



**Kulliyah of Dentistry**

# **FACILITATOR'S GUIDE**

**PROBLEM BASED LEARNING MODULE**

**Year 5**

**Academic Session 2019/2020 Block 1**

**Endo-Perio Lesion**

Prepared by

**Restorative/ Periodontics**

Prepared by

**PBL committee 2019**

## PART A : GENERAL PROCEDURE

<p>1st Session (1 hrs) Group Session</p>	<ol style="list-style-type: none"> <li>1. Ice breaking - Facilitators get to know students and vice versa.</li> <li>2. Group Dynamics - Appointment of Team leader, a Recorder and a Scribe.</li> <li>3. Introduction to case scenario (with or without trigger 1) - ask a student to volunteer to read.</li> <li>4. Prompt students to start the discussion to critically assess the scenario. At the end of this activity student must come up and present LEARNING ISSUES.</li> <li>5. Group dynamics - delegation of work, job assignment for further data collection.</li> <li>6. Final remarks by facilitator- to summarize the conduct of the session and review on the learning issues. Comments on each student performance for the session.</li> </ol>
<p>2nd Session (2 hrs) Group Session</p>	<ol style="list-style-type: none"> <li>1. Distribute the new trigger(s).</li> <li>2. Revise the learning Issues.</li> <li>3. Students present and discuss the findings of learning issues.</li> <li>4. Summarization of information.</li> <li>5. Final review of scenario with class - add missing information.</li> <li>6. Final remarks - add any information that students might have missed (check tutor guide) and to comment on the performance of each student for that session.</li> </ol>

Remarks:

1. References and rubrics are to be distributed to students prior to PBL session 1.
2. PBL should be composed of minimum 2 sessions and maximum 3 sessions.
3. PBL session with the maximum of 3 triggers.
4. The number of students for each group should be composed of 8 to 12 students.`

## PART B : GENERAL INTRODUCTION TO CASE SCENARIO & ANALYSIS OF TRIGGERS

**Title : Endo-Perio Lesion**

Authors and allocation:

**Authors:**

Asst Prof Dr Juzaily Husain (L)

Asst Prof Dr Munirah Yaacob

Asst Prof Dr Suhaila Muhammad Ali

Dr Muhammad Nor Hafizi Mohd Ali

**Allocation:**

Num.	Facilitators	Groups	Venue
1.	Dr Juzaily	1	
2.	Dr Munirah	2	
3.	Dr Suhaila	3	
4.	Dr Hafizi	4	

## Case Scenario

42 years old diabetic male patient was referred to a periodontist because he had a complaint of throbbing pain in lower left back tooth region. He noticed pain worse on biting and difficult to masticate. He received a periodontal therapy by dental hygienist and failed to comply with the previous appointments.



**Figure 1: Intraoral picture of maxillary and mandibular teeth in occlusion.**



**Figure 2: Intraoral occlusal picture of the mandibular teeth**

### LEARNING ISSUES FOR CASE SCENARIO

1. Age: 42 years old.
2. Gender: male.
3. Diabetic.
4. Referred to periodontist.
5. Throbbing pain in lower right back tooth region.
6. History of pain worse on biting and difficult to masticate.
7. History of periodontal therapy and poor compliance
8. Complaint tooth is functional/ in contact with upper tooth and heavily restored with amalgam restoration (refer to figure 1 and 2)

## TRIGGER 1

Intraoral examination showed several teeth heavily restored with amalgam restoration with marginal discrepancies at tooth 36. The marginal gingiva surrounded at 36 areas was redness with bleeding on probing. Probing depths are seen on the chart (Figure 3) and periapical radiograph showed radiolucency noted at apical tooth 36 which extends to the furcation area (Figure 4).

