

CHAIRSIDE INVESTIGATIONS

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INTRODUCTION

Investigations are the extensions of physical examination in which tissue, blood and other specimens are obtained from patients which are subjected to microscopic, microbiological or immunologic examinations.^[1] This step is next to examination of the complaints elicited by the patients and carried after clinical inspection, palpation methods. The purpose of investigation is to get the information about the underlying pathology and understand the nature of the disease which is invisible to naked eyes.

Chairside Investigations are the specialized chairside procedures which can be done as a chairside exercises. Chair side investigations can be carried out conveniently in a clinic or dental office set up. They require only simple and relatively inexpensive equipment and can usually be performed with an acceptable degree of accuracy without extensive specialized training.^[1] The results of most of these investigations can be known almost immediately which may facilitate in quick and at least initial management of the patient's disease or may give direction to carry out further proper investigations. Chair side investigations are those chair side procedures after performing which the results are available immediately to arrive at particular conclusion.

Apart from soft tissue lesions or disorders, investigations of hard tissues are also required to detect carious lesions, fractures and any other anomalies of the teeth. Sometimes it is not possible to give the diagnosis based only on examination. Visual examination may aid in giving a working diagnosis but may not contribute to the final diagnosis. Some conditions like inter proximal caries, fracture of the teeth, taste and smell abnormalities and for drug

allergies the various chair side investigations can aid in the diagnosis and treatment for the benefit of the patient.^[1]

Chair side investigations give result immediately most of the times. The clinician may get a brief idea about the underline pathology. These are the simple procedures to be done with simple instruments or solutions.^[1] In these tests specimens (saliva, fluid) are collected from the patient's oral cavity and working diagnosis can be achieved.

The chairside investigations are exclusive for providing the additional information about the disease.

The advantages of chairside investigations are

- 1) Non-invasive methods
- 2) Comfortable to patients
- 3) Inexpensive
- 4) These don't require specialized training and equipment.

The disadvantages of chairside investigations are

- 1) Subject to observer bias
- 2) The information obtained by some of investigations may not be completely reliable.
- 3) The information may not be reliable and conclusive.

The Chairside Investigations can be briefly classified as

1. Chairside investigations giving an immediate impression of disease.
2. Chairside investigations give guide for further investigations to carry out.
1. Chairside investigations giving an immediate impression of disease: These are the some chairside procedures which are in a position to give some nature of the underlying pathology and some definitive conclusion of the disease process.

These include

- Tooth Mobility test and percussion tests.
- Pulp vitality tests
- Caries detection test and caries indicator dyes
- Tests to detect cracked tooth
- Selective anesthesia

- Diagnostic nerve block
- Plaque disclosing agents
- Mirror test
- Tongue Blade sign
- Whole mouth test/sip and spit method
- Diascopy
- Intraoral patch test
- Endfeel test
- Test for Trauma From Occlusion

3. Chairside investigations give guide for further investigations to carry out

These are chairside investigations which don't give immediate conclusion of the disease. These are chairside procedures which give further guidance to carry out the proper investigations to arrive at a definitive conclusion.

- Toluidine blue staining
- Lugol's iodine
- Acridine Binding Method
- Methylene blue
- Rose Bengal
- FNAC
- Pathergy test
- Capillary fragility test
- Paget's test
- Intraoral patch test

1. Chairside investigations giving immediate impression of disease

Tooth mobility test and percussion test

Mobility is graded clinically by holding the tooth firmly between the handles of two metallic instruments or with one metallic instrument and one finger. An effort then is made to move it in all directions. Abnormal mobility most often occurs faciolingually. Mobility is graded according to the ease and extent of tooth movement. Previously one finger and a blunt end of instrument was used to check the mobility, But due to finger's fat it may give false positive result. This test offers the diagnosis of Perodontitis.

