



Surgical Intervention and Endodontics for Maxillary Alveolar Bone Regeneration in a Patient with Periapical and Interradicular Bone Defect: A Case Report

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Abstract

Bone defects are common in jaws due to pathogenesis from odontogenic and periodontal infections. Infection can also be caused by orthodontic tooth movement. The focus of infection is removed and the area with adequate vascularity is made by surgical intervention without using the graft results in bone regeneration occurs. A case evaluation of periapical bone defect, which is treated with periapical and interdental curettage and endodontic correction, shows maxillary bone regeneration.

Key Words: Periapical bone defect, bone regeneration, endodontic, interradicular

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Introduction

Bone is a specialized connective tissue that provides support and protection for the delicate and vital organs of the body and also allows for locomotion. It has abundant regenerative capacity. Within the confines of the tooth and periapical tissue, the structures are often subjected to infection. This may cause marked structural alteration in bone response to injury, changes of stress and vascular influences. Various naturally derived bone morphogenic proteins can induce alveolar bone regeneration. Regenerative therapies using bone regeneration materials and graft are seldom achieved complete success. Bone regeneration is a very slow process. Recently, Vaishnavi et al. reported that the surgical intervention alone is failed to complete the bone regeneration, even at the one-year follow-up [1]. However, a careful removal of the pathological tissues at the periapical and inter radicular region is found to be effective for the complete maxillary bone regeneration. In this article, a case of surgical intervention such as combined surgical intervention and endodontics for treatment of periapical and interradicular bone defect is used to produce complete bone regeneration is reported.

Case Report

An 18-year-old female patient reported to Maxillofacial department, complaint of swelling over the upper anterior buccal vestibular region. It was non tender on percussion and grade 1 mobility was present only to central and lateral incisor teeth. She had a history of orthodontic treatment for correcting anterior teeth proclination. The treatment was completed six months back. She had no other traumatic injury to teeth including no trauma from occlusion was present. There was no fistulous tract opens to either buccal vestibule or palatal mucosa. Her general condition was good.

Intra oral periapical radiograph was taken on left upper central and lateral teeth. There was a periapical radiolucency present, measuring 2 cm x 1,5 cm x 1,3 cm, bone loss on image taken with R V G Kodak Dental X-Ray (Figure 1). Preoperatively root canal treatment was done with filling of Gutta-Percha points to the involved teeth. Preanesthetic fitness of the patient was obtained. Patient was taken under general anaesthesia for removing pathological tissues. Envelope incision was done, with releasing incision flap was raised bony cavity involving the

teeth thoroughly curetted, special attention paid to remove the granulation tissue between roots of the teeth and sub gingival calculus. Irrigation was done with normal saline, apicoectomy was done. The apex of the tooth, filled with Gutta-Percha, was sealed with heated ball burnisher. Flap was replaced over the defect; the edges were kept over the normal adjacent bone. Water tight closure was done with nonabsorbable suture and with sling suture. The patient was advised to follow post operative instructions. Patient was reviewed every two weeks for 1st two months and again after one year (Figure 2). Intra oral periapical radiograph has taken to evaluate the bony defect after one year. Radiologic image showed marked amount of bone regenerated to these areas. 2 cm x 1,5 cm x 1,3 cm defect was completely filled with bone and no evidence of any radiolucency near the defect and adjacent teeth (Figure 3). On clinical examination there was no evidence of mobility of teeth.