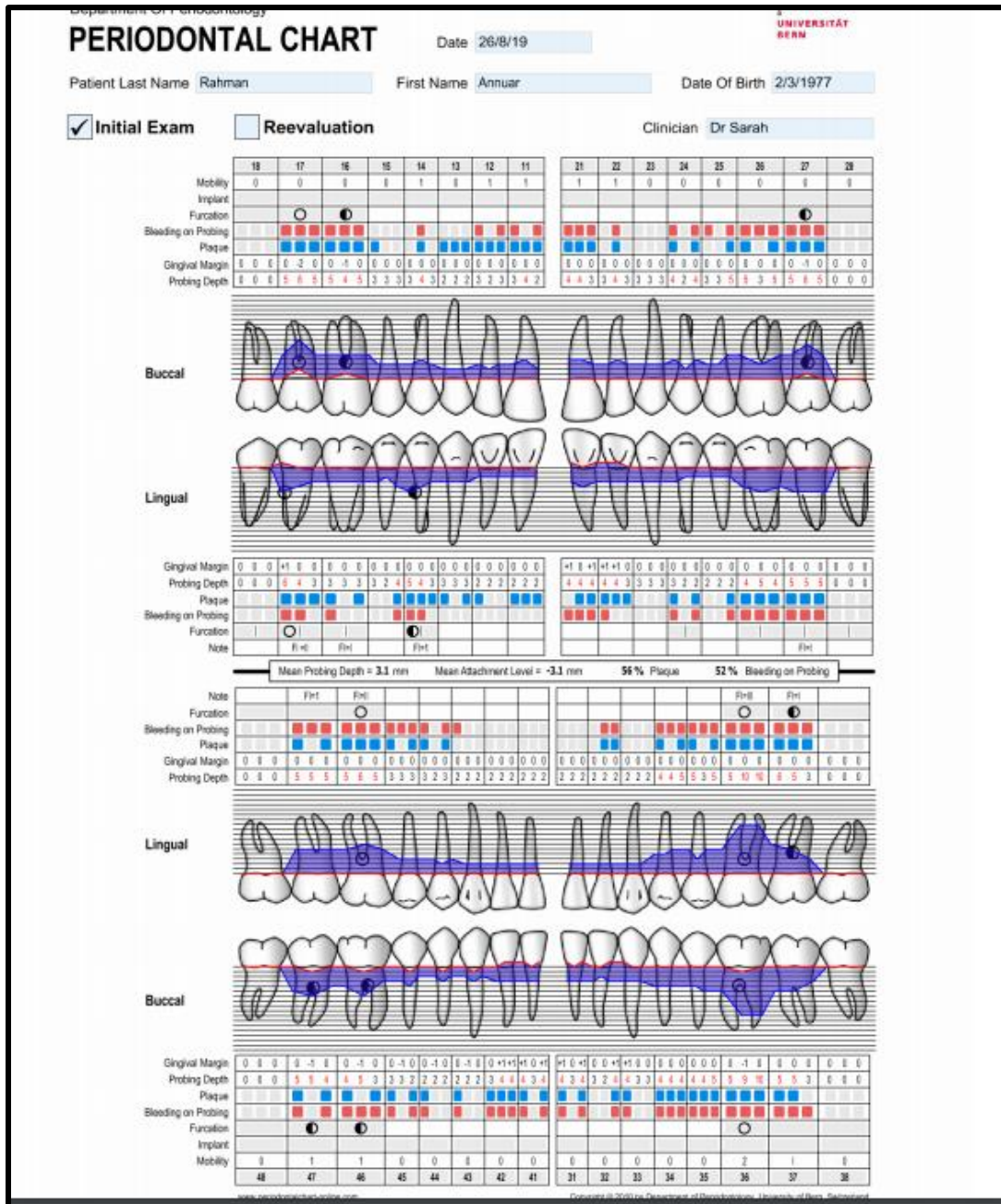


Figure 3: Full Periodontal Charting

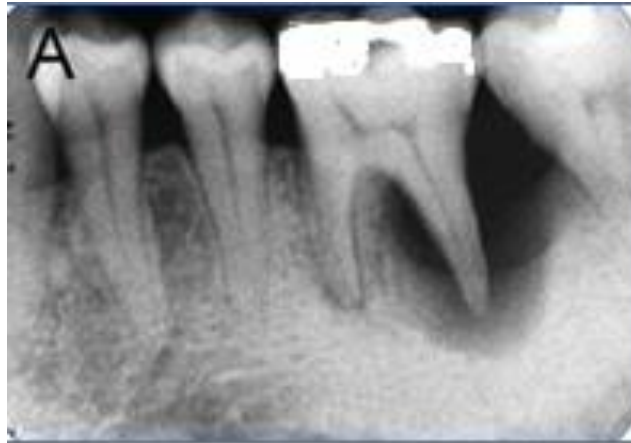


Figure 4: Periapical radiograph at 36

**LEARNING ISSUES FOR TRIGGER 1**

1. Moderate/high caries risk with poor restoration on 36
2. Gingiva inflammation at 36
3. Further investigations was conducted (Full periodontal assessment+radiograph)

## TRIGGER 2

He was treated at specialist clinic. The defect at 36 was treated by surgical intervention (Figure 5). The permanent restoration has been constructed at a few weeks later (Figure 6).



Figure 5: A full thickness flap and cortical bone exposed



Figure 6: Permanent PFM (porcelain fused metal crown).

### LEARNING ISSUES FOR TRIGGER 2

1. Treatment was done at specialist clinic.
2. The defect treated with surgical intervention.
3. Permanent constructed a few weeks later.

## PART C : SPECIFIC LEARNING OUTCOMES

Identification of learning issues/objectives:

At the end of these PBL sessions the student should be able to understand the following:

Case Scenario:

1. To know on how to gather information of pain history.
2. To identify the risk factors of the disease and its correlation.
3. To determine and undertake appropriate diagnostics tests.
4. To identify diagnosis of endo-perio lesion, understand and apply the differential diagnosis of a perio-endo lesion.

Trigger 1:

1. To explain classification of perio-endo lesions.
2. To describe major pathways of communication between the pulp and periodontal tissue, and to identify possible etiologies for perio–endo lesions.
3. To comprehend the relationship between pathology of the dental pulp and periodontium.
4. To determine and undertake additional diagnostics tests.
5. To identify the diagnosis of endo-perio lesion.
6. To determine the prognosis for teeth with perio-endo lesions.

Trigger 2:

1. To construct an appropriate treatment plan, including treatment options and how these should be applied to individual patients.
2. To discuss the clinical situation and possible solutions with the patient, taking account of expected outcomes.



## PART D : NOTES FOR FACILITATORS

**Notes for facilitators to encourage student's participation:**

**Notes for Case Scenario:**

**Discussion questions to encourage student's participation:**

- Clarify any difficult words/terms that student do not understand.
- Do the age and gender contribute to the disease?
- What is kind of pain question should be asked?
- What is the risk factor for the disease and its association?
- What is other risk factor that may contribute to the disease?
- Are there any other relevant factors that contributing for patient management?
- What is the diagnostic test needed to be done?
- What is differential diagnoses and why?

**Epidemiology studies on endo-perio lesion.**

Endodontic-periodontal lesions, defined by a pathological communication between the pulpal and periodontal tissues at a given tooth, occur in either an acute or a chronic form, and are classified according to signs and symptoms that have direct impact on their prognosis and treatment. The studies on prevalence are sparse, but, the disease is common in male and older age in comparison with other endodontic diagnosis.