Percussion test is used to determine whether the inflammatory process has extended into the periapical tissues or surrounding periodontal ligament. The dentist performs the percussion test by gently tapping on the incisal or occlusal of the tooth in question with the end of the mouth mirror handle, which is held parallel to the long axis of the tooth. The idea is pressing the tooth in the surroundings if it is inflamed the patient complains of pain. It can be carried out in oblique fashion too. The vertical pain on percussion indicates apical area is inflamed and confirms the diagnosis of apical periodontitis while oblique or lateral indicates the surrounding periodontal area is inflamed.^[2]

Pulp vitality test

Pulp vitality test is crucial in monitoring the state of health of dental pulp, especially after traumatic injuries. In thermal testing, Heat test, Cold test, Electric pulp test (EPT), Test cavity are more commonly used in day to day practice. It indicates prior to operative procedures where pulp health may be in question, diagnosis of pain, post trauma assessment and assessment of teeth that have been pulp capped or required deep restoration, and to check the vitality of the tooth associated with the lesions like tumor or cysts in jaws. The test confirms the diagnosis of vital or non vital teeth.^[3]

Caries detection test and Caries indicator dyes

The most common method of caries detection is visual tactile method with light, mirror, and gentle probing. Other non-invasive techniques for detection of early caries have been developed, caries indicator dyes complex with carious tooth structure which is later disclosed with the help of fluorescence. They aids in both quantitative and qualitative analysis of the lesion. Various caries indicator dyes are used like, Procion, Calcein, Zyglo ZL-22, Brilliant blue. The test confirms the diagnosis of caries especially the incipient caries.^[4]

Tests to detect cracked tooth (Greenstick fracture)

Most common tests which are used to detect cracked tooth syndrome are, The Fractfinder or tooth slooth, tactile examination, exploratory excavation, percussion test, dye test, transillumination, bite tests. The Fractfinder or tooth slooth can be used on each individual cusp and the patient is asked to bite, thus allowing the placement of selective pressure on one cusp. If there is pain on biting or release of biting pressure, it is indicative that the cusp is cracked. Vitality tests are usually positive.^[5]

Selective anesthesia

Selective anesthesia refers to administration of a local anesthetic to facilitate identification of the tooth causing a painful episode. It may help to identify the possible source of pain. A block can localize pain to one arch. It has ability to anesthetize a single tooth has been questioned. This test is restricted to patients who are in pain at the time of the test when the usual tests have failed to identify the tooth. The objective is to anesthetize one tooth at a time until the pain disappears and is localized to a specific tooth.^[6]

Diagnostic nerve blocking

A diagnostic nerve block can be helpful in establishing a diagnosis, particularly when used to distinguish peripheral disease, such as dental disorder, from more centrally acting neuropathic pain. If pain does not resolve after a nerve block, then the neuropathic changes are likely to be central in origin. Trigeminal nerve block provides hemifacial anesthesia and is used predominantly in the diagnosis and treatment of neuralgia.^[7]

Plaque disclosing agents

Dental plaques are relatively invisible. Certain agents (dyes) may be used to make the supragingival plaques visible and such agents are called disclosing agents.

Erythrosin: These tablets are dissolved into a solution or chewed to dissolve in the mouth. It stains the plaque area red but also may stain soft tissues. It is the most widely used disclosing agent.^[8]

Mirror test (Fog test)

Mirror test is used to check the habit of mouth breathing. A double-sided mirror is held between the nose and the mouth. Fogging on the nasal side of the mirror indicates nasal breathing while fogging on the oral side indicates mouth breathing.^[9]



Tongue Blade sign test (Mouth Mirror Sign)

Saliva normally wets mucosa and aids in cleansing the teeth. Tongue blade sign test is carried out by gently pressing the tongue blade against mucosa. If it adheres the tissue, the tongue blade sign is positive. The positive tongue blade sign indicates hyposalivation.^[10]

Whole mouth test / Sip and spit method

A whole-mouth test is used to assess the patient's ability to detect, identify and evaluate the intensity of different concentrations of sweet, sour, salty and bitter taste solutions. In this method, a solution of a predetermined concentration of a sweet, salty, bitter, or sour substance is gargled and then spit out. The patient is asked to identify the taste and the concentration can be varied to determine threshold sensitivity.^[11]

Diascopy (Vitropression)

Diascopy (vitropression) is a procedure in which a diascope (more commonly a microscope slide (rather than thin glass plate) or magnifying glass, even a wafer of clear acrylic) is pressed against a lesion with gentle pressure down on to tissue or gently rocked from one side to other to see whether it blanches.