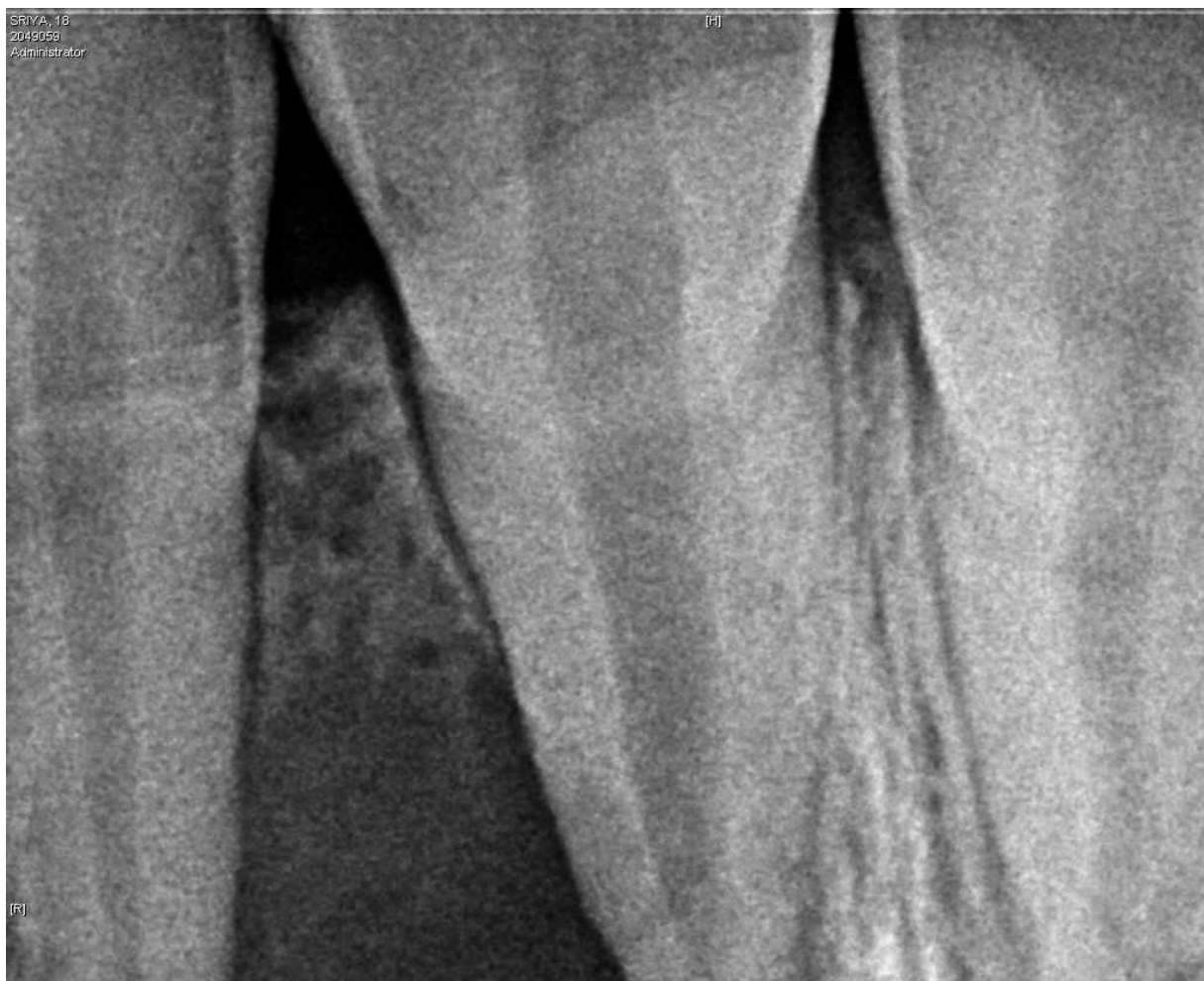


Figure 1. Pre operative radiograph with bone defect

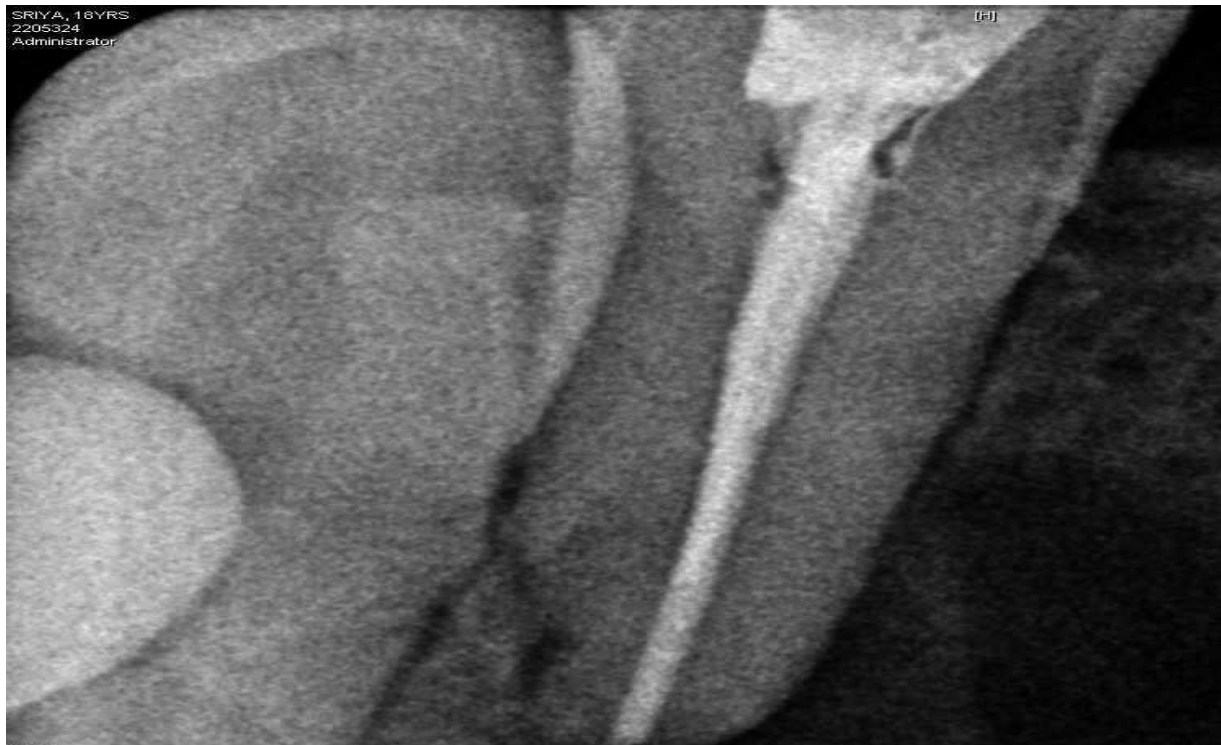


Figure 2. Pre operative radiograph after root canal treatment



Figure 3. Post operative radiograph after one year

Discussion

Enamel and dentin protect the dental pulp from the temperature changes, acting as a physical barrier. Dental pulp fills the pulp cavity and canal, exits through apical foramen to periapical tissues. In developing pulp, cellular elements are more compared to fibrous elements [2]. This indicates the metabolic and regenerative capacity of pulp. Slight teeth movement can occur without disruption of neurovascular bundle. If the degree of irritation to the pulp is sufficient, it becomes inflamed and subsequent degeneration, necrosis and suppurations. This usually cause palatal or vestibular fistula, but in some cases this may be present inter radicular to gingival sulcus.

Radiologically periapical inflammation, secondary to necrosis can be seen early as third week after trauma. Combinations of clinical and radiologic signs are required to diagnose a bone defect [3]. The envelope incision, placed for elevating the subperiosteal flap, will give access to periapical and interradicular areas. Complete removal of pathological tissue and replacing the flap to the cervical area of the teeth and greater than five millimeters coverage from the defective margin will not only provide watertight closure but also give adequate stimulation of the periosteum to lay down new bone. The role of natural morphogenic proteins for formation of alveolar bone begins here. It also permits periodontal ligament formation [4].

