APEXIFICATION

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INTRODUCTION

Conventional endodontic treatment of immature non vital teeth is impractical as chances of fracture of thin walls of root and inability to achieve proper apical seal will lead to failure. It is imperative to create an artificial apical barrier or induce the closure of apical foramen with calcified tissue [1]. Apexification is the method to induce apical closure to produce favorable condition for conventional root filling [2]. Endodontic infections are mixed infection of poly microbial etiology. Siqueira et al. found high level of Porphyromonas gingivalis by using polymerase chain reaction and checkerboard technique [3]. Baumgartener et al. reported high prevalence of spirochetes in endodontic infections using different molecular methods [4]. Use of calcium hydroxide as intra canal medication resulted in reduction of most of species but some of the species such as Enterococcus faecalis were refractory to therapy [5]. Calcium hydroxide activity is related to close contact with lethal hydroxyl ions. Some bacteria can be lodged in dentinal tubules and evade the ions [6]. Apexification procedure requires chemico mechanical debridement of canal followed by placement of an intra canal medicament to stimulate apical bridge formation. Calcium hydroxide paste has become the material of choice to induce apexification [7]. It has anti bacterial activity due to its high alkaline nature and plays an important role in re mineralization process [8]. Apexification is not a static phenomenon and apexified area undergoes through the years to a conspicuous readjustments involving bone, apical root tissue and root filling material [9]. Many authors have recommended the use of intra canal medication with antimicrobial activity between therapy sessions to eliminate persistent microorganism in case of pulp necrosis [10]. This report presents a case in which single visit apexification was performed to induce apical closure to allow successful endodontic treatment in carious non vital immature right mandibular second premolar tooth.

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CASE REPORT

A thirteen years old girl presented at operative dentistry department, Armed Forces Institute of Dentistry with one month history of swelling and pain associated with right mandibular second premolar tooth. Her extra oral examination was unremarkable. Intra oral examination revealed carious right mandibular second premolar with adjacent swelling. Tooth was tender to percussion and unresponsive to thermal and electric pulp test.

Radiographic examination revealed periapical radiolucency around right mandibular second premolar and wide open apex (fig. 1).

Based upon history, clinical examination and investigations a diagnosis of acute apical periodontitis mandibular second premolar with open apex was made. Case was discussed at operative dentistry forum. Apexification for mandibular second premolar was planned. Abscess was drained through trephination. Tooth was isolated and access opening was made. When endodontic file was inserted gently in the canal no resistance was felt in apical area. Tooth was prepared bio mechanically and working length was carefully adjusted to avoid stabbing of peri apical tissues. Copious irrigation with normal saline was used. Canal was dried and filled with calcium hydroxide paste with lentulospiral. Cotton pellet was used to compress the paste in canal. Pulp

chamber and access opening was sealed with zinc phosphate cement. Tooth was examined radiographically two times in alternate months.

After six months peri apical radiograph revealed formation of apical bridge at the apex of mandibular second premolar (fig. 2). Tooth was reopened and probe apically with no 35 K. file. Apical resistance was felt in apical third of canal. Canal was obturated with gutta percha using lateral condensation technique (fig. 3). Cavity was filled with amalgam restoration and patient was referred for full coverage restoration.

DISCUSSION

Induction of an apical closure or apical stop is the most widely used approach in the treatment of immature non vital teeth. Most commonly used material in the treatment is calcium hydroxide [7].

Exact mechanism by which calcium hydroxide induces cellular activity is unknown. Anti bacterial action, tissue dissolution, inhibition of root resorption and induction of hard tissue formation are attributed to calcium hydroxide [11]. Dominquez and associates in a study of calcium hydroxide apexification in 26 young permanent incisor found 100% apical closure, 88.4% of their cases needed three to four session of calcium hydroxide treatment. The average time employed was 12.19 months [12]. Safi and Ravanshad. found continued root formation of pulpless permanent incisor following root canal treatment. They emphasized on the role of Hertwigs epithelial root sheath in apical development as it is more resistant to trauma and infection [13]. Felippe and co workers concluded that replacement of calcium hydroxide paste was not necessary for apexification to occur [7]. In present case apical barrier was achieved within six months after single visit apexification.

Andreason and colleagues found that long term use of calcium hydroxide as root canal dressing may increase the risk of root

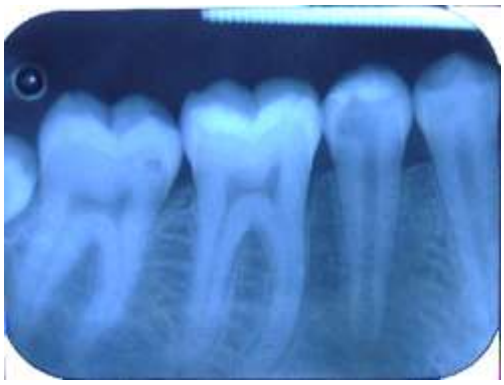

Fig. 1: Periapical radiolucency around right mandibular second premolar.

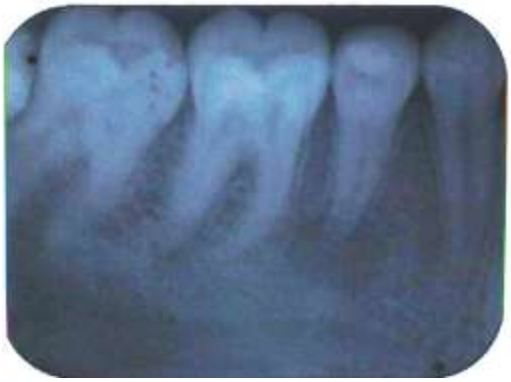

Fig. 2: Formation of apical bridge.

Fig. 3: Obliteration of canal with gutta percha.

fracture [14]. Recently a newer material in the form of Mineral Trioxide Aggregate (MTA) has been advocated for filling canals, repairing perforation, pulp capping and root end induction [15]. Felippe and others found Mineral Trioxide Aggregate used after root canal preparation more suitable for apexification and peri apical healing [1]. El-Meligy and Avery compared apexification with Mineral Trioxide Aggregate and calcium hydroxide and found MTA suitable

replacement for calcium hydroxide [16]. In present case it appears that apical closure occurred in non vital immature tooth because necrosis had not involved root sheath or odontoblast in apical area.

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