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The Effects of Wearing of Total Prosthesis on Palatine Glands: A Morphological Study

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Abstract: The purpose of this study is to examine the morphological effect which appears in acini and ductus of palatine glands in patients wearing total prostheses. Acini had considerably wide lumens due to degeneration and desquamation in secretory epithelial cells in those who wear prostheses during varying periods. It was observed that, in regions adjacent to the apical membrane in most of the epithelial cells of acini and excretory canals, large vacuoles were formed, whereas in some others, cytoplasm was disarranged due to membrane destruction. Cytoplasmic structures which were encountered in these cells underwent to degeneration and desquamation as well as secretory granules in the lumen. Furthermore, the osmiophilia of mucous secretory granules is increased and their structures impaired.

While adiposity was observed in the epithelial cells of some acini, some others were detected to be transformed into adipose tissue completely and not only did adiposity increase but also the secretion in the lumen was decreased as the wearing period of prosthesis was prolonged. Increased mast and plasma cells from the focal lymphocytic reaction surrounding the acini was noted. There was thrombus formation in vascular lumens and hyaline thickenings around small capillaries.

It was concluded that wearing total prostheses led to considerable alterations in the acini and ductus of palatine glands depending on the duration of wearing.

Key Words: Palatine glands, total prostheses, ultrastructure.

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Introduction

Besides the functions as facilitating speech, swallowing and lingual movements, salivary glands play protective role on the oral mucosa. Minor salivary glands consist of numerous small glands. One of them is palatine gland (1-4). The secretion from the palatine glands is purely mucous and it is released directly into the oral cavity under normal conditions.

Palatal secretion also contributes to the fixation of the prostheses in patients who wear total prostheses (5,6). But, these glands cannot release their secretions very easily into the oral cavity in those patients. Because they are included within supportive boundaries of the prostheses. It is suggested that, this condition might lead to alterations in the histopathology of the palatal mucosa and palatine gland (7-10). For example; thickening of the palatal epithelium, degenerative changes in the palatine glands.

This study was designed to determine ultrastructural changes that might arise in the structure of palatine glands in patients who wear total prostheses.

Materials and Method

In this study, human palatine gland biopsy materials (9 samples) were used. Three of them were selected as controls who had never worn total prostheses and who had their upper impacted canines operated upon. The others (6 samples) were obtained from the patients who had worn total prostheses. (1.5-5-5-8-10-12 years). The patients were operated upon due to irritation fibroma and extraction of rooth impacted under mucosa. Two of the patients were female and the others were male. Their ages ranged from 22 to 70 years.

Morphological Method

Biopsy materials were sectioned into small pieces of 1 mm in size for examination under electron microscope (11). The tissue samples were fixed in 2.5 % gluteraldehyde solution with phosphate buffer for two hours and thereafter postfixed in buffered 1 % osmium tetroxide solution for one hour. After dehydration of the samples in graded ethanol solution and treatment with propylene oxide to eliminate eth-

anol, the tissues were embedded in Epon 812 (Fluka AG Germany). Semithin sections (0.5-1 µm thick) were taken from LKB ultramicrotome (Stockholm, Sweden) and they were stained with Toluidine blue for light microscope. For electron microscopic study, ultrathin sections (400-600 Å) were cut with same ultramicrotome. The sections were stained with uranyl acetate and lead citrate. They were examined with transmission electron microscope (Jeol 100 C, Japan).

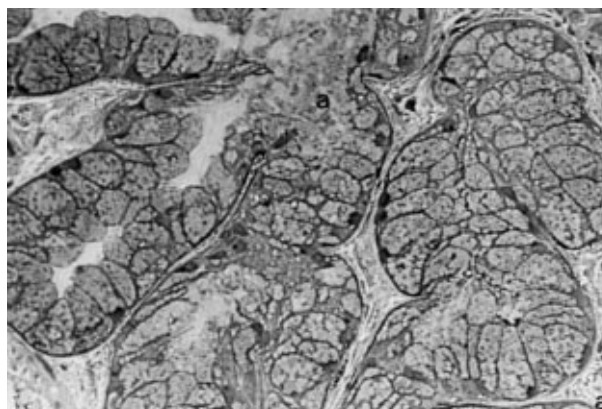
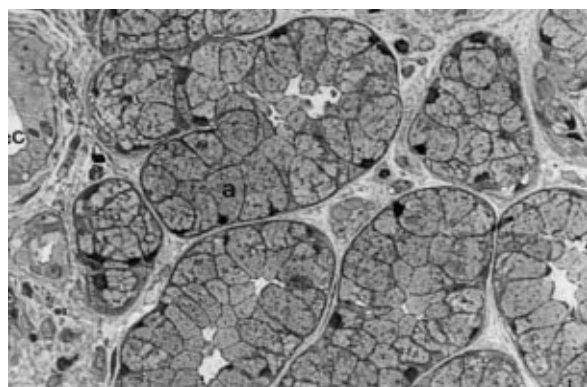
Results

In those subjects who comprised the control group who did not wear prostheses, normal structure were observed in the palatine glands situated in connective tissue. They had elongated pure mucous acini and excretory canals. The nucleus in acinar cells were seen near the base of the cells. Their cytoplasm contained many secret granules (Fig 1).

