

Endo-Perio Lesions: Diagnosis Made Easy

Rashmita Nayak¹, Rinkee Mohanty², Anurag Satapathy¹, Abhaya C. Das³, Saurav Panda³, Gatha Mohanty⁴

¹Professor, ²Professor & Head, ³Reader, ⁴Senior Lecturer, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

It is not possible to reach into the final diagnosis by only noting the patient history and clinical examination. Appropriate diagnostic aids are mandatory to co-relate the history with the clinical findings to reach into a correct final diagnosis. It is seen mostly the diagnosis of endo-perio lesion becomes difficult and complicated, unless the clinician possesses sound knowledge regarding the basic diagnostic procedures. Or else, there is a fair chance to miss the findings, small though relevant which would lead to an inaccurate diagnosis. Hence, this review topic is taken to help the practitioners with simple basic procedures to make the diagnosis of the endo-perio lesion made easy.

Keywords: Endo-perio lesions, Periodontal, Pulpal, Diagnosis.

Introduction

There is a close inter-relationship among the dental pulp and the periodontium. Anatomically, there is a communication between the same via the apical foramina, dentinal tubules, and lateral or accessory canals. This makes pulpal inflammation gives rise to the inflammatory changes in the periodontal ligament much earlier than the pulp could turn into a full necrotized tissue. The toxic and the by-products of the bacteria, tissue, and food debris from the pulp attain the periradicular area via any foramina of the root canals giving rise to inflammatory and reactions.¹⁻⁵ Pulpal disease can undoubtedly lead to periodontal diseases, however, the concept that periodontal disease cause pulpal disease remains controversial. If cementum getsexposed by progressive recession, it can become more readily penetrable by repeated scaling, curettage, or by direct bacterial action. Thus, the pulp may be

affected in a few instances when large numbers of dentinal tubules become exposed through advancing pocket depth. Two usual routes are available for the entry of injurious agents into the pulpal tissue.^{1,2}

1. Exposed canals (including those of the furcation) allow direct access of microorganisms and their toxic by-products to the pulp.
2. Dentinal tubules, exposed by repeated instrumentation, causing damage to the cementum, or diseased cementum can become an avenue of direct microbial load entry into pulpal tissues.

True combined perio-endo lesions occur when independent periodontal and periapical or lateral lesions are present and do communicate resulting in perio-endo lesions.¹

Correct steps to achieve endo-perio lesions diagnosis easily:

1. **Patient History:** Maximum data can be gained if history is noted carefully with attention. A single point missed can lead to a wrong diagnosis which can jeopardize the next process, the treatment plan, which could have easily achieved. For the pain history, leading and precise form of questions are put to the patient to get a clue to find whether the case is pulpal or periodontal. If it is a case of early pulpitis, pain would be of mild degree and short

Corresponding Author:

Prof. Rashmita Nayak

Department of Periodontics and Oral Implantology,
Institute of Dental Sciences, Siksha 'O' Anusandhan
(Deemed to be University), Bhubaneswar, Odisha,
India

e-mail: rashmitanayak@soa.ac.in

duration. And in the case of pulpal involvement, pain would be of acute onset with severe in degree. In the case of only periodontal involvement, as it would be chronic, the degree of pain varies from mild to moderate. And lastly, in the case of pulp periodontal lesion, pain would be of very minimal in degree as the drainage occurs via the periodontal pocket which reduces the pressure leading to a reduction in pain.⁵⁻⁸

2. Visual examination: It should be carried out thoroughly with proper digital pressure on both the hard as well as the soft tissues of the oral cavity. Sufficient illumination with enhanced magnification is a must during the visual examination. The tissues are examined visually well to detect the presence of dental caries, fractures, development defects, denuded enamel and dentin, cracks, erosion, faulty restorations, abscess, sinus fistula, pink spot, discoloration, in the tooth crown.³ To check for any swelling present, seen on the mesiobuccal fold, it would be of pulpal infection and whereas on the attached gingival would indicate of periodontal lesions.⁹

