The Structural Changes in the Tongue Papillaes in Conjunction with the Malocclusion

This study was to investigate whether was to determine the effect of structural changes in the tongue papillae in conjunction with the malocclusion. This study was carried out in 9 sheep dog. The dogs were divided three groups. In group 2 the enamel and dentin of the teeths in the right maxillary and mandibularly posterior regions were reduced with air and water cooling low speed hand pieces up to the pulp chambers in general anesthesia. In group 3, the same method was used for maxillary and mandibularly anterior teeth to obstruct biting, plucking, breaking forces exerted during mastication.

The tongues dorsal lingual epithelium was composed of several layers of nonkeratinizatinized cells. In the experimental group tongues papillae revealed thickening, blunting, keratinization and hyperkeratotz. The tips of the filiform and fungiform were pointed and hook shape anatomical processing were observed.

The results of this study indicate a strong relationship between occlusal and tongue papillaes. In our study, it is concluded that, malocclusion can produce structural changes in tongue epithelia and papillae.
INTRODUCTION

Malocclusion, with alternative names such as; crowded teeth, cross bite, open bite, means that the teeth are not aligned properly. Occlusion refers to the alignment of teeth and the way that the upper and lower teeth fit together. Ideally, all upper teeth fit slightly over the lower teeth. The points of the molars fit the grooves of the opposing molar. All teeth are aligned, straight, and spaced proportionally. The upper teeth keep the cheeks and lips from being bitten, and the lower teeth protect the tongue. Malocclusion is the most common reason for referral to an orthodontist. Very few people have perfect occlusion. There are 6 primary types of malocclusion: overbite, underbite, anterior crossbite, posterior crossbite, wry mouth, base narrow canines. Both heredity and environmental factors can play a role in developing malocclusions. Tongues disorders as abnormal volume, modified position and mobility can cause maxillary deformation.

Bad habits and immature oral perception are thought to be factors that cause functional problems related to some malocclusions. Questions remain as to which comes first – oral dysfunction or the skeletal condition. Without rejecting the possibility that dysfunctional oral behavior exists in open bite, some authors still debate how to link orthodontic treatment and myofunctional therapy of tongue thrust. In animal research, however, many studies of different species have concluded that there is an intimate relationship between the jaw and the tongue, in which jaw closing movements evoke shortening or retrusion of the tongue and inhibit the genioglossus muscle. Because the bite, through neuronal or electrical stimulation, causes a backward displacement of the tongue in animals, it would be interesting to study the degree of bite awareness of subjects with myofunctional disorders, and how this interacts with malocclusion and open bite.

Soft tissues in the orofacial region exert weak but consistent forces on the teeth according to the classical equilibrium theory, which has been reevaluated. Tongue pressure is considered to be a particularly important factor in the diagnosis and prognosis of orthodontic treatment.

The lingual dorsal epithelium of adult mammals is generally composed of regularly ordered columns of cells with different degrees of keratinization, namely the anterior cell columns of the filiform papillae and the interpapillary cell columns. In rodents, the interpapillary epithelium shows very weak keratinization, which may be identical with parakeratinization; however, in many mammals other than rodents, this area shows no evidence of keratinization. In most mammals, keratohyalin granules are recognized only in the anterior regions of the filiform papillae. However, the mechanism of morphogenesis of these papillae during development and growth remains to be clarified. In rats and mice, the rudiments of fungiform and circumvallate papillae, which are related to the sense of taste, are visible earlier than those of the filiform papillae, which are not involved in taste. Furthermore, many studies have shown that sensory nerves play an important role in the formation of gustatory papillae, and this role has been confirmed by the results of denervation experiments.

The purpose of this study, therefore, was to determine the effect of structural changes in the tongue papillae in conjunction with the malocclusion.

MATERIAL and METHODS

This study was carried out in 9 sheep dogs. The dogs were divided into three groups of 3.

Group 1 consisted of the controls. In group 2, the enamel and dentin of the teeth in the right maxillary and mandibularly posterior regions were reduced with air and water cooling low speed hand pieces up to the pulp chambers under general anesthesia. In this way, mastication function in the right buccal region was obstructed. In group 3, the same method was used for maxillary and mandibularly anterior te-
eth (incisive and canine) to obstruct biting, plucking, breaking forces exerted during mastication. All dogs were fed with standard food for eight months, and then the dogs were anesthetized by 2.5% glutaraldehyde with systemic perfusion. The fragments lesion tongues were also removed from dogs, fixed in formalin fluid and embedded in paraffin. Five to - six micron serial sections were prepared and stained with haematoxylin-eosin. The stained sections were later evaluated under light microscopy.

RESULTS

In control group, the appearance of tongues papillae was normal. The tongues dorsal lingual epithelium was composed of several layers of nonkeratinizatinized cells.

In the experimental group, tongues papillae revealed thickening, blunting, keratinization and hyperkeratosis. A typical keratinized layer was located at the surface epithelium, and it was composed of several layers of cells. Furthermore, the tips of the filiform and fungiform were pointed, and hook shape anatomical processing was observed.

