

CLASSIFICATION SYSTEMS IN ORAL SUBMUCOUS FIBROSIS PATIENTS: A REVIEW

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Abstract

Among south east Asian population Oral Submucous Fibrosis is an acquired disease usually associated with the habit of areca nut chewing. Consumption of chilies, nutritional and vitamins deficiencies, genetic susceptibilities, altered salivary constituents, autoimmunity and collagen disorders have also been suggested to be the etiological factors associated with oral submucous fibrosis. The usual problem of patient suffering from OSMF is reduced mouth opening and sensitivity towards spicy food. If the habit is stopped and the patient is treated in the early stages the disease will not progress further but if the habit is continued and left unchecked the disease may turn malignant.

Keywords: Oral Submucous Fibrosis, Grading, Classifications, clinical grading, Histopathological grading.

Introduction

The relation between human beings and disease starts with birth. Few diseases are preventable and curable while some end with death of the diseased. Diseases may be inherited or acquired. By 600 BC Sushruta in ancient Indian medical literature named "VIDARI" a condition resembling OSMF was described as early as characterized by progressive reduction in mouth opening, depigmentation of oral mucosa along with pain on eating food.¹

Oral submucous fibrosis is a potentially malignant condition and was first described by Schwartz in 1952. He named it as "Atropicaidiopathica (tropica) Mucosae oris." Various other names given to OSMF are "diffuse scleroderma of the mouth", "idiopathic palatal fibrosis", "sclerosing stomatitis" and "juxta-epithelial fibrosis". An Indian doctor Joshi in 1953 termed oral submucous fibrosis (OSMF).²

Apart from chewing areca nut, consumption of chilies, nutritional deficiencies, genetic susceptibilities, altered salivary constituents, autoimmunity and collagen disorders have been suggested to be contributors to the pathogenesis of oral submucous fibrosis.³

There have been reports stating an increase in prevalence of OSMF of up to 85% in patients younger than 35 years.⁴

The lesion starts as an inflammatory condition and as it progress the vascularity of the involved area decreases and blanching of the affected oral mucosa occurs and fibrosis of the involved areas is observed. Sometimes in the initial stage the patient may come with the complaint of burning sensation or pain in the mouth and on visual examination areas of small vesicles or ulcers may be seen. As the disease progresses further, fibrous bands (Figure 1) are formed which lead to restricted mouth opening (Figure 2), difficulty in swallowing and tongue movements' etc.⁵

Mixing of habits i-e areca nut with tobacco has been reported in younger individuals. OSMF is seen to develop faster in these chewers as compared to those who use areca nut alone and they also seem to show early cancerous transformation.⁶

It is said to be the main cause of OSMF and can even

result in malignancies of the oral cavity. The combination



Figure 1: Fibrous band in retromolar area and blanching of buccal mucosa in patient of OSMF



Figure 2: OSMF patient with reduced mouth opening

Areca nut or betel nut chewing is a major habit seen amongst the Indian population and there is an upsurge in the intake due to commercially available preparation like tobacco, alcohol and areca nut increases the incidence of OSMF and its malignant transformation as compared to when areca nut is used alone. Treatment is given as per the stage of the disease and is symptomatic in nature. Both pharmacological and physical therapies are advised for cure.⁷

In 1996, S C Cox and D M Walker estimated that the people that were affected by this disease are about 2.5 million worldwide. In 2002, the statistics by Chiu CJ et al for OSMF in Indian continent alone was about 5 million people (0.5% of the population). OSMF is considered as a public health issue worldwide including the UK, South Africa, and various South Asian countries due to its much higher incidence rates in recent times.⁸

Incidence rates exist for India only. Reports from north-western India give an incidence of 2.6 and 8.5 per 100 000 per year for males and females respectively, whereas in the south India the estimation is higher 9 and 20 per

100 000 per year for males and females respectively. The rates for males and females combined are 13 per 100000 per year.⁹

With the help of various epidemiological studies on OSMF the prevalence rate was calculated by Cox and coworkers. They examined 35000 urban Indian at dental colleges in Bombay, Bangalore and Trivandrum and estimated the prevalence as 0.5% 0.5% and 0.2% respectively. Another author found the prevalence rate of 0.5% by examining Indians in South Africa. The prevalence of this condition in the Indian rural population has been reported to vary from 0 to 0.4%.¹⁰