**Pain History**

This is crucial to obtain a good understanding of the disease. When pain is one of the complaints, the following questions should be asked:

1. When did the pain begin?
2. Where is the pain located?
3. Is the pain always in the same place?
4. What is the character of the pain (short, sharp, long lasting, dull, throbbing, continuous, occasional)?
5. Does the pain prevent sleeping or working?
6. Is the pain worse in the morning?
7. Is the pain worse when you lie down?
8. Did or does anything initiate the pain (trauma, biting)?
9. Once initiated, how long does the pain last?
10. Is the pain continuous, spontaneous, or intermittent?
11. Does anything make the pain worse (hot, cold, biting)? Does anything make the pain better (cold, analgesics)?

It is also useful to ask the patient to quantify the amount of pain on a scale of 0 (no pain) to 10 (the most excruciating pain). This quantification can provide the practitioner an idea about the urgency and severity of the problem, but also allows comparison of the pain from visit to visit, particularly if there is residual pain after treatment.

**Association of apical and marginal periodontitis with systemic disease.**

Studies have suggested the links between marginal periodontitis and a number of systemic conditions (cardiovascular disease, diabetes, pregnancy complications) have steered the discipline towards an area of research called “periodontal medicine”. Emergent evidence suggests that the vast area of exposure of the host blood stream to the oral microbiota, via the inflamed and ulcerated periodontal sulcus, leads to a marked systemic host response that is manifest in circulating biomarkers of inflammation. Such pro-inflammatory mediators are found in atheromatous lesions. Periodontal disease has been implicated in a two-way relationship with diabetes, where each may affect the control and progression of the other.

In contrast, the number of investigations on the relationship between apical periodontitis and systemic diseases is sparse and without any significant associations. Investigations on the effect of smoking, diabetes and on cardiovascular disease have failed to note significant findings. This may also be explained by the fact that the likely surface area of exposure, between an ulcerated periapical lesion and the resident microbiota in the root canal, is probably limited.

**Risk factors**

Periodontal disease	Periapical disease
<p><b><u>Non-modifiable</u></b></p> <ul style="list-style-type: none"> <li>• age</li> <li>• Gender</li> <li>• Race/ethnicity</li> <li>• Gene polymorphisms</li> </ul>	<p><b><u>Non-modifiable</u></b></p> <ul style="list-style-type: none"> <li>• age</li> <li>• Gender</li> <li>• Tooth type; 1st molars</li> <li>• Race/ethnicity?</li> <li>• Gene polymorphisms?</li> <li>• allergies</li> </ul>
<p><b><u>Environmental, acquired</u></b></p> <ul style="list-style-type: none"> <li>• Specific microbiota</li> <li>• Smoking</li> <li>• Diabetes</li> <li>• obesity</li> <li>• osteopenia/osteoporosity</li> <li>• hiV</li> <li>• psychosocial</li> </ul>	<p><b><u>Environmental, acquired</u></b></p> <ul style="list-style-type: none"> <li>• caries</li> <li>• Trauma</li> <li>• Restorations; inadequate</li> <li>• Root fillings; inadequate</li> <li>• Usage of dental service</li> <li>• Diabetes</li> <li>• Smoking</li> </ul>

The main risk factors for the occurrence of EPL were advanced periodontitis, trauma, and iatrogenic events. Other reported risk factors were the presence of grooves, furcation involvement, porcelain-fused to-metal crowns and active carious lesions (see Table 5);

**TABLE 5** Main characteristic of the studies included in the endo-periodontal lesion review, stratified by the periodontal condition

Periodontal condition	Study design	References	Number of teeth included	Percentage (%) of studies according to each study design								
				Signs					Signs and symptoms			
				Deep periodontal pocket (≥5 mm)	Altered pulp response	Purulent exudate	Apical bone resorption	Straw tract	Tooth mobility	Gingival color alteration	Gross color alteration	Pain
Periodontitis patients	CR	Alsafi; Blandhard	5	100	100	50	100	50	50	0	0	100
	CS	Dall'acqua; Fabiani; Gomes; Nijlodi; Kobayashi; Rupp; Perinzi; Li	190	100	100	0	75	0	12.5	0	0	25
	RCT	Corbelli; Gupta	62	100	100	0	0	0	0	0	0	0
	<b>TOTAL</b>		<b>257</b>	<b>100</b>	<b>100</b>	<b>8.3</b>	<b>83.3</b>	<b>8.3</b>	<b>16.6</b>	<b>0</b>	<b>0</b>	<b>33.3</b>
Nonperiodontitis patients	CR	Agarwal; Altan; Balakrishna; Cisteko-Baz; Corbelli; Floratos; Fujii; Gandhi; Govil; Haidari; Jivkovic; Kambale; Karabucak; Kocik; Kurekci; Kishore; Koyen; Malik; Miaz; Nagaveni; Ok; Ok; Picket; Sharma; Singh; Soontaran; White	39	100	100	33.3	70.3	33.3	29.6	3.7	7.6	55.5
	CS	Xie	13	100	100	0	100	0	0	0	0	0
	<b>TOTAL</b>		<b>52</b>	<b>100</b>	<b>100</b>	<b>32.1</b>	<b>71.4</b>	<b>32.1</b>	<b>29.3</b>	<b>3.5</b>	<b>7.1</b>	<b>53.5</b>
	Unclar	Karimzadeh; Naring; Sokolovic; Rubin-Arroyave; Wang; Wanghese	0	100	100	83.3	100	33.3	66.6	0	0	50
Unclar	CR	Rhee	168	100	100	0	100	0	0	0	0	0
	CS	LENKOPOLSKA-KRZYWONK; Perinzi	69	100	100	0	100	0	0	0	0	0
	<b>TOTAL</b>		<b>245</b>	<b>100</b>	<b>100</b>	<b>0</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>FINAL TOTAL</b>	Number of studies: 50	<b>554</b>	<b>100</b>	<b>100</b>	<b>30</b>	<b>80</b>	<b>24</b>	<b>28</b>	<b>5</b>	<b>4</b>	<b>44</b>

