Oral Pathology

Introduction

Biopsy (Principles and techniques)

Oral and maxillofacial pathology is the specialty of dentistry and the discipline of pathology that addresses the nature, identification and management of diseases affecting the oral and maxillofacial regions.

Surgical Pathology: is that specialty of pathology which deals with the diagnosis of diseases by microscopical examination of tissues taking by a surgeon ((Biopsy)).

Interpreting biopsies is one of the most important duties of the surgical pathologist, having taken a careful history and completed the clinical examination; the clinician is often in a position to formulate the diagnosis, or at least a list of differential diagnosis. In the latter case, the diagnosis is provisional and another opinion (consultation and referral) or investigation may be necessary to reach a firm diagnosis.

Biopsy is the removal of tissue from a living individual for a diagnosis by histopathological examination. The use of biopsy is not restricted to the diagnosis of the tumors, but is invaluable in determining the nature of any unusual lesion.' However not all lesions present a specific microscopic appearance and for this reason a definitive diagnosis cannot always be made. The need for special techniques in surgical pathology is sometimes needed to reach a final diagnosis.

Types of biopsy according to the size of tissue that to be biopsied:-

1- Incisional biopsies, only a portion of the lesion are sampled, and therefore the procedure is strictly of a diagnostic nature.

2- Excisional biopsy, the entire lesion is removed, usually with a rim of normal tissue, and therefore the procedure serves both a diagnostic and a therapeutic function.

Types of biopsy according to the instruments used to obtain them:-

- **Cautery biopsy.**
- **Cone biopsy.**
- **Core needle biopsy.**
- **Vacuum assisted biopsy.**
- **Endoscopic biopsy.**

- **Punch biopsy.**
- **Surface biopsy.**

1-Cautery Of these, the one usually least suitable for microscopic interpretation is that obtained with a cautery, because this instrument chars and distorts tissues.
2-Cone biopsy Cone Biopsy removes a piece of tissue which is cylindrical or cone shaped. Cone biopsy is performed to diagnose cervical cancer. Cone biopsy is often done following a pap smear, colposcopy (examination of the cervix under illuminated magnification), and a punch biopsy.
3-Core needle biopsy Core needle biopsy (or core biopsy) is performed by inserting a small hollow needle through the skin and into the organ or abnormality to be investigated. The needle is then advanced within the cell layers to remove a sample or core. Needle biopsy is also a type of percutaneous (through the skin) biopsy. The needle may be designed with a cutting tip to help remove the sample of tissue. Core biopsy is often performed with the use of spring loaded gun to help remove the tissue sample.
4-Vacuum Assisted Biopsy Core biopsy is sometimes suction assisted with a vacuum device. This method enables to removal of multiple samples with only one needle insertion. Vacuum assisted core biopsy is being used more and more in breast biopsy procedures.
5-Endoscopic Biopsy Endoscopic biopsy is a very common type of biopsy that is done through an endoscope (a fiber optic cable for viewing inside the body) which is inserted into the body along with sampling instruments.
6-Punch Biopsy Punch biopsy is typically used by dermatologists to sample skin rashes, moles and other small masses. After a local anesthetic is injected,
7-Surface Biopsy Surface biopsy involves sampling or scraping the surface of a sore or tumor to remove cells for pathologic testing. Surface biopsy is often performed by dermatologists to remove a small piece of skin to test for carcinoma (cancerous tissue).

Indications for biopsy

- Any lesion that persist for more than 2 weeks with no apparent etiologic basis.

- Any inflammatory lesion that does not respond to local treatment after 10-14 days.
- Persistent hyperkeratotic changes in surface tissue.
- Any persistent tumescence, either visible or palpable beneath relatively normal tissue.
- Lesion that interfere with local function.
- Bone lesions not specifically identified by clinical and radiographic findings.
- Any lesion that has the characteristics of malignancy.
- Erythroplasia-lesion is totally red or has speckled red appearance.
- Ulceration-lesion is ulcerated or present as an ulcer persisted for more than 2 weeks.
- Growth rate-lesion exhibits rapid growth.
- Bleeding-lesion bleeds on gentle manipulation.
- Induration-lesion and surrounding tissue is firm to the touch.
- Fixation-lesion feels attached to adjacent structures.

Diagnostic cytology

Diagnostic cytology, when performed by well-trained, experienced individuals, offers an extremely high degree of reliability. A positive cytological diagnosis of malignancy made under these circumstances should be given the same weight as one obtained from a surgical biopsy.

Fine needle aspiration (FNA)

The technique of fine-needle aspiration (FNA) was developed at Memorial Hospital in New York City in the 1920s. It is generally carried out with a ‘fine’ needle (OD 0.6–0.9 mm), sometimes under image guidance. There is no question that the procedure is, in most instances, inexpensive, safe, quick, and – when performed by experienced workers – quite accurate. It has contributed a great deal to transform cytology from a primarily screening tool to a powerful diagnostic technique**.**

Abrasive cytology (exfoliating cytology):

This method has provided very accurate results over the years for symptomatic patients, as good as or better than with the use of mucolytic agents or abrasive methods, this rather involved procedure precludes its use as a general screening method for unselected patients.

Laboratory techniques in histopathology

1-Fixation. Of the many fixatives that have been proposed, *10% buffered formalin* remains the best compromise under most circumstances. It is inexpensive, the tissue can remain in it for prolonged periods without deterioration, and it is compatible with most special stains, including immunohistochemical techniques, as long as the tissue is placed in fixative shortly (<30 min) after surgical removal, and over fixation (>24–48 hours) is avoided.

2-Laboratory tissue processing

These refer to any treatment of tissues necessary to impregnate them with a solid medium to facilitate the production of sections for microscopy.

1- labeling of tissue
2- completion of fixation process
3- gentle and complete dehydration to remove aqueous fixative and any tissue water e.g. Ethanol and alcohol.
4- Clearing with a substance which is totally miscible with both the dehydrating agent which precedes it and the embedding agent which follows it. e.g. Xylene.
5- Embedding e.g. wax, resins and agar.
6- microtomy-is the sectioning of tissue blocks by microtome
7- staining either by ordinary stains (hematoxylin and eosin) or special stains

Special stains

Those most commonly used at present are the following:

1. *Periodic acid–Schiff* (*PAS*) *stain*. This is an extremely useful and esthetically pleasing technique, and makes evident most types of fungi and parasites.

2. *Stains for microorganisms*. These include techniques for gram-positive and gram-negative bacteria, acid-fast mycobacteria, fungi, and parasites.

3. *Argentaffin and argyrophilic stains*. Silver stains are mainly used for the identification of neuroendocrine cells and their tumors, but also for the demonstration of reticulin fibers, melanin, and calcium.

4. ***Amyloid stains.*** The mysteriously named Congo red followed by examination with both standard and polarized light is regarded as the most reliable and practical technique to detect amyloid.
5. *Reticulin stains*. Reticulin stains demonstrate both ‘reticular fibers’ and basement membrane material.
6. *Trichrome stain.* The main value of this group of stains is in the evaluation of the type and amount of extracellular material**.**
7. *Phosphotungstic acid–hematoxylin (PTAH) stain.*
8. *Stains for hemosiderin (Perls), melanin (Fontana–Masson), and calcium (von Kossa).*
9. *Stains for neutral lipids.*
10. *Mucin stains.* since it demonstrates mucosubstances of neutral, slightly acidic, and highly acidic types.