Periapical curettage can be done in either two step procedure, where root canal is cleaned and filled before the flap is raised, or single step procedure, flap is raised, apical portion of the root is exposed and decided whether apicoectomy to be done or not, pathological tissues are removed by curettage and canal preparation, filling can be carried out using Gutta-Percha. Special care has taken to remove pathological tissues from inter radicular bone [5].

Bone regeneration occurs once the pathological tissues are removed. Osteogenic cells are derived from periosteum, endosteum and circulating pluripotential mesenchymal cells. Osteoclasts derived from monocytes precursor cells to resorb the necrotic bone and bone that to be remodeled. Six months after surgery, there was regeneration of alveolar bone. Sharpie's

fibers are uniting the regenerated bone to the newly formed cementum. Natural bone matrix may be required to initiate the cascade formation of normal pattern of bone contour [6]. Different graft materials including platelet rich plasma are used to fill the bone defects to induce natural modes of bone regeneration. Regenerative therapies using bone regeneration materials and graft are seldom achieved complete success. The surgical intervention alone is failed to complete the bone regeneration, even at the one-year follow-up. This case study concludes that complete removal of pathological tissues by surgical interventions and endodontic will also be an effective for maxillary alveolar bone regeneration.

Conflict of interests

The authors have no conflicts of interest or funding to disclose.

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