CR: Case report; CS: Clinical study; RCT: Randomised clinical trial; CR: Cross-sectional

### **Other factors to be considered for this case:**

- 1) Status of diabetic; controlled vs non- controlled
- 2) Compliance of patient
- 3) Patient motivation and awareness
- 4) General oral hygiene

### **Diagnosis of endodontic- periodontic lesions**

Diagnostic tests include subjective signs and symptoms, visual and radiographic examinations, and clinical tests. The key elements, which should be considered together, include:

- history of dentinal, pulpal or periapical pain
- history of periodontal symptoms (gum bleeding, tooth mobility and drifting, abscesses)
- signs of pulpal/periapical disease (including pulp tests)
- periodontal charting, including the probing profile around the tooth
- radiographic pattern of marginal and periradicular bone loss.

### **Subjective Signs and Symptoms**

A complete history of the location, duration, intensity, and frequency of pain and of medications used for pain relief can provide valuable information to help determine the nature of a patient's

complaint. In general, periodontal disease is a chronic and generalized process that is associated with little or no significant pain. In contrast, pulpal and periapical lesions are localized conditions and are more likely to be associated with acute symptoms that require analgesics.

### Visual Examination

Visual examination of the teeth and gingival tissues provides valuable initial information for diagnosis. The presence of caries, extensive restorations, and discolored crowns is usually associated with endodontic lesions. The absence of obvious coronal defects in conjunction with plaque, calculus, and ageneralized gingivitis or periodontitis indicates the presence of periodontal disease.

### Radiographic Examination

Periodontal lesions are usually associated with angular bone loss extending from the cervical region toward the apex. In contrast, periapical lesions cause destruction of apical periodontium that occasionally extends coronally toward the CEJ). In addition to angular bone loss, which is usually pathognomonic for periodontal disease, the absence of the buccal or lingual plate (or both) may result in a clear definition of the tooth and the root canal or canals to the level of the bone loss. Localized or generalized bone loss is an important radiographic finding for differentiation between a lesion of pulpal origin and one of periodontal origin. Usually, periodontal lesions are found around multiple teeth, although this may not always be the case. In contrast, periapical lesions are usually isolated to a single tooth and heal after complete cleaning, shaping, and obturation of root canals.

### Clinical Tests - vitality tests, percussion and palpation tests, and periodontal probing.

#### Vitality Tests

The results of vitality tests are generally, but not totally, reliable. Irreversible pulpitis is invariably associated with exaggeratedpulpal reaction to cold or heat. Teeth with necrotic pulps have usually no response to thermal or electric stimuli. In contrast, teeth with periodontal lesions often have vital and responsive pulps.

#### Palpation and Percussion

Palpation sensitivity of coronal soft tissues is indicative of gingivitis or periodontitis. Palpation sensitivity over the root apex of a tooth with pulpal necrosis indicates the presence of periapical lesions. Percussion, when positive, to some degree shows the presence of an inflammatory response in the periodontal ligament. (The inflammation can be from a pulp or a periodontal lesion.) However, the percussion test is not reliable for differentiating between the two diseases.

#### Probing

Probing defects on mating from a periodontal lesion are usually wide and usually do not extend to the apices of the involved teeth. In contrast, probing defects of pulpal origin are usually narrow and extend either to the openings of lateral canals or to the apical foramen. Developmental grooves, vertical root fractures, and enamel spurs may create a narrow pocket simulating a lesion of pulpal origin."

## **Differential Diagnoses**

### Periodontal Lesions of Bone that Can Be Confused With Pulpally Induced Bony Lesions

- Acute periodontal abscess
- Lesions of chronic periodontitis
- Periodontal lesions involving the furcation
- Lesions associated with aggressive forms of periodontitis
- External root resorption
- Cemental tears

### Pulpally Induced Lesions that Can Be Confused With Periodontal Lesions

- Furcation or lateral lesions without loss of attachment
- Acute periapical abscess
- Chronic sinus tracts of pulpal origin with drainage through the gingival sulcus
- Chronic sinus tracts of pulpal origin with permanent periodontal attachment loss
- Response of the periodontium to mechanical root perforations

### Bony Lesions of the Periodontium that Do Not Originate from Either Periodontal or Pulpal Pathosis

- Deep coronal fractures
- Vertical root fractures
- Developmental lingual groove on maxillary lateral incisors and similar lesions
- Other possible rare lesions

## **Notes for Triggers 1:**

### **Discussion questions to encourage student's participation:**

- Clarify any difficult words/terms that student do not understand.
- If endo-perio lesion has been suspected, what is the classification of the disease?
- What is the microbiological profile of the disease?
- What is the major pathway between pulp and periodontal tissue?
- **What is the additional test needed to be done?**
- What is the interpretation of the radiograph and periodontal assessment?
- What is tooth prognosis diagnosed with perio-endo lesion?

