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Oral mucosal findings associated with chewing tobacco in Sweden — a clinical and histological study

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Key words: Leukoedema; smokeless tobacco, chewing tobacco; snuff, snuff induced changes

SUMMARY

Twenty men of mean age 51,9 years who used Swedish chewing tobacco as their only tobacco habit were examined for clinical and histological changes. On average they had been chewing tobacco for 10,7 hours daily for 11,3 years. The most common clinical finding was a leukoedema-like change of the buccal mucosa at the site where the quid was held after chewing. Ten subjects showed changes similar to mild snuff-induced ones. Histological findings corresponded well with the clinical ones. It appears that oral mucosal changes associated with chewing tobacco in Sweden are discrete.

OPSOMMING

Twintig mans met 'n gemiddelde ouderdom van 51,9 jaar wie se enigste tabakgewoonte die pruim van Sweedse pruimtabak was, is ondersoek vir kliniese en histologiese veranderinge. Hulle het die tabak vir gemiddeld 10,7 uur daagliks vir 11,3 jaar gepruim. Die algemeenste kliniese bevinding was leukedeemagtige veranderinge van die bukkale mukosa in die area waar die pruimpie gehou is nadat dit gekou is. Tien persone het matige veranderinge getoon soortgelyk aan dié wat deur snuif veroorsaak word. Histologiese bevindinge het goed ooreengestem met die kliniese beeld. Dit kom voor asof veranderinge in die mondmukosa wat verband hou met pruimtabak in Swede nie opvallend is nie.

INTRODUCTION

Smokeless tobacco has been the subject of extensive research during the last decade. Evaluation of its biological effects on humans has been made in an IARC monograph (1985). In 1991 the first International conference on smokeless tobacco was held in Columbus, Ohio. The term smokeless tobacco is commonly employed to describe products that contain tobacco as a principal constituent and used without combustion. A great variety of products are included in this term.

The effect of snuff taking on the oral mucosa has been the subject of many studies. Clinical and histological studies on snuff have recently been reviewed by Andersson (1991). There is only sparse information in the literature on the clinical and histological features associated with chewing tobacco.

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There are three main types of chewing tobacco, namely, plug/moist plug, loose-leaf and twist/role (IARC, 1985). In Sweden, predominantly twist tobacco is used. The twist type is often cut into pieces of suitable portion size. The predominant raw material for chewing tobacco is heavy-bodied, fire-cured tobacco. The difference in taste between various brands lies mostly in the casing, which may be sweet, sharp, salty or fruity (Andersson, 1991). The consumption figures of chewing tobacco in Sweden are low compared with those of moist snuff, 14 tons and 4 600 tons, respectively.

There is only one report from Europe presenting data on oral changes associated with tobacco chewing (Tyldesley, 1971). In a sample of 1,490 British coal-miners 381 were habitual chewers of tobacco. 91,2 per cent of the chewers were also regular smokers. Among 280 chewers 12 (4,3 per cent) showed pre-leukoplakia and 10 (3,6 per cent) leukoplakia. Among 122 non-chewers one case of pre-leukoplakia was found. The prevalence of leukoedema was 10 per cent in chewers and 4,9 per cent in non-chewers. In 8 of the cases showing leukoplakia a biopsy was secured which showed hyperorthokeratosis, acanthosis and a well-marked granular layer associated with minor epithelial atypia in some cases. There was no evidence of incipient malignant change. At a follow-up study of 8 tobacco chewers with oral leukoplakia after five years, one case of malignant transformation was encountered at the site at which the tobacco had been held for 30 years. In 5 other men no change was found and in 2, even a regression of the lesion was seen (Tyldesley, 1976).

The aim of the present study was to describe oral mucosal clinical lesions and to identify histological changes associated with the use of chewing tobacco in Sweden.

MATERIALS AND METHODS

Selected for the study were 20 subjects with a mean age of 51,9 years (range 25-80 years). Only men using chewing tobacco of the Swedish brand Picanell were included. Picanell is a non-fermented product with a pH value of 4,9 (cf. Swedish moist snuff with a pH value of 8-9!). The nicotine content is 21 mg/g tobacco (cf. Swedish moist snuff with a nicotine content of 5-11 mg/g!). The subjects had been using chewing tobacco on average for 11,3 years (range 1-50 years) and 10,7 hours per day (range 3,5-22 hours per day). One package of tobacco (14 grams) lasted on average for 4,2 days (range 1,5-10 days).

At their first visit each subject was examined according to a standardized programme. In addition to questions on smokeless tobacco habits, they were also asked about other tobacco habits, alcohol habits and medical history. Those with other tobacco habits or using drugs were excluded from this study.

A thorough clinical examination was carried out. Lesions of the oral mucosa were recorded and colour slides obtained. From the central parts of the area showing the most change, a biopsy was taken with a 6 mm punch instrument under local anesthesia (0,5 ml 2 per cent Xylocain-Adrenaline).

The criteria used for the clinical classification of the mucosal lesions were in accordance with those described by Axéll (1976) and later by Axéll and Henricsson (1981) and Andersson, Axéll and Larsson (1991) and were as follows:

Leukoedema was described as a greyish-white, velvet-like diffuse oedematous film covering a smooth oral mucosa. On the buccal mucosa a delicate folding could be seen. The folds were more or less vertical and did not disappear on maximal opening of the mouth. The surface of the lesion could easily be scraped off or displaced and re-established almost immediately.

