Effect of Clodronate and Vitamin D3 on Retention after Orthodontic Teeth Movement in Rabbits

Thesis Submitted
By

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ABSTRACT

Relapse after orthodontic tooth movement is undesirable outcome after orthodontic treatment. reduction of tooth movement may be utilized by giving bisphosphonate drug to promote 'pharmacological anchorage', which is one of the important events in orthodontic treatment plan.

Aims:

The purpose of this study is to investigate the influence of systemic administration of clodronate + Vitamin D3, after orthodontic teeth movement in experimental rabbits. and to find out the effects of treatment with the two drugs on the new formed bone generated by fixed orthodontic appliance .

Materials & Methods:

This study done in college of dentistry, Mosul university. Two experimental branches in this study have been done, clinical and analytical,that include radiologic, biochemical and histological analysis. This performed involving a total of (125) local rabbits, the animals were separated into three groups,(control, clodronate and clodronate + Vitamin D3) for four periods of giving drugs 1, 2, 3 and 4 weeks .

The animals were anesthetized with an intramuscular injection of ketamine 10mg/Kg , and xylazine 4mg /Kg, then stripping of both incisors in the midline with sand strip prior to appliance placement and tooth movement .

After completion of tooth movement, the appliance was removed from the rabbits teeth and the space was measured with the digital caliper. For statistical analysis the space between the teeth measured directly at the time of removing the appliance(sp0), at end of 1st week (sp1) and the end of 2nd week (sp2). Rabbits underwent standardized serial digital radiographyof the work field and different measurements were done before and after treatment and at 1, 2, 3, 4th weeks.Bone Mineral Density of the newbone was measured using DXA .Blood samples were taken in the morning then the serum was separated for measuring serum bone specific alkaline phosphstase,and procalcitonin hormone .

The mandible was removed and the soft tissue covering it was removed. Each specimen was fixed in10% neutral buffered formalin. After fixation, decalcification done by using formic acid, the sections were examined and assessment of the amount of formation of new bone and the number of osteoblasts and osteoclast in the remodeled area.

Results:

A significant decreased tooth movement after appliance removal in experimental group was observed .A great decrease of space was seen in control group from gaining space to remaining space in 1 and 2 weeks, it is more in 1st week period gradually till 4th week, this clearly seen in percentage of relapse. In treating groups , higher value of space remaining in 1 week relapse than in 2 weeks relapse because the loss of space in 1 week relapse occurs quickly.Radiographic scores of all the groups show that the two drug groups give excellent results from the 1st week which is 5 compared with 4th week for control group which is 3.

The measuring of bone density between lower incisors, found that the mean value of control group for the four periods was lower than the plain group .The two treatment groups show higher values than plain group. The largest value is seen in the 1st and 2nd week for clodronate ,then for clodronate+vitamin group in 2nd week. BAP shows an increase in 1st 2weeks then it decreases but does not return to normal level . There an is increase of BAP seen in control group for the four periods compare to plain group.An increase of BAP in the 1st 2weeks for the treatment groups,and that , significant differences are found for those groups compared with plain one, then it decreases in the 2nd 2 weeks. For PCT there is a decrease of this hormone occur in the 1st 2weeks of all the groups, then it increases in the 2nd 2weeks to be near the plain group,there is a coincidence of PCT with BAP, in that, a negative relation between BAP and PCT.

Histologically, the larger values of osteoid tissue formation are seen in control group in 1sttwo weeks than the 2nd two weeks in both cervical and middle areas.For the two treatment groups, the values of clodronategroup are near to the values of clodronate+vitamin D3 group. Cells count or osteoblast number follows the same sequance of osteoid tissue for all the groups .

Conclusion:

The present study is highly recommended that systemic administration of bisphosphonate [clodronate and clodronate+vitamin D3] in rabbits led to decrease in orthodontic teeth movement.

تأثير الكلودرونيت وفيتامين D3 على التثبيت بعد حركة الاسنان التقويمية في الأرانب

اطروحة دكتوراه تقدمت بها

نعم فخري اغا

إلى مجلس كلية طب الأسنان، جامعة الموصل كجزء من متطلبات
نيل درجة دكتوراه فلسفة في علوم طب الاسنان/ تقويم الاسنان
باشـــــراف

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