REGRESSIVE ALTERATIONS OF TEETH

CONTENTS

INTRODUCTION

- Ageing when strictly interpreted refers to all changes which occur in the body from birth to death possibly from conception onwards.

- At molecular level this is named as regressive changes after a cell has achieved state of maximum function or it also means loss of cell adaptability with time.

ATTRITION

- **Definition and etiology:**
  - Physiologic wearing away of teeth as a result of occlusion, or other tooth to tooth contact.
  - When the amount of loss of tooth material is extensive, and compromises aesthetics and function, it must be regarded as pathologic.

CLINICAL FEATURES

- Affects occlusal, incisal, proximal surfaces of teeth.
- Mild: small polished wear facet, flattening of incisal edge or reduction in cusp height, interproximal attrition results in shortening of dental arch with age.
- Advanced: enamel worn away, and dentin exposed; reparative dentin formed rapidly enough – rare pulp exposure.

- Clinical features (contd.)
  - Children:
    - Attrition is rare but can occur.
    - End to end dentition, or bruxing habit may result in attrition.
    - Children with Dentinogenesis imperfecta or Amelogenesis imperfecta will develop attrition.
  - Adults:
    - Degree increases with age.
    - Usually more severe in men.
    - Associated with high fibre diet, bruxers, tobacco chewers.

ATTRITION

ABRASION

- **Definition:**
  - The pathologic wearing away of tooth structure as a result of an external abnormal mechanical process independent of occlusion.
- **Etiology**
  - Most common cause: toothbrushing.
  - Other: pencils, toothpicks, pipe stems, hair grips, chewing tobacco, biting thread and even using dental floss inappropriately.

Clinical features

- Toothbrushing:
  - Horizontal notching of cervical area at cemento-enamel junction, with sharply defined margins and polished surface.
  - Exposed dentin appears highly polished.
  - Degree is greatest on prominent teeth e.g. canines.
- Other patterns:
  - Notches in incisal surface: Pins, nails, tacks, hair-grips
  - Occlusal surfaces: Pipe stems.
  - Interproximal areas: toothpicks, dental floss.
- Pulp exposure and dentin sensitivity are rare.

ABRASION

ABRASION

ABRASION

EROSION

- Definition
  - Is loss of tooth substance by a chemical process not involving known bacterial action.

- Etiology
  - Working in acidic environment – industrial exposure.
  - Ingesting highly acidic substances (e.g. lemons).
  - Bulimia nervosa and other chronic regurgitation.
  - Sometimes idiopathic.

