

## Revascularization of Immature Central Incisor with Apical Periodontitis: A Case Report

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### Case Report

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**Abstract:** The field of regenerative endodontics is rapidly advancing. It is based upon the principles of tissue engineering, namely the spatial delivery of appropriate cells, scaffolds, and growth factors. To date, none of the published clinical studies fully engage the concepts of tissue engineering. Instead, these studies are best described as revascularization procedures that attempt to regenerate biologic tissues within the root canal space, without necessarily replicating the pulp – dentin complex. This article describes the revascularization procedure done on a 15 year old patient with immature central incisor, diagnosed with apical periodontitis. Periodic follow up has shown successful apical healing and closure of apex.

**Keywords:** Revascularization, Blunderbuss canal, immature teeth, Regeneration.

### INTRODUCTION

The goal of endodontics is to prevent or treat apical periodontitis. An optimal way to accomplish this goal is to either maintain pulpal health in cases of pulpal inflammation or to regenerate healthy pulpal tissue in cases of pulpal necrosis [1]. Pulp necrosis of an immature tooth as a result of caries or trauma could arrest further development of the root, leaving the tooth with thin root canal walls and blunderbuss apices. The absence of an apical constriction makes root canal treatment problematic because of the difficulty to obtain a seal with conventional obturation methods. The thin root canal walls render it susceptible to fracture [2].

Traditionally, multiple-visit specification with calcium hydroxide was the treatment of choice in necrotic immature teeth, which would induce formation of an apical hard tissue barrier.

Although this approach was predictable and successful, long-term use of calcium hydroxide has several disadvantages such as multiple treatment appointments, probable recontamination of the root canal system during treatment period, and increased brittleness of root dentin, which increases the risk of future cervical root fractures. An alternative technique for specification with calcium hydroxide is artificial apical barrier technique, which is done by placing barrier material in apical portion of the canal. The material of choice for this technique is mineral trioxide aggregate (MTA), which has been shown to have high success rates and reduce the number of required clinical sessions. Both of the mentioned methods (i.e. specification and artificial apical barrier techniques) share the same disadvantage of not allowing the continuation of root development, which leads to a fragile root structure. Revascularization is a regenerative treatment and a biologically based alternative approach to treat necrotic immature teeth that, unlike specification and artificial apical barrier

techniques, allows continuation of root development [3].

### CASE REPORT

A 15 year old female patient reported to the Department of Conservative Dentistry and Endodontics, Al Badar Rural Dental College and Hospital, Gulbarga, Karnataka, with a chief complain of pain in upper front teeth region since two months. Patient gives history of trauma five years back and pus discharge; symptoms were relieved then but, since past two month's patient noticed pain and sensitivity on the involved tooth. On further intra oral examination we noticed fracture of 21 which was tender on percussion. Pulp vitality test was performed which showed negative response. On radiographic examination, the teeth showed a blunderbuss canal with periapical radiolucency. It was diagnosed as Ellis class III fracture with apical periodontitis. Revascularization was the treatment plan. Rubber dam (Hygiene) was placed and access opening was done and working length was confirmed through

digital radiography. Irrigation was done using 2.5% of sodium hypochlorite and saline. Triple antibiotic paste (Minocycline, Metronidazole, and Ciprofloxacin) was placed for one week to disinfect the canal. Patient was recalled after a week, rubber dam was placed to

maintain the complete aseptic field. Canal was cleaned using saline and 2.5% of sodium hypochlorite. With the help of K – file bleeding was induced in the canal and MTA was placed above the clot followed by permanent restoration.



**Fig-1: Pre-operative**



**Fig-2: Rubber dam**



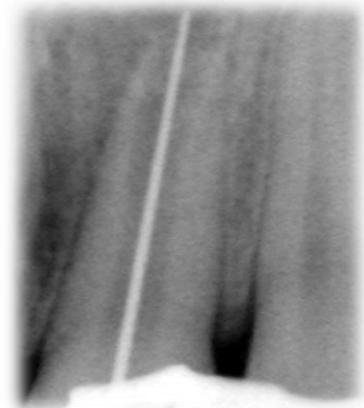
**Fig-3: Bleeding induced**



**Fig-4: MTA placed**



**Fig-5: GIC restoration**



**Fig-6: Working length determination i.r.t 21**



**Fig-7: One month follow up**



**Fig-8: After 1 year of follow up**

## DISCUSSION

The main advantages of revascularization technique over the traditional specification or artificial barrier technique in endodontic treatment of immature necrotic teeth include continuation of root development and strengthening the root structure [4]. In this case revascularization was decided as the treatment plan over conventional methods of apexification with calcium hydroxide or artificial barrier technique because of potential to gain the benefits of root development and as the patient was very young and the younger patients have a greater healing capacity or stem cell regenerative potential. Completely eliminating the necrotic tissue and micro-organisms from root canal is a key factor for a successful revascularization. Certain irritants show cytotoxic effect on human cells [5] and interfere with the attachment of DPSCs to the root canal walls [6]. Thus, we only used NaOCl 2.5% for irrigation of the canals.

Studies have reported different methods for disinfecting the necrotic immature teeth in revascularization treatment. Triple antibiotic paste was led in large part by Hoshino and colleagues. They demonstrated the effectiveness of combinations of antibiotics (in particular the high efficacy of the combination of ciprofloxacin, metronidazole & minocycline) in eradicating bacteria from the infected dentin of root canals [7]. Coronals sealing the blood clot and to avoid further microleakage is an important step of revascularization. Various studies have suggested that use of MTA shows excellent sealing properties to a level below the CEJ [8].

In a study by Jeeruphan *et al.* [9] Revascularization was associated with significantly greater increases in root length and thickness in comparison with calcium hydroxide apexification and MTA apexification as well as excellent overall survival rates. Similarly Bukhari *et al.* [10] presented a Retrospective Case Series on Outcome of Revascularization Procedure, they concluded that the outcome of revascularization, wherein healing of periapical periodontitis and maturation of roots occurs,

is fairly high, making it a viable treatment option in comparison with specification.

In the present study, after revascularization was attempted, the patient was completely asymptomatic and on further follow up, root development was appreciated. In conclusion, revascularization must be considered as a treatment option for immature apices in young tooth, rather than multiple visit apexification procedure or artificial barrier technique.

## CONCLUSION

Within the limitations of this study it can be concluded that, Revascularization should be considered as a treatment option for treating young immature apices with apical periodontitis. Although pulp revascularization is a recent therapy of regenerative endodontic procedures, it seems to be effective for immature teeth since it allows root formation in a relatively simple technique. Nevertheless, more studies are necessary to evaluate its long-term efficacy and new approaches.

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