Chairside investigations in dentistry

Madhura Mahajan, Manjushri Waingade

Department of Oral Medicine and Radiology, Sinhgad Dental College and Hospital, Pune, Maharashtra, India

Abstract

21st century is the era of “smart work.” It is not how hard you work but how much you get done! So everyone is trying to run with the time. Being oral medicine practitioners, it is our duty to diagnose quickly at the same time accurately. Chairside investigations are simple procedures which are performed by a dentist along the chairside. They are easy to perform, non-invasive, quick diagnostic techniques which make diagnosis earlier and easier. They are not only beneficial in dentist’s point of view but also in patient’s point of view as they are cost-effective. Therefore, to become a capable dental practitioner, dentists must know the importance of these diagnostic procedures and perform these investigations routinely in their dental practice.

Instead of making this narrative review unnecessarily lengthy, here we have put forth a detailed classification of the chairside investigations in dentistry which will increase the curiosity of readers to go to the depth of each investigation using references provided in the article. In this overview article, we are trying to give a bird’s eye view about important chairside investigations in dentistry.

Introduction

21st century is the era of “smart work.” It is not how hard you work but how much you get done! So everyone is trying to run with the time. Being oral medicine practitioners, it is our duty to diagnose quickly at the same time accurately. Case history and proper chairside investigations could diagnose the disease better.

Investigations are an extension of the physical examination which include chairside investigations, radiographic investigations, and lab investigations. Chairside investigations are simple tests performed along the chairside. Chairside investigations are easy to perform, non-invasive, rapidly doing procedures which even do not require big, expensive equipment. These investigations are useful in both dental hard and soft tissue examination. Moreover, we can get the results of these investigations within very less time, which helps in early and effective management of the patients. They play a key role in narrowing of differential diagnosis of the patient’s disease. In recent decades, these investigations have showed astonishing results and gained popularity among dental practitioners. Early diagnosis would help in conservative therapeutic approaches and a short recovery time with better prognosis.

Most of the time they serve as an “extra eye” to the practitioner. They do not only help in diagnosing oral diseases but also in diagnosing systemic diseases which the patient might be unaware of. Moreover, as the tests are simple and results are quick, patients are seen to be comfortable and relaxed and they believe on the test results when they see the results with their own eyes. By performing these investigations, we can provide efficient healthcare, enhancing the quality of care and most importantly in low cost! Being a dentist, everyone should know these investigations thoroughly. There are some upcoming advances in such investigations. But at the end, the oral practitioner should decide what is suitable for the patient.

In this review article, we are trying to give a bird’s eye view about important chairside investigations in dentistry. The only aim of this article is to spread awareness of chairside investigations among general dental practitioners who balk to confidently diagnose the oral diseases.

Commonly Done Chairside Investigations in Dentistry

1. Investigations for teeth examinations
   a. Pulp vitality tests
      i. Thermal tests Commonly done diagnostic pulpal tests
         a. Cold test
         b. Heat test.
      ii. Electric pulp testing
      iii. Other tests
         a. Pulse oximetry
         b. Test cavity
         c. Selective anesthesia
d. Laser Doppler flowmetry

e. Photoplethysmography

f. Spectrophotometry

g. Surface temperature measurement

h. Caries detection tests:
   • Using caries dyes
   • By fiberoptic transillumination and digital fiberoptic transillumination
   • By laser fluorescence
   • By diagnodent
   • By Endoscope
   i. Tests to disclose plaque using plaque disclosing agents
   j. Mobility test
   k. Test to detect cracked tooth Bite test

2. Test for detection of vascular lesions
   a. Diascopy

3. Tests for detection of potentially malignant lesions and conditions
   a. Vital staining
   i. Toluidine blue staining
   ii. Lugol iodine
   iii. Methylene blue
   iv. Rose Bengal.
   b. Light based detection system
      i. Tissue fluorescence imaging
      ii. Chemiluminescence
      iii. Exfoliative cytology
      iv. FNAC
   d. Histological technique
      i. Incisional biopsy
      ii. Excisional biopsy
      iii. Punch biopsy
      iv. Trephine biopsy
   v. Drill biopsy.

4. Investigation for maxillary sinus
   a. Transillumination test

Investigations for saliva, taste, and oral malodor evaluation
   a. Collection of whole saliva
   i. Draining technique
   ii. Spitting
   iii. Suction methods
      a. Parotid collector – Carlson crittenden cup
      b. Submandibular – Segregator
      c. Minor salivary gland – Periotron.
   d. Tests for xerostomia
   1. Tongue blade sign
   2. Lip stick test.
      c. Tests for detection of taste disorders
   1. Electrogustometry
   2. Whole mouth test/sip and spit method.
      d. Tests for oral malodor
      i. Organoleptic method
      ii. Gas chromatography
      iii. Portable Sulfide monitors/Halimeter
   iv. Electronic nose
   v. BANA (Benzoyl-DL-arginine- a-Naphthylamide) test.

5. Tests for TMJ and muscles of mastication
   a. Gnathodynamometry
   b. Water in mouth test
   c. Double sided mouth mirror.

6. Tests to detect mouth breathing
   a. Butterfly test
   b. Water in mouth test
   c. Double sided mouth mirror.

7. Investigations for allergy
   a. Skin prick test
   b. Patch test.

8. Investigation for neuromuscular disorder
   a. Diagnostic nerve blocking.

9. Miscellaneous
   a. Test for Measurement of Blood glucose
   b. Test for trauma from occlusion
   c. Fremitus test.
   d. Tests to evaluate lacrimal function
      i. Schirmer e test
      ii. Rose Bengal test
      iii. Tear film breakup time.
   e. Oral fluid nano sensor test (OFNASET).

