Histological evaluation of osseointegration around titanium implants in thyroidectomized rabbits

(Experimental study)

A thesis

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Abstract

Background:

Thyroid hormones are essential for linear growth and peak bone mass acquisition. Hypothyroidism occurs when the thyroid gland produces less than the normal amount of thyroid hormones. The present study was carried out to evaluate the effect of hypothyroidism on osseointegration around the titanium implants screwed in rabbit's tibia.

Materials and methods:

Fifty four machined surface Iraqi implants were inserted in 27 male rabbits (2implants in each rabbit's tibia).Eighteen of these rabbits were subjected to subtotal thyroidectomy to induce hypothyroidism three weeks before implantation surgery.While the remaining 9 rabbits were considered as a control group.

Blood sample was taken from each animal at the beginning of this study in order to find the normal range of T3, T4, and TSH .Another blood sample was taken for experimental groups to find the levels of T3, T4, and TSH, three weeks after thyroidectomy in order to assess the hypothyroidism status.

After 2, 4, 6 weeks after implant surgery (6rabbits from experimental group and 3rabbits from the control group) were sacrificed. In the day of sacrifice, one of the screws was unscrewed with a torque meter, and the peak torque required to shear off the implant was recorded. Then the decalcified sections of the bone around the implants were studied histologically and histomorphometrically .The eye piece reticule was used for morphometrical studies, which were includes: number of osteocytes, number of osteoblasts, thickness and number of bone trabeculae, and thread width

Results:

The results showed that hypothyroid rabbits had delay in osseointegration, bone formation and maturation around implants in almost all rabbits in experimental groups. While the rabbits in the control groups showed improvement in osseointegration around titanium implant.

Removal torque test illustrated higher torque test value in control animals in comparison with experimental one. Moreover, there were increased torque test values in both groups with time.

Biochemical serum analysis revealed a decrease in T3, T4, and increase TSH levels in experimental animals.

Conclusion:

It can be concluded that there were low bone quality with a delay in bone healing around titanium implants in hypothyroid rabbits compared with healthy one.