CASE REPORT

Socket Preservation using Human Recombinant Growth Hormone Associated with Bio-Oss® Biomaterial with the Purpose of Improving Healing and Reducing Treatment Time - A Case Report

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ABSTRACT

The purpose of this article is to describe a clinical case where recombinant human growth hormone (rhGH) associated with Bio-Oss® was used in socket preservation. 53-year-old female patient, ASA I, attended the dental clinic presenting a root fracture of the second upper right premolar. The treatment plan consisted of tooth removal and socket preservation with rhGH and Bio-Oss. After 4 months, a tomography scan was performed before implant placement. At the time of the implant placement, a bone sample was sent for histological analysis. The collected material was analyzed histologically and demonstrated mature bone, with areas of neoformation and deposition of bone matrix and the tomographic aspect was of a hypodense image inside the socket. Socket preservation realized with rhGH associated with Bio-Oss® was able to maintain the three-dimensional dimensions of the sockets, promoting neoformed bone with histological and radiographic features of maturation and was able to reduce the time of treatment.

Key words: Recombinant human growth hormone, growth factors, socket preservation

INTRODUCTION

After tooth loss, there is a change in the amount of socket bone. The decrease of the socket bone can begin at the moment of the extraction, either through the excessive bone removal, fractures of the buccal bone walls or after extractions, evolving to alveolar atrophy. This process of reabsorption of the alveolar ridge follows progressively throughout life, and it may be impossible to rehabilitate implants, since this therapy is based on the principle of correct three-dimensional positioning of the implant in the socket bone.[1]

A wide range of materials and techniques has been proposed for socket preservation. Autogenous bone, biomaterials, and different membranes and more recently the blood concentrates are some examples among the most used for this purpose. Among the biomaterials used, the bone substitute of xenogeneic Bio-Oss® origin is the most widely used and researched in the world.[2] Many of the investigations involving biomaterials seek to improve their characteristics so that they can have the same performance as an autogenous bone without the inconvenience of needing a donor area.[1,3]

The use of growth factors to aid in bone metabolism has been studied for years in orthopedics and more recently in the maxillary bones. Among the factors of growth, we can cite the GH.[4] In 1959, the effect of recombinant human GH (rhGH) on bone repair in fractures was proposed by Janicki *et al*.,[3] and subsequently other studies demonstrated the action of rhGH on bone metabolism in animal models, as in Bail *et al*.,[5] in 2003, in which they evaluated the systemic use of

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rhGH in the healing of tibial fractures induced in mini-pigs. The action of GH occurs in different tissues of the body, being more highlighted on bone metabolism, through direct action on chondrocytes and osteoblasts. Recent articles demonstrate the local application of GH around osseointegrated implants, use in procedures of bone grafting of the jaws and use in endodontics associates with MTA.[5,6]

The aim of this article is to describe a clinical case report where the rhGH associated with Bio-Oss® was used in socket preservation.

CASE REPORT

A 53-year-old female patient, ASA I, attended the dental clinic presenting a root fracture of the second upper right premolar, making it impossible to maintain it. The proposed treatment was dental extraction and posterior rehabilitation with implant. Due to the need to preserve the socket structure for the correct positioning of the implant in a second moment, we chose to perform a socket preservation procedure by locally applying four international units of rhGH associated with 0.25 g of Bio-Oss® small.

Due to its liquid in ampoule presentation, rhGH can be easily manipulated and incorporated with Bio-Oss®. After the mix of both substances for 30 s, the combination can be inserted into the socket. The patient received routinely post-operative instructions and returned in 6 days to remove stitches without presenting complications. For the surgical planning of the implant, a tomography scan of the site was obtained after 4 months of the dental extraction and graft. The tomography showed good bone density in the grafted region, suggesting a viable neoformed bone for implant installation. Before bone milling for implant installation, a portion of the bone was removed with a trephine bit with 2 mm of internal diameter [Figure 1]. The implant was installed and the bone collected was sent to histopathological analysis.

RESULTS

The collected material, when analyzed histologically, demonstrated a mature bone, with areas of neoformation and deposition of the bone matrix, confirming the tomographic aspect of a viable bone for the insertion of implants [Figure 2].

Regarding the imaging tests obtained, the tomography showed a good bone density at the site of the dental extraction [Figure 3].

