

***Effects of glucocorticoids
– induced osteoporosis on
osseointegration of
titanium implants in rabbits
(histomorphometrical and biochemical study)***

A Thesis

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By

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Abstract

Background:

Osseointegrated dental implants are currently recognized as a standard treatment method in dentistry.

Aims of the study:

The aim of the present study was to find the relationship between implant placement and onset of an osteoporosis (OP)-like bone as a determining factor in the establishment and maintenance of osseointegration.

Materials and methods:

Ninety machined surface Iraqi implants were inserted in 45 female rabbits (2 implants in each rabbit's tibia). Thirty of these rabbits were given 10 mg /B.W hydrocortisone i.m daily for 8 weeks to induce OP-like condition either before the osseointegration (group I) , or with the beginning of osseointegration (group II) , or 1 month after the beginning of osseointegration (group III). While the remaining 15 rabbits were given normal saline as a control groups (5 rabbits with each experimental group).

After 4 weeks of confirming osteoporosis in the animals, Pamidronate drug (type of Bisphosphonate) was given i.m. as a treatment for OP-like condition to 3 animals per each experimental group with a dose of 1.5 mg/Kg W.B. every 10 day for one month. The bone density was measured in x-ray films which were taken in operation day and at sacrificed day under Transmission densitometer.

After 4, 8, 12 weeks postoperatively (10 rabbits from I, II, and III experimental groups and 5 rabbits from its control group), blood sample was taken from each animal for serum alkaline phosphates, calcium, and

phosphorus analysis. One of the screws then unscrewed with a torque gauge, and the peak torque required to shear off the implants was recorded. Then the animals were sacrificed and the decalcified sections of the bone around the implants were studied histomorphologically. The eye piece reticle was used for morphometrical studies, which were includes: number of osteocytes in the first 3 threads, trabecular, and periosteal thickness.

Results:

The results revealed that the rabbits with glucocorticoid (GC)-induced osteoporosis showed delay in osseointegration, bone formation and bone maturation around implants in almost all 3 experimental groups, but this delay was especially noted in case of GC-induced osteoporosis before implantation (improvement in group I). While the rabbits in control groups showed improvement in bone formation and maturation around the dental implants.

Bone formation and maturation in experimental group was slightly improved by using Pamidronate drug as a treatment for GC-induced osteoporosis.

Removal torque test (as an indication for the osseointegration) showed higher torque test value in control animals than that in experimental one. Moreover, there were increases in torque test values in both groups with time.

Biochemical serum analysis revealed an increase in alkaline phosphatase and calcium serum concentrations in experimental animals than that in control one.

Conclusions:

It can be concluded that osseointegration can be performed in osteoporotic-like condition with slight delay in healing period. This delay can be improved by using Pamidronate drug to accelerate healing period.