In 1968, Pindborg and Sirsat defined OSMF as “an insidious chronic disease affecting any part of the oral cavity and sometimes pharynx. Although occasionally preceded by and /or associated with vesicle formation, it is always associated with juxta-epithelial inflammatory reaction followed by fibro-elastic changes in the lamina propria, with epithelial atrophy leading to stiffness of oral mucosa causing trismus and inability to eat”.¹¹

WHO in 1978 defined Oral Submucous Fibrosis as a slowly progressive disease in which fibrous bands form in the oral mucosa leading to severity restriction to movement of the jaw including tongue.¹²

The prevalence of OSMF was found to be 0.4% in the Ernakulam district, Kerala.¹³

The clinical classification is given based on mouth opening and the histological classification is based on the change in the epithelial and connective tissue features. Till date various classifications have been given by various researchers and many have been proposed. Here we are reviewing the various classification systems one by one.

Classification systems

Several classifications based on clinical and histological features by various researchers, depending on different aspect of OSMF.

A. Classification Based on Clinical Features

JV Desa (1957)¹⁴ classified OSMF into three stages as follows:

Stage 1: Stomatitis and vesiculations

Stage 2: Fibrosis.

Stage 3: As its sequelae

Wahi et al (1966)¹⁵ classified OSMF, based on clinical involvement into three groups.

Group 1: Usually, there are no symptoms referable to mucosal involvement. The lesion affects one or other commonly involved anatomical sites, are focal in character, show pallor or whitish coloration, wrinkling of mucosa and minimal indurations.

Group 2: Cases might present symptoms of soreness of the mucosa or increased sensitivity to chili. The lesion is diffuse white extensively and indurated, on various anatomical sites.

Group 3: Symptoms are due to restricted mobility such as trismus, stretching at the angles of the mouth and

altered pronunciation .Firm mucosal bands can be palpated, and the surface might be fissured or ulcerated. Ahuja and Aggarwal(1971)¹⁶ classified OSMF clinically based on the extent and type of fibrosis.

Class1: Localized fibrous bands in the cheek extending from the superior to inferior vestibular fornix on one or both sides. In order of frequency, these bands are usually located on the lips, in the premolar region and in second molar region.

Class2: Generalized diffuse hardening of subepithelial tissue. This hardening usually extends from the cheek and hard palate to the soft palate, uvula and pillars of the fauces. In occasional cases the hardening might extend to the mucous membrane lining the pharynx.

Class3: Combination of the above two types where the fibrous bands are associated with a generalized diffuse form of submucous fibrosis.

Bhatt and Dholakia (1977)¹⁷ clinically grouped patients into three grades:

Grade 1: Comprising mild and early cases with very slight fibrous bands and little closure of the mouth.

Grade2: Cases with moderately pronounced symptoms of disease and fibrous banding extending from the cheek to the palate area.

Grade 3: Cases show excessive amounts of fibrous banding involving the cheek, palate uvula tongue and lips and narrowed mouth opening.

Gupta et al (1980)¹⁷ clinically classified four stages of submucous fibrosis according to increasing intensity of trismus.

I Very early stage: Complains of burning sensation in the mouth or ulceration without any difficulty opening the mouth.

II Early stage: Along with symptoms of burning sensation, complains of slightly difficulty opening the mouth.

III Moderately advanced stage: Marked trismus, to the extent that the patient cannot open their mouth more than two finger width. Associated difficulties with mastication are apparent.

IV Advanced stage: Patient is under nourished, anemic and show marked trismus and/or other symptoms, as mentioned above.

Pindborg JJ (1989)¹⁸ separated OSMF into three stages based on clinical features:

Stage 1: Stomatitis includes erythematous mucosa, vesicles, mucosal ulcers, melanotic mucosal pigmentation and mucosal patchiae.

Stage 2: Fibrosis occurs in healing vesicles and ulcer, which is the hallmark of this stage. Early lesions demonstrate blanching of oral mucosa. Older lesions include vertical and circular palpable fibrous bands in the buccal mucosa and around the mouth opening or lips, resulting in a mottled marble like appearance of the mucosa because of the vertical thick, fibrous bands associated with blanched mucosa.

Specific findings include the following:

- Reduction of mouth opening (trismus)
- Stiff and small tongue
- Blanched and leathery floor of the mouth
- Fibrotic and depigmented gingiva
- Rubbery soft palate with decreased mobility
- Blanched and atrophic tonsils
- Shrunken bud like uvula.
- Sinking of the cheeks, not commensurate with age or

Stage 3: Sequelae of OSMF

- Leukoplakia is found in more than 25% of individuals with OSMF.
- Speech and hearing deficits may occur because of involvement of the Eustachian tubes.

