The Endodontics
Introduction

By: Thulficar Al-Khafaji
BDS, MSC, PhD
1. Introduction

Definition

Endodontontology

- form
- function
- health of the dental pulp and the periradicular tissues that surround the root(s) of teeth.
- injuries and diseases of the pulp and periradicular tissues and their prevention and treatment.
1. Introduction

History

1- Ancient root canal filling: Nabatean warrior in 2200 years ago (around 200 BC), 2.5 mm metal bronze wire inside the root canal.

2- It was thought that the metal wire could prevent the tooth warm from burrowing inside the canal.

Figure 1. (2.5 mm) metal bronze wire inside the root canal.
1. Introduction

History

3- The ancient Chinese also thought that the cause of the caries is tooth warm.

4- Chinese used arsenicals to treat pulpitis by the year 200 AD

Figure 2. Chinese character representing the warm and tooth
1. Introduction

History

5- Dr Louis I. Grossman, divided the period between the 1776 and 1976 into four 50-years periods.

<table>
<thead>
<tr>
<th>Period</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st period</td>
<td>Leeches or toasted fig poultices &amp; red-hot wire</td>
</tr>
<tr>
<td>2nd period</td>
<td>General anaesthesia, rubber dam, Intracanal antiseptics, barbed broaches &amp; gutta-percha</td>
</tr>
<tr>
<td>3rd period</td>
<td>Local anaesthesia, x-ray, CMCP</td>
</tr>
<tr>
<td>4th period</td>
<td>Improvements in the radiographs, anaesthetics and procedures of treatment and introduction of new agents such as Calcium hydroxide &amp; EDTA</td>
</tr>
</tbody>
</table>
1. Introduction

Anatomy

Pulp space or cavity
1-Pulp chamber
2-root canal

Change in size and shape of the pulp cavity

1-Secondary dentine
2-Irritation dentin (tertiary dentin “reactionary or reparative dentin”)

Aging

External stimuli or irritant (caries, attrition, abrasion, erosion, impact trauma and clinical procedure)

Figure 4. Anatomy of pulp space
1. Introduction

Histology

Pulp

- cells, intercellular substance, fibre elements, vessels and nerves

1-Peripheral region
- A-odontoblast cells.
- B-cell-free zone of Weil (subodontoblastic layer) which consists of plexuses of capillaries and small nerve fibres.
- C-cell-rich zone which consists of fibroblasts and undifferentiated cells.

2-Central region

Large vessels and nerves, cells (fibroblast are the principal cells) and extracellular substance (ground substance and collagen are the principal components)

B- cell free zone (the zone of Weil)
*It is present beneath the odontoblastic layer.
*It is suggested to be the area of mobilization and replacement of odontoblasts.

C- cell rich zone:
It is present beneath the cell free zone.
It is composed of fibroblasts and undifferentiated mesenchymal cells.
1. Introduction

Pathology

Noxious stimuli \rightarrow \text{Pulp inflammation, necrosis and dystrophy}

Noxious Stimuli:

I. Bacterial
II. Traumatic
III. Iatral
IV. Chemical
V. Idiopathic
I. Bacterial

A. Coronal ingress
   1. Caries
   2. Fracture (a. Complete. b. Incomplete)
   3. Non-fracture trauma

B. Radicular ingress
   1. Caries
   2. Retrogenic infection (a. Periodontal pocket. b. Periodontal abscess)
   3. Hematogenic

II. Traumatic

A. Acute
   A. Coronal fracture
   B. Radicular fracture
   C. Vascular stasis
   D. Luxation
   E. Avulsion

B. Chronic
   1. Adolescent female bruxism
   2. Traumatism
   3. Attrition or abrasion
   4. Erosion
A. Cavity preparation
   1. Heat of preparation
   2. Depth of preparation
   3. Dehydration
   4. Pulp horn extensions
   5. Pulp haemorrhage
   6. Pulp exposure
   7. Pin insertion
   8. Impression taking

B. Restoration
   1. Insertion
   2. Fracture (a. Complete  b. Incomplete)
   3. Force of cementing
   4. Heat of polishing

C. Intentional extirpation and root canal filling

D. Orthodontic movement

E. Periodontal curettage

F. Electrosurgery

G. Laser burn

H. Periradicular curettage

I. Rhinoplasty

J. Osteotomy

K. Intubation for general anaesthesia
IV. Chemical

A. Restorative materials
   1. Cements
   2. Plastics
   3. Etching agents
   4. Cavity liners
   5. Dentinbonding agent
   6. Tubule blockage agent

B. Disinfectants
   1. Silver nitrate
   2. Phenol
   3. Sodium fluoride

C. Desiccants
   1. Alcohol
   2. Ether
   3. Others

V. Idiopathic

A. Aging
B. Internal resorption
C. External resorption
D. Hereditary hypophosphatemia
E. Sickle cell anaemia
F. Herpes zoster infection
G. HIV and AIDS
1. Introduction

History, diagnosis and treatment planning:

• Medical and dental history: Medical history should reveal any medical condition or medication which might influence diagnosis or treatment.