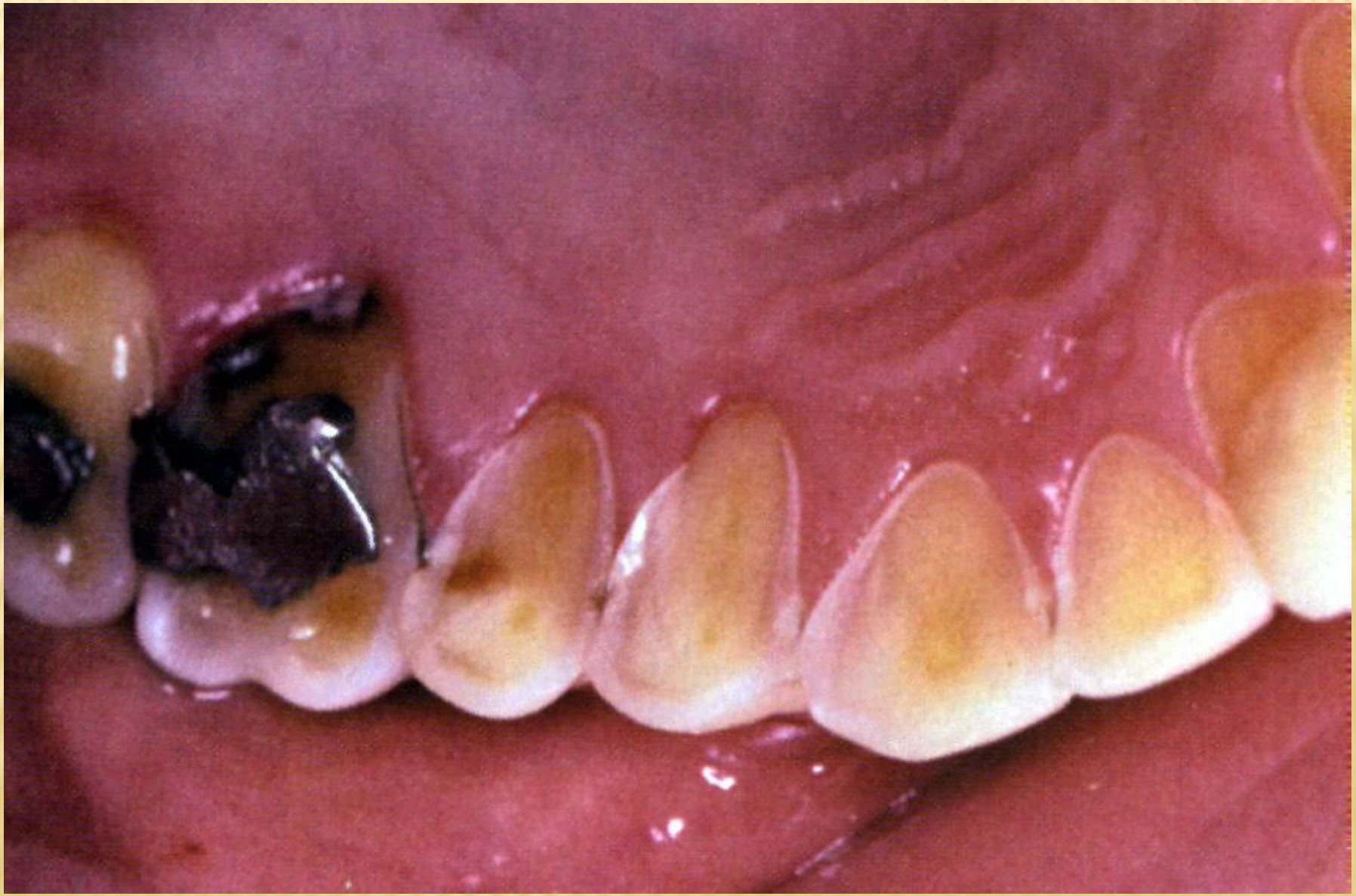
CLINICAL FEATURES

- Smooth highly polished depression, above the cemento-enamel junction, in the cervical region of the tooth – can become more extensive.
- Deep lesions will have reparative dentin formation.
- Labial surfaces of anterior teeth – ingested substances.
- Lingual surfaces of teeth – regurgitation or vomiting.

EROSION

EROSION

EROSION



EROSION

EROSION

ABFRACTION

- Definition and Etiology
  - Is loss of tooth structure as a result of repeated tooth flexure caused by occlusal stresses.
  - It occurs because dentin can withstand greater tensile stress than enamel.

CONTD.

- Clinical features
  - Wedge shaped defect limited to the cervical area of the teeth and may closely resemble cervical abrasion or erosion.
  - Clues to the diagnosis:
    - Deep narrow V-shaped defects (toothbrush cannot contact the base).
    - Often a single tooth is affected.
    - Occasional lesions are subgingival (protected from abrasion and erosion).
    - Almost exclusively on the facial surface – high prevalence in patients who brux.
    - Higher frequency in mandible – presumable because of the lingual inclination of the teeth.

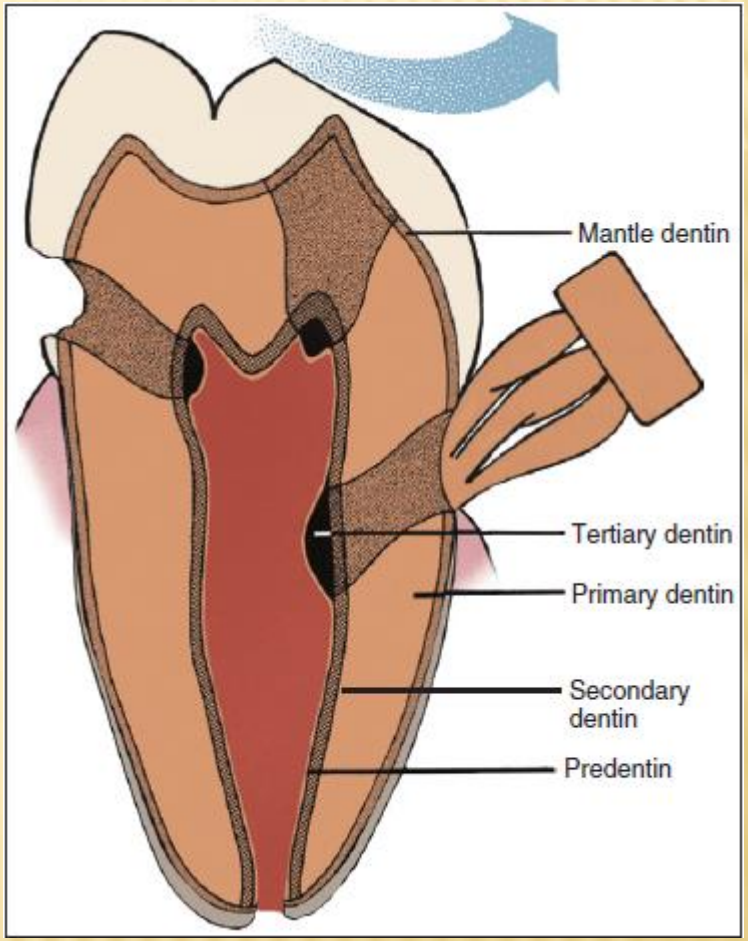
ABFRACTION

- Treatment of tooth wear (Attrition, Erosion, Abrasion and Abfraction):
  - Multifactorial cause, therefore multifactorial approach is needed.
  - Detailed diagnosis, preventive measures and long term follow-up.
  - Preventive:
    - Education of the patient.
    - Mouthguards
    - Control of toothbrushing.
  - Symptomatic
    - Reduce sensitivity (fluorides)
    - Restorative: premature in the presence of ongoing wear – postpone until aesthetic concern, severe sensitivity, uncontrollable wear.

