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**Histological, Immunohistochemical localization of TNF- α
and Biomechanical Studies of the Effects of Hyaluronic
Acid on Osseointegration of Titanium Implant in Rabbits**

A thesis

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Abstract

Background:

Dental implant is a surgical screw that integrate with of maxillary or mandibular jaw bones to carry and to fix a dental prosthetic parts such as a crown, bridge, denture or to play as an anchorage in orthodontic treatment.

Our attempt is using a biomaterial system that is easily obtained and applicable and have the ability to provoke osteoinductive growth factor to enhance bone formation at the site of application. One of these natural polymers is hyaluronic acid.

Aims of the study: To study the effects of hyaluronic acid on bone-implant interface histologically, histomorphometrically, biomechanically and to study the immunohistochemical localization of TNF- α during implant integration

Materials and methods: Sixty machined surface implants from commercially pure titanium rod were inserted in tibias of thirty New Zealand rabbits. Two implants were placed in both tibia of each rabbit. The animals were scarified at 1, 2 and 4 weeks after implantation (10 rabbits for each interval). Five for torque removal test and five for histological and immunohistochemical study. For all of animals the right tibia's implant was control(uncoated) and the left one was experimental (coated with 0.1ml Hyaluronic acid gel).

At sacrificing days of three intervals (1,2 and 4 weeks) 30 implants from both groups (right tibia as control and left one as experimental) were used for study the force needed during anti-screwing of the implant from bone by using torque meter. The other 30 implant were used for histological and immunohistochemical study for expression of TNF- α for both control and experimental groups.

All sections have been stained with Haematoxylin and Eosin then they are histologically examined and assessed for histomorphometric analysis for counting of bone cells (osteoblast, osteocyte and osteoclast), cortical bone thickness, trabecular width, thread width and marrow space star volume (V^*). Also bone specimens of control and experimental at all healing periods were checked immunohistochemically for localization of TNF- α during implant integration.

Results:

1. Histological findings for HA coated titanium implant revealed an earlier bone formation, mineralization and maturation than that in control groups.
2. Immunohistochemical findings revealed more osteobalsts, osteocytys and bone marrow stromal cells that positively express TNF- α in HA coated implants in comparison to control one.
3. The biomechanical test results showed increase in removal torque mean values for both experimental and control groups with advancing time, while the mean torque values of the experimental group showed higher records than that of controls.
4. Histomorphometrical analysis for all bone parameters that examined in this study, showed highly significant difference between control and experimental groups in all healing intervals.

Conclusion:

Topical application of hyaluronic acid may act as an osteocoductive in the placement of endosseous implants thus accelerating healing process and enhancing osseointegration.