

Autologous Dentin: As A Regeneration Biomaterial In The Placement Of A Post-Extraction Implant, Case Report

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Abstract

The objective of this Case Report was to determine that the use of an Autologous Dentinal Graft is so efficient that it shows comparable results and clinical performance similar to autologous bone, when used as a graft material in Immediate Post-Extraction Implants.

A Literature Review was carried out and various results were found from Meta-Analyses, Systematic Reviews, Clinical Trials (In Vitro and Animal), Randomized Controlled Studies, Prospective and Retrospective Studies to Case Reports.

The results reported in all studies conclude that the use of Autologous Particulate Dentine or Mineralized or Demineralized Dentine Matrix show clinical, histological performance similar to autologous bone and superior to Xenograft.

Autologous dentin is an effective option for bone augmentation around dental implants, with acceptable primary stability, marginal bone loss, and incidences of complications or failures.

Keywords: dentin; autologous; regeneration; implant; post-extraction

Introduction

We present a case of dental trauma with root fracture of the upper left central that was extracted and the root remainder used as filling material for the space between the post-extraction implant and the vestibular table.

The biomaterial par excellence is autologous bone, but in recent years it has been proven that dentin grafts act in a similar way to bone.

Materials and Methods

A 50-year-old male patient presented one week after having suffered dental trauma when he fell to the floor after losing his balance. Clinical examination revealed edema and erosion of the upper lip, and intraorally enamel fracture in the middle third of the right upper lateral incisor and left central

incisor.

Radiographic evaluation shows a fracture of the root middle third of specimen 2.1 (Figure 6). Mobility was stabilized by splinting with fluid resin to neighboring parts. The evaluation of the case was completed by means of: Photos, Study Models and CBCT. After consulting with the specialist, it was decided to perform endodontics on teeth 1.1 and 1.2.

Based on the Diagnosis and Treatment Plan, procedures involving Periodontics, Implantology and Oral Rehabilitation were carried out. The immediate extraction and placement of a conical connection implant and internal hexagon was performed to preserve the emergence profile, the crown of the tooth was used as provisional and the root rest as filling material for the vestibular gap.

Treatment included extraction of the fractured tooth and root remnant (Figure 2), immediate implant placement (Figure 4), use of dentin to fill the space between the implant and the vestibular table (Figure 13), and immediate provisionalization to preserve the emergence profile (Figure 14). The CBCT control showed the integration of the graft at 2 months (Figure 15), so prosthetic rehabilitation was performed.

Pieces 1.1, 1.2, 2.1 and 2.2 were rehabilitated with lithium disilicate crowns and veneers (Figure 16).



Figure 1: Initial Situation.



Figure 2: Atraumatic Extraction.



Figure 3: Part 2.1.



Figure 4: Immediate Implantation.



Figure 5: Endodontics.



Figure 6: Root fracture.



Figure 7: Extraction.



Figure 8: Starter Cutter.

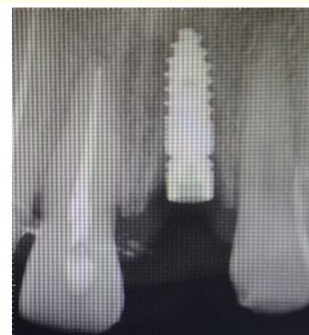


Figure 9: Post-extraction implant.

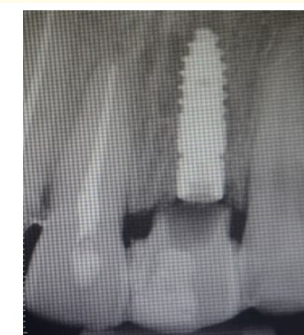


Figure 10: Dentin Graft.

The use of immediate post-extraction implants allows the emergence profile to be maintained and the loss of bone and alveolar density to be reduced [1, 13].

The review of scientific literature to support the use of Autologous Particulate Dentin DAP presents us with the scientific evidence for its use as a bone graft substitute, dentin has the same embryonic origin as alveolar bone, its physical properties such as density and roughness which explains its ability to form bone [2-4].

After extraction, the tooth is cleaned of periodontal tissue, previous fillings. Vital pulp tissue, filling material and enamel are removed. The remaining dentin is then crushed in a bone mill, the dentin particles are packed into the socket and used as a graft [2].

The IDA Autologous Dentin Graft has been compared to the Bio-Oss Xenograft for alveolar ridge augmentation. The vertical dimension of the grafted bone was measured at the time of grafting and at the time of implant placement, after 6 months. The vertical dimension of alveolar bone increased by 5.4 ± 2.7 mm in the ADI group and 6.6 ± 3.5 mm in the Bio-Oss group at 6 months post-extraction. New bone formation at the ADI sites was $31.2 \pm 13.9\%$ while in the Bio-Oss group it was $35.0 \pm 19.3\%$. The Autologous Dentin Matrix.