## **Classification of endo-perio lesion**

Several classifications of perio–endo lesions have been proposed but none of them especially contributes to diagnosis or treatment. They do, however, serve to delineate the categories possible to encounter in practice.

The classification system most commonly used for the diagnosis of EPL was published in 1972 by Simon et al (1989) and included the following categories: (1) primary endodontic lesions; (2) primary endodontic lesions with secondary periodontal involvement; (3) primary periodontal lesions; (4) primary periodontal lesions with secondary endodontic involvement; and (5) “true” combined lesions. The main drawback of this classification and a recent proposed amendment was to base their categories on the primary source of infection (root canal or periodontal pocket). This seemed to be a suitable approach, as lesions of periodontal origin might have a worse prognosis than those of endodontic origin.

A simple classification is adopted here:

1. Primary endodontic lesion (with potential for secondary periodontal involvement)
2. Primary periodontal lesion (with potential for secondary pulpal involvement)
3. True combined lesion of dual origin.

**2017 World Workshop**

Endo-periodontal lesion with root damage	Root fracture or cracking	
	Root canal or pulp chamber perforation	
	External root resorption	
Endo-periodontal lesion without root damage	Endo-periodontal lesion in periodontitis patients	<i>Grade 1</i> – narrow deep periodontal pocket in 1 tooth surface
		<i>Grade 2</i> – wide deep periodontal pocket in 1 tooth surface
		<i>Grade 3</i> – deep periodontal pockets in more than 1 tooth surface
	Endo-periodontal lesion in non-periodontitis patients	<i>Grade 1</i> – narrow deep periodontal pocket in 1 tooth surface
		<i>Grade 2</i> – wide deep periodontal pocket in 1 tooth surface
		<i>Grade 3</i> – deep periodontal pockets in more than 1 tooth surface

**Microbiological Profile of Endo-Perio Lesion (EPL)**

Overall, these studies showed a great similarity between the microbiota found in the root canals and periodontal pockets. Most of the bacterial species identified were recognized periodontal pathogens from the so called “red” and “orange” complexes, such as *P. gingivalis*, *T.*

*forsythia*, or *Parvimonas micra*, and species from the genera *Fusobacterium*, *Prevotella* and *Treponema*. Studies using “open-ended” molecular techniques observed a higher microbial diversity and identified less common taxa, such as *Filifactor alocis*, *Enterococcus faecalis*, and species from the genera *Desulfobulbus*, *Dialister*, *Fretibacterium*, or *Rothia*. Incidentally, most of these species and genera have recently also been associated with chronic or aggressive periodontitis. Taken together, the above-mentioned data suggest that there are no major differences between the microorganisms found in the endodontic and periodontal lesions, or a specific microbial profile associated with the EPL. This was somehow expected, as both sites of infection (root canal and periodontal pockets) are anaerobic environments exposed to similar nutrients.

## Pathways of communication

### Predisposing factors leading to combined lesions.

#### A) Atypical anatomic factors

- I. Mal-alignment of a tooth, a predisposing factor to trauma: examples are food impaction and occlusal trauma.
- II. Presence of a multirooted tooth in a position usually occupied by a single rooted tooth, or additional roots, separate or fused in multirooted teeth.
- III. Presence of additional canals, with resultant changes in root morphology in single and multirooted teeth.
- IV. Cervical enamel projections into the furcation of multirooted teeth.
- V. Large lateral (accessory) canals in coronal and middle sections of roots.

#### B. Trauma

- I. Combined with gingival inflammation, trauma can lead to deep periodontal pockets or, in multirooted teeth, furcation exposure. If large lateral canals exist in the pocket area, the pulp will usually be exposed to the oral environment, and in addition to the periodontal problem, an irreversible pulpitis may occur.
- II. Possible cause of crown fracture, root fracture, or root displacement, resulting in irreversible pulpitis, necrosis, or periapical disease.
- III. Possible involvement of the pulp and disturbance of the periodontal membrane, with the resultant sinus tract draining through the periradicular tissue and existing through the gingival crevice; a newly found “pathway of least resistance” that differs from the usual sinus tract which drains through the labial or buccal mucosa.
- IV. Possible cellular changes in the pulp or periodontium leading to internal or external resorption associated with root perforation. Trauma to a tooth can originate from an accidental blow, cavity preparation and other restorative procedures, tooth separation, orthodontic treatment, malocclusion and detrimental habits. Trauma appears to be a major etiologic factor in the formation of an endodontic – periodontic lesion.

#### C. Miscellaneous factors

- I. Iatrogenic errors, such as perforation into the furcation of multi-rooted teeth during root canal therapy, root perforation during instrumentation or post-preparation.

- II. Possibly, systemic factors, such as systemic disease as a cause of the combined lesion (eg. Diabetes mellitus).

### **Pathways of communication**

Direct communication between the pulp and periodontal ligament exists by way of the dentinal tubules, the lateral and/or accessory canals and the apical foramina. These pathways of communication may be divided into 3 categories.

1. Developmental- Apical foramina- Lateral/accessory canals- Developmental grooves
2. Pathological- Empty spaces created by destroyed Sharpey's fibres- Root fracture following trauma/endodontic therapy- Idiopathic resorption - Internal/ external
3. Iatrogenic- Exposure of dentinal tubules following root planning.- Accidental lateral perforation during endodontic therapy.

### **Additional diagnosis tests for this case.**

#### **1. Vitality Tests/Pulp sensibility test**

The results of vitality tests are generally, but not totally, reliable. Irreversible pulpitis is invariably associated with exaggerated pulpal reaction to cold or heat.

