COLPOSCOPY: EXPLICIT DIAGNOSTIC PROCEDURE IN DENTISTRY– A REVIEW

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ABSTRACT

The mortality and morbidity related to oral cancer and the incidence of premalignant lesions is increasing undeviatingly across the world. The most important factor for better prognosis is there early and accurate diagnosis which cannot be solely based on clinical findings, thus making histological evaluation play a pivotal role in diagnosis. Colposcopy is a simple, versatile, non invasive, precise and reliable diagnostic procedure which has been routinely practiced in gynecology. It gives an illuminated magnified view of oral mucosa with good resolution. It evaluates changes in surface topography and vascular pattern of the lining mucosa, thus allowing the colposcopist to visually distinguish normal from abnormal appearing tissue and take directed biopsies which is done by ruling out the possibility of taking biopsy from the most representative area supposed to reveal epithelial dysplasia. This article states several studies which enlightens the better efficiency and result of colposcopy in diagnosis of various oral premalignant lesions such as leukoplakia, OSMF (oral sub mucous fibrosis) and malignant lesions such as oral SCC and carcinoma of buccal mucosa and how it can prove to be a beneficial step towards the amelioration of patient solicitude.

Keywords: Colposcope, Direct oral microscopy, Biopsy, Oral pre-cancerous lesions and conditions, Vascular patterns

I. INTRODUCTION

Colposcopy is a medical diagnostic procedure deriving its origin from ancient Greek word “kolpos” meaning “hollow, womb, vagina” and “skpos” - to “look at”. This technique has been mainly used in gynecology since decades for prevention of cervical cancer by early diagnosis of precancerous lesions. The procedure was developed by German physician Hans Hinselmann by experimenting on Jewish inmates from Auschwitz. Nowadays this procedure is seen to be advocated for the early diagnosis of oral cancer and premalignant lesions. The most common oral cancer which accounts for 90% of total oral cancers is oral squamous cell carcinoma.
OSCC), usually 2/3rd cases of OSCC enter the advance stage due to late diagnosis leading to a poor prognosis. A clinico-pathological diagnosis is need since it cannot be solely based on clinical findings thus vitalizing the need for a more accurate and versatile and non invasive diagnostic procedure. The early detection of premalignant lesions of the oral cavity allows the early treatment to prevent their progression to an invasive carcinoma thus the survival rate. There are numerous techniques developed to facilitate identification of carcinomas such as toluidine blue vital staining but studies showed the risk of more affinity of the stain with DNA and false positive staining. Other techniques such as auto fluorescence, oral brush biopsy, acetic acid staining, chemiluminescence etc are however not accurate to establish a final diagnosis. Colposcopy gives a magnified view of oral mucosa with good resolution by evaluating surface topography and changes in vascular pattern of lining mucosa. It identifies the normal and abnormal areas and gives a more accurate site selection for biopsy.