SK Katharia et al (1992)¹⁹ gave different scores assigning measurement of mouth opening between upper and central incisors.

Score 0: Mouth opening is 41 mm or more

Score 1: Mouth opening is 37 to 41mm

Score 2: Mouth opening is 33 to 36

Score 3: Mouth opening is 29 to 32mm

Score 4: Mouth opening is 25 to 31mm

Score 5: Mouth opening is 21-24mm

Score 6: Mouth opening is 17 -20mm

Score 7: Mouth opening is 11 to 16mm

Score 8: Mouth opening is 6 to 10mm

Score 9: Mouth opening is 5 to 8mm

Score 10: Mouth opening is 0 to 4 mm

Mathur and Jha (1993)¹⁷ classified clinical features of OSMF into three stages

Stage 1: Early OSF

- a. Mild blanching
- b. No restriction in mouth opening.
- c. No restriction in tongue protrusion, measuring from mesio-incisal angle of an upper central incisor to the tip of the tongue when maximally extended with mouth at maximal opening.
- d. Burning sensation only on ingesting spicy foods hot liquid, etc

Stage 2: Moderate OSMF

- a. Moderate to severe blanching
- b. Mouth opening reduced by 33%, tongue protrusion reduced by 33%, and flexibility also demonstrably decreased.
- c. Burning sensation even in absence of stimuli
- d. Presence of palpable bands
- e. Lymphadenopathy, either uni- or bilateral
- f. Demonstrable anemia on hematological examination

Stage 3: Severe OSMF

- a. Very severe burning sensation, patient unable to perform day-to-day work.
- b. More than 66% reduction in mouth opening, cheek flexibility and tongue protrusion. In many cases, the tongue may appear fixed.
- c. Ulcerative lesion may appear in cheek.
- d. Thick palpable bands
- e. Lymphadenopathy evident bilaterally.

Nagesh and Bailoor (1993)¹⁴ classified OSMF into three stages as follows:

Stage I Early OSMF:

Mild blanching, no restriction in mouth opening (normal distance between central incisor tips: Males 35 to 45 mm, females 30 to 42 mm), no restriction in tongue protrusion (normal M-I; mesio-incisal angle of upper central incisor to the tip of the tongue when maximally extended with the mouth wide open: Males 5 to 6 cm, females 4.5 to 5.5cm. Cheek flexibility CF=V1V2, two points measured between; V2 = is marked at 1/3rd the distance from the angle of the mouth on a line joining the tragus of the ear and the angle of the mouth and V1=the subject is then asked to blow his cheeks fully, and the distance measured between the two points marked on the cheek. Mean value for males=1.2cm, females=1.08cm. Burning sensation on taking spicy food or hot beverages.

Stage II Moderate OSMF:

Moderate to severe blanching, mouth opening reduced by 33%, cheek flexibility also demonstrably reduced, burning sensation also in absence of stimuli, palpable bands felt. Lymphadenopathy, either unilateral or bilateral and demonstrable anemia on hematological examination.

Stage III Severe OSMF:

Burning sensation is very severe patient unable to do day-to-day work, more than 66% reduction in the mouth opening, cheek flexibility and tongue protrusion. Tongue may appear fixed. Ulcerative lesions may appear on the cheek, thick palpable band and lymphadenopathy is bilaterally evident.

Lai DR (1995)²⁰ divided OSMF based on the inter-incisal distance as follows:

Group A: >35mm

Group B: Between 30 and 35mm

Group C: Between 20 and 30 mm

Group D: < 20 mm

Ranganathan K et al (2001)¹⁴ divided OSMF based on mouth opening as follows:

Group I: Only symptoms, with no demonstrable restriction of mouth opening.

Group II: Limited mouth opening 20 mm and above.

Group III: Mouth opening less than 20 mm.

Group IV: OSMF advanced with limited mouth opening. Precancerous or cancerous change seen throughout the mucosa.

