



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

*International Journal of Recent Scientific Research*  
Vol. 9, Issue, 7(B), pp. 27827-27830, July, 2018

**International Journal of  
Recent Scientific  
Research**

DOI: 10.24327/IJRSR

## Research Article

# PERIODONTAL TREATMENT OF INTRABONY THREE WALL BONE DEFECT WITH XENOGRAFT MATERIAL

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DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0907.2340>

### ARTICLE INFO

#### Article History:

Received 12<sup>th</sup> April, 2018  
Received in revised form 23<sup>rd</sup>  
May, 2018  
Accepted 7<sup>th</sup> June, 2018  
Published online 28<sup>th</sup> July, 2018

#### Key Words:

Periodontal regeneration, Xenograft material, intrabony defect, open flap debridement.

### ABSTRACT

The aim of periodontal therapy is regeneration of tissues destroyed by periodontal disease. There are different grafting material available in market but the xenograft materials generally are biocompatible and an effective alternative in periodontal regeneration. When compared to open flap debridement, treatment of intrabony defects using xenograft materials generally results in improvement of clinical outcomes. In the present case report we used xenograft materials in the treatment of a periodontal intra-bony defect with the aim to achieve faster healing of the intrabony defect. After 6 months, the absence of an intra-bony defect, pain swelling and tooth stability along with decrease in probing depth level indicated a successful outcome of periodontal treatment.

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## INTRODUCTION

Periodontitis is an inflammatory disease characterized by destruction of alveolar bone, root cementum, periodontal ligament and gingiva as a response to insults elicited by microbial accumulations on tooth surfaces. As a result of which changes in tooth and bone morphology is seen leading to intraosseous defects of various architectures.<sup>1</sup>

Periodontal surgery is defined as any surgical procedure used to treat periodontal disease with an alternative goal to restore health and function to the periodotium and to preserve teeth for life time.<sup>2</sup> The use of grafting material within periodontal defects during periodontal therapy is well documented. These materials may facilitate formation of alveolar bone, periodontal ligament and root cementum through localization of bone-forming cells (osteoneogenesis), providing a scaffold for bone formation (osteoconduction) and by containment of bone inducing substances (osteoinduction).<sup>3</sup>

Bone replacement graft materials are classified into four type - autografts, allografts, alloplasts, and xenografts which are widely accepted and commonly used in periodontal therapy.<sup>4</sup> A xenograft is a heterograft type graft which is obtained from another species such as bovine, equine, or coral.<sup>5</sup> Bovine-

derived bone such as anorganic bovine bone<sup>6</sup> and anorganic bovine derived hydroxyapatite matrix (ABM) with a synthetic cell-binding peptide.<sup>7</sup> The processing of such materials is reported to remove cells organic and proteinaceous materials leaving inert absorbable bone scaffolding that assists in revascularization, osteoblast migration and new bone formation.<sup>8</sup> The crystal size of a commercially available anorganic bovine bone (ABB) (Bio-Oss, E. Geistlich, Ltd., Switzerland) is approximately 10 nm, 21 nm, which is similar to human cancellous bone structure<sup>9</sup> which provides a correspondingly larger surface area which will enhance angiogenesis and osteoconduction, serving as a scaffold for the formation of new bone.<sup>10</sup>

### Case report

A 41-year-old male reported to the department of Dentistry Shaheed Hasan Khan Mewati Govt. medical college, dist. Nuh, Haryana with the chief complaint of mild pain and swelling in relation to lower right back tooth region since 1 week which subsided slowly after taking medication which was prescribed by a local dentist in the past. She did not give any relevant medical history and was reported to be in systemically healthy condition. There was no history of dental trauma or injurious habit reported by the patient. On intraoral examination,

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distobuccal aspect of tooth 46 revealed probing pocket depth (PPD) of 8mm, with clinical attachment level (CAL) of 9 mm. No mobility was detected in relation to 46. Although bleeding on probing and pus exudation was present but no signs of swelling were noticed. A digital orthopantomogram taken using long cone technique, revealed presence of interdental angular bone loss distal to tooth no. 46. (Figure 1)



Figure 1 Pre operative Orthopantomogram

### Initial patient care

Oral prophylaxis was performed and patient was evaluated for acceptable oral hygiene maintenance. Routine blood investigations revealed patient's platelet count (3.6 lac/mm), Haemoglobin (13.6 gm/dl), Bleeding time (2.6 min), Clotting time (4.6 min) and random blood sugar (125mg/dl) to be within normal limits. Re-evaluation after 4 weeks following non-surgical periodontal therapy revealed PPD and CAL to be still 7 mm and 8 mm respectively. (Figures 2 & 3)



Figure 2 Preoperative photograph



Figure 3 Pocket Probing Depth measured with UNC -15 probe

### Surgical procedure

After 4 week Intra-oral antiseptics and extraoral antiseptics was performed with 0.2% chlorhexidine gluconate rinse and povidone iodine solution respectively. Following administration of local anaesthesia xylocaine with adrenalina (1:80000) buccal and palatal sulcular incisions were made and mucoperiosteal flaps were reflected involving the two adjacent teeth. A combined intrabony defect (with three walls apically

and two coronally) was thus revealed distal to 46. Care was taken to preserve as much inter-proximal soft tissue as possible. Root planning and complete defect debridement was done. No osseous recontouring was performed. (Figure 4) Xenograft material was taken from a bottle and mashed with saline water in Petridish.