Orbit is a procedure of applying pressure to a suspected vascular lesion to visualize evacuation of coloration and may facilitate the differentiation of small vascular lesion from a pigmented lesion. It will evacuate the blood from small vessels allowing evaluation of other colors. It can be done intraoral also. Erythema due to vasodilatation blanches when the vessels are compressed, while purpura, on the other hand, does not blanch because the blood is present in tissue spaces not in vessel. Telangiectasis will also blanch. Diascopy is used to determine whether a lesion is vascular, non-vascular (nevus), or hemorrhagic (petechia or purpura). Hemorrhagic lesions and non-vascular lesions do not blanch; while inflammatory and vascular lesions blanch on diascopy procedure. . Diascopy can also help identify sarcoid skin

lesions, when tested, turn an apple jelly color. This is detected in lupus vulgaris. It is detected to differentiate from localized area of vasoconstriction from a hypopigmented and depigmented skin patch, i.e. vitiligo. In the former the diascopy will blanch the lesion and in later the patch is still detectable.^[12]

End feel test

If mouth opening is restricted, it is helpful to test the “end feel”. End feel describes the characteristics of restriction. End feel can be evaluated by placing the fingers between patient’s upper and lower teeth and applying gentle-but-steady force in an attempt to passively increase the interincisal distance. Muscle restrictions are associated with soft end feel and results in increase of >5mm above the active opening (wide opening with pain). Joint disorders such as acute non reducing disc displacement have hard end feel and characteristically limit assisted opening to <5mm.^[13]

Test for trauma from occlusion (Fremitus test/Functional Mobility).

Trauma from occlusion

It is a term used to describe pathologic alterations or adaptive changes which develop in the periodontium as a result of undue force produced by the masticatory muscles. Fremitus is a measurement of the vibratory pattern of the teeth when the teeth are placed in contacting position and movements. This test can be assessed by placing the dampened index finger over the buccal mucosa and palpating the buccal aspect of teeth while asking the patient to close and move in excursive movements or tap their teeth together. Fremitus is caused by trauma from occlusion and may be due to periodontal disease destruction. Each tooth is recorded in the periodontal chart for being positive or negative for fremitus.^[14]

2. Chairside investigations give guide for further investigations to carry out

These are chairside investigations which don’t give immediate conclusion of the disease but may give further guidelines to carry out most proper investigations to reach some conclusion.

It includes

Toluidine blue

It is useful for surgeons to demarcate the extent orofacial lesion prior to excision. It indicates area of dysplasia and further need of biopsy. Only the dark staining lesions are taken as positive whereas equivocal stains (faint stains) and the lesions which do not retain at all are

taken as negative. This was followed by an oral rinse with 1% acetic acid solution which was given to the patient to hold in the mouth for 20 seconds before expectorating. Toluidine blue (1% W/W) was applied as an oral rinse for 20 seconds and then 1% acetic acid was used for 20 seconds to eliminate mechanically retained stain. Only the dark staining lesions were taken as positive whereas equivocal stains (faint stains) and the lesions which did not retain the stain at all were taken as negative but all the lesions were subjected to histopathological examination.^[15]



Figure 1



Figure 2

Lugol's Iodine

Lugol's Iodine solution consists of 5g iodine and 10g Potassium iodide mixed with 85 ml distilled water to make a brown solution. Lugol's iodine is used in early screening and also can be used to identify the lesion margin and extension in precancerous lesions like homogenous leukoplakia, non-homogenous leukoplakia, erythroplakia, reticular lichen planus, erosive lichen planus.^[16]



Acridine Binding Method

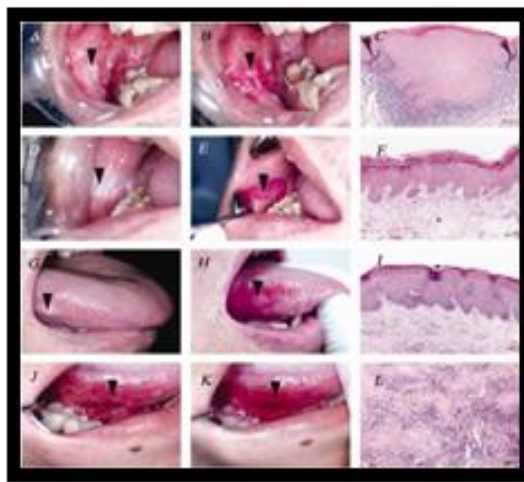
In this method, the uptake of acriflavine by desquamated buccal cells is measured. Since the DNA content of the dysplastic cells are more, they will stain more intensely than normal cells.^[17]

Methylene blue

Methylene blue staining is a useful diagnostic adjunct in a large, community-based oral cancer screening program for high-risk individuals. It indicates area of dysplasia and gives guidance for exact site of biopsy.^[18]