Kiran Kumar et al (2007)¹⁴ categorized three clinical stages of OSMF on the basis of mouth opening as follows:

Stage I: Mouth opening > 45 mm

Stage II: Restricted mouth opening 20 to 44 mm

Stage III: Mouth opening < 20 mm

Tinky Bose and Anita Balan (2007)²¹ gave clinical classification, categorized the patients into three groups based on their clinical presentations:

Group A: Mild cases:

Only occasional symptoms, pallor, vesicle formation, presence of one or two solitary palpable bands, loss of elasticity of mucosa, variable tongue involvement with protrusion beyond vermilion border. Mouth opening > 3 cm.

Group B: Moderate cases:

Symptoms of soreness of mucosa or increased sensitivity to chillies, diffuse involvement of the mucosa, blanched appearance, buccal mucosa tough and inelastic fibrous bands palpable, considerable restriction of mouth opening (1.5 to 3 cm) and variable tongue movement.

Group C: Severe cases:

Symptoms more severe, broad fibrous bands palpable, blanched opaque mucosa, rigidity of mucosa, very little opening of mouth (less than 1.5 cm), depapillated tongue and protrusion of tongue very much restricted

Kerr et al (2011)²² proposed a disease grading system in five grades.

Grade 1: Mild: Any feature of the disease triad for OSMF (burning, Depapillation, blanching or leathery mucosa) may be reported and interincisal opening > 35 mm

Grade 2: Moderate: The above features of OSMF + interincisal opening limited to 20-35 mm

Grade 3: Severe: Above feature of OSMF + interincisal opening < 20 mm

Grade 4a: OSMF + other potentially malignant disorder on clinical examination

Grade 4b: OSMF with any grade of oral epithelial dysplasia on biopsy.

Grade 5: OSMF + oral squamous cell carcinoma.

They concluded that bands are common at the posterior region in mild cases of OSMF and more likely to be found anteriorly also as the disease increases in severity Chandramani More et al (2011)²³

Clinical staging:

Stage 1 (S1): Stomatitis and /or blanching of oral mucosa.

Stage 2 (S2): Presence of palpable fibrous bands in buccal mucosa and/or or pharynx, with /without stomatitis.

Stage 3 (S3): Presence of palpable fibrous bands in buccal mucosa and/or or pharynx, and in any other parts of oral cavity, with/without stomatitis.

Stage 4 (S4): as follows:

- a. Any one of the above stage along with other potentially malignant disorders, e.g. oral leukoplakia, oral erythroplakia, etc.
- b. Anyone of the above stage along with oral carcinoma.

Functional staging

M1: Interincisal mouth opening up to or greater than 35 mm.

M2: Interincisal mouth opening between 25 and 35 mm.

M3: Interincisal mouth opening between 15 and 25 mm.

M4: Interincisal mouth opening less than 15 mm

Haider et al (2011)²⁴ divide it based on severity of the disease with functional staging and objective measures inter-incisal opening:

Clinical Staging:

- Stage 1: facial bands only
- Stage 2: facial and buccal bands
- Stage 3: facial and labial bands

Functional Stage:

- Stage A: Mouth opening 13 to 20 mm
- Stage B: Mouth opening 10 to 11 mm
- Stage C: Mouth opening

B. Classifications Based on Histopathological Features of OSMF

Pindborg JJ and Sirsat SM (1966)¹⁴ were the first to divide OSMF depending only on histopathological features alone as follows:

Very early stage: Finely fibrillary collagen dispersed with marked edema. Plump young fibroblast containing abundant cytoplasm. Blood vessels are dilated and congested.

Inflammatory cells, mainly polymorphonuclear leukocytes with occasional eosinophils are found.

Early stage: Juxta-epithelial area shows early hyalinization. Collagen still in separate thick bundles. Moderate number of plump young fibroblasts is present. Dilated and congested blood vessels. Inflammatory cells are primarily lymphocytes, eosinophils and occasional plasma cells. (Figure 3)

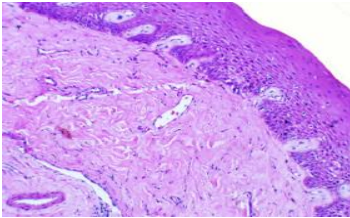


Figure 3: Photomicrograph showing Early OSMF

Moderately advanced stage

Collagen is moderately hyalinized. Thickened collagen bundles are separated by slight residual edema. Fibroblastic response is less marked. Blood vessels are either normal or compressed. Inflammatory exudates consist of lymphocytes and plasma cells (Figure 4).

