

clinically grouped the patients into 3 grades:

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

Grade 2: Moderately pronounced symptoms of the diseases with fibrous bands extending from cheek to palate area.

Grade 3: excessive amount of fibrosis involving cheek, palate, uvula, tongue and lips and restricted mouth opening.

6) Gupta DS et al. (1980)¹² clinically classified into four stages of OSMF as per the increasing intensity of trismus:

1. Very early stage: the patients complained of burning sensation in the mouth or ulceration without difficulty in opening the mouth.

2. Early stage: along with symptoms of burning the patients complain of slight difficulty in opening the mouth.

3. Moderately advanced stage: the trismus is marked to such an extent that patient cannot open his mouth more than two fingers. Patient therefore experience difficulty in mastication.

4. Advanced stage: patient is undernourished, anaemic and has a marked degree of trismus.

7) Pindborg JJ (1989)⁸ divided OSMF into three stage:

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

Stage 2: Fibrosis occurring in the healing vesicles and ulcers is the hallmark of this stage.

- Early lesions demonstrate blanching of the oral mucosa.

- Older lesions include vertical and circular palpable bands in the buccal mucosa and around the mouth opening or lips resulting in mottled marble like appearance of the mucosa because of the vertical thick fibrous bands in association with blanched mucosa.

- Specific findings include reduction of mouth opening, stiff and small tongue, blanched and leathery floor of the mouth, fibrotic and depigmented gingival, rubbery soft palate with decreased mobility, blanched and atrophic tonsils, shrunken bud like uvula and sunken cheeks, not commensurate with age or nutritional status.

Stage 3: Sequelae of OSMF are as follows:

- Ø Leukoplakia is found in more than 25% of individuals with OSMF.

- Ø Speech and hearing deficit may occur because of involvement of tongue and the Eustachian tube.

8) Katharia SK et al. (1992)¹³ have given different scores assigned to the patients on the basis of mouth opening between upper and lower central incisors as follows:

Score 0: Mouth opening is 41 mm or more.

Score 1: Mouth opening is 37 to 40 mm.

Score 2: Mouth opening is 33 to 36 mm.

Score 3: Mouth opening is 29 to 32 mm.

Score 4: Mouth opening is 25 to 28 mm.

Score 5: Mouth opening is 21 to 24 mm.

Score 6: Mouth opening is 17 to 20 mm.

Score 7: Mouth opening is 13 to 16 mm.

Score 8: Mouth opening is 09 to 12 mm.

Score 9: Mouth opening is 05 to 08 mm

Score 10: Mouth opening is 0 to 04 mm.

9) Nagesh and Bailoor (1993)¹⁴ classified OSMF based on clinical features as:

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 tongue protrusion.

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 bands and lymphadenopathy bilaterally evident.

10) Racher SK (1993)⁸ classified OSMF based on Habits: the patients can be grouped into 3 stages:

Stage I: Stage of Stomatitis and Vesiculation:

- Characterized by recurrent stomatitis and vesiculation. Patient complains of burning sensation in the mouth and inability to eat pungent food.

- The examination reveals vesicle on the palate. They may rupture and a superficial ulceration may be seen. Some amount of fibrosis can be seen.

Stage II: Stage of Fibrosis:

- There is inability to open the mouth completely and stiffness in mastication. As disease advances there is difficulty in blowing out cheek and difficulty in protruding the tongue.

- On examination, there is increasing fibrosis in the submucosa. Mucosa is blanched and white, lips and cheeks are stiff. Dorsum of tongue may show atrophy of papillae. Blanching and stiffness of the mucosa of the floor of the mouth is less marked than that seen in the lips, cheek and palate. Larynx is free from disease and respiration is not affected.

Stage III: Stage of sequelae and complications:

- Leukoplakia changes in the mucosa. An ulcerating malignant lesion may be seen involving the cheek, oropharynx, tongue. Patients with OSMF may be predisposed to develop Oral cancer under the influence of carcinogens.

11) Lai DR (1995)⁸ divided OSMF based on the inter-incisal distance as follows:

Group A: mouth opening greater than 35 mm

Group B: mouth opening between 30 and 35 mm

Group C: mouth opening between 20 and 30 mm

Group D: mouth opening less than 20 mm

12) Maher R et al. (1996)¹⁵ had given criteria for evaluation of interincisal distance as an objective criterion of the severity of OSMF and divided into 3 categories:

- Involvement of one-third or less of the oral cavity (if three or less of the above sites are involved).

- Involvement of one to two-thirds of the oral cavity (if four to six intraoral sites are involved).

- Involvement of more than two-thirds of the oral cavity (if more than six intraoral sites are involved).

13) Haider SM et al. (2000)¹⁶ Classified based on severity of the disease taking mouth opening into consideration

- **Clinical Staging:**

- o **Stage 1:** faucial bands only.

- o **Stage 2:** faucial and buccal bands

- o **Stage 3:** faucial, buccal and labial bands

- **Functional Stage:**

- o **Stage A:** Mouth opening >20 mm

- o **Stage B:** Mouth opening 11-19mm

- o **Stage C:** Mouth opening <10mm

14) Ranganathan K et al. (2001)⁸ divided OSMF based on mouth opening as follow

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

Group II: Limited mouth opening 20 mm and above.

