CHANGES IN THE DUCTS OF THE GLANDS OF THE HARD PALATE IN REVERSE SMOKERS

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Three hundred fifty-nine cases of stomatitis nicotina were studied in reverse smokers of home made chuttas. One hundred thirty-five biopsies of papular unbilicated lesions of stomatitis nicotina were studied histopathologically. The biopsies were chosen after toluidine blue staining. Mild dysplastic to severe dysplastic changes were seen around the openings of the ducts of the glands. There were three cases of microinvasive carcinoma in the one hundred thirty-five biopsies. Cystic dilatation of the ducts, due to obstruction of the ducts by keratotic plugging, was not seen in stomatitis nicotina lesions but was seen in elderly women who had smoked reverse for more than 4 to 5 decades. The ducts of the glands could probably form a portal of entry for the tobacco pyrolytic products which may act as carcinogenics.

CARCINOMA OF THE HARD PALATE IS ONE OF the common carcinomas seen in the District of Visakhapatnam on the East Coast of India; in fact, the highest incidence of carcinoma of the hard palate has been recorded here.[9] It also has been noted that a peculiar habit of smoking home made chuttas,‖ with the lighted end inside the mouth, is associated with this carcinoma.[3,4,11,12] The earlier changes the hard palate might undergo because of this habit have not been studied previously, but Reddy et al.[10] showed that stomatitis nicotina occurs when chuttas are smoked with the lighted end inside the mouth. One hundred and twenty biopsies from the palates of the reverse smokers and also from 12 nonsmokers were studied. In 38 of the biopsies there were dysplastic changes, and, in three cases, there was microinvasive carcinoma. These findings caused Reddy to suggest that stomatitis nicotina occurring in the reverse smokers could be precancerous.

Changes in the mucosa of the oral cavity due to smoking, chewing tobacco,[2] betel-nut, pan, and lime,[7] and other methods of smoking like Hookli etc.,[6] have been studied. Quigley et al.[8] studied the changes in the palate in people in the Caribbean who smoke cigarettes with the lighted end inside the mouth. No particular attention has been paid to the glands and the ducts leading from the glands on to the squamous epithelium in the above studies. Thoma,[17] Saunders,[13] Sutherland,[16] and Van Wyk[18] also studied stomatitis nicotina previously.

In a few of the biopsies of the papular lesions we saw peculiar changes in the mouths of the ducts of the glands of the glandular zone of the hard palate. An attempt was made to study these changes in more detail and in more cases.

MATERIALS AND METHODS

During a period of 6 months, we had the opportunity to study stomatitis nicotina in 251 female reverse smokers (Fig. 1) and 108 male reverse smokers. One hundred thirty-five biopsies were done from the papular umbilicated lesions of these people.

Stomatitis nicotina lesions were seen in the glandular zone of the hard palate. They were graded as mild when red dot-like openings were seen over a blanched area (Fig. 2); as

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‖ A homemade cigar consisting of bits of tobacco leaf wrapped round by a tobacco leaf. Length varies from 7.5 to 10 cm and the diameter from 0.75 to 1 cm. The tobacco is sun cured and grown locally.

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FIG. 1. A young girl smoking a chutta in the reverse fashion.

moderate when definite elevation could be made out with central umbilications, and as severe when the papules were bigger (5 mm or more) with umbilications of 2 to 3 mm. Biopsy sites were chosen by using the toluidine blue technique[14] to demarcate dysplastic areas. Only those papules whose umbilications stained blue to more than 2–3 mm in diameter were chosen for biopsy (Fig. 3). The whole papule was biopsied where possible, but it was not possible to take the whole thickness of the palatal mucous membrane. For the study of the normal glands and ducts, we stripped normal palatal mucous membrane in 10 autopsies in which there was no smoking history.

Whenever the ducts could be made out, serial sections were cut to show the continuity of the duct to the outside and also into the glands. The changes in the ducts were studied for thickening and squamous metaplasia of the ducts, lengthening of the ducts, tortuosity, and whether any plugging was present in the ducts. The lining epithelium of the ducts was studied for atypical changes like basal cell hyperplasia, vacuolation, hyperchromatism, irregular keratinization, mitotic figures, abnormal mitosis, presence of large malpighian cells and gaint cells, and for microinvasive carcinoma. No attempt was made to correlate the exact duration of the smoking or the number of chuttas smoked per head, as these particulars are difficult to obtain from the type of individuals in whom this reverse smoking habit is prevalent.