II. REVIEW OF LITERATURE

The history of colposcopy began in Hamburg, Germany, within early 1920s. In 1921, Von Franqué, professor of gynaecology at Hamburg University assigned his assistant, Hans Hinselmann, to the study of this cervical surface. He advised him to see at the leukoplakias that, it had already been observed, may be seen with the optic, adjacent to several small cervical cancers. Hinselmann published his first paper on colposcopy in 1925, and also the first textbook of colposcopy in 1933. He developed this method in 1925 with Helmut Wirths. In 1928 Walter Schiller, hystologist within the II Gynecological Clinic in Vienna, found that dysplastic and carcinomatous structures don't contain glycogen and, led by this thought, created the iodum test as a way for detecting an early portio carcinoma, recommending to smear the portio by Lugol iodum-iodurate solution, probably due to the numerous mistakes caused by Hinselmann himself: this system proposed and almost exclusively intended for early discovery of cervical carcinoma. In 1932 the Allgemeine Ortskrankenkasse from Hamburg was the primary clinic within the world to supply to insured women a free colposcopic examination, performed by its specialists, if they asked for it. Colposcopy may be a stereoscopic binocular field microscope with a long focal length and powerful source of illumination. Parts include a head, height adjustment knob, inclination knob. Halogen lamp via a fibro optic cable is employed to supply illumination. It can magnify the tissue from 4 to 40 folds. Colposcope uses green or blue filter to facilitate examination of vascular change and color tone because white light reduces color contrast. It is mainly indicated in primary screening of cervical cancer, abnormal cyto-smear, clinically suspicious cervix, evaluation and treatment of CIN etc and nowadays has made its way into diagnosis of premalignant lesions and carcinoma. It was only in 2000 when Goran Gynther used colposcopy for diagnosis oral lesions like leukoplakia, oral lichenoid lesions, or suspected malignancy and pointed out that Twenty-nine patients (83%) showed changes in the vascular image on microscopy, along with the colposcopy criteria. In 40% patients (14 patients), the biopsy sites identified by direct oral microscopy showed more advanced histological signs than the ones selected by routine clinical examination (0.01 < P within the biopsy samples, as identified during routine clinical examination. In 17 patients (49%), we found no differences between the biopsy specimens. In 2014 Nayyar et al performed diagnosis of leukoplakia and carcinoma buccal mucosa and saw that sensitivity and specificity for the choice of biopsy site by colposcopic examination was higher for leukoplakia than carcinoma buccal mucosa patients having a awfully good prognosis. Drogoszewsk also in 2014 used this system for diagnosis of oral lichen ruber planus and observed that Biopsies obtained supported direct oral microscopy revealed dysplasia in 16 patients (53.3%). Biopsies obtained supported clinical examination with the eye revealed dysplasia in 3 cases (10%). In 2015 Chomik et al used it for oral SCC and located histopathologic results of biopsies from areas indicated by direct oral microscopy revealed dysplasia in 86.7% of
patients, whereas biopsies from areas indicated by clinical examination revealed dysplasia only in 40% of people, leading to the requirement for widening of mucosal margins.\[4\]

