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Review Article

Use of Colposcope in Oral Mucosal Lesions

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Abstract

Potentially malignant disorders and oral cancers incidence is steadily increasing in India. Being one of largest tobacco producing country, our country has not succeeded in curbing the menace created by tobacco and increased death rates toils because of the oral cancer predominantly. Clinical diagnosis of the early changes in oral mucosa warrants further confirmation histo-pathologically.

Therefore selection of biopsy site is vital in diagnosis and further management. Colposcopy, a direct oral microscopic method proves useful in selecting the representative sites for biopsy which otherwise is difficult by only clinical methods. Because of advantages like ease of use, non-invasive and precision, colposcopy might prove to be a useful in early detection and management of the oral potentially malignant and malignant diseases. This article details what as dental practitioner dealing with diagnosis of these potentially malignant disorders should know about this newer aid, further helping in reducing the burden of oral cancer by earlier diagnosis which form an important aspect in treatment of oral cancer.

Keywords: Colposcope; Potentially Malignant Disorder; Oral Cancer

Introduction

Potentially malignant disorders and oral cancer incidence is steadily increasing in India. Being one of largest tobacco producing country, our country has not succeeded in curbing the menace created by tobacco and increased death rates toils because of the oral cancer predominantly [1]. Diagnosis of early changes in cancer may prove helpful in better prognosis of this condition. Colposcopy is an established diagnostic procedure for precancerous changes of cervix, vagina and vulva [1]. Literature in the past points to similarities in oral and female genital mucosa which encouraged researchers adapting to this method of examination and exploring its usefulness in oral potentially malignant and malignant lesions [2].

Literature has mention of numerous techniques developed to facilitate identification of initial carcinomas. Toluidine blue vital staining has been advocated as a simple, inexpensive and sensitive chair side test and is being used most commonly. But it may have false positive staining in inflammatory and ulcerated areas of oral cavity representing as high as 30% [3]. Exfoliative cytology on other hand has false-negative rates similar to toluidine blue [4]. Other techniques such as autofluorescence, oral brush biopsy, chemiluminescence, acetic acid staining etc. [5] however cannot replace gold standard, the histopathology. The histological assessment of a biopsy specimen is regarded as the most reliable criterion for a correct diagnosis and is thus considered gold standard [6]. Dysplasia and carcinoma *in situ* herald invasive oral cancer, but carcinomas also occur in areas with no previous signs of dysplasia [7].

This may be caused by the rapid emergence of invasive cancer, but it is also possible that earlier biopsy specimens were taken from unrepresentative sites of the lesion or before morphologic changes could be detected [6]. Colposcopy thus had a potential purpose of identifying the representative sites for biopsy which proved efficient in gynecological practice.

Discussion

Use of colposcopy in gynecological practice is accepted worldwide. Where cervical mucosa, is examined for morphological alterations observed using stereoscopic binocular magnification of colposcope. It is a direct microscopic technique [focal length of the microscope is 200 mm], used to identify visible clues suggestive of altered tissue.

History: Invention of the colposcope dates back to 1925 by a German Professor Hinselmann of Hamburg, which was specifically used for the purpose of detecting early changes associated with cervical cancer [6] lot of modifications have taken place with the original instrument and variety of models are available now.

Components of colposcope and scope: The colposcope has a pair of binoculars and is mounted on a pedestal with a light source attached to it (Figure 1). This lighted binocular microscope is used to magnify the view of the cervix, vagina, and vulvar and other similar mucosal surfaces. halogen lamp provides Illumination via a fibre-optic cable connected to a system of lenses resulting in magnification of the tissue from 4 to 40 folds. General impression of surface changes is visualized using Low power (×2-6) and deeper layers can be evaluated by medium (×8-15) and higher (×15-25) powers. The higher powers are required for identification of certain vascular patterns which suggest presence of more suspicious lesions. It provides three-dimensional images of the tissue surfaces examined. Easy viewing of these changes on monitor screen is made possible with the use of digital advances and portable video camera that is attached to [6] the real-time viewing is made possible by a digital colposcope allowing viewing of images and computerized manipulation of stored images on the video screen. For improved visualization of altered tissue light filters are used, which help the physician to examine tiny blood vessels in the mucosal areas as the blue or green filtered light thus making them more obvious [6].