RESULTS

The normal palate mucous membrane along with the glands and its draining duct is shown (Fig. 4). The duct is lined by one or two layers of flattened epithelium and where it opens on to the mucous membrane the squamous epithelium is normal. There is no parakeratosis nor any atypism.

In the mild stomatitis nicotina lesions (Figs. 5, 6), there is squamous metaplasia of the ducts deep into the glands. There is parakeratosis and thickening of the squamous epithelium around the opening of the ducts and not much beyond on the surface epithelium. There is mild atypism of the lining of the cells, hyperchromatism, loosening of the cells,

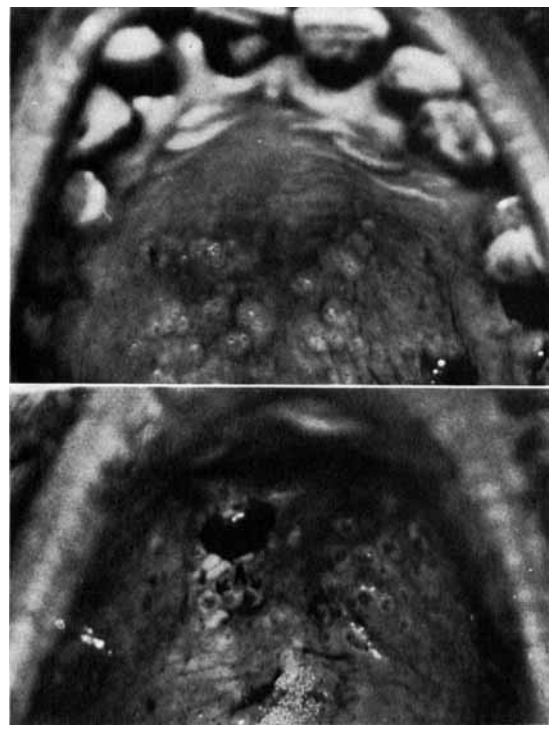

FIG. 2 (*top*). Palate of a reverse smoker showing mild stomatitis nicotina.

FIG. 3 (*bottom*). Palate of a reverse smoker with stomatitis nicotina after toluidine blue staining. The umbilications are stained. The irregular dark area is the biopsy site.

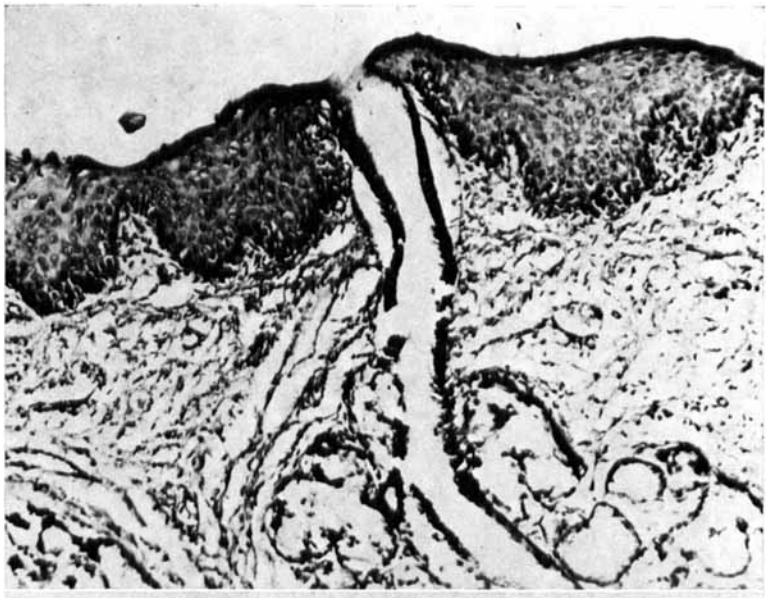

FIG. 4. The normal palate mucous membrane showing the opening of the duct of the gland (H and E, ×100).

