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# Management of dens evaginatus by revascularization: a case report

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**Abstract:** Dens evaginatus often fractures or is worn away, when tooth comes into occlusion, leading to pulp exposure and periapical inflammation. This case report describes the treatment of an immature permanent tooth with dens evaginatus using revascularization technique. The root canal of immature permanent tooth with periapical lesion was gently debrided and disinfected; then was medicated with triple antibiotic paste. When the tooth was asymptomatic, bleeding was induced followed by placement of MTA at root canal orifice. Eighteen months after revascularization, radiographic examination progressive lengthening and thickening of root canal walls. Our finding suggests that revascularization can be used for the treatment of immature permanent teeth with periapical lesion, as part of a regenerative endodontic treatment procedure.
**Keywords:** Revascularization, Dens evaginatus, immature permanent teeth, Periapical lesion, Triple antibiotic paste, Mineral Trioxide Aggregate

## INTRODUCTION:

Dens evaginatus is a developmental anomaly of tooth arising during the early stage of tooth development, before mineralization of hard tissues [1, 2]. Proliferation of inner enamel epithelium and sub adjacent odontogenic mesenchyme into the stellate reticulum of dental organ is responsible for this. The term dens evaginatus was recommended by Yip (1974); however, they have also been called occlusal tuberculated premolar, leongs premolar, evaginated odontome and occlusal enamel pearl. Prevalance of Dens evaginatus in the Indian population is 2.40 % [3]; and has been clinically characterized as an accessory cusp arising from the occlusal or lingual surfaces of the tooth. It is most commonly seen on premolars and rarely occurs on molars, cuspids and incisors.

The dens evaginatus or accessory cusp is composed of an outer layer of normal enamel, a core of dentin with varying extensions of pulp tissue into it or may also be devoid of a pulp horn. The cusp is usually placed at a level higher than that of normal cusps. Therefore, when tooth comes into occlusion this cusp is easily worn away or fractured, leading to exposure of the pulpal extension, which in turn may lead to pulp necrosis and early periapical infection. Depending on pulpal conditions, apical maturation and symptoms, the recommended management for a dens evaginatus tooth ranges from preventive treatment, pulpotomy, pulpectomy, conventional root canal treatment, and apexification.

Endodontic treatment of immature teeth with non-vital pulps is still a challenge; conventional treatment of choice being apexification using calcium hydroxide or MTA followed by endodontic therapy. A major limitation of apexification is the arrest of root length. Researchers have concluded that dentine exposed to calcium hydroxide for an extended period (6 months to 1 year) results in reduced flexural strength and lower fracture resistance [6, 7, 8]. Thus, in recent years there has been a paradigm shift from apexification to revascularization, where as periapical environment conducive for root maturation is provided that will allow continuation of root development.

## CASE REPORT

A 11 Year old girl reported to the Department of pedodontics and preventive dentistry with a chief complaint of pain and swelling in her lower right back tooth region. The patient gave a history of spontaneous pain since 1 week, following which they had visited a dentist and was prescribed pain killer. The pain was relieved but agin aggrevated within 3 days, this time accompanied by a swelling in relation the lower right back tooth region. No relevant medical history was reported. On examination, swelling of 5×3cm which was tender on palpation and soft in consistency with no local rise in temperature was observed. The submandibular lymphnodes were palpable. (Figure 1)

Intra oral examination revealed no carious lesions; however, 44, 45 and 46 were tender on percussion and palpation. The presence of a Dens

evaginatus and grade I mobility were observed in relation to 45(figure 2 and 3). Intra oral periapical radiograph revealed the presence of a periapical lesion in relation to 45. Pulp vitality tests (electric pulp test, cold and heat tests) gave negative results. Thus, a diagnosis of buccal space infection, secondary to periapical abcess from dens evaginatus in relation to 45 was arrived at (figure 4) and considering the root length and canal form, revascularization treatment was planned on 45.