Figure 4 Flap reflected and defect debrided

The intrabony defect was filled with the mixture using light pressure. The mucoperiosteal flaps were repositioned and secured in place using 3-0 non-absorbable braided black silk surgical suture. Simple interrupted sutures were placed and the surgical area was protected and covered with periodontal dressing. (Figures 5,6,7,8) Suitable antibiotics and analgesics were prescribed, along with chlorhexidine gluconate rinses (0.2%) twice daily for 2 weeks.



Figure 5 Xenograft material



Figure 6 Xenograft material placed in bone defect



Figure 7 Sutures given



Figure 8 Co-pack given

Periodontal dressing and sutures were removed after 10 days. Saline irrigation was done and patient was instructed for gentle brushing with a soft toothbrush. Re-evaluation was done weekly for up to 1 month after surgery and then at 3 and 6 months (Figure 9, 10). No subgingival instrumentation was attempted at any of these appointments.



Figure 9 After 6 months pocket depth reduced to 3mm



Figure 10 Post operative after 6 months

## RESULTS

The patient showed good compliance and satisfactory oral hygiene maintenance during the course of observation period. The healing was uneventful, without any signs of infection or complications.



Figure 11 Post operative Intra oral Periapical radiograph after 6 months

Clinical re-evaluation at 6 months after the periodontal surgery revealed PPD of 3 mm and CAL of 4 mm with no signs of bleeding on probing (Figure 10). Digital radiographic re-evaluation confirmed periodontal regeneration (Figure 11).

## DISCUSSION

Intrabony pocket or defect is periodontal pocket in which the bottom is apical to the level of the adjacent alveolar bone.<sup>11</sup> The periodontal regeneration in intrabony defect is influenced by many factors related to the patient such as smoking, bony morphology, root topography, gingival biotype, gingival recession, surgical technique, and early supportive periodontal care.<sup>10,12</sup>

Intrabony defects less than 3mm are most effectively managed with a non-regenerative therapy, such as osseous resective surgery. The intrabony defects are classified by the number of walls – One wall defect is defined as in which only one interdental wall is present and is called hemi septum if remaining wall is proximal. Two wall defect is most prevalent bone defect found interdentially with facial and lingual walls remaining. It involves both the interproximal walls which are mainly called crater defects or interdental crater defects. Three wall defect – most commonly occurs in the interdental region which involves the three bony walls (facial, lingual and proximal).<sup>13</sup> Three-wall intrabony defects, characterised with narrow and deep periodontal pocket or defect have the greatest inherent potential for periodontal re-generation.<sup>14</sup> more than 50% hard tissue defect fill if the complete debridement of 3-wall intrabony defects is done with proper surgical technique.<sup>15</sup> Morphology of defect affects the availability of vascular and cellular elements required to regenerate the defect as well as the inherent structural support provided by the surrounding alveolar bone, which can influence space maintenance and clot stability. Hence the bone height is directly proportional to the defect angle or decrease number of walls as result of which inherent potential for periodontal regeneration decreases which are managed by using regenerative strategies including biologically active materials such as growth factor for example xenograft materials.<sup>16</sup>

In the present study we used xenograft material to fill the defect with regular follow up and found good results. Our results were similar to numerous human clinical trials where grafting of intrabony defects using ABB alone, or ABB with guided tissue regeneration (GTR) have resulted in significant pocket depth reduction, clinical attachment gain, and bone fill as compared to open flap debridement alone. Paolantonio has reported better clinical outcomes, with regard to clinical attachment gain and less gingival recession, using a bioabsorbable collagen membrane in combination with ABB, compared to ABB alone.<sup>17</sup> However, others have reported similar outcomes after using ABB alone or in combination with a bioabsorbable membrane.<sup>18</sup> Trombelli L *et al.* performed a meta-analysis to evaluate the efficacy of coral calcium carbonate in the treatment of intrabony defects, where they found that significant gain in clinical attachment level could be obtained after grafting intrabony defects using coral xenografts was compared to open flap debridement alone.<sup>6</sup>

## CONCLUSION

Bone graft specially xenograft can be used in the treatment of periodontal intrabony defects with significantly improved clinical parameters. However, clinical trials with larger sample size and confirmatory histological evaluations are required to better assess the clinical benefits in treatment of three wall intrabony bone defects in periodontal surgery.

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### How to cite this article:

Parveen Ranga and Amita Sharma.2018, Periodontal Treatment of Intrabony Three Wall Bone Defect With Xenograft Material. *Int J Recent Sci Res*. 9(7), pp. 27827-27830. DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0907.2340>

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