Revasularization of necrotic immature lower premolar: a case report

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ABSTRACT

Regenerative dentistry is a rapidly growing field, this progress is based on the principles of tissue engineering—namely, the spatial delivery of appropriate cells, scaffolds, and growth factors. Revascularization technique applies the principles of regenerative dentistry to regain the vitality of immature necrotic teeth. Revascularization represents a new treatment modality in dealing with immature necrotic teeth, replacing the traditional procedures. In this new treatment modality the problem of thin wall roots with open apex is overcome by maturation of the root. In this case report, we applied the principles of revascularization to treat a necrotic immature lower premolar, and after one year of follow up the treatment was successful, as the root continued to grow and the apex was closed.

Keywords: Necrotic immature, Regenerative dentistry, Revascularization.

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Introduction:

Immature necrotic permanent teeth represent a true challenge for dentists. Traditionally these teeth were treated by long term apexification\(^1,2\) or by MTA apical barrier procedures.\(^3\) Although these procedures resulted in formation of apical calcific barrier, they didn’t result in continuation of root formation. Revascularization of immature necrotic permanent teeth represents a new treatment modality, in which we have continuation of root formation and in some cases positive response to sensibility tests is documented.\(^4\)

Case presentation

A 14 year old boy, presented to the emergency clinic in the department of dentistry in King Hussein hospital with pain related to his lower left premolar. The tooth was diagnosed as necrotic and accessed in the emergency clinic and then referred to the endodontic clinic to continue the endodontic treatment. After clinical and radiographic examination, we found that the tooth was immature. Figure (1) treatment options were discussed with parents of the child, and a decision was made to revascularize his necrotic immature tooth. After informed consent and anesthesia, rubber dam was placed, the temporary filling was removed, the caries was cleaned, working length was determined by placing file and taking radiograph, copious irrigation with 2.5% NAOCL for 10 minutes, followed by irrigation of the canal with normal saline, the canal dried with paper points, double antibiotic (metronidazole, ciprofloxacin) paste was placed in the canal, dry cotton and glass ionomer were placed. A second visit after 21 days, without giving anesthesia rubber dam was placed and tooth opened, copious irrigation with saline to remove the double antibiotic paste, canals dried with paper points, then using size 40 headstrom file placed beyond the apex...
bleeding was induced. Then about 3mm of MTA placed over the blood clot and under the level of the cement-enamel junction, ketac silver then placed over the MTA. After one year Suleiman was recalled for follow up, the tooth was asymptomatic with no tenderness, perapical radiographs taken showed a successful revasculrization procedure, the apex was fully formed, the canal was narrowed and the walls were thickened and no signs of any periradicular pathosis was seen. Figure (2,3)

Fig 1: Pre operative radiograph showing lower 2nd premolar with immature root

Fig 2 & 3: show radiographs taken after one year follow up, as can be seen the apex was closed and the walls of root were thickened.

**DISCUSSION**

Apexification and artificial barrier formation were the common and traditional procedures used for treatment of necrotic immature permanent teeth. A new technique by using revascularization procedure offers two main advantages which are continuation of root development and strengthening of root structure. A lot of case reports done about revascularization procedure and any new case report may play a role to support evidence based when using this type of treatment modality. In this case we use revascularization technique instead of apexification and artificial barrier formation to give more chances for root development. Success of revascularization depends on microorganisms and necrotic tissue elimination from the root canals system. For this purpose 2.5% NAOCL is used for irrigation of the canal, according to different studies different methods were used for canal disinfection including triple antibiotic mixture. In this case report we use double antibiotic metronidazole and ciprofloxacin for 3 weeks and with 2.5% NAOCL. Successful outcome after one year follow up was obtained. We did not use instrumentation in this case because it is contraindicated in revascularization procedure due to thin dentinal wall of necrotic immature teeth and to avoid future root fracture. We used only size 40 headstrom file to induce apical bleeding. Sterile or disinfect canal space with the growth factors derived from dentinal walls, and platelets derived growth factor from blood clot make a good environment for successful population and differentiation of stem cells, and this lead to root development continuation which is one of the main goals of revascularization procedure. One of the most successful factors in revascularization technique is the coronal seal. Most of reported cases used MTA and resin bonded restorations to achieve good coronal seal. MTA as mentioned
in many studies show good sealing ability and is considered one of the best biocompatible materials.\textsuperscript{(12)} In this case MTA and glass-ionomer filling were used to get a good coronal seal. After one year follow-up according to signs and symptoms, the case shows good success outcome. In this case we couldn’t make histological analysis for more assessment and accuracy of pulp status.

**Conclusion**

With the growing success of regenerative dentistry and with the shortcomings of the traditional procedures of treating immature necrotic teeth, revascularization represents a valuable treatment option in these cases.

**References**


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