

# 1 Year CBCT Follow up Using Laser Biostimulation and Bone Graft In Treatment of Periapical Lesion

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## ABSTRACT

Nonsurgical endodontic treatment is a definitive predictable treatment option in most cases, but endodontic surgery may be indicated for teeth with persistent peri apical pathosis unresponsive to non-surgical approaches. This paper reports the case of post surgical bone healing using laser biostimulation and hydroxyapatite bone graft using CBCT analysis. Pre operative CBCT evaluation was done for each case. Post treatment evaluation was done clinically, radiographically and by CBCT analysis.

**Keywords:** Periapical Lesion, Laser Biostimulation, Bone graft, CBCT

## INTRODUCTION

Apical surgery is the surgical management of a tooth with a periradicular or periapical lesion that cannot be resolved with an orthograde endodontic treatment. Apical surgery is often considered as a last resort to preserve a tooth when conventional endodontic retreatment is not feasible or is associated with therapeutic risks (Kim and Kratchman, 2006). The treatment alternative for surgery would be tooth extraction, or in multi-rooted teeth, root or tooth resection<sup>1</sup>.

When periapical surgery is indicated it removes diseased soft tissue and with application of different graft material enhances new bone formation at the defective site. Formation of new bone can occur with regeneration or repair. The most commonly used technique for regeneration is the use of bone replacement grafts. The ideal bone replacement material should be easy maneuverable, inert, noncarcinogenic, and should be dimensionally stable. One of the promising biomaterials for bone healing and regeneration is Biphasic calcium phosphate ceramic.

The goal of surgical endodontic treatment is to eradicate any associated extraradicular infection such as periapical granulomas and cysts<sup>2</sup>. Low intensity laser Therapy accelerates the repair process and has bio-stimulating effects on stem cells of bone<sup>3</sup>. Application of Laser is painless, non invasive and without adverse effects<sup>4</sup>.

Recently, cone beam computed tomography (CBCT) has been introduced as it eliminates some of the most prevalent problems, such as superimposition and distortion and is a method of gaining an unabridged view of dental anatomy. CBCT is rapidly replacing other radiographic techniques in diagnosis, quality control of treatment methods and techniques, and outcome assessment and reduces false diagnosis<sup>5</sup>.

In this case report Periapical surgery was conducted and healing was observed. In this Case Laser Biostimulation was done and followed by placement of Hydroxyapatite bone graft .

## CASE REPORT

A 35 year old patient reported to the department with a chief complaint of discolored tooth in the upper front tooth region since 4-5yrs. The patient had reported trauma in the same region 7 years back. Patient revealed history of RCT irt 11. The past medical history of the patient did not reveal any significant finding and the patient was systemically healthy and was not on any medication. Patient revealed no history of alcohol, smoking and other deleterious habits. On examination, there was pain of palpation irt 11,12 and Ellis class IV fracture in relation to 12. The tooth appeared to be discolored.(Fig.: 1)The pulp vitality tests revealed that the tooth was non-vital while the radiographic examination of the concerned area in the form of an intra-oral peri-apical radiograph (IOPAR) revealed that it had a large peri-apical radiolucency.(Fig.: 2)Peri-apical surgery was planned for this patient. Blood heamogram tests were

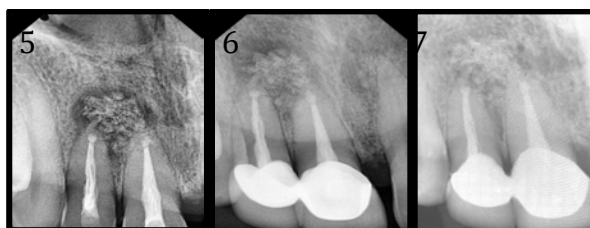
On the day of surgery patient was administered local anesthesia. Full thickness mucoperiosteal flap was reflected by giving two horizontal incisions and a horizontal incision. Osteotomy will be performed under copious water spray using straight micromotor handpiece with bone cutting bur. Root was resected up to 3mm. Removal of granulation tissue was done using curettes. Retro cavity preparation was done using micromotor contra angle handpiece and round bur. Retrograde Root filling was done using MTA at root end with the help of MAP system. After MTA placement, Laser Biostimulation with soft tissue diode Laser in non contact mode was used in elliptical manner. Three cycles of laser biostimulation was done of 10 seconds each. The power in first cycle was 1.5 watt with 3 cm away from the lesion site. In second cycle the power was increased to 2 watt with decrease in the distance to 2cm and third cycle was performed with maximum power up 2.5watt and minimum distance of 1 cm. Each cycle had interval of 10 seconds which was rest phase.(Fig.: 3)After Laser Biostimulation, Hydroxyapatite bone graft was placed in the bony cavity. (Fig.: 4) The Flap was sutured back in position.