Rose Bengal

Rose Bengal stain can be used as a diagnostic aid in the detection of oral potentially malignant and malignant disorders. Lesions more stained by Rose Bengal has higher likelihoods to be oral squamous cell carcinoma (OSCC) or epithelial dysplasia than those less stained.^[19]



Fine-needle aspiration biopsy (FNAB)

Fine-needle aspiration biopsy (FNAB) (also known as “skinny” needle or “thin” needle aspiration biopsy) is defined as a technique in which a fine needle is introduced into a mass, cells are aspirated, and a cytological diagnosis is rendered. It is used to identify the lesions whether it is a benign or malignant like, epithelial/myoepithelial lesion, granular cell tumor, pleomorphic adenoma, squamous cyst, Atypical squamous cells, adenocarcinoma, sarcoma, mucoepidermoid carcinoma, plasmacytoma, squamous cell carcinoma. Fine Needle Aspiration Cytology (FNAC) is a simple, quick and inexpensive method that is used to sample superficial masses like those found in the neck and is usually performed in the outpatient clinic.

- Aspiration biopsy is the use of a needle and syringe to penetrate a lesion for aspiration of its contents. It is used to determine the presence of fluid within a lesion and when exploration of an intraosseous lesion is indicated.

Procedure

- An 18 gauge needle on a 5 or 10 ml syringe is inserted into the area under investigation after anesthesia is obtained to find the fluid cavity.
- The syringe is aspirated and the needle redirected if necessary.^[20]

Pathergy test

Pathergy phenomenon is defined as a state of altered tissue reactivity that occurs in response to minor trauma. Pathergy test (PT) is an easy to perform skin test to look for the pathergy phenomenon.

Oral pathergy test

Site: lower lip

Procedure of oral pathergy test

prick the mucous membrane of the lower lip to the submucosa using a 20 gauge blunt disposable needle.

Assessment: Readings are taken after 48 hours, and the test is considered positive if a pustule or ulcer is seen.^[21]



Figure 1: Oral pathergy test: mucous membrane of the lower lip is pricked using a 20 gauge blunt disposable needle.



Figure 2: Reading taken after 48 hr shows an ulcer: positive Oral pathergy test

Capillary Fragility Test (Tourniquet test, Rumpel-Leede Capillary-Fragility Test or Hess capillary fragility test)

It is a clinical diagnostic method to determine hemorrhagic tendency. It is done by occluding the upper veins of the upper arm with a blood pressure cuff for five minutes. Positive result

will show unequivocal petechiae distal to cuff and negative result will show 1 or 2 petechiae distal to cuff. It is used in diagnosis of Dengue fever. It is used to identify thrombocytopenia, thrombocytopathia.^[22]

Paget's test

This test is done for small swellings to know the consistency (cystic/solid). The centre and peripheries are palpated with index finger. Cystic swelling feels softer at centre than periphery whereas solid swelling feels firmer at centre than periphery.^[23]



Intraoral patch test

Patch-testing is a diagnostic procedure that is most commonly used for identifying the possible causes of contact dermatitis (type IV hypersensitivity reaction). This can be done type I hypersensitivity reactions and in DRESS (drug reaction with eosinophilia and systemic symptoms) syndrome (type IVb hypersensitivity reaction). In this procedure mixing of allergen with white petrolatum (i.e. the vehicle) is done and then applied in close proximity with the skin. The first reading is taken after 30 minutes to look for type 1 hypersensitivity reaction, while a second reading is taken after 48 hours to investigate for type 4 delayed hypersensitivity reaction. Between the 2 readings, the patient should be instructed not to wet, rub or scratch the testing area, avoid exercise and sweating. The readings are evaluated using the International Contact Dermatitis Research Group (ICDRG) grading system: minus (-) stands for negative, plus (+) stands for a weak (non-vesicular) positive reaction, double plus (++) stands for a strong (vesicular) positive reaction and triple plus (+++) stands for extreme (bullous) positive reaction.

A pectin, gelatin, sodium carboxymethylcellulose, and plasticized hydrocarbon gel base (orabase) may be used as a vehicle to test for contact allergy within the oral cavity. The suspected chemical is incorporated in the vehicle and applied to the oral mucosa. Fenretinide

mucoadhesive patches were attached (q.d. 30 min for 10 consecutive days) to the right buccal mucosa (blank patches on left buccal mucosa) immediately posterior to the intraoral commissure of the upper and lower lips. Intraorally patch testing can be done by keeping the antigen in the maxillary denture base and holding it in the mouth.^[24]

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