Snuff dipper's lesion was defined as a slight or heavy wrinkling of the mucosa with or without whitish-yellowish to brown discoloration and with or without an obvious thickening. The localisation of the lesion was the site for regular placing of the quid. Snuff dipper's lesions were subgrouped according to a four point scale where Degree 1 comprises a superficial lesion of normal mucosal colour and Degree 4 a marked lesion with heavy wrinkling and deep reddended furrows or heavy thickening.

RESULTS

Eighteen of the 20 subjects placed the tobacco in the vestibular area inside the lip or cheek after chewing it. All of them showed a leukoedema in the buccal mucosa. Ten subjects showed changes similar to snuff dipper's lesion of Degree 1 or 2 at the site(s) where the chewing tobacco was regularly placed. Out of these ten, two placed the tobacco directly at the changed site instead of first chewing it for some minutes. The remaining ten subjects chewed the tobacco most of the time without placing it at a special site. All of those 10 showed only a leukoedema.

Histological changes are described in the following two case reports.

Case 1. An 80 year old man who was healthy and not on medication. He had used chewing tobacco for 50 years and consumed one package of 14 g per 7 days. He chewed tobacco for about 10 hours a day. The clinical finding was a leukoedema in the buccal mucosa. The histological picture was consistent with leukoedema (Fig. 1). It showed vacuolated cells in the upper spinous layers. In addition, a surface layer of variable thickness showed swollen cells, with no evidence of keratinization.

Case 2. A 37 year old man who was healthy and not on medication. He had used chewing tobacco for two years and consumed one package of 14 g per 5 days. He chewed the tobacco for some minutes before placing it inside the upper lip. The tobacco quid was kept in the mouth for about 11 hours a day. The oral mucosa showed changes which are very similar to those seen in snuff dipper's lesions of clinical Degree 2 (Fig. 2). Histology showed epithelium with a thickened and condensed structureless eosinophilic surface layer with a few pyknotic nuclei, occasionally with a slight evidence of keratinization, with a more or less well-developed granular layer. These changes were accompanied by only slight inflammation. (Fig. 2.)

DISCUSSION

The changes seen in the mucous membrane following chewing of Swedish tobacco products thus seem to be similar to what has been found in association with the use of other tobacco products. Leukoedema has been shown to be more

Fig. 1: **Histological picture of specimen from Case 1. Vacuolated cells in the upper spinous layer. The surface layer is of variable thickness and shows swollen cells. There is no evidence of keratinization. x 140.**

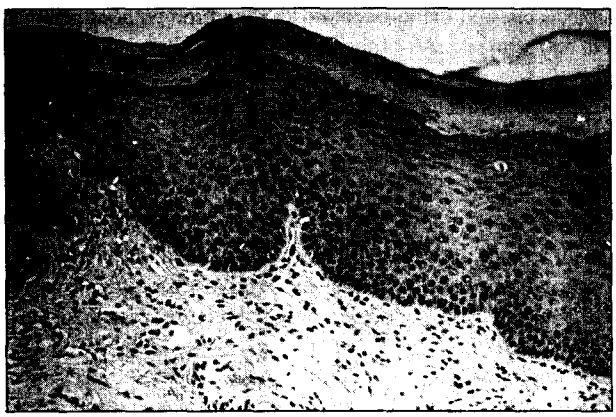

Fig. 2: **Histological picture from Case 2. Epithelium with a thickened and condensed structureless eosinophilic surface layer with a few pyknotic cells. Discrete granular layer and slight evidence of keratinization. Very slight inflammation. x 140.**

prevalent among tobacco smokers than among non-tobacco users (Axéll and Henricsson, 1981; van Wyk, 1985). Those who use snuff also show significantly more leukoedema changes than non-tobacco users even if those changes are not as pronounced as those seen in association with tobacco smoking (Axéll and Henricsson, 1981).

The finding of changes similar to those encountered among users of snuff has not been recognized previously. However, the finding of clinical Degree 1 or 2 lesions point to a relatively discrete influence on the tissues. This probably reflects the pronounced difference in pH values between Picanell chewing tobacco and Swedish moist snuff, about 5 and 8-9, respectively.

The changes encountered in this study are not compatible with leukoplakia. This point of view is in contrast with the one by Tyldesley (1971) who classified the lesions in his study as leukoplakias. The clinical appearance of the lesions described by Tyldesley seem to differ from those encountered in the present study. The cases illustrated by Tyldesley show a greater similarity to tobacco associated leukoplakias than the lesions found in the present study. This discrepancy most probably reflects the usage of different tobacco products.

Neither the lesions described by Tyldesley nor the changes seen in this study are comparable to the tobacco chewing lesions encountered in India. The tobacco products used are so different that changes at the site where the quids are placed should differ considerably from one another. Thus, as stated by Andersson *et al* (1991) "Depending on the contents of the "quid" this change may show varying clinical and/or histologic alterations. Such a "quid" lesion should preferably be recorded as a separate entity and not included among leukoplakias inter alia for purposes of follow up on the development of that specific "quid" lesion".

In conclusion, the present study has indicated that oral mucosal changes associated with Swedish chewing tobacco are discrete.

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