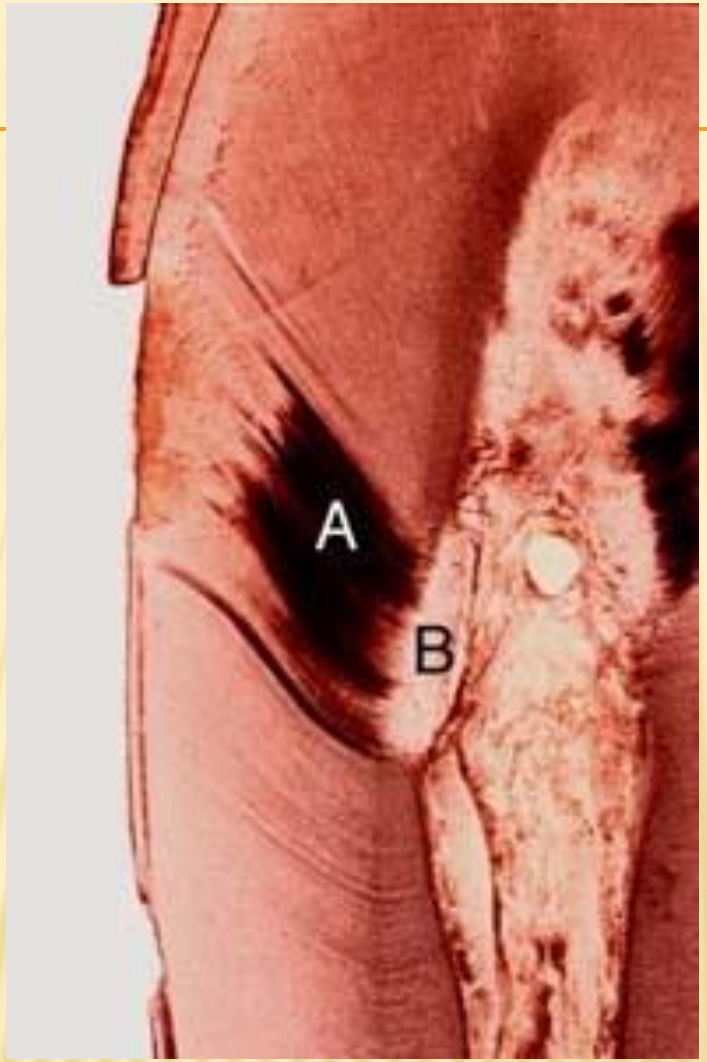
Dead Tracts

DEAD TRACT

- Moderate to high stimuli may result in death of odontoblastic process with associated odontoblast.
- This leads to formation of empty tubule which gets filled by the air.
- These areas of dentin are called as dead tracts.
- They extend from the external surface to the pulp.



- This appears black in the transmitted light and white in the reflected light.
- These areas demonstrate reduced sensitivity.
- These are probably the initial step in formation of sclerotic dentin.
- They are sealed off by reparative dentin at the pulpal surface.