DISCUSSION

The maintenance of the socket bone for implant rehabilitation is a procedure performed in several ways, considering

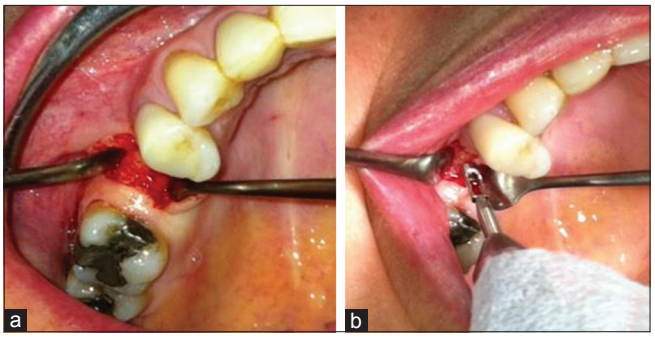

Figure 1: (a) Aspect of the bone in the trans-surgical, after incision and distancing of the flap, (b) bone formation for histological analysis

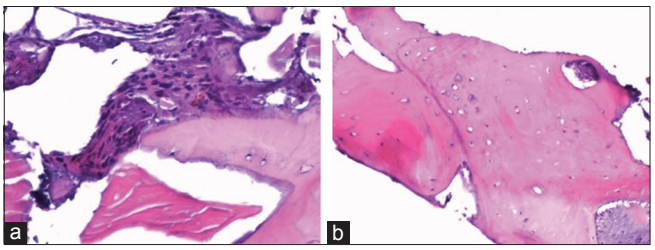

Figure 2: (a) Histological analysis of the collected tissue showed areas of neoformation and deposition of bone matrix, (b) compact bone and demonstrating vital bone

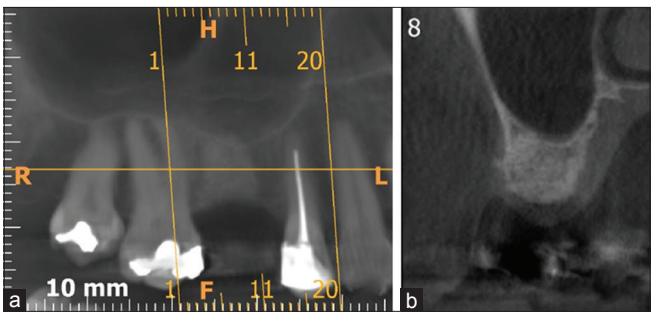

Figure 3: (a) The tomography showing the region of the dental extraction and graft; (b) sagittal section of the tomography showing the volume of Bio-Oss® and recombinant human growth hormone grafted

the variety of materials and techniques proposed for this treatment. The time required between bone grafting and dental implant rehabilitation is inconvenient for the surgeon and the patient, since a period of 6 months is often necessary.[3,7]

This case report brought the use of GH in socket bone preservation, the results show a compact bone is vital to the tomographic and histological examination, respectively, the goal of hormone use is to accelerate bone healing and make the treatment shorter.

In a study conducted by Silva *et al*.,[8] the use of socket preservation without the use of rhGH was demonstrated, the healing time was 6 months after grafting, in this study with

4 months it was possible to evaluate through histology the presence of viable bone for implant insertion.

The first published articles on osseointegration already emphasized the importance of bone quantity and quality of the site that would receive the dental implant, and good quality bone is a predictive factor of success for the osseointegration of the implant, in this study, we can note that the use of rhGH is associated with early bone maturation, with 4 months of healing, it was possible to notice a viable bone for the placement of the osseointegrated implant.

Radiographic and tomographic imaging tests may be methods to qualitatively evaluate, non-invasively, the bone that will receive the implant.[9] The tomography obtained from the region showed that there was adequate bone density, making the site fit to receive osseintegrated implant.

rhGH, used in other studies, seems to be a promising growth factor for application in the maxillofacial area and may add important characteristics to the materials usually used for bone reconstruction,[4,10] in this case, it was used for socket bone preservation and early maturation of the bone.

CONCLUSION

Based on the results of this case report, socket preservation with rhGH associated with Bio-Oss® was able to maintain the three-dimensional dimensions of the sockets, providing a neoformed bone with histological characteristics of maturation in the evaluated period and also showed that it was possible to reduce the time of healing of the socket.

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