The purpose of diagnosis is to determine what problem the patient is having and why the patient is having that problem.

Data gathered from the patient’s chief complaint, medical/dental history, clinical examination and appropriate clinical tests will in most cases lead to an accurate diagnosis and subsequent successful treatment.

No treatment should be recommended until a definitive diagnosis is reached.

**Patient’s complaint(s):**

Listen carefully to the patient’s description of his/her symptoms. Ask specific, but not leading, questions about their pain such as:

- **Onset**
- **Location**
- **Duration**
- **Character**
- **Aggravating and relieving factors**
- **Frequency and timing.**

It is usually possible to decide from the patient’s history whether the pain is of pulpal, periapical or periodontal origin, or if it is non-odontogenic.

Without proper attention to the patient’s complaint, the clinician may find (and treat) dental pathosis that is not related to the patient’s symptoms!

**Medical history:**

There are no medical conditions that contra-indicate endodontic treatment.

Systemic medical disease or certain medications could influence the course of treatment and prognosis of endodontic therapy.

There are several which require special care such as:

- Allergies
- Bleeding tendencies
- Pregnancy
- Cardiac disease and risk of IE
- Immune defects
- Hx of radiation to the head and neck
- Glaucoma, asthma
- Patients taking bisphosphonates

**Patient’s complaint(s):**

The absence of clinical symptoms does not necessarily mean that the pulp is completely healthy!
Extra-oral examination:

- The patient’s face and neck are examined
- Facial asymmetry (e.g., swelling, skin color, and localized redness, etc).
- Submandibular and cervical lymph nodes may provide clues about any spread of infection or the presence of tumorous diseases.
- Muscles of mastication
- Mouth opening (at least three fingers’ wide)
- The presence of various diseases, traumatic injuries, and facial scars.
- Extra-oral sinus tracts/ fistulas.

A simple check list for a medical history (Scully and Cawson)

- Anemia
- Bleeding disorders
- Cardiorespiratory disorders
- Drug treatment and allergies
- Endocrine disease
- Fits and faints
- Gastrointestinal disorders
- Hospital admissions and attendances
- Infections
- Jaundice or liver disease
- Kidney disease
- Likelihood of pregnancy or pregnancy itself

Extr-oral examination:

- The patient’s face and neck are examined
- Facial asymmetry (e.g., swelling, skin color, and localized redness, etc).
- Submandibular and cervical lymph nodes may provide clues about any spread of infection or the presence of tumorous diseases.
- Muscles of mastication
- Mouth opening (at least three fingers’ wide)
- The presence of various diseases, traumatic injuries, and facial scars.
- Extra-oral sinus tracts/ fistulas.

Intra-oral examination:

The tooth requiring endodontic treatment should be assessed in terms of restorability and strategic importance

Palpation and percussion, determination of tooth mobility, pulp tests, and periodontal and radiographic examinations should be used routinely and in full for each patient

Additional tests include transillumination, selective anesthesia, bite tests, and test cavities if there is any doubt about the condition of the pulp

Diagnostic tests:

III- Mobility:

May be increased due to:
- Generalized periodontal disease
- Trauma: physical or occlusal
- Horizontal root fracture

As a result of periapical inflammatory processes (acute apical abscess)

Tested by pushing with the back of a mirror handle against a finger on the other side of the tooth.

Mobility may be graded as:
- Grade I: 0.3 – 1 mm in a horizontal plane
- Grade II: 1-2 mm in a horizontal plane
- Grade III: >2mm in a horizontal plane or any vertical mobility

Intra-oral examination:

- Thorough assessment of hard and soft tissues including:
  - Tongue, lips, cheeks, palate
  - Standard of oral hygiene
  - Amount and quality of restorative work
  - Prevalence of caries
  - Missing and unopposed teeth
  - General periodontal condition
  - Presence of soft or hard swellings
  - Presence of any sinus tracts
  - Discoloured teeth
  - Tooth wear and facets

Diagnostic tests:

I- Palpation:

The tissues overlying the apices of any suspect teeth are palpated buccally and lingually to locate tender areas.

The site and size of any soft or hard swellings are noted and examined for fluctuation and crepitus.

II- Percussion:

Gentle tapping with a finger both laterally and vertically on a tooth is sufficient to elicit any tenderness.

It is not necessary to strike the tooth with a mirror handle, as this invites a false positive reaction from the patient.
IV- Pocket probing:
Should be carried out in relation to the entire dentition to permit differential diagnosis between endodontic and periodontal etiologies.
A deep, narrow, isolated pocket may be due to:
- Vertical root fracture
- A sinus tract discharging through the sulcus
- A palatal gingival groove
- A long-standing perforation with destruction of the supporting tissues

Diagnostic tests:

V- Pulp testing:

Often referred to as “vitality” testing or “sensibility” testing.
Is an indirect method of determining the condition of the pulp and provides information about the vitality of the sensory nerve fibers.

Add in diagnosis by:
- Eliciting a positive or negative response
- Reproducing the patient’s symptoms
- Relieving the patient’s symptoms
- Recording a baseline reading

Selection of the test is based on the patient’s chief complaint.
Immediacy, intensity and duration of the response are diagnostic.
Sensitivity vs. specificity (false positive, false negative results)
Multi-rooted teeth?