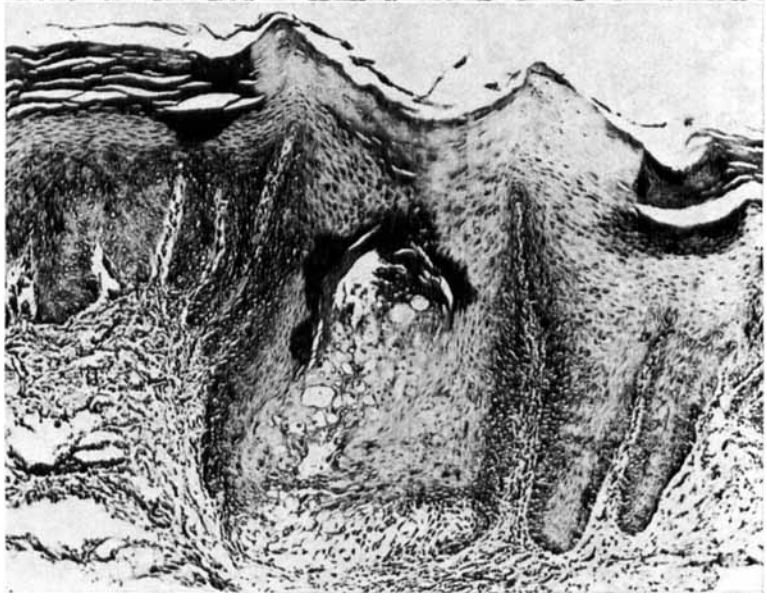

FIG. 5. The papule of a stomatitis nicotina lesion showing the squamous metaplasia of the ducts of the glands and parakeratosis at the opening of the duct (H and E, ×50).

and parakeratosis. In the next grade, the amount of squamous metaplasia of the ducts is more evident and parakeratosis and atypical changes have spread to the surrounding squamous epithelium also. Moderate atypism in the form of cell irregularity and hyperchromaism are evident (Fig. 7). In the severe stomatitis nicotina lesions (Fig. 8), the atypism is more marked. There is loss of polarity, hyperchromatism, irregular cornification, and irregularity in cell size (Figs. 9–11). In none of the above could we show obstruction to the ducts of the glands by keratotic plugging. Also, there were no changes in the glands to show that there was obstruction to the draining ducts and resultant atrophy or proximal dilatation of the obstructed ducts. There was no acinar atrophy and replacement fibrosis of the glands.

In the most severely dysplastic stomatitis nicotina lesions, the atypism was very much evident and showed microinvasive carcinoma (Figs. 12–14). There were three such lesions in the 135 lesions studied.

Cystic dilatation of the glands and acinar atrophy of the glands (Fig. 15) with thinning of the lining epithelium of the ducts and glands and interacinar fibrosis were seen by us