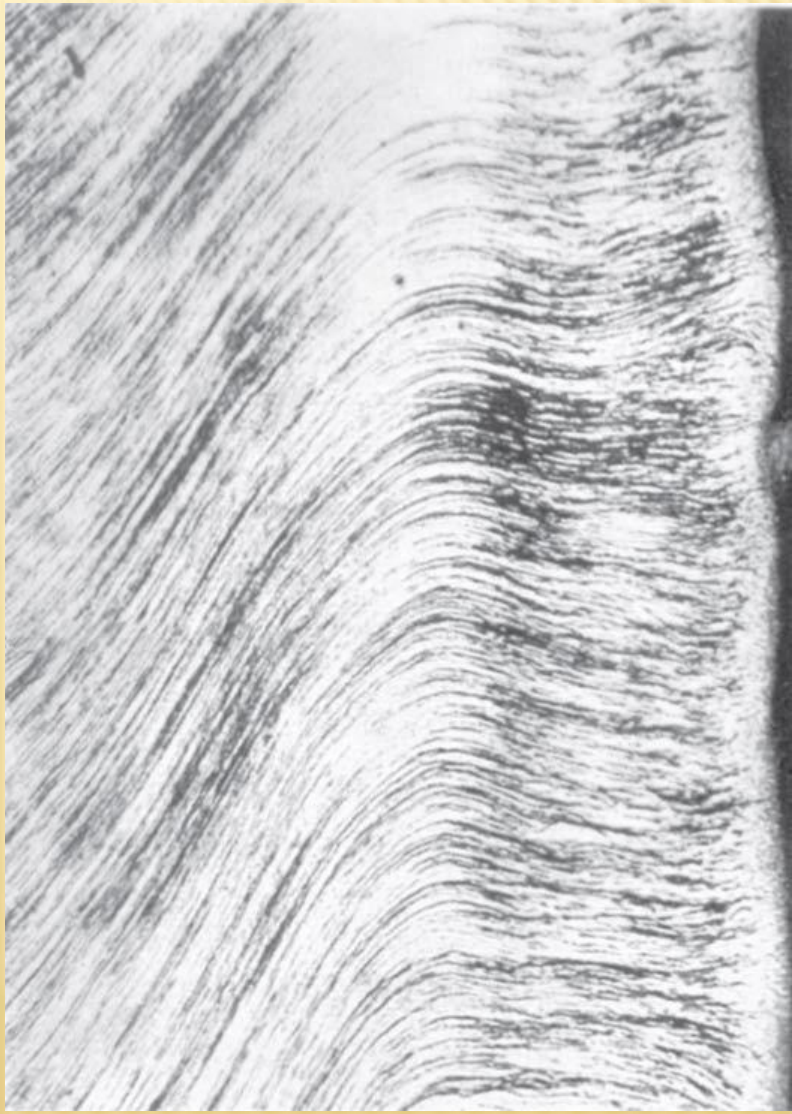


A-DEAD TRACT

B-REPARATIVE DENTIN

SECONDARY DENTIN

- The dentin tubule that make up dentin are usually “s” shaped and regular.
- The secondary dentin formed is irregular and contains less calcium, phosphorus, collagenous matrix per unit volume than primary dentin and is formed after root completion.
- Minerals- 6-10% less than primary dentin.



Tertiary dentin

- Irregular dentin that is formed in response to abnormal stimuli such as excess tooth wear.
- Also called as irregular dentin, irritation dentin, reparative dentin, replacement dentin.

- Recent terminology suggests that the term ***reparative dentin*** be used when the **original odontoblasts** function in deposition
- And that ***response dentin*** be used when **newly recruited odontoblasts** begin depositing dentin.
- The latter case occurs with a more severe injury to the tooth.

SCLEROTIC DENTIN

- It is characterized by the hyper--mineralization or blockage of the tubules with whitlockite or plate like octacalcium phosphate crystals and by a denatured collagen network.

- Initially the apatite crystals are sporadic in dentinal tubule but later, gradually gets filled with the fine meshwork of crystal.

- Gradually tubule lumen gets obliterated with the minerals which appears much like Peritubular dentin progressing from dentinoenamel junction to pulpal surface.

- Few consider deposition of calcium salts takes place from dental lymph within tubule.

RESORPTION

- Definition- Is loss of tooth structure from the surface of cementum (external) or dentine (internal).
- Normal root resorption of primary teeth is a process of physiologic resorption– this is not a pathologic process.

- Slight external resorption may occur at the apices of roots of adult teeth, as a result of occlusal forces– this is also physiological resorption, and is sometimes used in forensic odontology for age determination.

