Case Report

Efficacy of hydroxyapatite granules in bone regeneration following periradicular surgery

Sahadev C K[*], M J Bharath[**], Praveen Kumar M R[***], Sandeep R[****], Rosamma George[*****]

[*]Professor, [**]Professor and HOD, [***]Reader, [****]Assist Professor, [*****]Post Graduate Student, Department of Conservative Dentistry and Endodontics, Sri Hasanamba Dental College and Hospital, Hassan- 573201, Karnataka, INDIA.
Email: dr.rose75@gmail.com

Abstract

The indications for surgical Endodontics have become fewer with the advancements in non surgical endodontic techniques and material. However, there are some cases, which definitely required an apical surgery. The success of apical surgery depends on regeneration of the periapical tissues and filling of the osseous defects. For this purpose, different grafts are used. One such allogenous bone graft is the bioresorbable, bioactive hydroxyapatite: Biograft-HA. The effects of this graft on bone regeneration are evaluated in this study. This graft was used in three cases with osseous defects by a simple procedure. The cases with three months, six months follow up are presented here.

Keywords: Periapical lesions, Hydroxy apatite crystals, Bone regeneration.

[*****]**Address for Correspondence:**
Dr. Rosamma George, Post Graduate Student, Department of Conservative Dentistry and Endodontics, Sri Hasanamba Dental College and Hospital, Hassan- 573201, Karnataka, INDIA.
Email: dr.rose75@gmail.com

Received Date: 02/12/2014 Accepted Date: 12/12/2014

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 13 December 2014

INTRODUCTION

The cell is the structural and functional unit of body. The tissues of human body possess properties of programmed growth, development, differentiation, regeneration and repair. Even though it is a well-engineered machine, many a times the repair of the lost tissues remains imperfect owing to the factors that determine the healing.[1] Most periapical radiolucent lesions heal uneventfully after endodontic therapy. However, some cases may require periradicular surgery in order to remove pathological tissue from the periapical region and simultaneously eradicate any sources of irritation that could not be removed by conventional root canal treatment[1,3,4]. As apical surgery is often considered as a last resort to preserve a tooth when conventional endodontic treatment is not feasible or is associated with therapeutic risks. The alternative treatment is the tooth extraction[2].

MATERIALS AND METHODS

This clinical study was undertaken on outpatients attending the Department Of Conservative and Endodontics, Sri Hasanamba Dental College and Hospital, Hassan. Three patients with large periapical lesion complaining of pain, swelling and pus discharge in the upper anterior region since two months were selected. Past history revealed trauma in the upper anterior region five years back in two cases and seven years back in third case respectively. Radiograph and Radiovisiography were taken. These lesion measures 2x3cm (case1), 1.5x1.8cm (case2) and 1.4x1.9cm (case3) respectively as shown in radiographs (Fig-1). Root canal treatment was done and post obturation radiographs were taken (Fig-2), followed by periradicular surgery was performed to remove the non healing pathological tissue. To augment repair process, hydroxyapatite C_{10} $(PO_4)_6(OH)_2$ graft material were placed. Clinical and Radiographic assessment were performed at intervals of third month (Fig-3) and six month(Fig-4) respectively.

RESULTS

The results were evaluated both clinically and radio graphically.

How to site this article: Sahadev C K, M J Bharath, Praveen Kumar M R, Sandeep R, Rosamma George. Efficacy of hydroxyapatite granules in bone regeneration following periradicular surgery. *International Journal of Recent Trends in Science and Technology* December 2014; 13(2): 338-340 http://www.statperson.com (accessed 15 December 2014).

Clinical evaluation

This included assessment of:

a. Edema, post-operative pain.
b. Signs of infection.
c. Untoward reaction
d. Wound dehiscence.

Above all three cases showed mild edematous swelling 24 hours after the surgery. This gradually subsided over a period of 3 days. Above patients did not complain of any unusual or severe pain. There were no signs of infection, untoward reaction, wound dehiscence or extrusion of material in above cases. The mobility of the teeth gradually reduced and by the end of 12 weeks it was almost normal.

Radiographic evaluation

Intra oral periapical radiographs were taken immediately after surgery and at 12 weeks follow-up. Immediate postoperative radiographs showed increased radio-opacity due to the material within the bony defect. Twelfth week radiograph showed a diffuse radio-opaque area and increased calcification surrounding the material, indicative of the graft to the bone.