• Clinical examination: The patient should be examined both extra- and intraorally.

• Diagnosis: The cause of the patient’s complaint should be identified. Some or all, of the following diagnostic tests may be applied: palpation, mobility test, percussion, periodontal examination, occlusal analysis, testing for possible cracked teeth, pulp sensitivity tests, transillumination, selective local anaesthesia, radiography (normally by using the paralleling technique and a beam guiding device for good reproducibility), colour matching and sinus tract exploration.

• Treatment planning: It should be planned for those teeth that are functionally or aesthetically important and have reasonable prognosis.
1. Introduction

Records:

• It is essential to make adequate records of the presenting symptoms, history of the present complaint with a dental history related to this, results of clinical examination and sensitivity tests, report on radiographs taken, diagnosis and treatment plan should be recorded.

• Informed consent records: Where there are alternative treatments or special problems, these should be explained and discussed with the patient along with the likely prognosis and recorded. It is good practice to provide the patient with written information. It should be recorded that the patient has agreed to the treatment and to the cost.

• Treatment records: Such as the use of local anaesthesia, working length of canals and their reference points, size to which canals are prepared, preparation technique, root filling material, sealer and technique.

• Review records: The outcome of the treatment should be reviewed periodically and recorded.
Infection control:

• The operator and dental nurse should wear gloves and use an aseptic technique. All instruments used within the oral cavity should be sterile, have been decontaminated and sterilized or disinfected where sterilization is not possible.
1. Introduction

Treatment:
• Early treatment and prevention of pulp damage: Cavity preparations should be kept as small as possible.
• Treatment for reversible pulp damage:
  • 1. Indirect pulp capping (stepwise excavation of caries).
  • 2. Direct pulp capping.
• Treatment for irreversible pulp damage:
  • 1. Pulp amputation.
1. Introduction

Specific indications for RCT:
Every tooth is indicated for endodontic treatment, from central incisor to third molar.
The specific indications of endodontic treatment are:

- Teeth with irreversibly damaged or necrotic pulps, with or without clinical and/or radiographic signs of apical periodontitis.
- Teeth with no clear evidence of pulp disease, where pulp space is required for restorative procedure (e.g. post space preparation, preparation of overdenture abutments, tooth hemisection, crown preparation on mis-aligned teeth).

So, RCT can be provided for teeth with vital and non-vital pulp tissues.
1. Introduction

Contra-indications for RCT:

• Teeth that cannot be made functional nor restored.
• Teeth with insufficient periodontal support.
• Teeth with poor prognosis, uncooperative patients or patients where dental treatment procedures cannot be undertaken.
• Teeth of patients with poor oral condition that cannot be improved within a reasonable period.
1. Introduction

Indications for RC re-treatment:

• Teeth with inadequate root canal filling with radiological findings of developing or persisting apical periodontitis and/or symptoms.

• Teeth with inadequate root canal filling when the coronal restoration requires replacement or the coronal dental tissue is to be bleached.
1. Introduction

Indications for surgical endodontics:

- Radiological findings of apical periodontitis and/or symptoms associated with an obstructed canal (the obstruction proved not to be removable, displacement did not seem feasible or the risk of damage was too great).

- Extruded material with clinical or radiological findings of apical periodontitis and/or symptoms continuing over a prolonged period.

- Persisting or emerging disease following root canal treatment when root canal re-treatment is inappropriate.

- Perforation of the root or the floor of the pulp chamber and where it is impossible to treat from within the pulp cavity.
Contra-indications for surgical endodontics:

• Local anatomical factors such as an inaccessible root end.
• Tooth with inadequate periodontal support.
• Uncooperative patient.
• Patient with a compromised medical history. See, the contra-indications for root canal treatment.
2. Aim

Endodontic or root canal treatment aims to preserve teeth in a healthy and functional condition by:

- removing diseased pulp tissue
- managing internal infection
- preventing its recurrence.
3. Method

1. **Instrumentation**
   - Opens access for the deep exchange of irrigants

2. **Irrigation**

3. **Obturation**
   - Develop a smoothly tapering canal form that will promote the dense compaction of root canal filling materials
Thank you
Sample Statement Of Consent For Endodontic Treatment

1. I hereby authorize Dr. ___________________, and any other agents or employees of ___________________ and such assistants as may be selected by any of them to treat the condition(s) described below:

2. The procedure(s) necessary to treat the condition(s) have been explained to me and I understand the nature of the procedure to be:

3. I have been informed of possible alternative methods of treatment including no treatment at all.
4. The doctor has explained to me that there are certain inherent and potential risks in any treatment plan or procedure.
5. It has been explained to me and I understand that a perfect result is not guaranteed or warranted and cannot be guaranteed or warranted.
6. I have been given the opportunity to question the doctor concerning the nature of the treatment, the inherent risks of the treatment, and the alternatives to this treatment.
7. This consent form does not encompass the entire discussion I had with the doctor regarding the proposed treatment.

Patient’s signature

Figure 1-22 Informed consent form for endodontic procedures recommended by the American Association of Endodontists (may be copied and enlarged).