Method of use

Acetic acid wash

Acetic acid (3%) is applied to the mucosa for about 30 seconds using cotton swabs which results in coagulation of mucus easing its removal, and facilitate abnormal areas to be seen more easily and clearly with the colposcope. The normal epithelium is not affected by acetic acid as it does not penetrate below the outer one-third of the epithelium. It has its pronounced effect on Dysplastic cells as they contain altered nuclear cytoplasm ratio. The mucosal surfaces that stain white after the acetic acid application are called acetowhite lesions. The vascular patterns and alteration are evident just as the aceto-whitening begins to fade in about 40 - 60s.

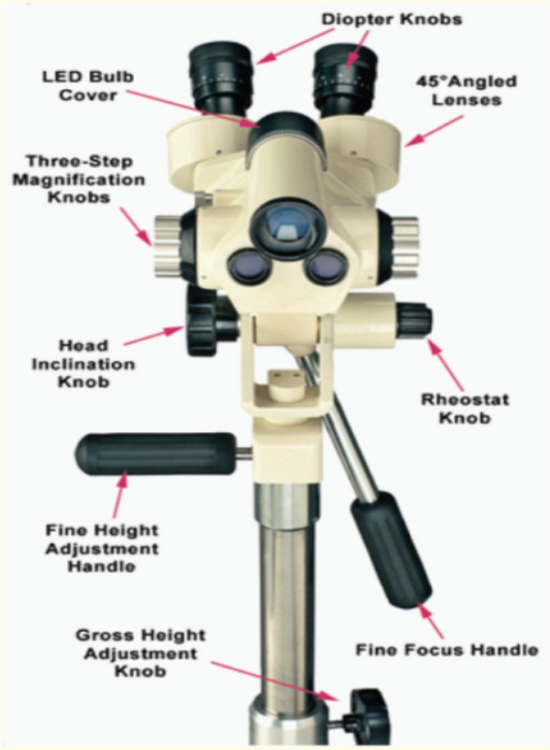


Figure 1: The colposcope.

Lugol's solution

Lugols solution is utilized in cases where acetic acid application fails to show visible lesions. The normal squamous epithelium consists of abundant glycogen which has affinity to iodine stain and turn brown in a uniform manner, whereas potentially malignant and malignant lesions lack glycogen content and thus will not take up the iodine staining.

Interpretation of vascular changes seen by colposcope

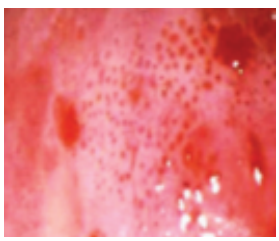
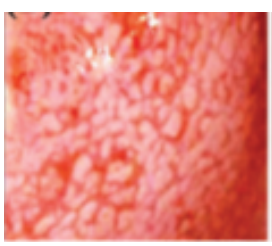
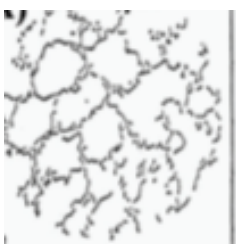
In a few studies conducted by Pazouki., *et al.* [8] it was concluded that there was a close relationship between vascularity and tumour progression in oral mucosa. These changes detected by colposcopy can be used biopsy sites selection in oral cavity. One of the most frequently used index is the Reids index (Table 1). Oral mucosal epithelium appears pink and smooth with fine and

regular vessel patterns. When mucosa is affected by inflammatory, benign, and malignant lesions and conditions the vessel pattern is altered and appears atypical [9]. Colposcopic findings suggesting invasion are altered appearance related to; vascular pattern, intercapillary distance, surface pattern, colour tone and opacity as well as the clarity of demarcation of the mucosal lesions [10]. Because of the increase in vascularity, necrosis of the surface epithelium occurs and in some cases production of keratin leading to colour change. Application acetic acid demonstrate a duller shade of white with straighter, sharper outlines and well-defined borders in high grade lesions and low-grade lesions appear translucent or bright white having feathery margins and irregular borders. Accuracy of colposcopy for the detection of mucosal changes is about 80% to 98% [6]. All the demonstrable variations seen using coloscope are valuable in diagnosis of various lesions.

The oral or, genital mucosa normally present two basic types of vascular patterns, network capillaries, and hair pin capillaries. Some principal abnormal findings which are associated with pre-malignant and malignant lesions are described in table [11] (Table 2).