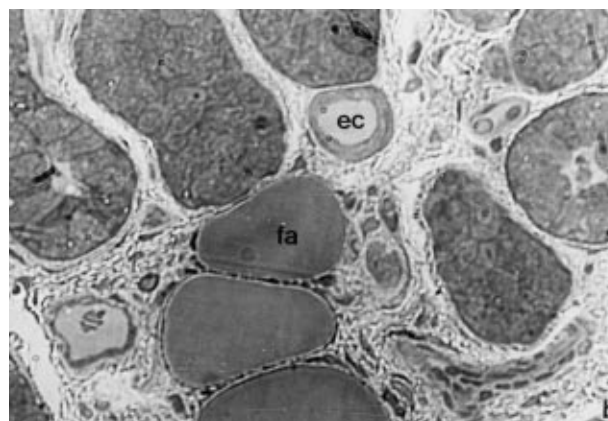
Considerably wide acini were observed due to degeneration and desquamation in the epithelial cells in patients who had worn total prostheses in various periods (Fig 2a). While epithelial cells were seen to be excessively fatty in some acini, some acini were totally transformed into adipose tissue (Fig 2b). Focal lymphocytic reaction in the stroma of the gland increased. Mast and plasma cells were noted (Fig 2c). While thrombus formation was observed in the vascular lumen of connective tissues, hyaline thickenings were seen surrounding small capillaries.

Examinations under transmission electron microscope (TEM) revealed that large vacuoles were ruptured and cytoplasmic organelles were scattered as a result of membran destruction (Fig 3a and b). Cytoplasmic structures of degenerated and desquamated

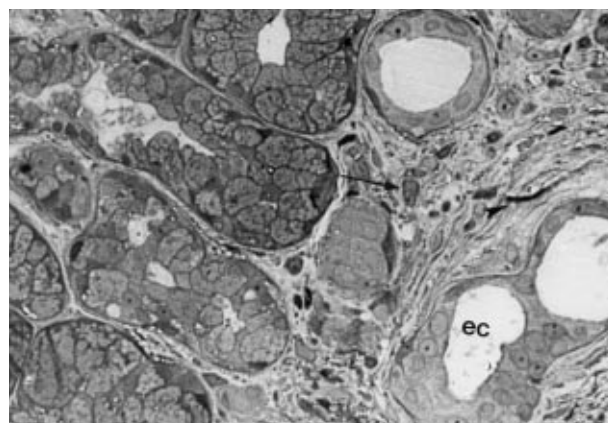
Figure 1. Control group: Normal mucous acini (a) of palatine glands with excretory canal (ec) in the left corner. Semi-thin plastic section. Toluidine blue x 200