CONTD

1. External resorption:

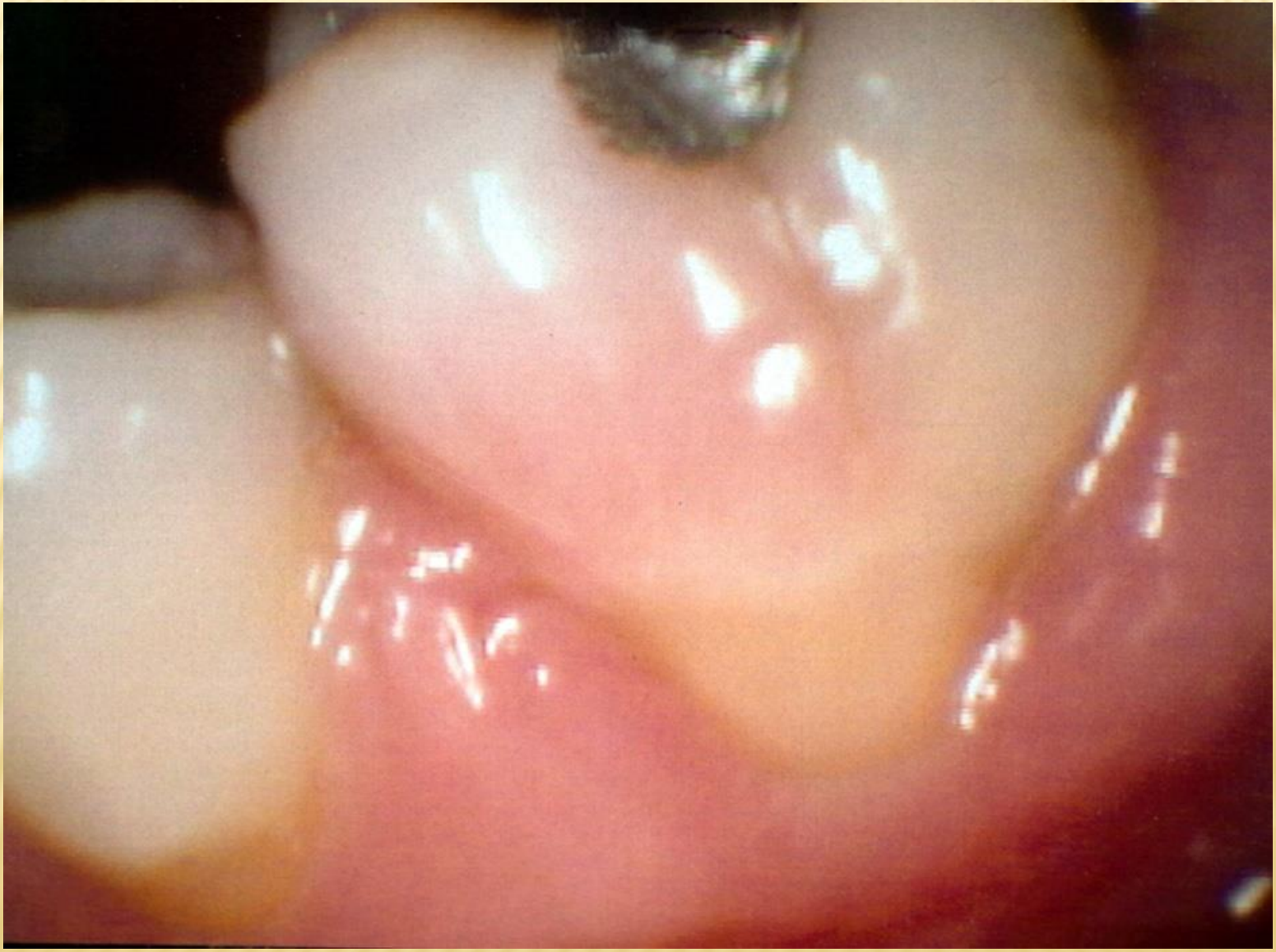
- Etiology
  - Peri-apical inflammation– may stimulate osteoclasts.
  - Re-implanted teeth.
  - Cysts and tumors (pressure).
  - Impacted teeth
    - Completely impacted teeth are more likely to be resorbed than partially impacted teeth.
    - Impacted maxillary cuspids are most susceptible.
    - In impacted teeth, the resorption is first likely to be noticed on the crown.
  - Orthodontic tooth movement.
  - Idiopathic.

2. Internal resorption

- Etiology:
  - pulpal injury (trauma or pulpitis), or idiopathic.
- Clinical features
  - Begins inside the pulp.
  - Initially asymptomatic, but progresses to undermine enamel, giving the tooth a pink-blushed color, known as the “Pink tooth of Mummery”.
  - Usually only one tooth involved; any age, any tooth.

INTERNAL RESORPTION

INTERNAL RESORPTION



RADIOGRAPHIC DIFFERENCES

EXTERNAL RESORPTION	INTERNAL RESORPTION
Appears as carious lesion	Presents well--defined, spherical radiolucent area in dentin
Larger lesions produce moth eaten appearance Radiographic-root canal remains intact	External outline of tooth remains intact Radiograph shows communication between pulp chamber or root canal and PDL space