**Fig-1:Preoperative photograph showing swelling irt right side of the face**

**Fig-2: Dens evaginatus irt 45**

**Fig-3: Intraoral photograph**

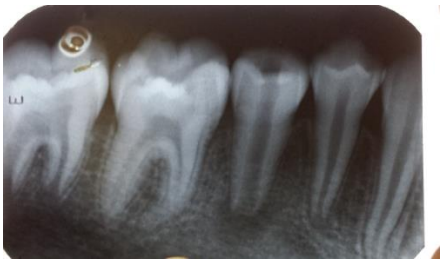

**Fig-4: Preoperative periapical radiograph**

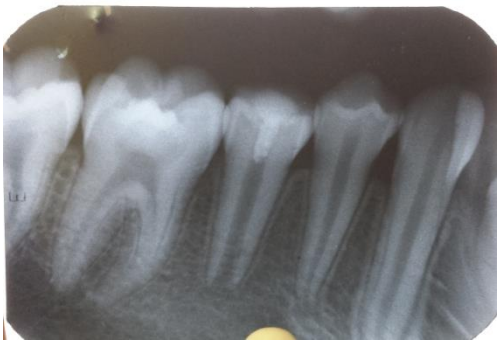

**Fig-5: 6 months follow up**

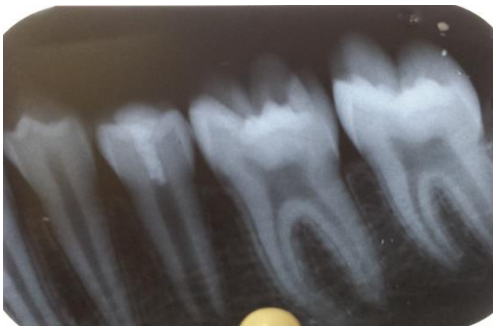

**Fig-6: 18 months follow up**

**Treatment and follow up:**

On the first appointment, antibiotics and analgesics (Cap Moxiclav-650mg and Tab Ibuprofen - 400mg) were prescribed and the patient was recalled after 3 days. On the subsequent visit, swelling and pain had subsided, so access opening and complete debridement of the canal along with copious irrigation (using saline, sodium hypochlorite and chlorhexidine) was done, following which triple antibiotic paste (cefaclor, minocycline and metranidazole mixed with propylene glycol) was placed and a closed dressing was given. The patient was then recalled after 3 weeks. On the recall examination, the lesion had healed, but did not completely resolve; therefore, triple antibiotic paste was placed again and the patient was recalled. At the next appointment, periapical lesion had healed considerably. Hence, the decision was made to continue with the next step. Isolation was achieved using rubber dam; and local anaesthesia was not administered. The triple antibiotic paste was flushed out with saline following which chlorhexidine irrigation was done. The canal was dried using paper points, following which bleeding was induced, by introducing a 20 number K-file beyond the apex of the tooth. A dampened cotton pellet was placed at the root canal orifice till hemostasis was achieved; following which white MTA (MTA Angelus) was placed at the orifice of the canal. GIC (Type 9) was placed as a coronal restoration and the patient was again recalled after an interval of 3 months. At the subsequent visit, increase in root length and dentin width was observed. After 18 months of follow up, root length and width was observed to have increased; however, apical closure has not occurred yet (Figure 6).

## DISCUSSION

Revascularization of teeth with necrotic pulps and open apexes are capable of regenerating tissues within the root canals, various series of case reports and our case also proves this [11]. The rationale of revascularization is that if a sterile tissue matrix is provided in which new cells can grow, pulp vitality can be re-established. Sterile tissue matrix was obtained by placement of triple antibiotic paste and use of 2.5% NAOCL and chlorhexidine. Infected area requires a normal blood supply which is no longer the case for teeth with necrotic pulps and for teeth without pulp tissue. MTA stimulates cell proliferation, migration and subsequent differentiation. Udaya J (2013) in the review article proposed different mechanism of revascularization –First being the vital pulp cells that remain at the apical end of the root canal, might proliferate under the organizing influence of cells of Hertwig's epithelial root sheath, into the newly formed matrix and differentiate into odontoblasts. These newly formed odontoblasts can lay down a tubular dentin at the apical end and lateral aspects of dentinal walls causing apexogenesis (elongation of root) as well as reinforcing and strengthening the root. Another mechanism of continued root development proposed is the multipotent dental pulp stem cells from the apical end might be seeded onto the existing dentinal walls and might differentiate into odontoblasts and deposit tertiary or a tubular dentin. The third possible mechanism could be attributed to the presence of stem cells in the periodontal ligament which can proliferate, grow into the apical end and within the root canal, and deposit hard tissue both at the apical end and on the lateral root walls. The fourth possible mechanism of root development could be attributed to stem cells from the apical papilla or the bone marrow. Instrumentation beyond the confines of the root canal to induce bleeding can also transplant mesenchymal stem cells from the bone into the canal lumen. These cells have extensive proliferating capacity. Another possible mechanism could be that the blood clot itself, being a rich source of growth factors, could play an important role in regeneration. These include platelet-derived growth factor, vascular endothelial growth factor (VEGF), platelet-derived epithelial growth factor, and tissue growth factor and could stimulate differentiation, growth, and maturation of fibroblasts, odontoblasts, cement oblasts, etc from the immature, undifferentiated mesenchymal cells in the -newly formed tissue matrix[9].

In this case, crown of the tooth was intact and caries free, ensuring that bacterial penetration into the pulp space through cracks and defects is slow. This young tooth with wide open apex, favoured the growth of new tissue into the pulp space quickly and thereby replacing the necrotic tissue. Thus, the race between the new tissue formation and infection of the pulp space favoured the new tissue [10].

Revascularization approach is mainly preferred because apexogenesis can be achieved, other advantages are chance of root fracture is minimal, technically simple and economically feasible. Various limitations are long term clinical results are not yet been available and also revascularized tooth may be susceptible to further pulpal disease [10]. Researchers report regeneration of pulp like tissue after revascularization [11]; whereas, immunohistochemical studies reveal that the tissues formed within the pulp canals are not pulpal tissues, but cementum and bone like tissues [12] .

## CONCLUSION

On the basis of short-term results of this present case, it appears that regeneration of vital tissues in a tooth with a necrotic pulp and periapical lesion is possible with a simple procedure like revascularization. Longterm observation of this case and randomized prospective clinical trials along with animal studies are needed to come to a definitive conclusion about the success of revascularization procedure.

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