Introducion: Application of miniscrew with bone cement is a promising method that may extend the limits of force application for orthodontic movement. Tricalcium Phosphate (TCP) is a kind of biodegradable material and used for bone replacement and augmentation. Tricalcium Phosphate cement has a potential to be used with orthodontic miniscrews. It will be in contact with bone also with the surrounding soft tissue during application with miniscrews. In this study, the early effects of the cement on the surrounding gingiva tissue was investigated by histological examinations of epithelium and connective tissue. 

Materials and Methods: 8 male of New Zealand white rabbits were divided into two groups; as cement treated (n=7) and control (n=1) group. For cement treatment, a defect of 1.2 mm in diameter was created by punch at the level of lower left incisor gingiva, and the formed cavity was filled with TCP. The animals were sacrificed after 24 hour of surgery, and the gingival tissues were dissected for histological examinations. Tissue samples were fixed in 10 % formalin solution for 24 hour before tissue processing. Following paraffin embedding, gingival tissue sections of 5-μm were stained with hematoxylin-eosin (H&E) for evaluation of epidermis and dermis, Gomori methenamine silver and Masson’s Trichrome staining techniques in order to investigate the dermal extracellular matrix related molecules, especially collagen fibers.

Results: Gingival epithelium of control group described a parakeratinized stratum corneum whereas other layers of epithelium, stratum granulosum, stratum spinosum, as well as stratum basale reflected a normal morphology. In addition, the cells of stratum spinosum were polygonal in shape and the ratio of nucleus to cytoplasm was normal. In the epithelium of TCP-treated gingival tissues, the stratum corneum, stratum granulosum and stratum basale layers were quite similar to those of the control group. However, there was a decrease in the ratio of the nucleus to cytoplasm of the stratum spinosum cells related to an increase in the amount of cytoplasmic mass. Histopathological examination of the dermal extracellular matrix related molecules, particularly collagen fibers, did not reveal any significant difference in terms of organization of collagenous fiber network in both groups.

In conclusion, we could suggest that TCP treatment resulted in early histopathological changes in gingival epithelium whereas no prominent change had been encountered in collagenous fiber network of the gingival connective tissue. In the future studies, further histopathological changes and the self-repair mechanism of the gingival tissue upon removal of biodegradable TCP will be investigated.