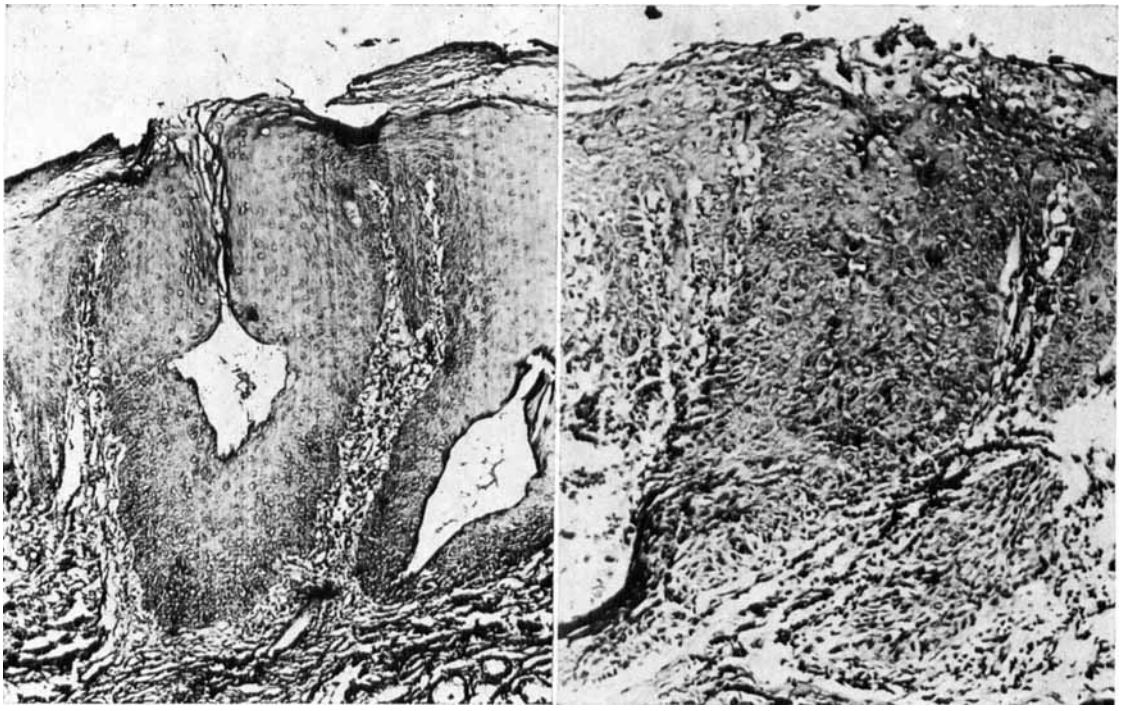

FIG. 6 (*left*). A duct in mild stomatitis nicotina showing mild atypical changes in the lining epithelium of the ducts (H and E, ×50).
FIG. 7 (*right*). A duct of the gland; the epithelium shows moderate atypism (H and E, ×100).

in only older people who had been smoking with the lighted end inside the mouth (Fig. 16) for more than 40 to 50 years and in whom very few flattened papules and patches of leukoplakia of the hard palate could be seen.

DISCUSSION

Thoma[17] was the first to study stomatitis nicotina lesions, and he described cysts in the corium of the palate with acanthosis hyperker-

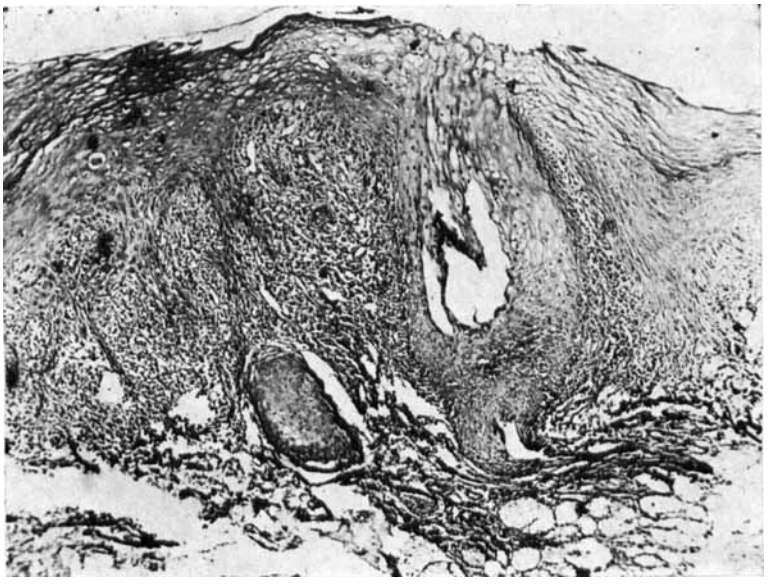

FIG. 8. A big papule from stomatitis nicotina showing severe dysplasia around the opening of the duct (H and E, ×40).

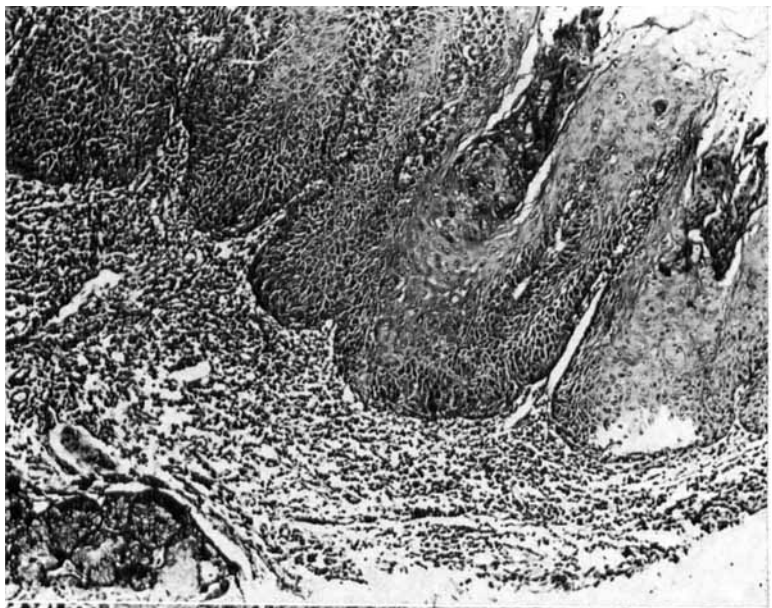

FIG. 9. Severe dysplasia of the lining epithelium of the glands with loss of polarity (H and E, ×60).

