HISTOLOGIC ASPECTS OF THE SOFT TISSUE AROUND DENTAL IMPLANTS: A STUDY ON DOGS

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ABSTRACT

Objectives. Histologic study of the soft tissue around dental implants placed in the lateral maxilla after loading.
Material and methods. Six middle size dogs, commune race, canis familiaris were used in the study. Three implants were placed in premolars fresh extraction sockets and nine after 80-90 days. Implants were immediately or delayed loaded. Samples were prepared for the histologic study of the implant-soft tissue interface.
Results. The peri-implant soft tissue had a well keratinized oral epithelium which was continuous with sulcular epithelium, and underlining connective tissue. Regular bundles of collagen fibers and abundent vascular structures were present. Lymphoplasmocytic inflammatory infiltrate and different degrees of acanthosis were found.
Conclusions. Knowledge of the structure of dental implant-soft tissue interface will aid the clinician to improve the clinical succes of the dental implant treatment.

Key words: dental implant, soft tissue, interface

INTRODUCTION

Research focused on bone to dental implant surface contact and on clinical survival of implants. Studies that evaluate soft tissue around dental implants over time are scarce. The soft tissue seal around a dental implant provides an essential biological barrier from the external environment (1).

Each case-specific limitations related to patient's clinical presentation and esthetic concerns must be shared with the patient prior to treatment (2).

As patient demand for esthetic restorations increases, clinicians must recontour the interdental papilla between teeth, between implants and teeth, and between adjacent implants (3).

This study evaluates the soft tissue around dental implants placed in the lateral maxilla with immediate and delayed loading, from histologic perspective.

MATERIAL AND METHODS

Six middle size dogs, commune race, canis familiaris were used in the study. Three implants were placed in premolars fresh extraction sockets and nine implants were placed after 80-90 days. Three implants were immediately loaded and nine implants were delayed loaded. Three months following loading the animals were euthanized and samples were prepared for the histologic study of

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the implant-soft tissue interface through optical microscope.

This study has been approved by the University of Veterinary Medicine Ethics Committee.

RESULTS

The peri-implant soft tissue presented a well keratinized oral epithelium which was continuous with sulcular epithelium, similar with the one of gingival tissue around teeth. In the connective tissue, collagen fibers were grouped in regular bundles, running along the blood vessels in different directions around abutment-implant interface with the role of soft tissue sealing.

Another histologic aspect in the connective tissue was the presence of lymphoplasmocytic inflammatory infiltrate and of abundent fibroblasts.

Abundent lymphoplasmocytic inflammatory infiltrate was found in 5 samples, medium levels were found in 3 samples and low levels in 2 samples. Lack of lymphoplasmocytic inflammatory infiltrate was registered in 2 samples.

Acanthosis was also found in the examined soft tissue around dental implants as follows: abundent in 4 cases, medium in 3 sites, low in 1 case. No acanthosis was found in 4 samples.

The soft tissue around dental implants showed abundent vascular structures, venous angiomatoses modifications, medium papillomatous changes, seromucous glands, graft material in the deep layers and marginal bone features of foreign body granuloma, as well.

At three months evaluation, the delayed loaded group compared with immediate loaded group didn't revealed significant differences regarding histologic aspects of soft tissue around the implants.

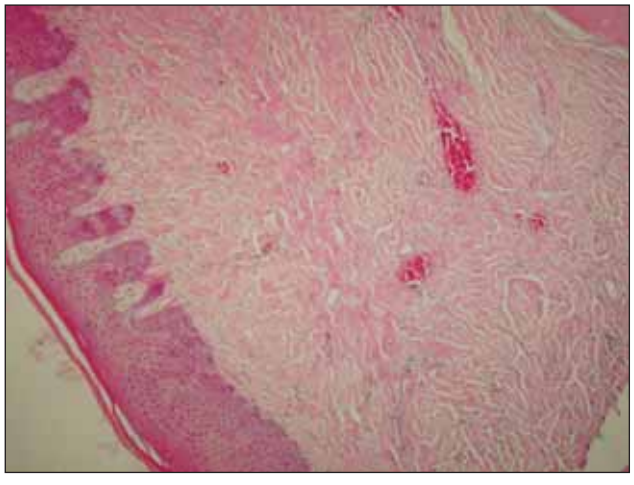

FIGURE 1. *Normal aspect of the periimplant mucosa. Hematoxilin and Eosin staining. 10x.*