Figure 1: Pre-operative radiographs

Figure 2: Post obturation radiographs

Figure 3: Third month follow up radiographs

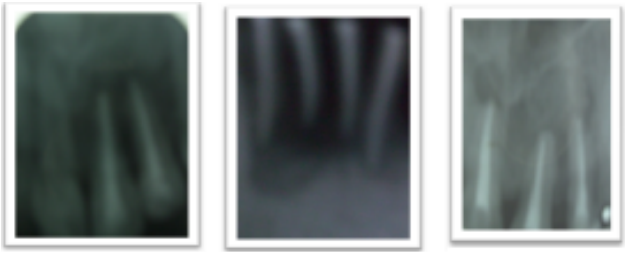

Figure 4: Six Months follow up radiographs

DISCUSSION

The size of the lesion may be a critical factor because the distance between hard and soft tissues could determine the type of tissue that will grow during healing[8,9]. If fibrous tissue establishes itself first, it will probably act as a barrier to prevent bone formation. Prognosis of smaller lesions after periradicular surgery was better than the prognosis of larger ones[7,9]. Pecora *et al*[8] evaluated the healing of Periapical lesions of more than 10 mm, and showed clinical and radiographic evidence of complete bone regeneration, when the bone graft (hydroxyapatite) material is used as a barrier[5,6]. Bone substitute material is employed primarily to serve as fillers and scaffolds, to facilitate bone formation and wound healing. The xenograft (anorganic-bovine bone) shows great similarity to natural bone and helps in bone regeneration. The hydroxyapatite crystals have many advantages as a biomaterial. It is extremely biocompatible and does not stimulate a foreign body reaction, when placed in contact with fresh bone surface. The new is deposited directly onto the surface of hydroxyapatite without intervening fibrous tissue. Hydroxyapatite does not stimulate osteogenesis, but is osteoconductive, that is, when placed next to viable bone, an advancing front of new bone grows into the porous matrix[6,7,8,11].

Hydroxyapatite crystals have several advantages over other bone grafts.

- No donor site is required.
- Unlimited supply of material.
- Easy procedure.
- No risk of transmission of disease.

The bone grafts containing hydroxyapatite gets more rapidly incorporated in to the host bone, because its surface already incorporates the biological apatite. This is one of the rationales for employing bovine bone as a substitute material[6]. In this study, the graft did not produce any adverse reaction. The wound healing and primary closure of the site were good. The twelfth week radiographs revealed increased radiodensity which is attributed to the known osteoconduction is a process that supports the in growth of spurting capillaries, perivascular tissue and osteoprogenitor cells from the recipient host bed into the bone graft. This early

vascularization is believed to provide nutritional support for the osteogenic capability of anorganic bone. Hydroxyapatite serves as passive scaffold, which gets slowly resorbed in the bone cavity[7, 8]. On the basis of this study, the use of hydroxyaptite in the endodontic lesions appears to be beneficial to patients.

CONCLUSION

The use of hydroxyapatite crystals as bone regeneration materials produced satisfactory regeneration of bone as consistently observed clinically and radiographically with no adverse complications.

REFERENCES

1. Tobon SI, Arismendi JA, Marin ML, Mesa AL, Valencia JA. Comparison between a conventional technique and two bone regeneration techniques in periradicular surgery. Int Endod J 2002; 35:635–41.
2. Kim S, Kratchman S. Modern endodontic surgery concepts and practice: a review. J Endod 2006; 32:601-623.
3. Bernard GN Healing and repair of osseous defects. Dent Clin of North Amer1991;35
4. Derine OR, Curtis *et al*. Mandibular augmentation with Hydroxyapatite. J. Prosth Dent 1986; 55:383-367.
5. Dennison H and Mangano C. *et al*. Hydroxy implants. Pican Nuova.1985;17
6. Kandaswamy D, Ramchandran G. Bone regeneration using hydroxyapatite crystals for periapical lesions. J Endod 2000; 12:51-54.
7. Kenny EG,*et al*. The use of porus hydroxyapatite implant in periodontal defects. J.Periodontal 1985;50:82-88
8. Tobon SI, Arismendi JA, Marin ML, Mesa AL, Valencia JA. Comparison between a conventional technique and two bone regeneration techniques in periradicular surgery. Int Endod J 2002; 35:635–41.
9. Pecora G, Baek SH, Rethnam S, Kim S. Barrier membrane techniques in endodontic surgery. Dent Clin North Am 1997; 41:1–16.
10. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. Int Endod J 2006; 39:921-930.
11. Rud J, Andreasen JO, Moller-Jensen JE. A multivariate analysis of the influence of various factors upon healing after endodontic surgery. Int J Oral Surg 1972;1:258–71

Source of Support: None Declared
Conflict of Interest: None Declared