RADIOGRAPHS OF INTERNAL RESORPTION

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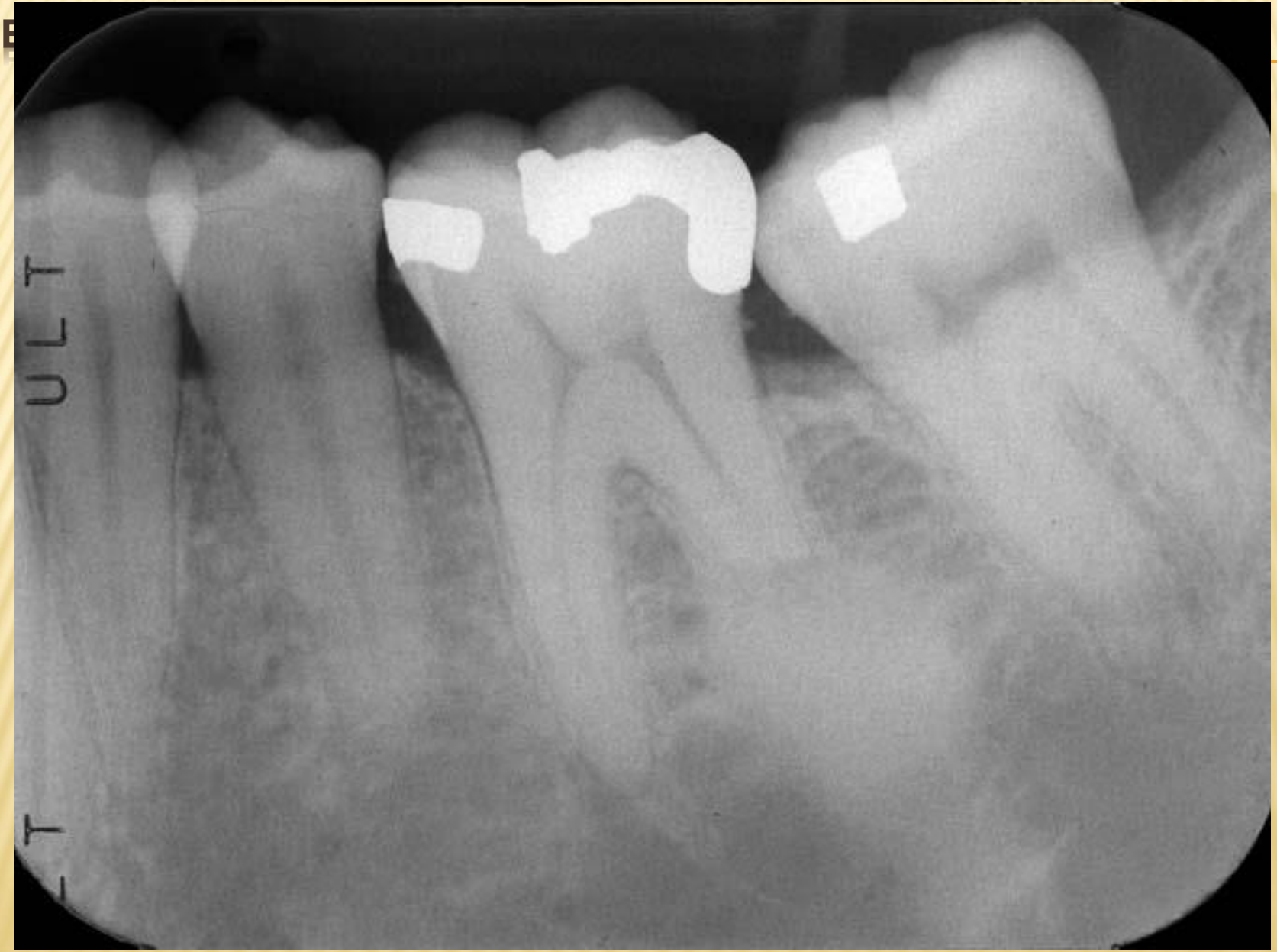
RADIOGRAPHS OF EXTERNAL RESORPTION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EXTERNAL RESORPTION

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EXTERNAL RESORPTION

EXTERNAL RESOR

TREATMENT

- Remove soft tissue from sites of destruction.
- Internal resorption can be treated successfully if all remaining vital pulp tissue before process perforates into the periodontal ligament.
- External resorption: Eliminate any accelerating factor. Apical areas are difficult to repair without causing damage, while cervical sites can be reached by surgical access and restoration.

PULP CALCIFICATIONS

- The two chief morphologic forms of pulp calcifications-
  - Discrete pulp stones (denticles, pulp nodules)
  - diffuse calcification.
- Pulp stones have been classified as-
  - True
  - false (depending upon their microscopic structure).

- **True denticles** are made up of localized masses of calcified tissue that resemble dentin because of their tubular structure.
- They are considerably more common in the pulp chamber than in the root canal.
- True denticles (subdivided further)
  - Free denticles,
  - Attached denticles,
  - Embedded denticles.

- **False denticles** are composed of localized masses of calcified material, and unlike true denticles, do not exhibit dentinal tubules.
- Instead, the nodule appears to be made up of concentric layers or lamellae deposited around a central nidus.

- The false denticles also may be classified as free or attached.
- As the concentric deposition of calcified material continues, it approximates and finally is in apposition with the dentinal wall. Here it may eventually become surrounded by secondary dentin, and it is then referred to as an ‘interstitial denticle’.

- False denticles, occur more commonly in the pulp chamber than in the root canal, are generally somewhat larger than true denticles.
- They may fill nearly the entire pulp chamber, while true denticles are seldom larger than a fraction of a millimeter in diameter.

DIFFUSE CALCIFICATION

- Most commonly seen in the root canals and resembles the calcification seen in other tissues of the body following degeneration.
- This type of calcification is frequently termed ‘calcific degeneration’.
- Its usual pattern is in amorphous, unorganized linear strands or columns paralleling the blood vessels and nerves of the pulp.

