspatal position and lateral excursions. Interferences in any of these positions could result in a degree of occlusal trauma and institute acute apical periodontitis.

Sinus tract exploration

Where a sinus tract is present, it may be possible to insert a small gutta-percha point. A radiograph is then taken to see which root the tract/point leads to.

Transillumination

Transillumination with a fibre optic light show cracks in teeth. These cracks cause stretching of the pulp tissues when a lateral pressure is exerted on the tooth therefore causing pain.

Periodontal probing

Detailed periodontal probing around suspected teeth may reveal a sulcus within normal limits. However, deeper pocketing will be identified. A narrow defect may be an indication of a root fracture or an endodontic lesion draining through the gingival crevice. This causes an endodontic-periodontal lesion.

Radiographs

Radiographs should be taken using film holders and a paralleling technique and be viewed using an appropriate viewer with magnification as necessary. They will not show early signs of pulpitis as there is no periodontal widening at this stage of pulpal degeneration. Radiographs may provide important information to help to confirm a diagnosis, but they should not be used alone. Radiographic findings may include the loss of lamina dura (laterally or apically) or a periradicular radiolucency indicative of pulp necrosis.

Alternatively, radiographs may show pulp chamber or root canal calcification, which may explain reduced responses to pulp sensitivity testing. This emphasises



the need for considering using more than one test. Radiographic examination may also reveal tooth/root resorptive defects.

Test cavity

Occasionally, as a last resort, an access cavity is cut into dentine without local anaesthesia as an additional way of sensitivity testing.

Selective anaesthesia

Selective anaesthesia can be useful in cases of referred pain to distinguish whether the source of pain is mandibular or maxillary in origin. It is less useful for distinguishing pain from adjacent teeth, as the anaesthetic solution may diffuse laterally.

Electric pulp test. It provides limited but useful information about the response of the nerve fibres in the pulp. Many factors affect the level of response as enamel thickness, area of probe placement (in the middle third of the labial surface), dentin calcification, restorations and patient’s level of anxiety. False positive and negative results may happen. A newly erupted tooth may give a negative response whereas a traumatised young tooth may not respond to testing. Multirouted teeth give inconclusive readings because there are many roots with different degrees of pulp inflammation in each root canal.



Clinical Findings in Reversible Pulpitis

Visual	Check for decay, fracture lines, swelling, sinus tracts, orientation of tooth, and hyperocclusion
Palpation	Not sensitive
Percussion	Not sensitive
Mobility	None (unless periodontal condition exists)
Perio probing	None (unless extensive periodontal disease exists)
Thermal	Hypersensitive to heat or cold (quick response lasting for seconds)
Electric Pulp Test	Responds
Translumination	Not used unless a fracture is suspected
Selective anesthesia	Not necessary
Test cavity	Not necessary, tooth is vital
Radiographic	Periapical x-ray shows normal periapex

Clinical Findings in Irreversible Pulpitis

Visual	Check for decay, fracture lines, swelling, sinus tracts, orientation of tooth, and hyperocclusion
Palpation	No response initially; may be sensitive in later stages
Percussion	No response initially; may be sensitive in later stages
Mobility	None (unless periodontal condition exists)
Perio Probing	None (unless extensive periodontal disease exists)
Thermal	Hypersensitive to hot and cold with prolonged response
Electric Pulp Test	Responds
Transillumination	Not used unless fracture is suspected
Selective Anesthesia	May help identify offending tooth
Test cavity	Not necessary, tooth is vital
Radiographic	Normal or thickened periodontal ligament

Clinical Findings in Necrotic Pulp

Visual	Check for decay, fracture lines, swelling, sinus tracts, orientation of tooth, and hyperocclusion
Palpation	Sensitive
Percussion	Mild to severe pain (depends on periapical inflammation)
Mobility	None to moderate (depends on bone loss)
Perio Probing	None (unless extensive periodontal disease exists)
Thermal	No response
Electric Pulp Test	No response
Transillumination	Not used unless fracture is suspected
Selective anesthesia	May help identify offending tooth
Test cavity	May be used if vitality is suspected
Radiographic	Periapical radiograph may show normal or thickened periodontal ligament, or radiolucent lesions