Group III: Mouth opening <20 mm.

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

15) Rajendran R (2003)¹⁷ reported the clinical features of OSMF as follows

Early OSMF: Burning sensation in the mouth. Blisters especially on the palate, ulceration or recurrent generalized inflammation of oral mucosa, excessive salivation, defective gustatory sensation and dryness of mouth.

Advanced OSMF: Blanched and slightly opaque mucosa, fibrous bands in buccal mucosa running in vertical direction. Palate and faucial pillars are the areas first involved. Gradual impairment of tongue movement and difficulty in mouth opening.

16) Bose T, Balan A (2007)¹⁸ classified OSMF based on clinical features:

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.

17) Kumar K et al. (2007)¹⁹ categorized OSMF on the basis of mouth opening as follows:

Stage I: Mouth opening >45 mm

Stage II: Restricted mouth opening 20-44 mm

Stage III: Mouth opening <20 mm.

18) Mehrotra D et al. (2009)²⁰ suggested a clinical grading of the disease as:

Grade 1: Stomatitis, burning sensation in the buccal mucosa with no detection of fibres.

Grade 2: Symptoms of grade 1, palpable fibrous bands, involvement of soft palate, maximum mouth opening 26-35mm.

Grade 3: Symptoms of grade 2, blanched oral mucosa, involvement of tongue & maximal mouth opening 6-25mm.

Grade 4: Symptoms of grade 3, lip fibrosis & mouth opening of 0-5mm.

19) More CB et al. (2011)²¹

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 oropharynx, with/without stomatitis.

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

Stage 4 (S4) as follows:

- Any one of the above stage along with other potentially malignant disorders, e.g. Oral Leukoplakia, Oral Erythroplakia, etc.
- Any one of the above stage along with Oral Carcinoma.

Functional staging:

M1: Interincisal mouth opening >35 mm.

M2: Interincisal mouth opening 25-35 mm.

M3: Interincisal mouth opening 15-25 mm.

M4: Interincisal mouth opening <15 mm.

20) Patil S and Maheshwari S (2014)²² suggested a new classification based on cheek flexibility

Grade 1 (Early): Cheek flexibility >30mm

Grade 2 (Mild): Cheek flexibility 20-30mm

Grade 3 (Moderate): Cheek flexibility <20mm

Grade 4 (Severe): Any of the above condition without concurrent presence of potentially malignant lesions

Grade 5 (Advanced): any of the above condition with concurrent presence of oral carcinoma

B) Classifications Based on Histopathological Features of OSMF:

1) Pindborg JJ and Sirsat SM (1966)¹ divided OSMF depending only on histopathological features as:

Very early stage: Finely fibrillar collagen dispersed with marked oedema with plump young fibroblasts containing abundant cytoplasm. The blood vessels are dilated and congested. Inflammatory cells, mainly polymorphonuclear leukocytes with occasional eosinophils are present.

Early stage: Juxta-epithelial area shows early hyalinisation. Collagen still in separate thick bundles. Plump young fibroblasts are present in moderate numbers. Blood vessels are often dilated and congested. Inflammatory cells are mostly lymphocytes, eosinophils and occasional plasma cells.

Moderately advanced stage: Collagen is moderately hyalinised. Thickened collagen bundles are still seen separated by slight residual oedema. Fibroblastic response is less marked. Blood vessels are either normal or compressed. Inflammatory exudate consists of lymphocytes, plasma cells.

Advanced stage: Collagen is completely hyalinised. Smooth sheets with no separate bundles of collagen is seen, oedema is absent. Hyalinised area is devoid of fibroblast. Blood vessels are completely obliterated or narrowed. Inflammatory exudate consists of lymphocytes and plasma cells.

2) Utsunomiya H et al. (2005)²³ modified Pindborg's classification

Early stage: Large number of lymphocytes in subepithelial, connective tissue zone along with myxoedematous 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 infiltrate is hardly seen. Number of blood vessels dramatically less in subepithelial zone. Marked fibrous areas with hyaline changes extending from subepithelial to superficial muscle layers. Atrophic and degenerative changes start in muscle fibers.

3) Kumar K et al. (2007)²⁴ graded OSMF as follows:

Grade I: Loose, thick and thin fibres.

Grade II: Loose or thick fibres with partial hyalinisation.

Grade III: Complete hyalinisation.

C) Classifications Based on Clinical & Histopathological Features of OSMF:

1) Khanna JN and Andrade NN (1995)²⁵ developed a group of 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 marked 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, widespread sheets of fibrosis palpable, interincisal distance of 26 to 35 mm.

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 polymorphonuclear 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 fibres.

Group IVA: Advanced cases Severe trismus, interincisal distance of less than 15 mm, 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/or Squamous Cell Carcinoma.

Histology: Collagen hyalinized smooth sheet, extensive fibrosis, obliterated mucosal blood vessels, 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

The purpose of the present article is to outline the classification systems for the ease of early diagnosis of OSMF and its timely management.

Conflict of Interest: None

Sources of Funding: None

Ethical Clearance: Not Applicable

References

References are available on request at editor@healtalkht.com