Conclusion
An early diagnosis of various oral diseases and dysfunctions can be done easily with the help of numerous chairside investigations. Here, we have listed and provided a compiled classification of common chairside investigations performed in dentistry. Instead of unnecessarily exposing patients to expensive, invasive investigations, we should perform these chairside investigations to provide an efficient promising healthcare system. And we hope not only specialists but also general dental practitioners will get themselves well acquainted to these investigations.

References
1. Xavier A, Gummadapu S, Chennupati A. Classification of chairside investigations in dentistry. Int J App Dent Sci 2019;5:5-7.
2. Ongole R, Praveen BN. Clinical Manual for Oral Medicine and Radiology. 1st ed. New Delhi: Jaypee Brothers Medical Publishers; 2007.
3. Garg N, Garg A. Textbook of Endodontics. 3rd ed. New Delhi: Jaypee Brothers Medical Publishers; 2018.
4. Ingle JI. Ingle’s Endodontics. 6th ed. United States: PMPH USA; 2007.
5. Virdee S, Seymour D, Bhakta S. Effective anaesthesia of the acutely inflamed pulp: Part I The acutely inflamed pulp. Br Dent J 2015;219:385-90.
6. Brisset T. Photoplethysmographie: A diagnostic aid in conservative dentistry-endodontics. Odontostomatol Trop 1999;22:12-20.
7. Kakino S, Takagi Y, Takatani S. Absolute transmitted light photoplethysmography for assessment of dental pulp vitality through quantification of pulp chamber hematocrit by a three layer
model. J Biomod Opt 2008;13:210-15.
8. Khashayar G, Dozic A, Kleverlaan CJ, Feilzer AJ. Data comparison between two dental spectrophotometers. Open Dent 2012;3:12-20.
9. Fanibunda KB. Diagnosis of tooth vitality by crown surface temperature measurement: A clinical evaluation. J Dent 1986;14:160-4.
10. Mc Comb D. Caries detector dyes-how accurate and useful are they? J Can Dent Assoc 2000;66:195-8.
11. Davies G, Worthington H, Clarkson J, Thomas P, Davies R. The use of fibre-optic transillumination in general dental practice. Br Dent J 2001;9:145-7.
12. Shakibaie F, George R, Walsh LJ. Application of laser induced fluorescence in dentistry. Int J Dent Clin 2011;3:38-44.
13. Nokhbatolfoghahaie H, Alikhasi M, Chiniforush N, Khoei F, Safavi N, Zadeh BY. Evaluation of accuracy of DIAGNOdent in diagnosis of primary and secondary caries in comparison to conventional methods. J Lasers Med Sci 2013;4:159-67.
14. Kayalvizhi G, Radha S, Prathima GS, Mohandoss S, Ramesh V, Arumugam SB. Comparative evaluation of plaque removal effectiveness of manual and chewable toothbrush in children: A randomised clinical trial. Int J Clin Pediatr Dent 2019;12:107-10.
15. Tanwar R, Sharma A, Suma G. Diascopy: A clinical technique for the diagnosis of vascular lesions. Gen Dent 2011;49:206-9.
16. Pallagatti S, Sheikh S, Aggarwal A, Gupta D, Singh R, Handa R, et al. Toluidine blue staining as an adjunctive tool for early diagnosis of dysplastic changes in the oral mucosa. J Clin Exp Dent 2013;5:e187-91.
17. Mascitti M, Orsini G, Tosco V, Monterubbianesi R, Balercia A, Putignano A, et al. An overview on current non-invasive diagnostic devices in oral oncology. Front Physiol 2018;9:1510.
18. Naugler C. Practice tips. Brush biopsy sampling of oral lesions. Can Fam Physician 2008;54:194.
19. Avon S, Kleib H. Oral soft tissue biopsy: An overview. J Can Dent Assoc 2012;75:78.
20. Pullen R. Assessing the paranasal sinuses. Nursing 2010;40:49-50.
21. Priya KY, Prathibba KM. Methods of collection of saliva-a review. Int J Oral Health Dent 2017;3:149-53.
22. Villa A, Connell CL, Abati S. Diagnosis and management of xerostomia and hyposalivation. Ther Clin Risk Manage 2014;11:45-51.
23. Pavlidis P, Gouveris H, Kekes G. Electrogustometry thresholds, tongue tip vascularization, dentistry and form of the fungiform papillae following smoking cessation. Chem Senses 2017;42:419-23.
24. Bicak DA. A current approach to halitosis and oral malodor-a mini review. Open Dent J 2018;12:322-30.
25. Konstantinova D, Dimova M. Historical review of gnathodynamometric methods used for the assessment of masticatory function. J IMAB 2016;22:1226-9.
26. de Andrade R, de Valle AE, de Andrade RS, de Souza LA, de Souza HG, Tamburini AB. Mouth breather diagnosis considerations-a critical review. J Dent Sci 2019;4:228.
27. Heinzerling I, Mari A, Bergmann KC, Bresciani M, Burbach G, Darsow U, et al. The skin prick test-European standards. Clin Transl Allergy 2013;3:3.
28. Lazzarini R, Duarte I, Ferreira AL. Patch tests. An Bras Dermatol 2013;88:879-88.
29. Singh D, Laluluddin M, Ranjan R. Trauma from occlusion: The overstrain of the supporting structures of the teeth. Indian J Dent Sci 2017;9:126-32.
30. Beckman KA, Lucha J, Milner MS. Making the diagnosis of Sj, Mil's syndrome in patients with dry eye. Clin Ophthalmol 2015;10:43-53.

How to cite this article: Mahajan M, Waingade M. Chair side investigations in dentistry. J Adv Clin Res Insights 2021;8(4): 76-78.