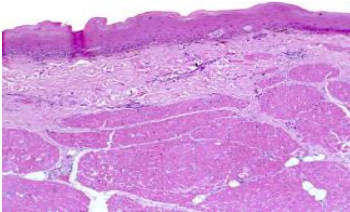


Figure 4: Photomicrograph showing Moderately advanced OSMF

Advanced stage

Collagen is completely hyalinized. No separate bundles of collagen are seen. Edema is absent. Hyalinized area is devoid of fibroblasts. Blood vessels are completely obliterated or narrowed. Inflammatory cells are lymphocytes and plasma cells. (Figure 5)

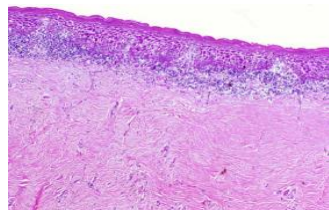


Figure 5: Photomicrograph showing Advanced stage OSMF.

Utsunomiya H, Tilakratne WM, Oshiro K et al (2005)²⁵ histologically divided OSMF based on the concept of Pindborg and Sirsat and modified it as follows:

Early stage: Large number of lymphocytes in sub epithelial, connective tissue, zone along with myxomatous changes.

Intermediate stage: Granulation changes close to the muscle layer and hyalinization appears in subepithelial zone where blood vessels are compressed by fibrous bundles. Reduced inflammatory cells in subepithelial layer.

Advanced stage: Inflammatory cell in filtrate hardly seen. Number of blood vessels dramatically less in subepithelial zone. Marked fibrous are as with hyaline change extending from subepithelial to superficial muscle layers. Atrophic, degenerative changes start in muscle fiber.

C. Classification Based on Clinical and Histopathological Features

Khanna JN and Andrade NN (1995)²⁶ developed a group classification system for the surgical management of OSMF

Group I: Very early cases

Common symptom is burning sensation in the mouth, acute ulceration and recurrent stomatitis and not associated with mouth opening limitation.

Histology: Fine fibrillar collagen network interspersed with mark edema, blood vessels dilated and congested, large aggregate of plump young fibroblasts present with abundant cytoplasm, inflammatory cells mainly consist of polymorphonuclear leukocytes with few eosinophils. The epithelium is normal.

Group II: Early cases

Buccal mucosa appears mottled and marble like, wide spread sheets of fibrosis palpable, interincisal distance of 26 to 35mm.

Histology: Juxta-epithelial hyalinization present, collagen present as thickened but separate bundles, blood vessels dilated and congested, young fibroblasts seen in moderate number, inflammatory cells mainly consist of polymorph nuclear leukocytes with few eosinophils and occasional plasma cells, flattening or shortening of epithelial rete-pegs evident with varying degree of keratinization.

Group III: Moderately advanced cases

Trismus, interincisal distance of 15 to 25 mm, buccal mucosa appears pale firmly attached to underlying tissues, atrophy of vermilion border, vertical fibrous bands palpable at the soft palate, pterygomandibular raphe and anterior faucial pillars.

Histology: Juxta-epithelial hyalinization present, thickened collagen bundles, residual edema, constricted blood vessels, mature fibroblasts with scanty

cytoplasm and spindle-shaped nuclei, inflammatory exudates which consists of lymphocytes and plasma cells, epithelium markedly atrophic with loss of rete pegs, muscle fibers seen with thickened and dense collagen fibers.

Group IVA: Advanced cases

Severe trismus, interincisal distance of less than 15mm, thickened faucial pillars, shrunken uvula, restricted tongue movement, presence of circular band around entire lip and mouth.

Group IVB: Advanced cases

Presence of hyperkeratotic leukoplakia and squamous cell carcinoma.

Histology: Collagen hyalinized smooth sheet, extensive fibrosis, obliterated the mucosal blood vessels, and eliminated melanocytes, absent fibroblasts within the hyalinized zones, total loss of epithelial rete pegs, presence of mild to moderate atypia and extensive degeneration of muscle fibers.

Conclusion

Since OSMF is a potentially malignant disorder an effort is made to provide and update the knowledge of classification system on OSMF so as to assist the clinician, researches & academics to endow with proper management of the disease, thus reducing the mortality of oral cancer and treatment can be done as per the grading and staging of the disease. As Paan masala and Gutkha, containing areca nut are the major etiological factors causing OSMF, a precancerous condition characterized by development of fibrotic bands and fibrosis of buccal mucosa, intolerance to spicy food and later on trismus which causes difficulty to eat properly, proper steps should be taken by government to stop and discourage the commercial preparation of areca nut.

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