#### **2. Palpation and Percussion**

Palpation sensitivity of coronal soft tissues is indicative of gingivitis or periodontitis. Palpation sensitivity over the root apex of a tooth with pulpal necrosis indicates the presence of periapical lesions. Percussion, when positive, to some degree shows the presence of an inflammatory response in the periodontal ligament. (The inflammation can be from a pulp or a periodontal lesion.) However, the percussion test is not reliable for differentiating between the two diseases.

### **Radiograph and periodontal assessment interpretations.**

Periapical radiograph:

- Radiolucency noted at apical tooth 36 which extends to the furcation area.
- Severe bone loss at distal root with furcation involvement.
- Radiopaque amalgam restoration MOD with marginal gap .
- Mild horizontal bone loss at teeth 34, 35 and moderate bone loss at 36 mesially.

Full periodontal assessment:

- Moderate pockets mostly at posterior teeth
- Deep pocket at 36 (Mid -B, DB, Mid – P, DP)
- Mobile grade II with class III furcation involvement).



## **Tooth Prognosis**

### 1) Endodontic lesion

A periodontal defect of pulpal (endodontic) origin should be considered a coronally extended periradicular lesion, which is initiated and perpetuated by the toxic materials within the root canal system. This defect is not a true periodontal pocket, and adequate cleaning and shaping, in addition to obturation of the root canal system, usually result in complete resolution. The defect does not require any adjunctive periodontal treatment, disappears quickly, and has an excellent prognosis.

### 2) Periodontic lesion

Because this is not periapical origin, root canal treatment does not result in resolution. Only periodontal treatment is indicated. The prognosis for these defects is totally dependent on the periodontal treatment. Occasionally, in multirooted teeth that require root amputation or hemisection to remove an unsalvageable root, root canal treatment is necessary as an adjunct to periodontal treatment.

### 3) Combine lesion

The overall prognosis for the affected tooth depends on the prognosis for each individual lesion. If the periapical and periodontal lesions communicate, successful root canal treatment eliminates perpetuation of the lesion of pulpal origin and converts the combined lesion into a defect of periodontal origin. Generally, however, the prognosis of such conditions is guarded.

## **Notes for Triggers 2:**

### **Discussion questions to encourage student's participation:**

- Clarify any difficult words/terms that student do not understand.
- Why patient is being treated at specialist clinic?
- How to manage endo-perio lesion in general and specific to this case?
- What is prosthetic consideration for the management of amputated root in molar?

### **Specialist clinic**

- Diagnosis is a combine perio-endo lesion.
- Multi-disciplinary and complicated case that may require having a surgical intervention.
- The prognosis is mostly guarded or poor.

## General management in perio-endo cases

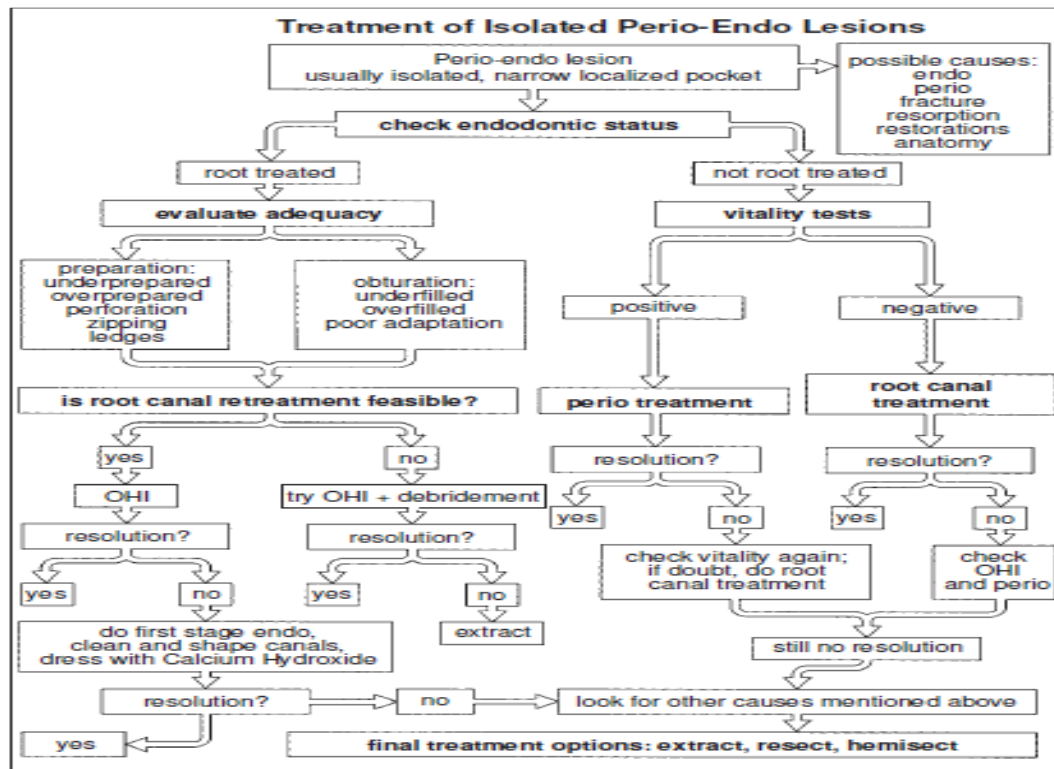


Fig. 12.85 Decision-tree for management of perio-endo lesions

## Indications and Contraindications

### Specific management for this case

Root amputation/Hemisectomy/bicuspidization

#### 1. Indications for root amputation or hemisection

- Severe bone loss in a periodontally involved root or furcation that cannot be surgically treated
- Untreatable roots with broken instruments, perforations, caries, resorption, and vertical root fracture or calcified canals
- Preservation of a strategically important root (or roots) and its crown