2a

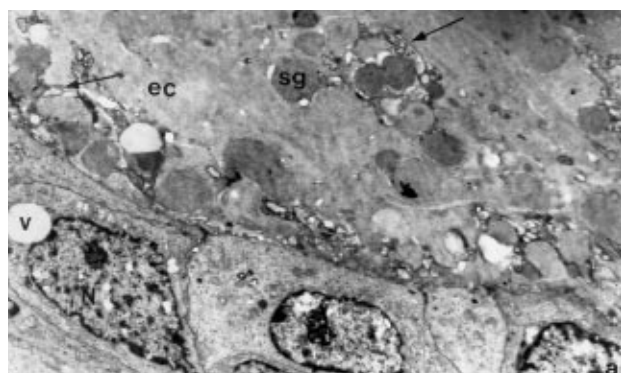


2b

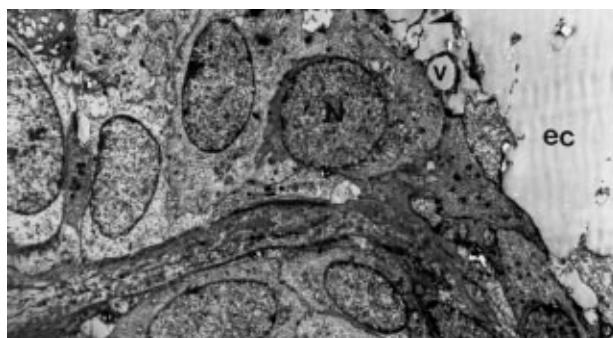


2c

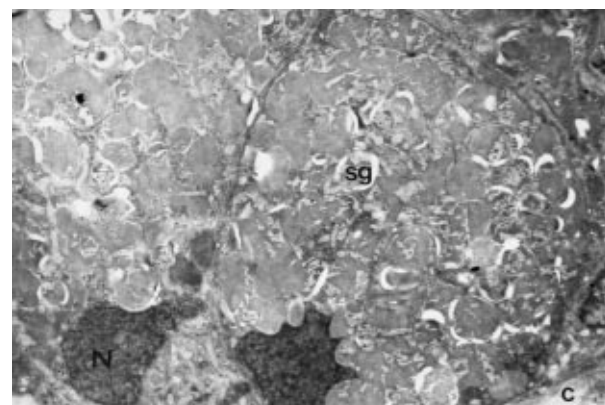
Figure 2. a) Palatine glands of patients wearing total prostheses. Epithelial rash in the enlarged acinus (a) and lumen are noted. Semi-thin plastic section. Toluidine blue x 200
 b) Focal adiposity (fa) in the acinus region due to advanced desquamation. Semi-thin plastic section. ec: excretory canal. Toluidine blue x 200
 c) Cellular and fibrillar increase in the stroma of the gland in the group. (>) Mast cell; (→): plasma cell. ec: excretory canal. Semi-thin plastic section. Toluidine blue x 120



3a



3b



3c

Figure 3. a-b) Ultrastructure of the excretory canal of the gland of the group wearing total prosthesis. N: nucleus V: vacuole, ec: excretory canal lumen, sg: secret granule. Electronmicrograph x 500 and 3000

c) Electronmicrograph reflecting the acinar structural in the upper right corner in Fig 2 in the acinar epithelium of the same group. N: nucleus, sg: secret granule. x 5000

cells were encountered with as well as secretory granules in the lumen (Fig 3c). The osmiophyllia of mucous secretory granules was increased and their structure destroyed (Fig 3c).

Discussion

Among small salivary glands, palatine glands play the most important role as regards to the wearing of total prostheses. By filling the space between the basal plate of the prostheses and the mucosa, not only do they prevent food debris from entering between the prostheses and the palate but they also allow prostheses to be worn comfortably in the mouth (5,6,9,12). An increase in the palatal epithelium and the thickness of the keratin layer was found in a previous histologic investigation that studied the tissue changes occurring under total prostheses (10). The fact that salivary gland dysfunction was frequently confronted in those patients has led most investigators to examine the histopathology of the palatine glands of these patients (7,8,13,14).

Niedermeier et al (8), who had widely investigated the physiology of palatine glands established that in 73 prosthetic patients, 38 of whom complained of oral burning, the functions of palatal mucosa were decreased by undergoing chemical and toxic irritation due to excessive compression on palatal mucosa. The same investigators also reported that Na^+/K^+ rates in the secretion were altered in the direction of Na^+ due to this destruction. On the other hand it was also reported among the results of this investigation that inflammatory findings, alterations in the osmiophyllia of mucous secretory granules and derangement in their structure seem to support these literature data (Fig 3c). Furthermore, focal lymphocytic reaction and increased mast and plasma cells in the surrounding connective tissue were also evaluated as a finding of chronic irritation in our findings.

Fartasch et al (7), investigated the ultrastructural phenomena of obstructive palatal sialadenitis. They studied in 7 patients wearing prostheses and 3 controls. They saw desquamation of duct and acinus cells and periductal infiltration consisted mainly of plasma cells and lymphocytes in patients who had worn total prostheses. The same investigators suggested that there might be some mechanical factors which play a role in the mechanism due to the fact that they could not visualise any microorganisms in the obstructed canals. They were not encountered with any neutrophils

or macrophage infiltrations in their ultrastructural examinations. We established focal lymphocytic reaction and mast cells in the connective tissue surrounding acini and excretory canals. We are of the opinion that, this condition may be attributed to the oral hygiene of our patients but desquamation of the excretory canal and acinus cells occurred due to wearing prostheses.

Another group of investigators (9,13) established that, the tissue damage was in the pattern of marked canal and glandular alterations in biopsies obtained both from living and from the cadavers. The damage was more severe in the patients who had worn total prostheses for a long time. These changes are in accordance with ours. They disclosed that the adipose tissue increased secondary to atrophy of acini due to

aging and obstruction and that fibrosis and lipomatosis developed following the retardation of the inflammatory processes. The data in this literature are confirmed by some excessively fatty acinar cells even by complete transformation of acini into adipose tissue, a condition which increases in parallel with the period of wearing the prostheses as well as by the severity of destruction in some vascular lumens.

We believe that research should be carried on a wide variety of case groups in order to make a comment as to whether destruction varies depending on age, sex and the systemic diseases the patient has concluding that total prostheses lead to significant alterations in the morphological structure of palatine glands due to the duration of wearing them.

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