Orthodontic Bone Stretching for bone augmentation and relocation: *prospective study ,interim report*

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Abstract

Ankylosed teeth and implants are the same challenge in report of growth. Infraclusion can be a consequence of the mobility due to the lack of ligament.

The orthodontic treatment, excluding ankylosed tooth or implant, is performed before surgical treatment.. The OBS technique associated to orthodontic movement, seems to be a viable procedure for the relocation of ankylosed teeth and implants.

Background and Aim

After avulsion of ankylosed teeth or after removing of an implant in a wrong position, a vertical bone augmentation is often necessary. Ankylosed teeth can appear being a good model in comparison with osseointegrated implants about their immobility and their behavior during growth or aging. Both doesn't follow the growth, conducing to infraclusion, vertical bone deficit and esthetic failure. The relocation of the tooth or implant with the surrounding bone should simplify the treatment

Recently a new technique, the Orthodontic Bone Stretching (OBS), was proposed for ankylosed tooth repositioning. The aim of this cohort study is to measure and to analyze the ankylosed teeth displacement and also to confirm the use of OBS technique for bone augmentation and implant relocation.

Methods and Materials

In a cohort of 14 patients with 17 ankylosed teeth and 3 malpositioned implants, orthodontic preparation was conduced to correct teeth misalignment. Then, open spaces were realized to permit the relocation. After alveolar bone exposition, one vertical interdental partial osteotomy cut was performed using ultrasonic surgery (Satelec Piezotome 2[®] with BS1 or BS5 Slim tips Acteon group, Mérignac, France) , on either side, in the same axis of the root and over the entire length of the tooth or implant. Next, cuts were connected through a third one that was positioned in a subapical manner to the apex. In al the cases, partial osteotomies involve cortical and a part of cancellous bone, preserving the opposite cortical, without any mobility of the area. The procedure is limited at the vestibular or palatal cortical.

Immediately after surgery, a continuous heavy orthodontic traction was introduced on the tooth or on the implant, in the same axis of the relocation, to stretch the residual bone. Patients were followed every 2 weeks for traction reactivation and measurement of the movement until the end of the relocation.

Orthodontic preparation before surgery

Orthodontic traction after surgery

Results

In all the case the bone bloc have moved. The displacement was 1,5 mm (+/-0,56) per months. All the implants were repositioned. Same results were obtained for single tooth, single implant and couple of teeth. In two patients (one implant and two central incisors), a second surgery was necessary to achieve the relocation. In 6 cases of ankylosed teeth the movement have stopped during the treatment. The causes of failure were an insufficient strength, a bad axis of drive or incomplete orthodontic preparation. One tooth too resorbed was broken, but after increase of marginal bone level.

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14 years old patient with I1 and 21 ankylosed

J0,
OBS surgery

Bone augmentation from first to second OBS surgery

Result at the end of treatment
2 veneers were performed

Diagram of the teeth movement

- tooth number 11
- tooth number 21

The comparison between the initial and final CBCT showed the movement of the ankylosed teeth, which were directed by the orthodontique forces in the three dimensions and lead to a vertical bone augmentation by bone stretching. For implant relocation, CBCT merging (CloudCompare Software) shows a movement of 4,55 mm +/- 3,78 in the sagittal direction.

45 yrs old patient with an implant in the left central incisor area

J0, OBS surgery

1 yrs after treatment

Merging of the Pre and Post Op CBCT showing the implant movement

Conclusions

OBS surgical relocation can be an alternative to ankylosed tooth avulsion, allowing to wait for the end of the growth in the young adult patient, with a better esthetic result. This technique corrects the bone level for the implant treatment. For malpositioned implants completely osseointegrated, this study suggests that implant relocation with OBS could be an effective alternative treatment. Corticotomy generate osteoclastogenesis and osteogenesis. The orthodontic traction promote bone stretching around the surgical area : this is the way for the ankylosed tooth or implant to move with all the bone block. This can be interpreted as a vertical bone augmentation.

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