3. Clinical examination:

a. Swelling: Periodontal Probing is carried out to check the origin of the swelling. In case of a localized swelling, around or near the gingival sulcus, it becomes very difficult for the clinician to differentiate the origin of the swelling or the origin of the abscess.¹⁰ The swelling is then probed with the help of a periodontal probe. Somewhere, if the probe drops down to the apex of the tooth and if the full width of the swelling comprises the entire pocket depth till the apex, the abscess would be of endodontic in origin. This type of swelling can be named as “blown-out”. In such cases, the endodontic treatment if attempted, it results in successful periodontal reattachment within a week.¹¹

b. Mobility: Two ends of the instrument are usually used to check the mobility of the tooth. If an isolated tooth is mobile, it can be endodontic in origin or even periodontal. If the phase is active, it is often considered as endodontic. And if there is mobility generalized, it is said to be periodontally involved.¹

4. Clinical Tests: Certain tests are carried out to reach an accurate diagnosis.

(a) Percussion Test: If the percussion test is positive

vertically, the lesion would be of periradicular infection, and if positive horizontally, it relates to the periodontal involvement.⁴

(b) Palpation Test: Periradicular abnormalities or “hot zone” quickly respond to the palpation method. However, it is not possible to confirm as endodontically involved or periodontally involved.⁶

(c) Pulp vitality test: It is an accurate test, to find the type and origin of the lesion. If there is pulp necrosis, the patient produces no response. On the other hand, if the pulp is vital, the patient gives a moderate transient response. In the case of reversible pulpitis the patient gives an immediate painful response whereas, in the case of irreversible pulpitis, the patient gives a lingering painful response.⁸

There are four various method of pulp tests are there: 1. Electric Pulp Test 2. Test cavity 3. Either Heat or Cold Test 4. Both the Heat and Cold Test. Sometime, false positive and false negative responses from the patient may confuse the clinician, hence it is advisable to add a combination of different test method to ensure a correct diagnosis.⁵

i. Electric Pulp Test: This device applies an electric shock to the tooth to check the vitality of the pulp. From the patient sensation arising from the sensory nerve of the pulp, when it comes in contact with a part of a sound tooth, the pulp is said to be vital. If there is no response, the pulp is said to be necrosed. False-positive response indicates partial pulp necrosis, and it happens due to the high anxiety of the patient and could be also of ineffective isolation. False-negative indicates obliterated root canals and it happens in case patients taking drugs to elevate the pain threshold, or poor electrode tooth contact, or recently traumatized tooth.⁹

ii. Heat Test: When hot stimuli are applied to the tooth structure with the help of a hot spatula, the patient sometimes complains of lingering pain which is suggestive of an irreversible pulpitis and periodically involved tooth. But if the patient pain is persistently even after the removal of stimulus, it indicates of endodontically involved tooth.⁹

iii. Cold Test: Few cold stimuli agents like ice sticks, ethyl chloride, dry ice (carbon dioxide), refrigerate like dichlorodifluoromethane (DDM) are used to carry this test. If the pulp is vital, the patient complains of sharp pain but for very few seconds.

If the case is an irreversible pulpitis, the patient may complain of intense and prolonged pain response. If there is no response by the patient, the pulp is very likely to be necrosed. However, false positive and false negative creates hindrance especially if the tooth is multi-rooted or calcified root canals.⁹

- iv. **Test cavity:** This is indeed a highly trustable device to check the pulp vitality. With the speed of a high handpiece a minute cavity is prepared on the crown surface of the targeted tooth, without local anesthesia. If the patient gives a positive response to severe pain or severe sensation, then the pulp seems to be vital. The negative response of the patient indicates pulp necrosis and completely no response from the patient indicates the tooth to be endodontically involved.^{7, 8}
- d. **Selective Anesthesia Test:** When there is a confusion of the origin of pain regarding the location of the arch it belongs, a specific arch block is injected at both the arches. The disappearance of pain indicates the particular arch involved and also reflects the origin of the pain.⁸ However, it does not help in diagnosing the type of lesion whether it is endodontically involved or periodontally, which seems to be a big disadvantage of this test.
- e. **Cracked Tooth Testing:**
 - a. **Illumination test:** This test is carried out to find any cracks or fractures on the tooth surface. High power light source with a fiber optic tip is used for providing illumination. The contrast is seen between the fracture lines as black shadows which will outcast the fracture line. The size position and the extent of the black line will suggest the type of fracture.⁵
 - b. **Wedging Test:** This test helps to recognize or identify the vertical crown fracture or crown root fracture. The patient is asked to chew a cottonwood stick or any rigid material to induce the wedging force. If there is a presence of a fracture, the patient complains of pain on chewing it. And the fracture indicates the origin to be endodontic.⁶
 - c. **Staining method:** This test is accompanied along with the wedge test. The dye (methylene blue dye) is used on the occlusal surface with the help of a thin brush. When the patient bites the cottonwood stick, the dye gets penetrated the area of the fracture is present. The patient is asked to gargle well and

a visual examination is accompanied after it with a very magnify loops, if possible. The presence of fracture indicates with a darkened line with dye.¹¹

