

## **WHITE SPONGE NEVUS**

### **Definition**

White sponge nevus (WSN) is a rare autosomal dominant disorder which was first described by Hyde in 1909, but the term was coined in 1935 by Cannon. It was also named as *familial white folded dysplasia*. The condition predominantly affects non-cornifying stratified squamous epithelia, such as the oral mucosa and, less frequently, extra oral sites, including the mucosal membrane of the nose, oesophagus, rectum and vulvovaginal mucosa; but not the skin. HPV 16 homologous DNA sequences in the biopsy specimen of oral WSN have been detected in one report.

### **Epidemiology**

The onset of white sponge nevus usually occurs before 20 years of age and often in early childhood. It exhibits no race or sex predilection; however, because of this condition's autosomal dominant pattern of this transmission, several family members may manifest the disorder.

### **Clinical presentation**

Clinically, white sponge nevus of the oral cavity is characterized by the presence of asymptomatic, bilateral, soft, white and "spongy" plaques (Figures 1-5). The surface of the plaque is thick, folded and may peel away from the underlying tissue. Lesions are asymptomatic and rough to palpation. The condition may involve the entire oral mucosa as to leave little normal mucosa visible, or may be distributed unilaterally as discrete white patches. The buccal mucosa is the most commonly affected site, followed by the soft palate, ventral tongue, labial mucosa, the alveolar ridges and the floor of the mouth. Gingival margin and dorsal aspect of tongue are usually spared. The disease is characterized by a wide variability and high penetrance, but with a benign clinical course. The size of lesions varies from patient to patient and time to time.

### **Aetiopathogenesis**

White sponge nevus (WSN) is an inherited disorder exhibiting autosomal-dominant transmission with no sex predilection mutations. The mutations affecting keratin protein interfere with intermediate filament assembly. Thus according to a putative pathogenic mechanism, the intermediate filament can be easily damaged as a result of mild mechanical trauma, inducing cytokine flooding of underlying basal cells, and, as a consequence,

excessive basal cell proliferation leading to mucosal hyperkeratosis. Histopathological features, including epithelial thickening, parakeratosis, extensive vacuolization of the suprabasal keratinocytes and compact aggregates of keratin intermediate filaments (KIF) in the upper spinous layers, resemble those found in epidermal disorders due to keratin defects. Suprabasal cell histopathology parallels the tissue-specific expression of keratins 4 and 13 in the differentiating cell layers. Suprabasal keratinocytes of the buccal, nasal, oesophageal and anogenital epithelia specifically express K4 and K13 and, mutations in K4 and K13 genes have been associated with white sponge nevus. Hence, the lesions are restricted to mucosal epithelia.

### **Diagnosis**

The recognition of this disorder is important in that it must be differentiated from other congenital or familial disorders of more widespread clinical significance. The clinical appearance is so distinctive that biopsy is usually unnecessary. The diagnosis is made more certain if there is a positive family history and other mucous membranes are affected. In case of any suspicion, biopsy should be performed. The differential diagnosis of white sponge nevus includes oral lesions of leukoplakia, chemical burns, trauma, syphilis, tobacco and betel nut use. White sponge nevus may also be confused with candidiasis, but fungal examination, the histology of biopsy specimens, and the response to antifungal agents will be the differentiating factors. Cheek-biting, lichen planus, lupus erythematosus should also be excluded.

Lesions of pachyonychia congenita, hereditary benign intraepithelial dyskeratosis, Darier's disease, dyskeratosis congenita may resemble lesions of white sponge nevus. Except for lichen planus and lupus erythematosus which may be limited to the oral cavity, these disorders can be distinguished clinically from white sponge nevus by their associated extra oral lesions. Thus, concurrent skin lesions exclude the diagnosis of white sponge nevus. The histopathology of these conditions also vary.

### **Treatment**

Although the patients suffer from no pain, they often complain of an altered texture of the mucosa or that the lesions are unaesthetic. Reassurance is all that is required, although numerous therapy models have been tried. None are likely to be effective unless they take into account the genetic nature of the lesions. Treatment with vitamins, antihistaminics and mouth rinses have been recommended, but none has been successful. Penicillin was reported to succeed to a little extent in the management of WSN. Treatments in the form of

gene therapy is difficult for a group of disorders including WSN due to autosomal dominant inheritance and the mutations acting in a dominant negative-manner. To achieve this the ways of inactivating mutant gene are actively being studied.

### **Prognosis and complications**

The lesions on mucous membranes persist through life, but the condition is benign.



**Figure 1.** White sponge nevus



**Figure 2.** White sponge nevus



**Figure 3.** White sponge nevus



**Figure 4.** White sponge nevus



**Figure 5.** White sponge nevus

### **Further reading**

- 1 Cox MF, Eveson J, Porter SR, Maitland N, Scully C. Human papillomavirus type 16 DNA in oral white sponge nevus. *Oral Surg Oral Med Oral Pathol.* 1992; 73:476-8
- 2 Lamey PJ, Bolas A, Napier SS, Darwazeh AM, Macdonald DG. Oral white sponge naevus: response to antibiotic therapy. *Clin Exp Dermatol* 1998; 23:59-63
- 3 Chao S-C, Tsai Y-m., Yang, Lee J.y-Y. A novel mutation in the keratin 4 gene causing white sponge naevus. *British Journal of Dermatology* 2003; 148:1125-1128
- 4 Rugg EL, McLean WH, Allison WE, Lunny DP, Macleod RI, Felix DH, Lane EB, Munro CS. A mutation in the mucosal keratin K4 is associated with oral sponge nevus. *Nat Genet* 1995; 11:450-2
- 5 Shibuya Y, Zhang J, Yokoo S, Umeda M, Komori T. Constitutional mutation of keratin 13 gene in familial white sponge nevus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2003; 96:561-5.