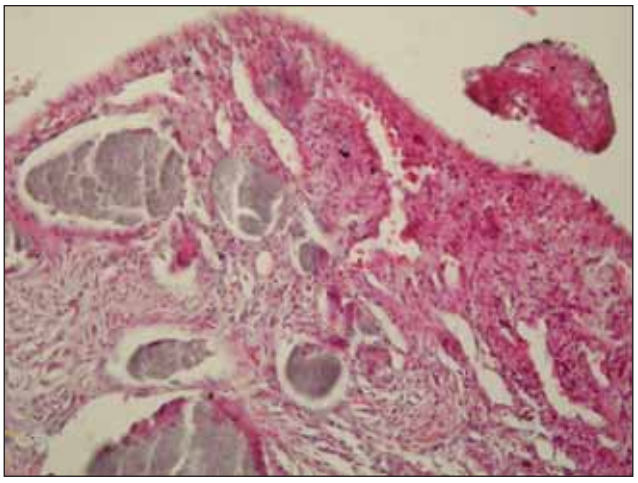

FIGURE 2. *Periimplant mucosa. Imaging features of foreign body granuloma. Hematoxilin and Eosin staining. 20x.*

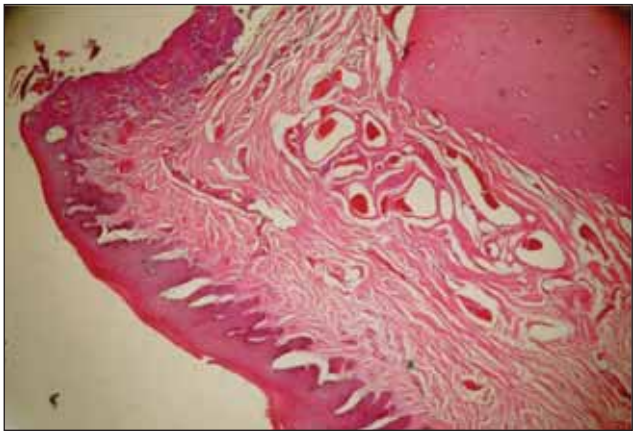

FIGURE 3. *Periimplant mucosa with medium papillomatous changes. Hematoxilin and Eosin staining. 10x.*

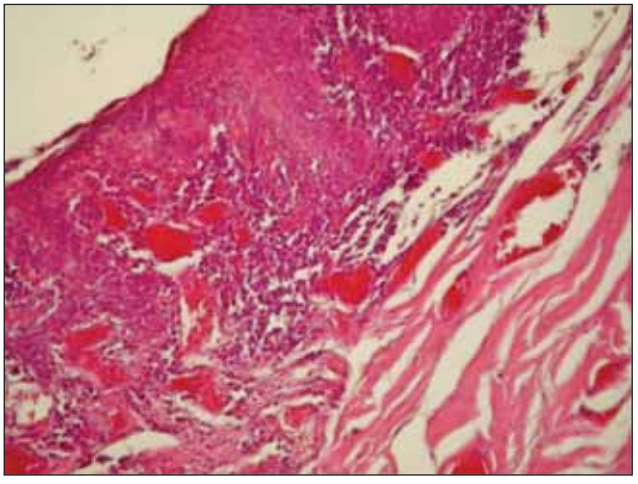

FIGURE 4. *Epithelium with papillomatous changes and chronic subepithelial inflammatory reaction. Hematoxilin and Eosin staining. 20x.*