Light microscopy revealed that filiform papillae were compactly distributed over the entire dorsal surface of the lingual body, and they had conical shape. The tips of the filiform papillae were pointed, and their apices were inclined towards the lingual radix direction. The surface layer was keratinized and was composed of a few layers of cells. The epithelial cells from the basal layer to the deep intermediate layer were cuboidal. Also, the evident thickening of the tongue epithelium and processing of the epithelia through the lamina propria were seen. The shape corruption of the filiform papillae was determined. The hook shaped process in the fungiform papillae was obtained.

The results of this study indicate a strong relationship between occlusal and tongue papillae. In the study, we conclude that, malocclusion can produce structural changes in tongue epithelia and papillae.

DISCUSSION

There are many studies into the morphology and distribution of the fungiform papillae on the tongues of adult mammals36-38, as well as studies reporting the differences in numbers of taste buds on each papilla among mammalian species39-41. Furthermore, the morphogenesis and the growth of other lingual papillae with taste buds, such as the foliate and circumvallate papillae, have been relatively limited42,43, and few studies have focused on the morphogenesis of filiform papillae44.

Orthodontists have traditionally viewed structural discrepancies as the major limitation of treatment. In reality, it is the soft tissues that more closely determine therapeutic modifiability45.

Cao J et al investigated the correlation between tongue size and openbite. The tongue size in openbite group, the difference was statistically significant, and tongue size was related to the openbite46.

Lamberton and et al reported that, the etiology of bimaxillary protrusion is complex, involving environmental factors, soft – tissue function volume and habit47. They examined the dorsal lingual surfaces of infant Japanese macaque (Macaca fuscata) and adult savanna monkey (Cercopithecus aethiopus). Filiform, fungiform, foliate and vallate papillae were found. The filiform papillae were distributed over the entire dorsal surface of the tongue. The fungiform papillae were round in shape, and more densely distributed on the lingual apex. The foliate papillae were seen on the dorsolateral aspect of the tongue. The three vallate papillae were arranged like a triangle with the apex of the triangle directing caudally. Each papilla was surrounded by a groove. The rudiments of the fungiform foliate and vallate papillae were visible earlier than those of the filiform papillae48. Much work has been published on the three-dimensional structures of the lingual surfaces in various animals. In the order Primates, there have been a few studies of the tongues of
ology and distribution of papillae on the dorsal lingual surface among animal species\textsuperscript{49-51.}

The dorsal surface of the tongue is covered by a specialized mucosa bearing different types of lingual papillae functioning in either a mechanical or sensory capacity. Interspersed between the numerous filiform papillae on the anterior surface of the tongue are the single (or isolated) smooth, round fungiform papillae. The fungiform papillae appear red because they possess a rich, vascular, connective tissue core that is visible through a thinly keratinized or nonkeratinized covering epithelium\textsuperscript{49}. Microscopically, each papule was morphologically consistent with a fungiform papilla surfaced by hyperplastic stratified squamous epithelium that exhibited a markedly thickened, often frayed layer of parakeratin with an adherent layer of microorganisms\textsuperscript{50}.

Pet rabbits are frequently treated by veterinary surgeons but most of the literature is based on diseases encountered in laboratory or commercial rabbits. Many pet rabbits suffer from dental abnormalities; therefore, 40 clinical cases of diseases associated with teeth problems were reviewed. The clinical and radiological examination of the oral cavity of conscious and anaesthetized rabbits was described and the treatment of dental disorders was discussed. Post mortem studies of 20 of the skulls revealed bone of poor quality. Deformed teeth with little or no enamel were found during clinical examination and post mortem. The poor quality of the teeth and bone was not related to malocclusion. Distorted growth of the crowns led to lacerations to the tongue or inside the cheek, causing anorexia, weight loss and problems with grooming. Distorted growth of the roots resulted in penetration of the weakened bones of the maxillae, mandibles and orbits. Osteomyelitis, abscess formation or infections of the lachrymal duct or nasal cavity were a result of this disease process. The cause of the defective teeth and poor bone quality was not determined, but preventative measures were proposed\textsuperscript{51}. In the literature, generally, the clinical aspects of the malocclusion have been evaluated. In our study, the histological changes caused by malocclusion on the tongue epithelial and the papillae were determined. Epithelial thickening, evident keratinization on papilla filiformis, fungiformis and foliata, hook shaped processes and shape corruptions were obtained.

\textbf{REFERENCES}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{The histological appearance of a light micrograph of the dorsal lingual mucosa. \textit{Ep}= Lingual epithelium (non-keratinized); \textit{Lp}=Lamina propria ; \textit{f}= filiform papillae ; \textit{fn}= fungiform papillae ; \textit{fl}= foliata papillae (original magnification x 100, hematoxylin and eosin stained).}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{The appearance of tongue papillae in the experimental animals in group 2. The epithelial thickening (↑), keratinization (k) and structural corruption of foliata papillae and fungiform papillae is seen easily (original magnification x 200, hematoxylin and eosin stained).}
\end{figure}


24. Miller IJ, Smith DV. Proliferation of taste buds in the foliate and vallate papillae of postnatal hamsters. Growth


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