Demineralization of extracted teeth grafted into extraction alveoli to increase vertical dimension was as effective as augmentation using inorganic bovine bone. Both groups showed favorable healing, similar implantation and histological confirmation of new bone formation. Thus, the results of this study suggest that ADI is a viable option for alveolar bone augmentation after tooth extraction [3].



Figure 11: Root Remainder.



Figure 12: Particulate Dentin Matrix.



Figure 13: Closing the Gap.



Figure 14: Immediate Provisioning.

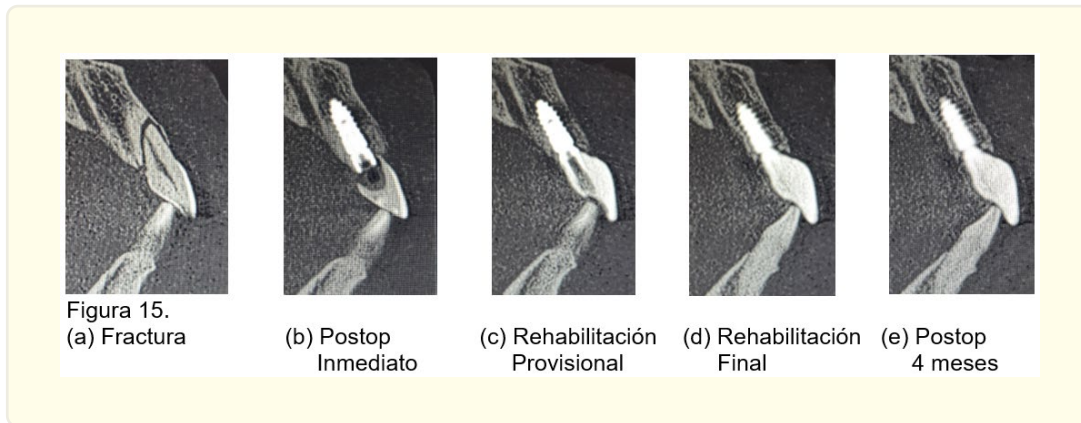
Implants placed at sites preserved with Autologous Mineralized Dentin, MDAM, had similar primary stability compared to xenograft granules. MDAM showed greater bone formation and less residual graft and the same clinical outcomes [4].

Histomorphometric measurements show that the new area of bone formation was on average $38.4\% \pm 16.5\%$, while residual particulate dentin showed on average $29.9\% \pm 14.4\%$ and the connective tissue component captured $31.7\% \pm 14.2\%$. The particulate dentin was in direct contact with the newly formed bone at an average rate of $69.1\% \pm 22.8\%$. Particulate dentin showed complete biocompatibility and high osseointegration. This material can.

It is considered as an acceptable biomaterial for different bone defects due to its osteoconductive and osteoinductive properties [5, 6].

The IDA particulate dentin graft can also be combined with platelet aggregates or fibrin-rich plasma, which helps in the healing and decrease of inflammation of the grafted area, increasing the comfort of patients. Histological evaluation revealed a mean relative bone percentage of 57.0%, dentin 0.9% and connective tissue 39.3%. A comparison of samples at 4, 5 and 6 months showed a progressive increase in the proportion of bone with a decrease in the proportion of dentin. The bone was compact with normal osteocytes and moderate osteoblastic activity [1, 7].

In the tomographic analysis of the grafted areas, they show greater dimensional stability on the study side. Histologically, there is an absence of inflammatory cells, or signs of foreign body reaction, as well as dentin particles completely surrounded by newly formed bone, and osteogenic fronts starting from dentin particles [10, 16, 17].



A particulate dentin graft should be considered as an alternative material for socket preservation and maxillary sinus lift. This material can be considered as an acceptable biomaterial for different bone defects due to its osteoconductive and osteoinductive properties [6-9, 11, 14].

Results

Radiographic and CBCT control was maintained, which evidenced the integration of the implant and the graft. In addition, the emergence profile and maturation of periodontal tissue around the ceramic restorations was restored (Figures 17 and 18).





Figure 17: Panoramic X-ray.

Figure 18: CBCT.

Discussion

The concept of alveolar preservation is related to the procedures carried out after tooth extraction in order to reduce resorption within the socket. Dentin has been proposed as a biomaterial for this purpose. Tooth and bone show a similar biochemical composition that's why it can be used as bone grafting material. The osteogenic capacity of dentin as a graft material has been shown in several studies.

Conclusions

The results obtained from this Case Report are similar to those reported in human studies and are in line with what has been described in the literature. At the tomographic level, we observed less dimensional variation in the alveoli where preservation with particulate dentin was carried out, these results added to the histological analysis contrast the properties described for particulate dentin grafts that present biocompatibility, osseosconduction and osteoinduction in the grafted sites.

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