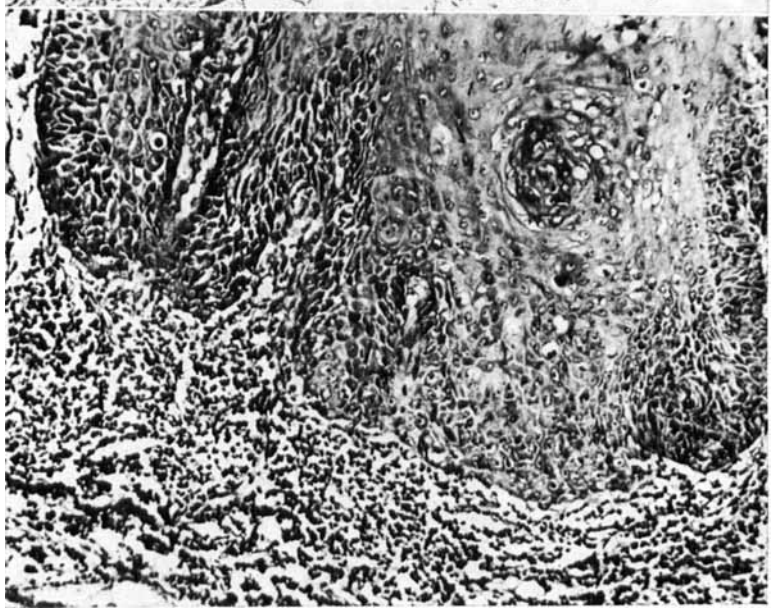

FIG. 10. Severe dysplasia of the duct lining (H and E ×100).

atosis and hypertrophy of the epithelial cells of the excretory ducts. The ducts were dilated because of keratotic plugging. Schwartz[14] and Sutherland[16] agreed with the findings of Thoma.[17] Van Wyk[18] studied 43 stomatitis nicotina patients and three normals. He studied pipe and cigarette smokers and those who smoke pipe tobacco wrapped in brown paper, and he described dysplasia in two cases. He also described parakeratosis, keratosis, and partial or complete occlusion of the ducts. Dilatation and cyst formation of the ducts were so prominent that acini discharged directly into the dilated cavities. The craters of the papules were thought to be due to the dropping off of the keratotic plugs. No mention has been made of any change in glands—neither hyperplastic changes to account for the papule formation nor atrophic changes as a result of the blocking of the ducts by keratotic plugging.

We have studied the stomatitis nicotina lesions from the mild-to-severe types before any leukoplakic lesions have occurred. The changes seem to occur in the ducts and around the opening of the ducts, from mild

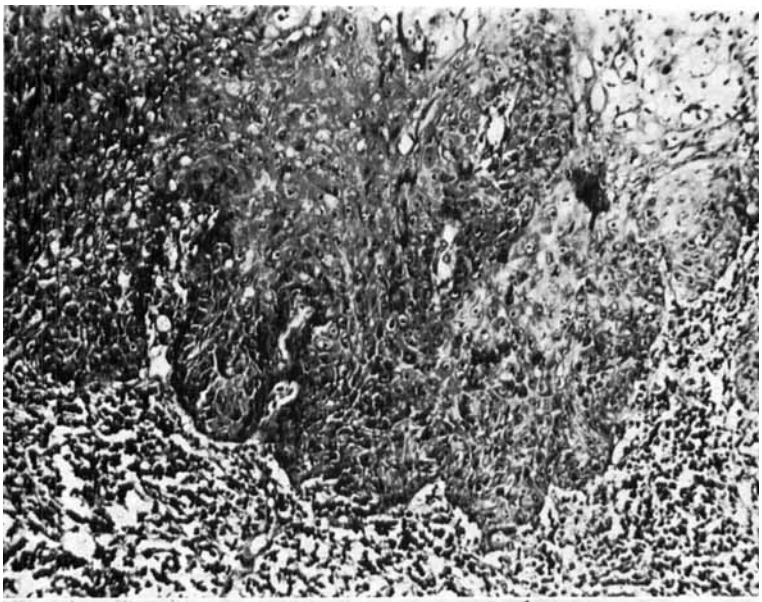

FIG. 11. Severe dysplasia of the duct lining (H and E, ×100).