Diagnostic tests:

V- Pulp testing:

False negative response could be due to:
- Heavily restored dentition
- Calcified canals
- Trauma
- Immature teeth
- Patients taking analgesics
- Generalized high threshold

False positive:
- Stimulation of the gingivae and surrounding soft tissues
- Stimulation of adjacent teeth
- Patient’s apprehensive approach

Diagnostic tests:

V.b- Heat test:

Different methods of applying heat to a tooth:
(i) Heated gutta percha stick
(ii) Heated green stick compound
- Apply a layer of Vaseline to prevent the gutta-percha from sticking to enamel causing unnecessary pain and damage to the pulp.
(iii) Hot water bath (after rubber dam isolation).

Diagnostic tests:

V.a- Cold test:

May be applied by:
- Ice sticks: cheap, readily available, easy to prepare.
- Ethyl chloride.
- Skin refrigerant (tetrafluoroethane): -26°C
- Frozen carbon dioxide (dry ice): -56°C

3 possible outcomes: no sensation, normal sensation and pain.
A-delta vs. C-fibers.
**Diagnostic tests:**

**V.d.** Laser Doppler flowmetry (LDF)

LDF was introduced in the early 1970s for measurement of blood flow in the retina.
Utilizes a beam of infrared light that is directed into the crown and pulp chamber by optical fibers.
As light enters the tissues, it will be frequency-shifted by the moving blood cells but will remain unshifted as it passes through static tissue.
The average Doppler frequency shift will measure the velocity at which the red blood cells move.
Accurate, reliable and reproducible method of assessing pulpal blood flow.
Readings take approximately 1h.

**Diagnostic tests:**

**V.c.** Electric pulp test:

The electric pulp tester is an instrument which uses gradations of electric current to excite a response from the nervous tissue within the pulp.
The teeth to be tested are dried and isolated with cotton rolls.
A conducting medium should be used; the one most readily available is toothpaste.
Patients with pacemakers: risk of electrical interference.
Teeth with full crowns! (Bridging with a probe)

**Diagnostic tests:**

**VI.** Radiography:

**VI.a.** Periapical radiographs:
A good parallel radiograph of the root and periapical region is mandatory.
Using a film holding and aiming device significantly improved the quality of radiographs.
2 or 3 angled radiographs provide more information.
Early stages of pulpitis are not normally associated with any radiographic changes.
A patent discharging sinus tract should be traced with a small-sized gutta-percha point and a radiograph exposed.
The gutta-percha point will lead to infection source.

**Diagnostic tests:**

**VI.b.** Bitewing radiographs:
provide additional information regarding the restoration marginal fit, level of bone support and presence of recurrent caries.

**Diagnostic tests:**

**VI.c.** Cone beam computerized tomography (CBCT):
3D image
More capable of diagnosing pathology
Increased radiation exposure and expensive equipment
VII. Bite test: May help in the diagnosis of complete or incomplete fractures. Pain typically occurs on release of bite pressure. Pulp vitality needs to be confirmed. Tooth slooth, wooden stick or rubber dam.

Diagnostic tests:

VIII. Fibre-optic light
Transilluminating teeth to show interproximal caries, fracture, opacity or discoloration. The penetration of light is considerably reduced behind the fracture line.

Diagnostic tests:

IX. Selective anaesthesia:
When patients cannot locate the pain and routine thermal tests have been negative, the pulpitic tooth can be identified by selectively anaesthetizing the suspect tooth (teeth) using intraligamentary injection.

Diagnostic tests:

X. Test cavity:
If the diagnosis is still uncertain, it may be necessary to remove an existing restoration or perform a test cavity without anaesthetizing the tooth. This procedure must be considered the last diagnostic method of choice.

Diagnostic tests:

The occlusion is carefully checked by having the patient move into various lateral and protrusive excursions. Marking paper can be used to identify premature contacts that can contribute to harmful wear facets, increased mobility and thermal sensitivity. Habitual grinding is a behavior that promotes malocclusion and is frequently associated with fractured teeth. An occlusal analysis can provide information about premature contacts in restorations or improper tooth loading, either of which may clinically simulate pulpitis.

Diagnostic tests:

Non-odontogenic facial pain may include:
- Myofascial pain and TMD
- Sinusitis
- Trigeminal neuralgia
- Migraine
- Herpes Zoster and post-herpetic neuralgia
- Burning mouth syndrome
- Giant cell arteritis
- Angina
- Chronic idiopathic facial pain (atypical facial pain)
Fracture/Cracked Tooth Syndrome

Teeth exhibiting incomplete fractures can respond with increasing sensitivity to cold, and pulpitic degeneration leading to necrosis of the pulp tissue is possible. Pain upon release following biting on a hard substance, which is due to stretching and rupture of the odontoblastic processes. Mandibular molars most often affected.

Contra-indications for root canal treatment:

a. General
   - Inadequate access
   - Poor oral hygiene (except the medically or physically compromised)
   - Patient’s general medical, physical or mental condition
   - Patient’s attitude

b. Local
   - Tooth not restorable
   - Insufficient periodontal support
   - Non-strategic tooth (unopposed and nonfunctional teeth)
   - Root fractures
   - Internal or external resorption??
   - Bizarre anatomy (exceptionally curved/ dilacerated roots, palatal grooves)

Indications for root canal treatment:

All teeth with pulpal or periapical pathology. Elective root canal treatment can be performed in the following situations:

- The need for a post space
- Overdenture
- Teeth with doubtful pulps (if it requires an extensive restoration, particularly if it is to be a bridge abutment).
- Risk of exposure
- Periodontal disease
- Pulpal sclerosis following trauma??

THANK YOU