Colposcopic sign	Zero point	One point	Two point
Margin	Condylomas Micropapillary areas Pale acetowhitening Satellite lesion and acetowhitening extending beyond the transformation zone	Regular lesions with smooth outlines	Rolled peeling edge Internal demarcation between areas of different appearances
Color	Shiny snow white Pale acetowhitening	Shiny grey	Dull oyster white
Vessels	Fine caliber vessels	Absent vessel	Definite punctuation and mosaicism
Iodine staining	Positive staining or minor iodine negativity	Partial iodine uptake	Negative staining

Table 1: Reid's colposcopic index.

Vascular change	Interpretation of changes	Clinical presentation	Diagrammatic presentation
Punctuation	**Punctuation** Wherein the tips of the terminal vessels in the stroma reach the surface of the epithelium through stromal papillae and appear as red dots prior to the application of acetic acid; wherein the fine punctuation are suggestive of a low–grade carcinoma *in situ*; while coarse punctuation suggests a high–grade carcinoma *in situ* or a frank malignant degeneration.		
Mosaic	Wherein the vessels do not reach the epithelial surface and extend only partially into the epithelium appearing as red lines surrounding blocks of the epithelium. The appearance is further accentuated after application of acetic acid. Furthermore, the finer the mosaic, the more likely the lesion is low–grade CIN or metaplasia; while the coarser, wider and the more irregular mosaic suggests a high–grade CIN or invasive carcinoma.		

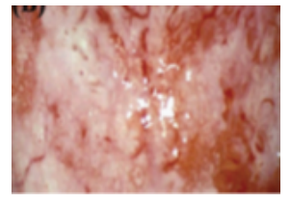
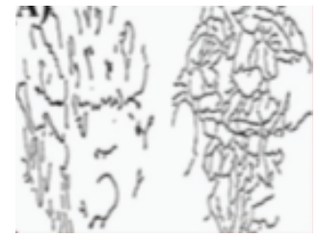
Atypical vessels	Wherein these vessels appear to be running on or parallel to the surface of the epithelium and are of irregular caliber and are branching appearing as coarse wide hairpins and commas, corkscrews, waste paper, coarse and caliber tree–like and root–like forms or spaghetti–like forms usually indicative of invasive carcinoma (Figure 3a-e). Important points to be considered in the assessment and interpretation of abnormal colposcopic findings include surface contour and margin of lesion; response to acetic acid; appearance of gland openings; iodine uptake; and keratosis and the varied vascular patterns including the appearance of blood vessels (including atypical blood vessels) suggestive more of the higher–grades of dysplasia		

Table 2: Atypical vascular changes observed using colposcope.

An experienced colposcopist consider number signs in suspecting the seriousness of a lesion like Localized congestion of the connective tissue, Vascular changes in the form of red spots, unequal distribution and appearances [12]. Interaction of incident and reflected light passing through the structures of epithelium and connective tissues produce the images which can be evaluated for the changes related to vascularity and appearances [9].

Advantages: colposcopy offers advantages like ease of use, non-invasive and precision and further might prove to be a useful in early detection and management of the oral potentially malignant and malignant diseases.

Limitations

Thus sensitivity of colposcopy is dependent on a number of factors including the skills of the colposcopist, number of biopsies taken, and skills of the reading pathologist. Other limitations include cost, which if the cost of histopathology is included, may be prohibitive in low resource countries.

An important area of application of colposcopy in oral mucosal lesions may well be in the diagnostic evaluation of the various oral potentially malignant lesions and frank oral cancers based on the vascular patterns [10]. In a recent study, Pazouki., *et al.* concluded a close relationship between stromal vascularity and tumor progression in the oral mucosa [11]. This increases horizons of this diagnostic method for early detection of potentially malignant and malignant lesion, which were previously relied greatly upon vital staining.

Conclusion

Colposcopy, a direct oral microscopic method proves useful in selecting the representative sites for biopsy which otherwise is difficult by only clinical methods. Because of advantages like ease of use, non-invasive and precision, colposcopy might prove to be a useful in early detection and management of the oral potentially malignant and malignant diseases.. Further studies regarding its application as adjunct evaluating its accuracy and efficacy with standard diagnostic methods in oral potentially malignant and malignant lesion are required which could be a step toward better outcome of oral cancer treatments, as detection in late stages of oral cancers are associated with poor prognosis.

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