

CLINICAL USE AND EVALUATION OF AUTOLOGOUS FRESH DEMINERALIZED TOOTH GRAFT AS A BONEGRAFT SUBSTITUTE-A PROSPECTIVE STUDY**¹Dr. Anand Mangalgi, ²Dr. Viqar Ahmed, ^{3*}Dr. Sowmya T., ⁴Dr. Aishwarya Manthale and ⁵Dr. Supriya Patil**¹Reader, Department of Oral and Maxillofacial Surgery, HKE's S Nijalingappa Institute of Dental Sciences and Research, Kalaburgi-585105.²Associate Professor, Department of Oral and Maxillofacial Surgery, K. B. N. Medical College, Kalaburgi 585105.³MDS, Oral And Maxillofacial Surgery.⁴Assistant Professor, Department of Oral and Maxillofacial Surgery, ESIC Dental College Kalaburgi.⁵Reader, Department of Conservative and Endodontics HKE's S Nijalingappa Institute of Dental Sciences and Research Kalaburgi-585105.***Corresponding Author: Dr. Sowmya T.**

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ABSTRACT

Background of the study: "Autogenous fresh demineralised tooth graft" (auto-FDT) is a synthetic graft material that has lately seen an increase in its application as a bone graft material for alveolar bone abnormalities. The purpose of the study is to evaluate the effectiveness of FDT in alveolar bone defects. **Methodology:** 20 patients requiring dentoalveolar procedures like extraction were considered in the study. All the patients underwent extraction followed by placement of auto-FDT graft in the extraction socket. All the patients were assessed for The patients were assessed for Pain, Infection, Wound breakdown, Loss of graft, Exposure of the implant, Change in bone height, Change in bone density at 1st post op day, 10th post op day, 3 months and 6 months post operatively. **Results:** In this prospective study 20 patients were enrolled where 11 patients were male(55%) and 9 patients were female(45%). All the patients were in the age range of 15years to 65years with a mean age of 31.25 years. Clinical and radiological evaluations of each patient who underwent auto-FDT grafting were performed on a regular basis. The mean pain score was 4.6+/- 0.9 on the first postoperative day. At the 10th postoperative day, it was around 3.6+/-1.8, and at three and six months, it was measured as 0. At three and six months after surgery, there was a significant decrease in pain values. The difference in bone height before and after surgery was compared. The mean preoperative bone height was about 8.12mm +/- 1.06, and the mean postoperative bone height was around 10.69mm +/- 1.26. All of the patients had a small rise in bone height ranging from 1-2 mm. **Conclusion:** Autogenous demineralised tooth graft can be regarded as an innovative material owing to its similar composition and properties like bone graftz

KEYWORDS: Bone graft, Autogenous fresh demineralised tooth graft, alveolar bone defects.**INTRODUCTION**

The tooth is a composite structure made up of inorganic components like the calcium phosphate lineage and organic components like collagen.^[1] Hydroxyapatite (HA), Tricalcium phosphate (TCP), Octacalcium phosphate (OCP), Amorphous calcium phosphate (ACP), and Dicalcium phosphate dehydrate (DCPD) are the five biological calcium phosphates found in tooth minerals. When transplanted, these calcium phosphates interact reciprocally to generate new bone.^[2,3,4] The chemical compositions of dentin and bone are very similar. Dentin and bone are both composed of 30% collagen, 60% hydroxyapatite, and 10% bodily fluid. Dentin is an acellular collagen-rich matrix that lacks vessels, whereas bone is a cellular structure that contains vessels.^[5] Rabbit-dentin's bone-inducing property was identified in 1967. Murata et al in 2003 reported the first clinical

example of human dentin autograft.^[6] "Autogenous fresh demineralised tooth graft" (auto-FDT) is a synthetic graft material that has lately seen an increase in its application as a bone graft material for alveolar bone abnormalities. The purpose of the study is to evaluate the effectiveness of FDT in alveolar bone defects.

MATERIALS AND METHODS

20 patients requiring dentoalveolar procedures like extraction reported to the department of oral and maxillofacial surgery were included in the study. All the patients underwent extraction followed by placement of auto-FDT graft in the extraction socket. Auto-FDT was prepared chair side. The donor teeth were treated with aqueous Sodium hypochlorite, an effective organic tissue solvent. After removal of pulp and tissue remnants tooth was treated with hydrogen peroxide. Following this

treatment, the donor teeth were allowed to dry before being placed in the grinding jar of the "KOMETA BIO SMART DENTIN GRINDER" machine. A graft collector was used to gather the powdered graft material. Dentin material was demineralized using an acidic dentin cleaner solution and PBS. All the patients were assessed for Pain, Infection, Wound breakdown, Loss of graft, Exposure of the implant, Change in bone height, Change in bone density at 1st post op day, 10th post op day, 3 months and 6 months post operatively.