#### 2. Contraindications to root amputation or hemisection

- Insufficient bony support for the remaining root or roots
- Root fusion or proximity so that root separation is not possible
- Availability of strong abutment teeth (the involved tooth should be extracted and a prosthesis fabricated)
- Inability to complete root canal treatment on the remaining root or roots

3. Indications for bicuspidization
  - Furcation perforation
  - Furcation pathosis from periodontal disease
  - Buccolingual cervical caries or fracture into furcation
4. Contraindications to bicuspidization
  - Deep furcation (thick floor of pulp chamber)
  - Unrestorable half
  - Periodontal disease (each half must be periodontally sound)
  - Inability to complete root canal treatment on either half
  - Root fusion
  - Severe periodontal disease

This option may be considered for molar teeth where loss of periodontal attachment has involved the furcation. The degree of furcation involvement is classified on the basis of the amount of periodontal tissue destruction in the interradicular area:

- Degree I – horizontal loss of periodontal support less than one-third of the width of the tooth
- Degree II – horizontal loss of periodontal support greater than one-third but not encompassing the total width of the tooth
- Degree III – horizontal through and through destruction of the periodontal tissues in the furcal area.

Root amputations are considered when the furcation is compromised by endodontic complications or Degree II or III involvement. Factors to be considered when deciding on root amputation are:

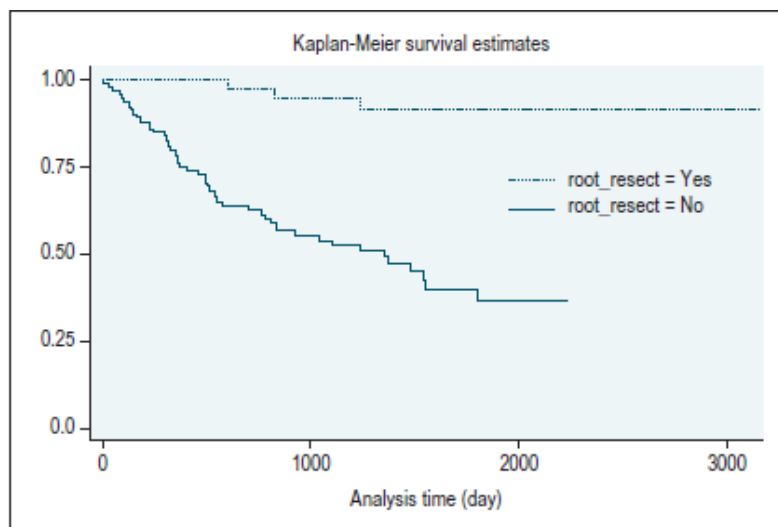
- Tooth-related factors
  - restorability of the tooth
  - strategic value of the tooth
  - feasibility of root canal treatment
  - post-treatment occlusal stability
- Root-related factors
  - length of the root trunk – ideally, a tooth with a short root trunk is a better candidate for resection. Teeth with long trunks will have a low furcation entrance and, once established, the amount of periodontal support remaining around the roots will be poor
  - divergence of the roots – the smaller the divergence (closely approximated roots), the smaller the interradicular space; these teeth are poor candidates for resection
  - length and shape of roots – short and small roots may exhibit increased mobility after resection
- Bone-related factors
  - the residual bone around the remaining roots should be assessed

- localized deep-attachment loss at one surface of the remaining roots may compromise the long-term prognosis of an otherwise ideal abutment.

On rare occasions where a vital resection becomes necessary, it is important that endodontic treatment is initiated within 2 weeks of the surgery to reduce the risk of any postsurgical infection. Such cases are difficult to manage endodontically because of the potential for microbial leakage into the root-canal system that may compromise outcome – a fact that should be pointed out to patient and periodontist alike.

The survival rate:

The teeth with root resection had a 5-year survival of 93%, while those without root resection had a survival rate of 47%.



### Proshetic consideration for management of root amputated molar

1. The occlusal relationship of the teeth to be resected must be carefully evaluated before treatment. Failure of these restorations usually occurs because of root fracture. To prevent failures, care must be given to construction of proper foundation restorations and the elimination of deflective occlusal contacts.
2. The retainer or crown for a maxillary molar with an amputated root can be a complete crown or a partial veneer crown (if an adequate amount of tooth structures remains and the mesiobuccal aspect of the tooth is intact). The crown preparation should be "barreled in" to eliminate the concavity over the furca and a knife-edge finish line will generally be required above the resected root. The casting must accurately fit the remaining root contour while minimizing concavities that would make access for plaque removal difficult.
3. For proper esthetics in maxillary restorations, a modified ridge-lap pontic may be used adjacent to resected abutments. The porcelain finish and contours should be esthetic while still providing access for plaque removal. A partial veneer crown can be an esthetic

restoration and its use will eliminate the problems associated with intrasulcular margins on thin root surfaces.

