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Review

Focus on basic principles of biopsy: A review

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Abstract

Various types of pathological conditions can be seen in the oral cavity. Oral lesions like oral malignancy can be fatal, but its fatality can be decreased if it is diagnosed properly and at the proper time. Biopsy is an important tool for the accurate diagnosis and thereby giving the patient its proper way of treatment. This can be achieved with the help of biopsy procedures performed by the dental surgeons with clinical judgment and appropriate methods. For which accurate knowledge of the principles of the biopsy procedures are essential. This review article focuses on the basic principles of the biopsy.

Keywords: Biopsy, Oral Lesions, Specimen.

INTRODUCTION

Biopsy is defined as the removal of the tissue from the living organism for the purpose of microscopic examination and diagnosis (Karkera et al., 2011; Khoo, 1995). For the foundation of high quality dentistry, accurate diagnosis and treatment of the oral disease is an important component; for which biopsy plays main role (Rosebush et al., 2010). With the help of appropriate method used, the aim of the biopsy is to provide a suitably representative sample for the pathologist to interpret, while minimizing the discomfort to the patient (Oliver et al., 2004).

As dental Surgeons commonly encounter various lesions including malignant and pre-malignant lesions in their day to day practice, they can play an important role for the benefit of the patient. The practitioner who attempts this procedure, without being aware of principles involved may prevent more competent hands from diagnosing a malignancy (Kazmi et al., 2012; Gross, 1960). First man to see a lesion is in the best position to initiate a cure. The aim of this paper is to present some of the principles of biopsy technique so as to give an insight into the procedure of biopsy.

Patient examination and history of the lesion

Thorough head and neck examination of every patient should be carried out and appropriate radiographic examination should be done. The clinical and radiographic examinations may provide sufficient information for the diagnosis of certain entities. However, in case of many diseases of the oral mucosa additional examination is required like biopsy to arrive at a precise diagnosis (Rosebush et al., 2010; Melrose et al., 2007).

Purpose of taking biopsy

The main purpose of biopsy is to examine histopathology of the behavior of the cells and arrive at a proper diagnosis. There are basically following reasons for performing a biopsy (Khoo, 1995; Gross, 1960; Mota-Ramírez et al., 2007).

(1) Diagnostic and verifying or establishing a diagnosis of a clinically suspicious lesion.
(2) Planning proper treatment i. e. local, radical, surgery or irradiation.
(3) Checking progress of treatment and its effectiveness.
(4) Checking extension of disease i. e. whether the abnormality has been removed.
(5) Evaluation of the end result; whether the site is free of recurrence.

Indications for biopsy

The following are the primary indications for the performance of the biopsy (Gross, 1960; Folk et al., 2003; Ali et al., 2012).
(1) Any progressive ulcerated lesion which has been present for three weeks or more than three weeks and one which fails to respond to therapy in three weeks should be biopsied.
(2) Any mass which has been present for three weeks or more should be biopsied.
(3) Any lesions that interferes with the normal local functions of the oral cavity.
(4) White patches in oral mucous membrane, especially those having a warty appearance.
(5) Areas which are intra-osseous and produce rarefaction and expansion of the cortical plates should be biopsied.
(6) Complete excision of small lesions as a method of diagnosis, may also serve as treatment in some instances.

Contraindications for biopsy

There are no absolute contraindications for the biopsy procedure. However it should not be done[1,6]:
(1) When the general health condition of the patient is very poor
(2) When acute, virulent, pyogenic infection is present.

Types of biopsy

There are different techniques used to perform biopsy procedure depending on the type of tissue of interest like, Cytology, Aspiration biopsy, Incisional biopsy, Punch biopsy, Excisional biopsy, sentinel node biopsy, Curettage and Frozen sections (Gross, 1960; Folk et al., 2003; Kalmer, 2006).

An adequate and appropriate tissue sample should be taken while doing biopsy. The clinician should try to remove a reasonably large, intact specimen without causing significant patient morbidity. Too small, fragmented or specimens of inadequate depth are often difficult to orient properly for sectioning and mounting on a slide and may be insufficient for accurate microscopic interpretation. Adequate depth is essential to include the entire layer of epithelium and a portion of the underlying connective tissue. If epithelium is lacking or separated from the underlying connective tissue, interpretation and diagnosis are impossible (Rosebush et al., 2010).