<table>
<thead>
<tr>
<th>Worker</th>
<th>Method used</th>
<th>Diagnosis</th>
<th>Prognosis</th>
<th>Result</th>
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<tbody>
<tr>
<td>Gynther et al (2000)</td>
<td>Colposcopy</td>
<td>leukoplakia, oral lichenoid lesions, or suspected malignancy</td>
<td>Excellent</td>
<td>83% patients showed changes in the vascular picture on microscopy, according to the colposcopy criteria. In 40% patients the biopsy sites identified by direct oral microscopy showed more advanced histologic signs than those selected by routine clinical examination ((0.01 &lt; P \leq 0.05)). 11% had more advanced histologic signs in the biopsy samples, as identified during routine clinical examination. In 49%, found no differences between the biopsy specimens.</td>
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<tr>
<td>Nayyar et al (2014)</td>
<td>Colposcopy</td>
<td>leukoplakia and carcinoma buccal mucosa</td>
<td>Very good</td>
<td>Sensitivity and specificity for the selection of biopsy site by colposcopic examination came out to be higher for leukoplakia than carcinoma buccal mucosa patients.</td>
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<tr>
<td>Drogoszewska et al (2014)</td>
<td>Colposcopy</td>
<td>Oral Lichen Planus</td>
<td>Very good</td>
<td>Biopsies obtained based on direct oral microscopy revealed dysplasia in 53.3% patients. Biopsies obtained based on clinical examination with the naked eye revealed dysplasia in 10% cases.</td>
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<tr>
<td>Chomik et al (2015)</td>
<td>Colposcopy</td>
<td>Oral SCC</td>
<td>Excellent</td>
<td>Histopathologic results of biopsies from areas indicated by direct oral microscopy revealed dysplasia in 86.7% of patients, whereas biopsies from areas indicated by clinical examination revealed dysplasia only in 40% of individuals, resulting in the need for widening of mucosal margins.</td>
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<tr>
<td>Singh et al (2016)</td>
<td>Colposcopy</td>
<td>Premalignant lesions</td>
<td>Excellent</td>
<td>A sensitivity of colposcopic screening test came-out to be about 71% while specificity was about 91%. Positive predictive value was 91%.</td>
</tr>
<tr>
<td>Khan et al</td>
<td>Colposcopy</td>
<td>Leukoplakia</td>
<td>Excellent</td>
<td>Results of our colposcopic examination regarding the selection of biopsy sites for leukoplakia reported a sensitivity of 0.8571 (85%) with a specificity of about 0.6667 (66%)</td>
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<td>Rathod et al (2017)</td>
<td>Colposcopy</td>
<td>OSMF</td>
<td>Excellent</td>
<td>All clinical parameters were higher in Group III (areca nut chewers with OSMF) and Group II (areca nut chewers without OSMF) as compared to Group I (healthy controls) (P &lt; 0.05)</td>
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<tr>
<td>Kesarwani et al (2017)</td>
<td>Colposcopy</td>
<td>Premalignant and oral SCC</td>
<td>Excellent</td>
<td>The sensitivity and spcificity of biopsies performed on the basis of colposcopic examination came out to be 64% and 93% respectively with a positive predictive value of 90% and a negative predictive value of 75% were reported. Thus colposcopic guided biopsies were more appropriate than on the basis of CF alone.</td>
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<tr>
<td>Mahmoud et al (2020)</td>
<td>Colposcopy</td>
<td>Oral leukoplakia</td>
<td>Excellent</td>
<td>The diagnostic accuracy of oral colposcopy with use of the Swede scoring system was superior to that of oral colposcopy with the use of the RCI.</td>
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Diagnosis of premalignant lesion by Singh et al in 2016 showed a sensitivity of colposcopic screening test came-out to be about 71% while specificity was about 91%.\[5\] Positive predictive value was 91% with excellent prognosis. Khan et al diagnosed leukoplakia and results of our colposcopic examination regarding the choice of biopsy sites for leukoplakia reported a sensitivity of 0.8571 (85%) with a specificity of about 0.6667 (66%).\[6\] In 2017 OSFM was diagnosed by Rathod et al found All clinical parameters were higher in Group III (areca nut chewers with OSMF) and Group II (areca nut chewers without OSMF) when compared to Group I (healthy controls) (P < 0.05).\[7\] Kesarvani et al also in 2017 found The sensitivity and specificity of biopsies performed on the premise of colposcopic examination came dead set be 64% and 93% respectively with a positive predictive value of 90% and a negative predictive value of 75% were reported.\[8\] Thus colposcopic guided biopsies were more appropriate than on the premise of CF alone for premalignant and oral SCC. In 2020 Mahmoud et al found. The diagnostic accuracy of oral colposcopy with use of the Swede classification system was superior to it of oral colposcopy with the utilization of the RCI.\[9\]