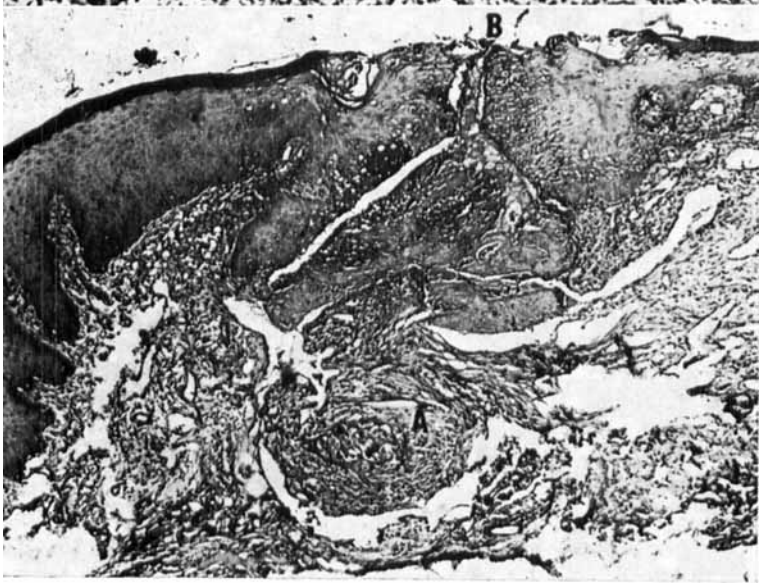

FIG. 12. Microinvasive carcinoma (A) near a duct opening (B), H and E, ×60.

atypism to marked dysplasia to even microinvasive carcinoma. In the early stages, the squamous epithelium, even a little beyond the opening of the duct, does not show any changes, but later on, as the lesion progresses, there is progressive atypism. No obstruction to the ducts could be seen. The glands below did not show any evidence of atrophy or thinning of the lining of the epithelium nor interacinar fibrosis—which could occur as a result of obstruction to the excretory ducts. On the other hand, there should have been hyperplasia of the glands to account for the papular elevations. It is not possible to explain the papules in any other way as there was no cyst formation. It was not possible to take a biopsy right up to the bone in the patients to show hyperplasia of the glands.

Obstruction to the ducts with resultant dilatation of the ducts and acinar atrophy of the glands could only be seen in older people who had the habit of reverse smoking for more than 4 to 5 decades. These findings also explain the earlier occurrence of the carcinoma of the hard palate in women in these areas[9] and also the earlier occurrence of stomatitis nicotina in women who smoke reverse.

Workers[14,16–18] have said before that the papules form because of obstruction to the excretory ducts and the resultant dilatation

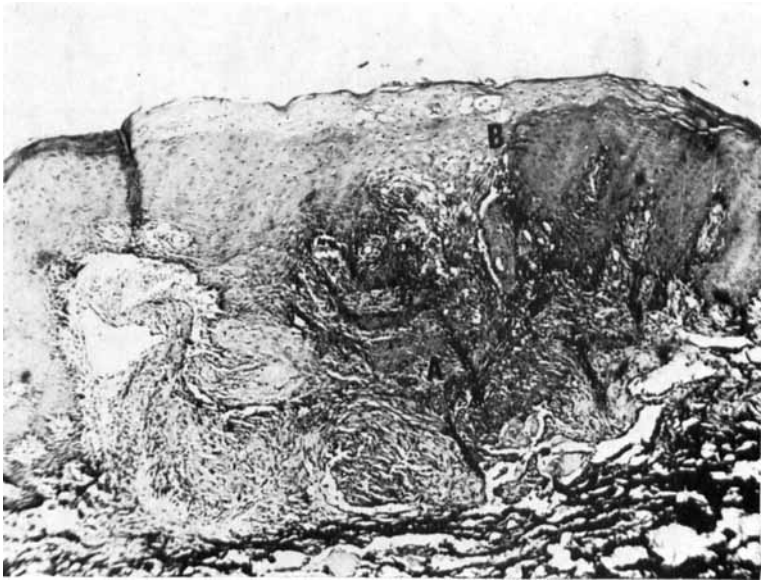

FIG. 13. Microinvasive carcinoma (A) around a duct opening (B), H and E, ×40.

of the ducts. This may be due to the fact that they might have studied longstanding lesions which might have advanced to a state of leukoplakia.