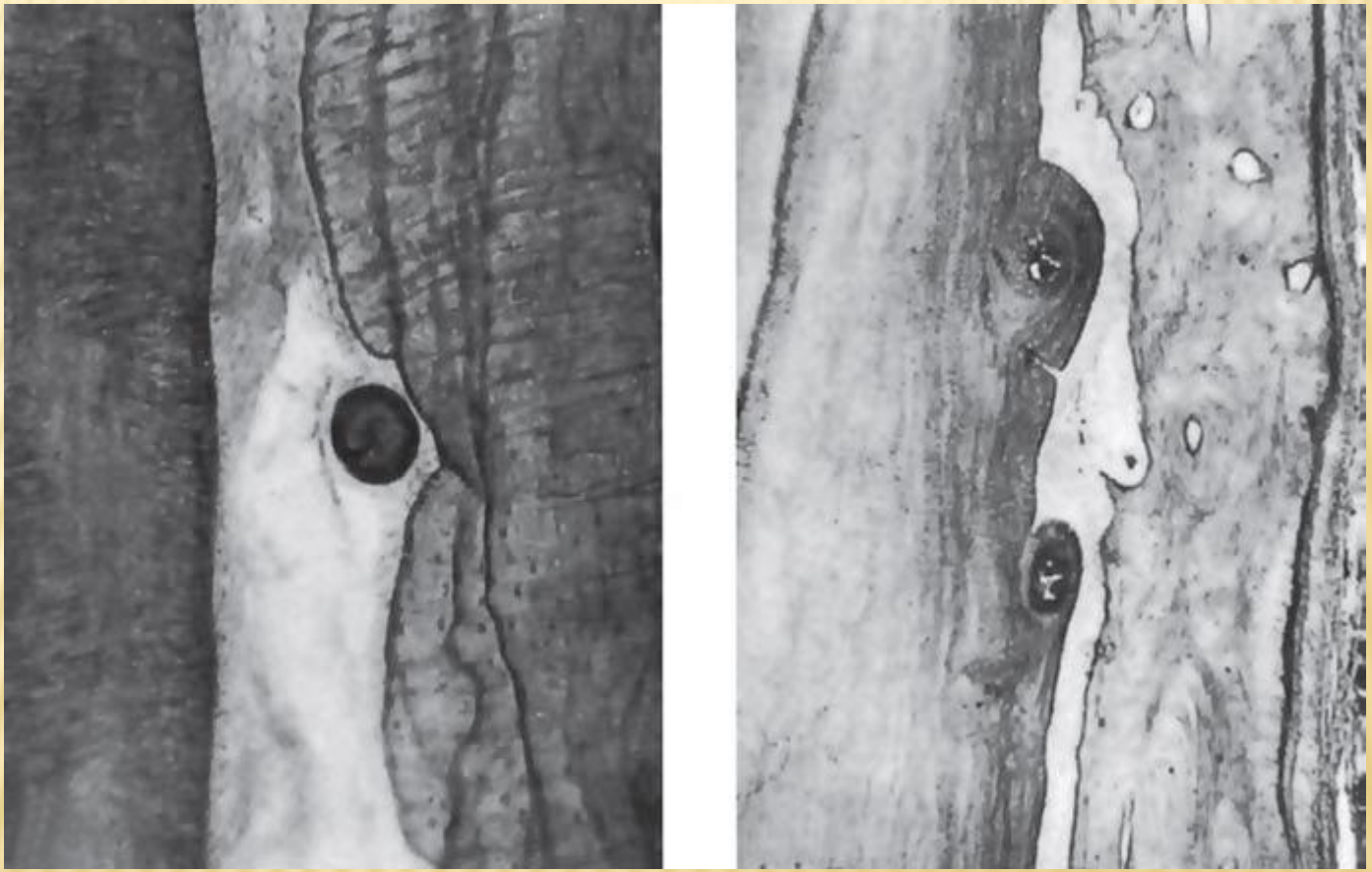
PULP CALCIFICATIONS

Treatment

- All are of little clinical significance except for rare difficulties posed during endodontic procedures.
- No treatment necessary.

CEMENTICLES

- Cementicles are small foci of calcified tissue, not necessarily true cementum, which lie free in the periodontal ligament of the lateral and apical root areas.
- The exact cause for their formation is unknown, but it is generally agreed that in most instances they represent areas of dystrophic calcification and thus are an example of a regressive or degenerative change.



HYPERCEMENTOSIS

- Definition- Deposition of abnormal amounts of cementum on the apical ⅔ of a tooth root.