Instrumentation used in the acquisition of the tissue sample is also of utmost importance. For minimal distortion and to provide optimum tissue sample, a scalpel biopsy is preferable. Heat produced by electrocautery and lasers often distorts the tissue, making diagnosis difficult. The use of laser or other cautery instruments can be used to control bleeding after the specimen has been obtained. Excessive tissue clamping with forceps should be avoided as it may also distort or crush tissue specimens (Rosebush et al., 2010).

Incisional biopsy is preferable to establish a diagnosis prior to treatment, where complete surgical removal is impractical. Sampling of multiple areas is recommended to ensure accurate assessment for extensive lesions. For example, a large erythroplakic patch may demonstrate moderate epithelial dysplasia in one area and a frank, invasive squamous cell carcinoma in other adjoining area (Rosebush et al., 2010; Folk et al., 2003).

Excisional biopsy involves complete removal of the lesional tissue, which is appropriate for small, accessible lesions. (e.g. mucocele, pyogenic granuloma and irritation fibroma). Excision of mucoceles must include the few lobules of minor mucous glands that drain into the mucocele. This minimizes the recurrence potential of these lesions (Rosebush et al., 2010; Folk et al., 2003).

Oral cytology is typically used as an adjunct to incisional or excisional biopsy procedures. Cytology cannot provide the histologic features crucial for an accurate and definitive diagnosis, but allows examination of individual cells. In aspiration biopsy, a needle and syringe is used to remove a sample of cells or contents of a lesion. The aspirated fluid is examined for the features like color, consistency, type, etc (Folk et al., 2003).

As an alternative to the traditional incisional biopsy, a punch biopsy can also be used. The punch can be disposable or sterilizable. The disposable punch comprises a circular blade attached to a plastic handle. Diameters of two to ten millimetres are available. This removes a core of tissue the base of which can be lifted from the mucosal surface and the base undermined with a scalpel. Care should be taken if aspiration is being used to prevent the specimen being sucked away. The resultant wound may not require suturing if using the smaller diameter punches (Oliver et al., 2004; Folk et al., 2003).

The sentinel lymph node biopsy is used to know the status of the lymph node. The lymph node status at the time of presentation has a profound effect on prognosis particularly in head and neck cancer surgery (Connor et al., 2013).

Specimen handling

For the purpose of histopathological examination to be done, the specimen tissue must be fixed properly. To achieve this purpose the specimen tissue should be placed into the proper fixative. The fixative most commonly used for the fixation of routine biopsy specimen is 10% formalin (Figure 1). However for the purpose of performing specialized techniques on the