Fig 1: Auto Dfg Processing.

RESULTS

In this prospective study 20 patients were enrolled where 11 patients were male (55%) and 9 patients were female (45%). All the patients were in the age range of 15 years to 65 years with a mean age of 31.25 years. Clinical and radiological evaluations of each patient who underwent auto-FDT grafting were performed on a regular basis. The mean pain score was 4.6 ± 0.9 on the first postoperative day. At the 10th postoperative day, it was around 3.6 ± 1.8, and at three and six months, it was measured as 0. At three and six months after surgery, there was a significant decrease in pain values. In three patients, signs and symptoms of infection were observed, and wound breakdown was observed in one patient, resulting in graft loss in a total of four patients. It was noted on the tenth post-operative day. In these individuals, the graft material was fully removed, and the site was thoroughly debrided; these patients were not followed up on for the study. As a result, only 16 patients were tracked after the 10th post-operative day. The difference in bone height before and after surgery was compared. The mean preoperative bone height was about 8.12 mm ± 1.06, and the mean postoperative bone height was around 10.69 mm ± 1.26. (graph 1) All of the patients had a small rise in bone height ranging from 1-2 mm. There were no intra-operative complications have been noted. Postoperatively infection was seen in three patients and wound breakdown was seen in one patient resulting in loss of graft placed seen in a total of four. In the current study, the total success rate of the auto-FDT graft was 80%. In 20% of the instances, the graft failed due to infection and wound dehiscence.

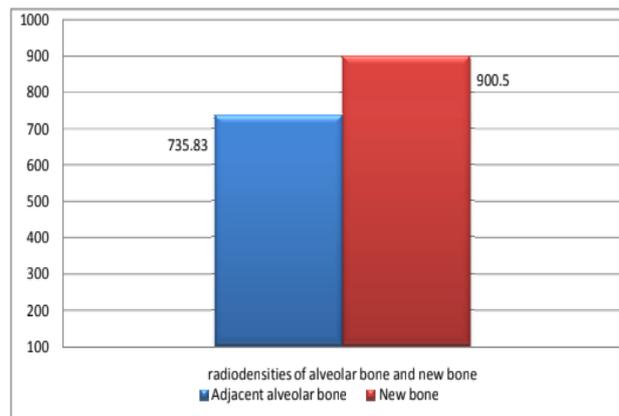


Fig 1: Comparison of Radiodensity.

DISCUSSION

A number of bone growth factors, including Type I collagen and bone morphogenic protein (BMP), are found in the tooth dentin matrix and has an osteoinductive function.^[7] The osteoinductive potential of ADDM in rabbit calvarial bone defects was histologically assessed by Gomes *et al.* (68). The study found that ADDM had chemotactic qualities for osteoprogenitor cells and osteoblasts, increasing the acceleration of bone regeneration at the bony defect.^[8] In this study, The auto-FDT graft was employed as a biomaterial containing growth factors for bone regeneration. cases who got auto-FDT grafts had good clinical results and no problems, with the exception of infection and wound dehiscence in a few cases. In the remaining patients, the gingiva and mucosa healed extremely effectively over the transplanted position. The graft was placed in extraction sockets and bony defects generated after surgical removal of impacted canines to preserve bone quality and enhance soft tissue recovery. Any immunological or biocompatibility issues were avoided by using the patient's own dentin as a graft material to grow bone. Clinical and radiographic evaluations of the transplanted demineralised dentin were performed. The autogenous demineralised dentin significantly improved radiopacity on the transplanted location, according to radiographic examination. Six months following the grafting procedure, complete bone healing was observed. When the extraction sockets were filled with demineralised dentin, a strong radiopaque layer of lamina dura was detected shortly after graft implantation, which eventually vanished. The auto-FDT graft was gradually absorbed and reshaped into new bone over time. After six months, no significant difference in the density of new bone at the transplanted site and neighbouring alveolar bone was seen. Given that autogenous demineralized tooth graft is comparable in composition and qualities to bone graft, it can be viewed as a new material. Growth factors, biocompatibility, bioabsorption, and low cost of treatment made this material a viable substitute for synthetic biomaterials.

CONCLUSION

Autogenous demineralised tooth graft can be regarded as an innovative material owing to its similar composition and properties like bone graft. Presence of growth factors, bio-compatibility, bioabsorption and low treatment cost enabled this material a realistic alternative over artificial biomaterials. Considering the results of this study, this novel technology using human demineralised dentin should spread to the bone regenerative field for patients in near future.

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