<b>Algorithm for management of furcation involved molars requiring root canal treatment and root resection</b>			
Primary phase therapy, diagnoses and treatment planning MUST have been completed before acceptance of any patients for Root Canal Treatment. Joint treatment planning is essential in all multi-disciplinary cases.			
Periodontal Origin Vital Pulp	Endodontic Origin Non-Vital or Dying Pulp	Uncertain Origin	Diagnosis
Elective Root Canal Treatment  Record individual root canal contents	Root Canal Treatment  Record individual root canal contents and record probing profile	Elective Root Canal Treatment  Record individual root canal contents and probing profile	Treatment and recording
Access, clean, and shape all canals; in the root to be resected, maintain WL at least 1mm short of EAL "0" reading to prevent extrusion. Dress with calcium hydroxide	Access, clean and shape all canals and dress with calcium hydroxide	Access, clean and shape all canals and dress with calcium hydroxide	Treatment Details
In root to be resected, RF to WL but in coronal third of canal, place an amalgam seal of sufficient length  Obturate other canals as normal with a coronal IRM plug	Review symptoms, check probing profile If pocketing reduced or eliminated, complete root canal treatment  If no improvement, redress with calcium hydroxide	Review symptoms, check probing profile If pocketing reduced or eliminated, complete root canal treatment  If no improvement redress with calcium hydroxide and advise extraction	
Complete root resection within one month of RF	Refer back to Periodontist for further management/ treatment planning		
If the periodontal defect presented as breakdown of the mucosa over the root-tip, complete root canal treatment and refer to the periodontist for mucogingival surgery (+/- apical resection and retrograde filling by endodontist).			

**Fig. 12.93** Algorithm for management of furcation involved molars requiring root canal treatment and root resection

## PART E : REFERENCES

1. Cohen's Pathways of the Pulp Expert Consult, 11e. Kenneth M. Hargreaves DDS PhD FICD FACD, Louis H. Berman DDS FACD.
2. Endodontics, Principles and Practice, 5e, Mahmoud Torabinejad DMD MSD PhD, Ashraf Fouad, Richard E. Walton DMD MS.
3. Problem Solving in Endodontics, Prevention, Identification and Management, 5e, James L. Gutmann DDS CertEndo PhD(honoris causa) FACD FICD FADI, Paul E. Lovdahl DDS MSD FACD FADI.
4. Endodontic-Periodontal Lesions, Evidence-Based Multidisciplinary Clinical Management, Igor Tsesis, Carlos E. Nemcovsky, Joseph Nissan, Eyal Rosen.
5. Endodontics, 4th Edition, Kishor Gulabivala Yuan-Ling N.
6. Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions.
7. Management of root-amputated maxillary molar teeth: periodontal and prosthetic considerations. Schmitt SM1, Brown FH. J Prosthet Dent. 1989 Jun;61(6):648-52.

## PART E : ASSESSMENT FORM

### PROBLEM-BASED LEARNING (PBL) MARKING SHEET

<b>Facilitator</b>		<b>Year</b>		<b>Group</b>		
<b>Facilitator's signature</b>		<b>Academic Session/block</b>		<b>Dates</b>	Session 1:	Session 2:

No	Students	PBL Session I (40%)		PBL Session 2 (60%)		
		Attendance	Participation (30%)	Attendance	Participation (30%)	Presentation of Learning issues (20%)

	Name	Matric No.	(10%)	Teamwork (10%)	Communication (10%)	Knowledge (10%)	(10%)	Teamwork (10%)	Communication (10%)	Knowledge (10%)	Content (10%)	Visual Aids (5%)	Responsiveness (5%)
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

## Problem-based Learning Evaluation Rubrics

### Participation Rubrics

Criteria	1-2	3-4	5-6	7-8	9-10
<b>Communication skills</b>	Unable to exhibit interpersonal communication skills	Able to exhibit interpersonal communication skills minimally but with constant prompting	Able to exhibit interpersonal communication skills limitedly	Able to exhibit interpersonal communication skills most of the time	Able to exhibit interpersonal communication skills at all times
<b>Teamwork</b>	The work load has not been discussed or no evidence of teamwork in the group	The work load and variety on each member does not seem to be fair or at least two members have been assigned trivial non-technical tasks	The work load and variety on each member seem to be fair or at least one member has been assigned trivial non-technical tasks	The work load and variety on each member seem fair	The work load and variety on each member are good

<b>Knowledge</b>	Does not have the knowledge required and unable to answer any questions.	Very limited knowledge on the related issue and unable to explain or elaborate on the issue discussed.	Demonstrates limited knowledge when answering questions or unable to give acceptable explanations or elaboration.	Demonstrates some knowledge by answering some of the questions with or without explanations and elaboration.	Demonstrates full knowledge by answering all questions with explanations and elaboration.
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### Presentation of Learning Issues Rubrics

Criteria	Excellent (8-10)	Good (6-7)	Fair (3-5)	Poor (1-2)
Content: Depth & accuracy	Findings are clearly stated. Implications of findings and information given are consistently accurate.  All facts are correct.	Description of findings is generally clear.  Implications of findings and information given are consistently mostly accurate.  All facts are mostly correct.	Some descriptions of findings are minimal or missing. Little implications of findings and information given are sometimes accurate.  Some facts are correct.	Most descriptions of findings are missing. Inaccurate implications of findings and information are given.
Criteria	Excellent (5)	Good (4-3)	Fair (2)	Poor (1)
Use of visual aids	Aids well prepared and organized. Main points stand out.	Aids prepared but moderately organized. Most of the main points stand out.	Aids are poorly prepared or used inappropriately. Unnecessary information is included.	No aids are used, or they are so poorly prepared that they detract from the presentation.
Responsiveness to questions	Responds well to questions. Restates and summarizes when needed.	Generally responsive to questions.	Reluctantly interacts with audience. Responds poorly to questions.	Avoids audience interaction. Not responsive to group.