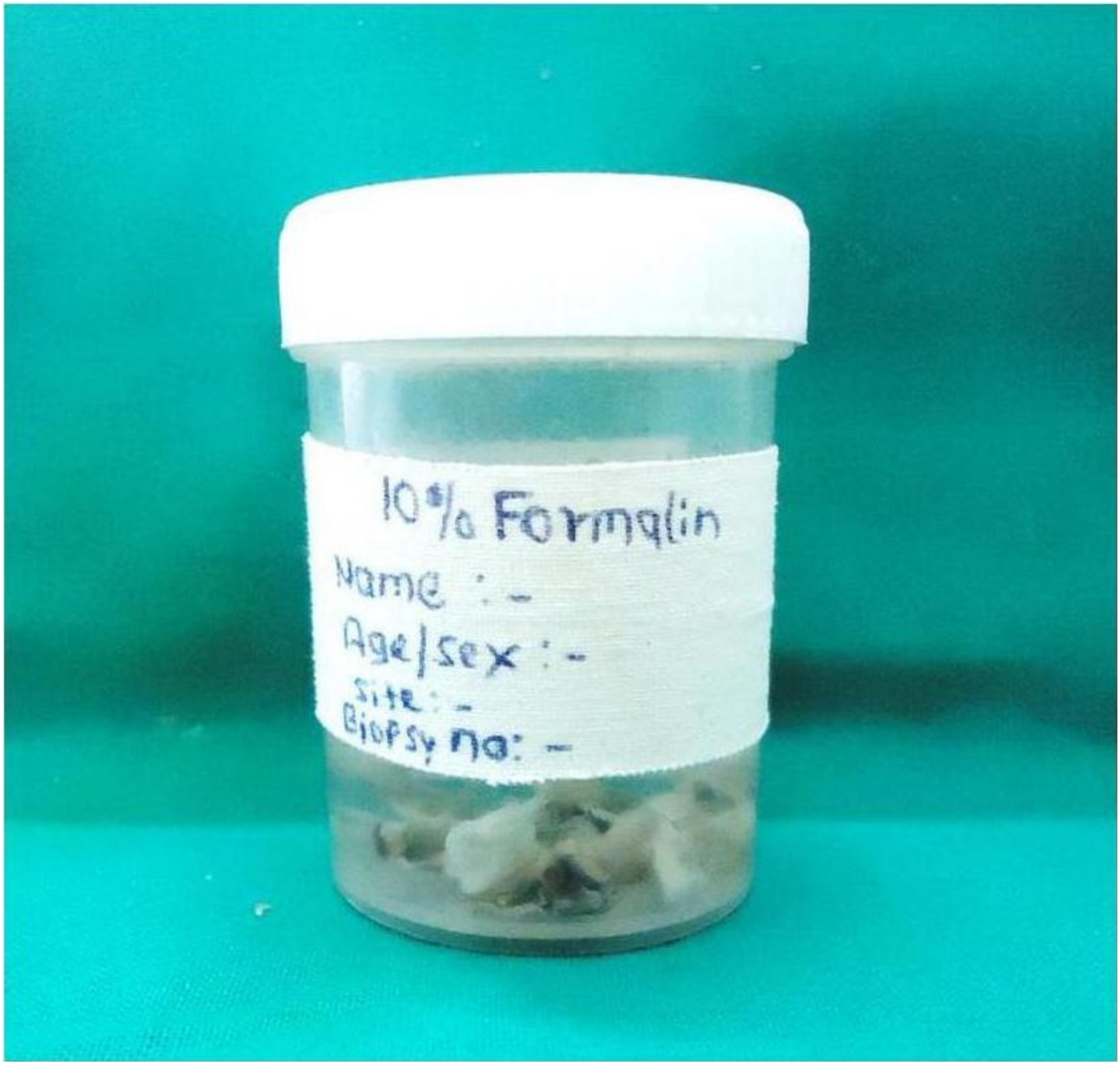

Figure 1. Properly labeled container of 10% formalin for fixation and transport of biopsy specimen.

specimen, certain special media are required; like for doing immunofluorescence procedure of autoimmune or vesicullo-bullous lesions, Michel's solution is required (Figure 2) (Khoo, 1995; Rosebush et al., Provide year; Oliver et al., 2004).

All biopsy specimens must be appropriately labeled and biopsy number should be given once submitted for the histopathological examination, so that the patients information and the site lesion can be identified from the specimen bottles and there should not be any interchanging of the valuable diagnostic biopsy specimens of the patients (Figure 1) (Khoo, 1995; Rosebush et al., 2010).

It is important for the clinician to know that which margins of the lesions has been clearly excised, for this purpose it is advisable to appropriately mark the margins of the specimens immediately after it is removed from the site in the oral cavity. This can be done with the help of simple measures like tying a suture thread on the margin of the interest of the lesion (Figure 3) and providing the note for the same in the requisition form at the submission of the biopsy. This can be really helpful for the patient point of view (Rosebush et al., Provide year; Folk et al., 2003).

Figure 2. Properly labeled container of Michel's solution for transporting tissue for immunofluorescence examination.

Figure 3. An excision biopsy specimen containing sutures for the indication of the orientation margins.

CONCLUSION

The dental surgeon should have a good knowledge of principles of biopsy procedure, its importance and purpose; it can be really helpful to arrive at a precise diagnosis and to aid in the benefit of the patient.

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