LOCAL FACTORS

- Abnormal occlusal trauma
- Adjacent inflammation
- Unopposed teeth (e.g., impacted, embedded, without antagonist)

SYSTEMIC FACTORS

- Acromegaly and pituitary gigantism
- Arthritis
- Calcinosis
- Paget's disease of bone
- Rheumatic fever
- Thyroid goiter
- Vitamin A deficiency (possibly)

HYPERCEMENTOSIS

- Clinical features
  - 2.5 times more common in molars than anterior teeth.
  - Usually no symptoms, but the root enlargement can cause extraction problems.
- Radiographic features
  - Thickening or blunting of root.
  - Adjacent is periodontal ligament space and intact lamina dura.
- Histology-
- Treatment- Not required.

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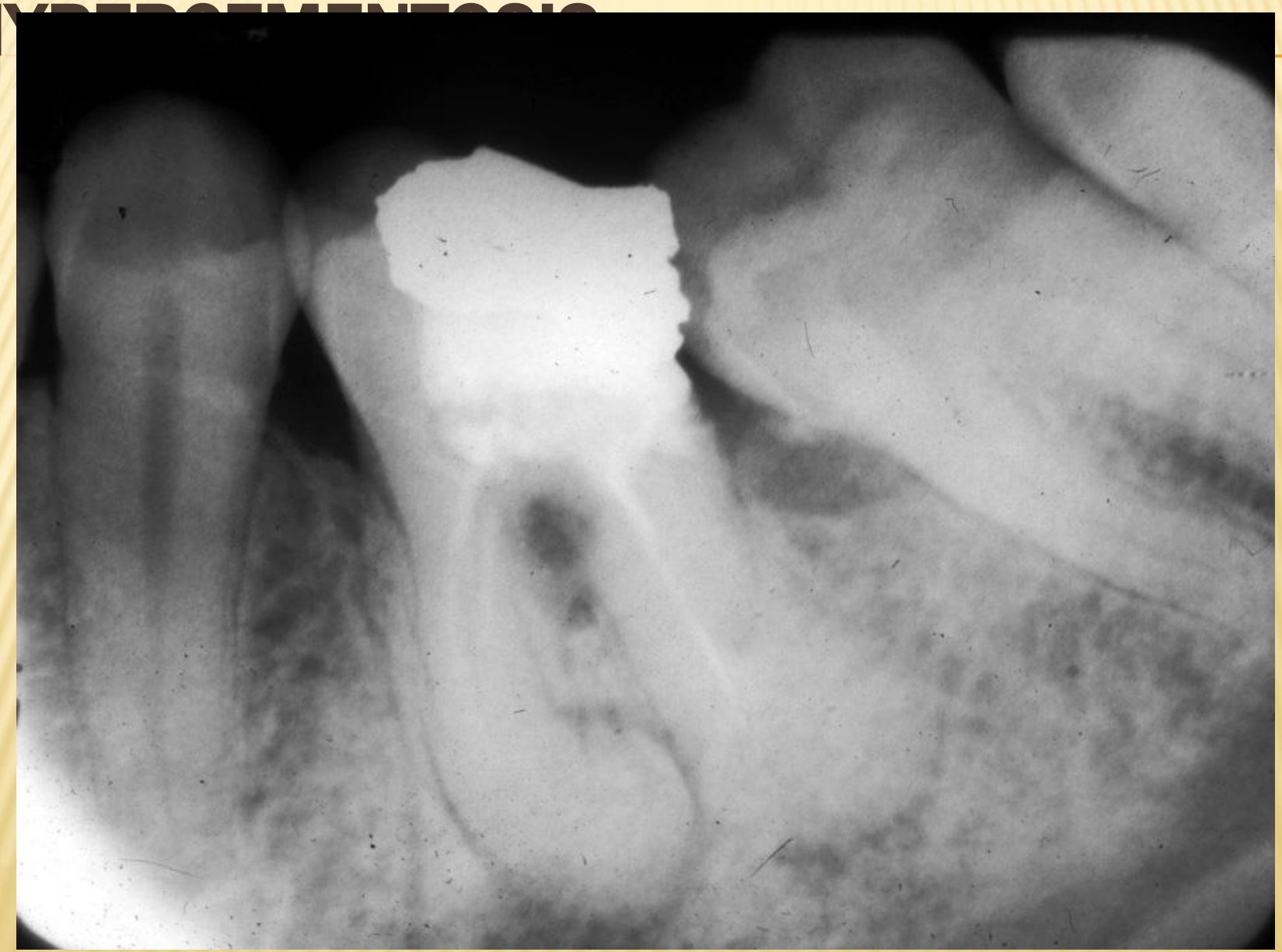

CEMENTICLES

- Definition
  - Small foci of dystrophic calcification (not necessarily true cementum) found in the periodontal ligament.
- Etiology
  - Idiopathic calcification between Sharpey's fibres.
  - Calcification of cell rests of Malassez.
  - Calcification of capillary thrombi.
  - Cemental tears.
- Clinical features
  - Asymptomatic, and of no clinical significance

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thank you