There has been some experimental evidence that glands have something to do in the development of carcinoma. Muir and Kirk[7] described squamous metaplasia of the sebaceous

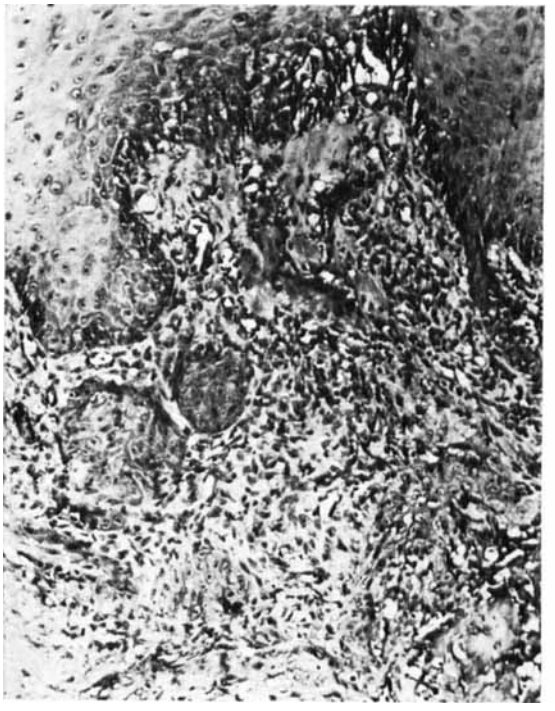

FIG. 14. High-power view of Fig. 13 to show microinvasive carcinoma (H and E, ×100).

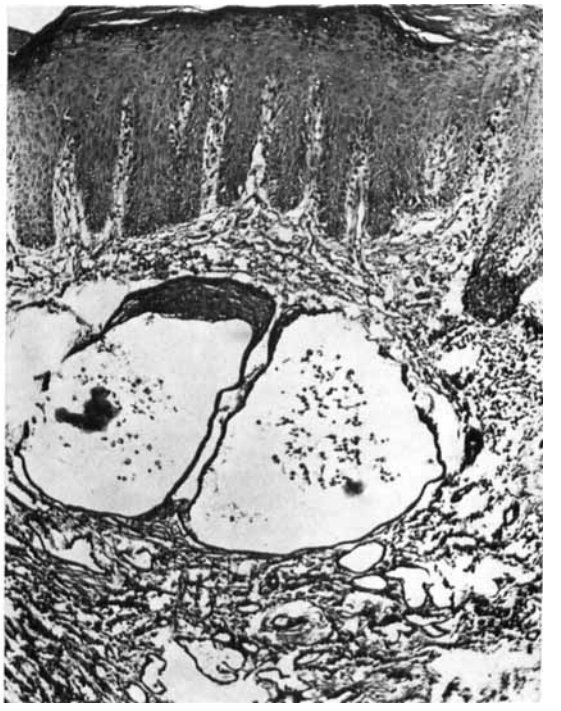

FIG. 15. A leukoplakic lesion showing cystic dilatation of the draining ducts, atrophy of the glands and surface hyperkeratosis (H and E, ×60).

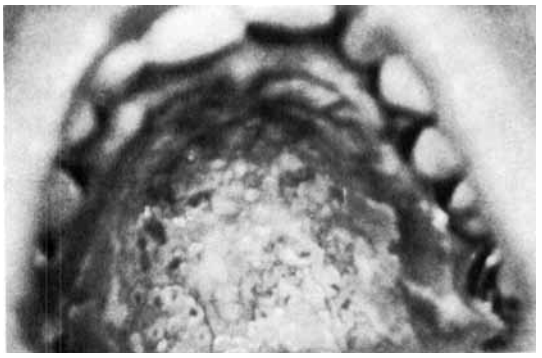

FIG. 16. A palate of a reverse smoker (longstanding) showing the conversion of the papular lesion into leukoplakia (umbilicated papules can still be seen).

glands in the ears of mice on painting with tobacco quid. Levy et al.[5] suggested that sebaceous glands might act as portals of entry for carcinogens. Carcinogenic agents applied to the keratinized mucosa of rodents and hamster pouches fail to evoke cancer as they do to the skin. It was suggested also that this might be due to the absence of sebaceous glands as a portal of entry for the carcinogen and the diluent effect of saliva.[1]

The ducts of the glands in the glandular zone of the palate might form a portal of entry for the tobacco pryolytic products which may be carcinogenic.

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