FIGURES-1:Pre-operative clinical picture, 2: Preoperative Radiograph, 3:Laser Biostimulation, 4: Placement of Bone Graft

Post operatively Radiograph and CBCT Scan was taken immediately after the surgery (CBCT I) for the measurement of the bone defect. Mesio-distally, superioinferiorly and labiopalatally the defect measured 9.4 mm, 11 mm, 7.4 mm respectively. CBCT II was taken after 1 year for the measurement and CBCT II revealed reduction in the size of the defect up to mesio-distally, superioinferorly and labiopalatally as 9.2 mm, 7.9 mm, 5.1 mm.

Also, Patient was recalled after 1 month, 6 months, and 1 year for evaluation for radiographic and clinical evaluation (Rud et al Criteria). Radiographs also revealed healing of the periapical bone defect. (Fig.: 5-7)



FIGURES- 5:1month follow up, 6: 6 months follow up, 7: 1 year follow up

## DISCUSSION

Nonsurgical endodontic treatment is a highly predictable treatment option in most cases, but endodontic surgery may be indicated for teeth with persistent periradicular pathosis unresponsive to non-surgical approaches. Surgical root canal therapy including root-end resection has been practiced since at least the mid 1800s. When indicated, periapical surgery involves removal of diseased soft tissue, root resection followed by retrograde root filling and application of different graft material, which enhance new bone formation at site of defect.

In the present case Mineral trioxide aggregate (MTA) as a root-end filling material is shown to promote osteoblast activity and have excellent sealing ability. It was less cytotoxic than amalgam, IRM, amalgam, or SuperEBA and had an antimicrobial effect. Results of MTA studies in dogs and monkeys showed that significantly less inflammation was seen than in amalgam. More importantly, cementum bridges formed directly over the MTA confirming the tissue friendliness of the material and its potential cementogenic property as root-end filling material<sup>6</sup>.

In present case Laser biostimulation was done followed by hydroxyapatite bone graft. Hydroxyapatite is a cheap and easily available bone substitute. Hydroxyapatite is a apatite of calcium phosphate,  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ , a ceramic naturally found in tooth, vertebrae and bone. The compound has a Ca/P mole ratio of 1.67, and is formed by precipitation of calcium nitrate and ammonium dihydrogen phosphate. Each pore is 100-140  $\mu\text{m}$  with constant interporous distance<sup>7</sup>.

The use of ceramics based hydroxyapatite Bone graft, which is osteointegrative and osteoconductive; and in some cases, osteoinductive<sup>8</sup>. Hydroxyapatite is used in a process wherein the bone is formed by osteoprogenitor cells from the recipient bed into, around, and through a graft and the in-growth of capillaries. These Hydroxyapatite crystals when used acts as a scaffold upon which new bone is deposited, which is then followed by a slow resorption of the graft. The ceramic materials are sufficiently adaptable to lend themselves to the management of defect pattern encountered in the individual patient<sup>7</sup>.


The bone grafts containing hydroxyapatite gets more rapidly incorporated into the host bone, because of presence of biological apatite in its surface. This is one of the rationale for employing bovine bone as a graft material<sup>9</sup>.

Kenney et al. in their study used porous hydroxyapatite on periodontal defect, found bone formation from the 3rd month examination onwards and connective tissue infiltration through the pores<sup>10</sup>.

The follow up examination of this case was done after 1 month, 6 months and 12months and periapical healing was observed. which was checked radiographically and by CBCT. On comparing pre operative CBCT with 1 year follow up it was observed that endodontic surgery performed with laser bio stimulation followed by Placement of Hydroxyapatite bone graft showed promising results of periapical healing.

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