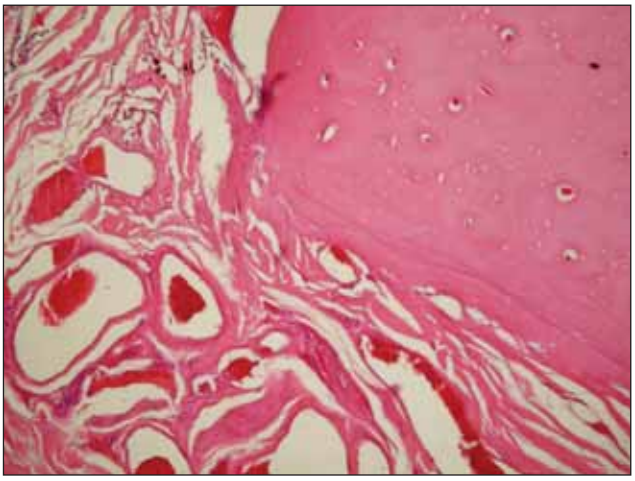

FIGURE 5. *Venous angiomatosis modifications. Periimplant mucosa. HE. 20x.*

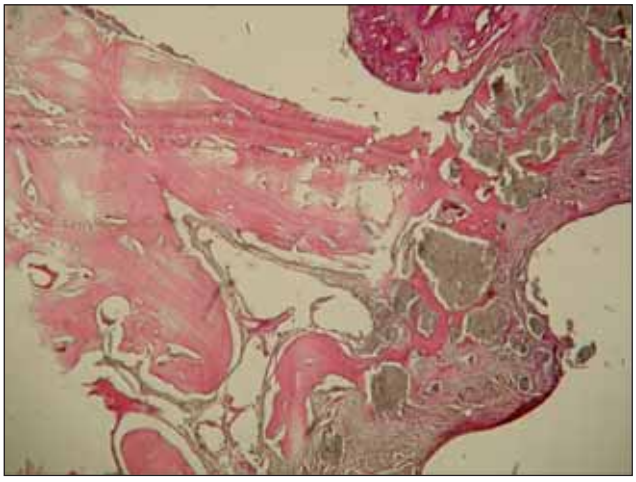

FIGURE 6. *Soft tissue with seromucous glands, graft material present in the deep layers, marginal bone. Hematoxilin and Eosin staining. 20x.*

DISCUSSIONS

The examination of soft tissue around dental implants is difficult due to demands in preparing sections of implant-soft tissue interface. However samples were obtained through implants dissection from the surrounding hard and soft tissues after demineralisation of the peri-implant bone.

The healing of soft tissue process after implant placement involved epithelialization and connective tissue formation. Decisive in healing is the epithelium migration which re-establishes the structures integrity. Important in the healing of soft tissue around dental implants are the complex interactions between cells, cytokines and matrix. Soft tissue shape, and type of implant superstructure can influence soft tissue healing around dental implants (4-6).

It is appreciated that the interaction between collagen fibers and titanium surface prevents apical epithelial migration (7).

Moon et al, 1999, described a 400 μm zone of connective tissue immediately lateral to dental implant with higher concentrations of fibroblasts, absence of blood vessels and reduced number of collagen fibres (8).

Mucosal individual variability may contribute to the difficulties in assessing soft tissues around dental implants (5).

Lindhe, 2005, postulated that a minimum width of 3 mm peri-implant mucosa may be required around dental implants to prevent bone resorbtion and to allow a stable soft tissue attachment to form (9).

Cochran et al, 1997, documented the dimensions and described the biological width around dental implants showing an area of epithelial attachment with the implant surface similar in morphology to that which is found in natural teeth. This physiological dimension was not altered whether loaded or unloaded (10).

Peri-implant soft tissue is similar to periodontal tissues, regarding both structure and function. A thorough understanding of the microstructure of dental implant-soft tissue interface will aid the clinician in choosing a dental implant system and improve the clinical longevity of the treatment (6).

CONCLUSIONS

Knowledge of the structure of dental implant-soft tissue interface will aid the clinician to improve the clinical succes of the dental implant treatment.

Acknowledgment

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