4. **Radiographic examination:** Radiographic examination is done basically by inserting a radiopaque material like gutta-percha (GP) points inside the gingival sulcus or the periodontal pocket. On the insertion of the (GP) points, the GP points reaching till the fistula which is observed in the radiograph, the case is said to be endodontic in origin. If the GP points reach to the furcation area or the mid-root, the case is said to be periodontal in origin. And lastly, if at all the GP points reaches till the apex region, it does not always alarm to be pulpal involvement; rather a pulp test should be carried out to finalize the diagnosis. (9). For the fistula Tracking method, once again the usage of GP points are suggested. The fistula can be seen extra orally and intraorally also. This method is performed by inserting a semi-rigid radiopaque material like GP points, deep into the sinus track till the resistance is felt. With the help of the radiograph, the course of the sinus tract and the origin of the infection is decided.⁵ And also, in the radiograph, if an apical radiolucency is seen surrounding a particular tooth, it indicates that the tooth to be of primary pulpal disease. Similarly, if a furcation involvement is seen in a particular tooth radiographically but not clinically, it may be either of pulpal origin or a case of traumatic occlusion.⁸

Latest tests for pulp vitality:

1. **Dual Wavelength Spectrophotometry (DWLS):** This test is independent of the pulsatile circulation. It measures any change in oxygenation in the capillary blood rather than in the supply vessels. It has the capability of detecting the presence or absence of oxygenated blood. The major advantage of this test is the visible light is used which is filtered and then guided to the targeted tooth with the help of fiber optics. It is a non-invasive test, small, portable, very much handy to carry, and also not expensive. It is very much suitable for the private dental office.¹²
2. **Pulp Oximetry:** This is a completely objective test, requiring no subjective response from the patient. This test can be an idle chairside screening test. It is a non-invasive, machine that measures the oxygen saturation in blood, used to detect pulpal blood circulation.

3. **Laser Doppler Flowmetry (LDF):** It helps in the measurement of the blood flow in a very small blood vessel of the microvasculature. It is a non-invasive, painless, and an electro-optical technique.
4. **Transmitted Light photoplethysmography (PPG technology):** It is an optical measurement technique used for monitoring the pulpal blood flow. It guides to find out the healthy pulp and the non-vital pulp by its pulsatile waveforms.
5. **Xenon Isotope:** It is also used to monitor the pulpal blood circulation and helps in differentiating the healthy pulp from the non-vital pulp.⁽⁶⁾
2. Basten CH, Ammons WF Jr, Persson R. Long-term evaluation of root-resected molars: a retrospective study. *Int J Periodontics Restorative Dent.* 1996;16(3):206-219.
3. Cohen S, Burns RC. *Pathways of the pulp*, 4th edition; C.V. Mosby Company; 1990; p-553,557,749.
4. Frank LA. Inflammatory resorption caused by an adjacent necrotic tooth. *J Endo* 1990;16:339-341
5. Grossman IL. *Endodontic practice*, 11th edition. Lea Febiger; Philadelphia 1988:pages 78,116,289,313
6. Haitt WH. Pulpal periodontal disease *J Periodontol* 1977;48; 598

Conclusion

Endo-periodontal treatment is mainly indicated for the preservation of the remaining tooth structure and to safeguard the same in the future. Both the specialty, Periodontics and Endodontics are crucially concerned with the health of supporting structures of the teeth. The possibility of Periodontal and Endodontic varies only by the location of the involved portion of the tooth and surrounding periodontal structures. The role of the periodontal treatment aims at the safeguarding of the periodontium and the other hand, the endodontic treatment is carried out to maintain the shape of the root canal space followed by its 3-dimensional obturation, to re-establish or preserve the apical periodontium to a biologically acceptable condition.

Conflict of Interests: The authors declare they have no conflicts of interest.

Ethical Issues: Approved

Funding: None

References

1. Chacker FM. Endodontic-Periododontic continuum. *DCNA*:1974.
2. Tomer AK, Raina AA, Ayub FB, Bhatt M. Recent advances in pulp vitality testing: A review. *International Journal of Applied Dental Sciences.* 2019; 5(3): 08-12.