III. DISCUSSION

Colposcope a gynaecological procedure is mostly indicated when either the PAP smear is abnormal or when the cervix loop abnormal while collecting the smear. It is also indicated for evaluation and treatment of CIN, sexual assault patients, patients with vulvar warts and patients with history of DES exposure. This method aids in early diagnosis of cervical cancer. Use of this technique in oral cavity has been gaining popularity. With increase in incidences of oral cancer, mostly oral squamous cell carcinoma (OSCC) need for a precise diagnostic procedure is critical to help gain a better prognosis and elevate five year survival rate of patient. The progression from dysplasia to carcinoma cannot be determined on the basis of the clinical findings. With Colposcopy, care can be administered more precisely with an enhanced appearance. This procedure makes it possible to see what a healthy naked eye can’t see like the surface pattern, clarity of demarcation, colour tone, and opacity. The advantages of colposcopy include high resolution, good magnification, good illumination, good storage capacity, detects lesions at an early stage, painless, non-invasive, with an accuracy of 80-90%. It is considered that colposcopy may bridge a gap between microscopic examination of the surface morphology of the oral tissues and histological examination.\[10\] Till date, various methods of examination have been adapted for diagnosis of premalignant lesions and oral cancer, but have shown limited success. This aid in the earliest detection of premalignant lesions and conditions such as leukoplakia, lichen planus, lichenoid reaction, oral submucosa fibrosis (OSMF) and various others. In a study, on application of 2% ethanoic acid, the mucosa appeared faint to dense acetowhite in color which reduced in intensity over the amount of time.\[11\] About 73% individuals OSMF in Stage 1 reported faint acetowhite staining and 27% individuals with clinically Stage II and III OSMF attained a dense acetowhite stain, signifying the deleterious effects of the advanced condition. This reversible osmolar change depends on the nuclear-cytoplasmic ratio and number of cells redirected as cytoplasmic dehydration and membrane collapse. The ethanoic acid coagulates mucus (nuclear-proteins and cytokeratins) which upon removal expedites visibility to the underlying mucosa. The Lugol's iodine application didn't show uniform uptake whereas the traditional epithelium, enriched with glycogen, took up Lugol's iodine and stained brown uniformly.\[17, 18\] Areca nut chewers with OSMF presented an atypical vasculature whereas the betel nut chewers without OSMF displayed network capillaries almost like the healthy group.\[12\] The epithelium acts as a filter that permits both the incident and therefore the reflected light to undergo. The ratio of reflected and absorbed light with reference to the thickness of the epithelium; its optical density; vascularity and nature of the underlying stroma; volume of hemoglobin; and concentration of the tissue chromospheres determine the colour tone of the mucosa.\[12\] In the normal oral or
genital mucosa, two basic vascular patterns which will be seen are network capillaries and hairpin capillaries. Some principal abnormal findings include: Punctuation – Wherein the ideas of the terminal vessels reach the surface of the epithelium through stromal papillae and appear as red dots. Mosaic – Wherein the vessels extend only partially into the epithelium appearing as red lines surrounding blocks of epithelium and fail to succeed in the epithelial surface. Atypical vessels – Wherein these vessels, of irregular caliber, seem to be running on or parallel to the surface of the epithelium and its branching appearing as coarse wide hairpins and commas, corkscrews, paper, coarse and caliber tree-like and root-like forms or spaghetti-like forms. The findings were according to findings of Rene Cartier et al. who reported that alterations within the vascular network reflect biochemical and metabolic changes in cervical tissue.[12] Malcolm Coppleson had stated that atypical vessels appeared corkscrew or comma-shaped indicating greatly increased vascularity to stay pace with the expansion of atypical epithelium.[13] In few subjects thanks to extensive pigmentation of the gingiva, discolored oral mucosa and increased keratinization the capillary arrangement wasn't clearly discernible. Since the anatomy of the oral mucosa and therefore the marginal, papillary and attached gingiva was different on the idea of thickness and keratinization of the epithelium, colposcope couldn't be wont to its full potential to look at the changes within the gingiva as an impact of betel nut. The signs and symptoms vary with the affected sites and stage of disease. Thick inelastic ropelike fibrous bands extending from the lamina propria through entire submucosa to the muscle layer appear vertically within the buccal mucosa, along the contours of the faucial pillars and round the entire circle of lips narrowing the mouth and reducing the mouth opening and thereby compromising oral hygiene and food intake.[14] The hardness of betel nut also as its interaction with the ingredient, in turn, depresses the hosts resistance to local factors and causes greater calculus formation accounting for the more periodontal destruction in its consumers.[15][16] In the present study, oral mucosa colposcopically visualized as dense acetowhite staining of the oral mucosa and development of atypical vasculature. Therefore, early diagnosis is of prime importance in arriving at an accurate conclusion where the prognoses are often improved.

IV. CONCLUSION

From the above review it can be concluded that colposcopy is a promising diagnostic tool for early detection of lesions and select an accurate biopsy site which is most likely to yield significant histologic pattern indicative of epithelial dysplasia. It provides high precision, versatility and ease of use. This non invasive technique is useful in ruling out epithelial dysplasia in early lesions when clinical changes have not become obvious.

V. REFERENCES


