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Regenerative Endodontic Treatment for Immature Permanent Teeth "Literature Review"

Sally Adnan Abdulhameed Al Shakarchi[1] Aseel Issam[1]

1. Babylon Health Department / Specialized Dental Center
moayadrm78@gmail.com

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Abstract

Eendodontics faces a dilemma when it comes to treating young teeth with pulp necrosis. Long-term administration of calcium hydroxide to induce apexcification is a common therapy for permanent teeth in children inadequate root development and pulp necrosis.
Scientists would discover a method of stimulating before the end of the year, the root system will be fully developed, including apex closure organism, ushering in a new age a type of regenerative endodontic therapy that tries to predictably restore damaged, inadequate, and missing materials with healthy freshly created tissues, restoring the tooth pulp-dentin complex's inherent function shape and function .
Revascularization becomes a new treatment method that intends to promote root development completion by invaginating new connective tissue into the pulp cavity's inner space .
Root maturation could be aided by revascularization result, root wall thickening and strengthening of immature permanent teeth.

Key words: immature teeth, revascularization, regenerative Endodontic.

Introduction

It's tough to treat apical periodontitis in children's underdeveloped permanent teeth.

Inappropriate, incorrect the treatment of such instances is almost certain to result in permanent tooth loss, mandibular growth and masticatory function problems, as well as speech and facial impairment.

Taking in consideration to avoid the loss of these teeth, extremely effective treatment procedures and biologically beneficial remedies must be developed (1,2).

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Endodontics faces a hurdle when it comes to treating young teeth with pulp necrosis (3).

Because of the small the root canal dentin thickness, as well as the high activity and form of an open apex, the root walls of young teeth with open apices are fragile this process may become even more complicated, leading to difficulties in accomplishing the process of chemically and mechanically preparing to eradicate an infection, root canals are used. This technique may be made more difficult in the case of young teeth with open apices, whose root walls are brittle because to the root canal den's thin thickness. Injuries or infections that are powerful enough to prevent mineral deposition might cause incomplete root growth cutting off blood flow; also, root creation is slowed (4).

Long-term calcium hydroxide administration to induce apexification is a typical therapy for permanent teeth in children apexification problems insufficient root development and pulp necrosis (5). This therapy procedure, according to Ding, has various drawbacks, including unpredictable treatment time, patient participation, and an increased risk of tooth breakage during long-term use preparation (6).

An artificial apical barrier was also created using the MTA plug approach. Although those treatments have been shown to be therapeutically helpful, they do not help to strengthen the roots. As a result of the lack of continuous root development, root dentin walls become thin and weak (7).

The idea of rebuilding pulp tissue into an immature tooth that had previously been infected has recently piqued people's interest. One of the most interesting potential advances in dentistry today is regenerative endodontics (8).

Revascularization is based on the theory that pulp life can be increased by creating new cells can develop in a sterile tissue matrix restored (9).

That matrix is provided by a newly formed blood clot established as a result of intentionally a leak a canal area that has been induced. The clot contains growth factors include platelet-derived growth factor, vascular endothelial growth factor, and tissue growth factor, which can aid undifferentiated cell types differentiate. The scaffold creates a three-dimensional biological and physico-chemical microenvironment for cell adhesion and migration, as well as cell development and differentiation (10). Continued root development is aided by pulp and/or periodontium stem cells and progenitor cells (11).

Literature Review

The tooth pulp is a one-of-a-kind organ made up of odontoblasts, extracellular matrix, fibroblasts, endothelial cells, neuron cells, immunological cells, and more recently found stem/progenitor cells a material having up to 52 pulp organs (12).

An open root apex can occur as a result of significant apical resorption periapical inflammation, or trauma healing after orthodontic therapy (13).

Camp(14), Shin et al(15), Banchs and Trope(16), Nosrat et al(3), and Chueh et al(3) all agree that (17), Correct pulp and periapical diagnoses are required before endodontic therapy for teeth with insufficient root development, as there is a danger of pulp vitality loss.

In the cervical and middle thirds, an immature tooth's root canal with an unfinished root canal apices is often the foraminal entrance is larger than the canal, giving it an hourglass form. Root canals in fully developed teeth are cone-shaped; the pulp chamber is to the left of the main base, whereas the apical third is to the right. On the other hand, teeth with open apices, approaching the apical third of the main base As a result, an open foramen lacks anatomical support, preventing filling because biomechanical preparation prevents the "apical seat" required for gutta-percha cone implantation.

One of methods which is used in treatment of teeth with open apices and pulp necrosis, this cleaning and a monthly-replaced temporary paste (calcium hydroxide) fills the root canal induces the growth of calcified tissue at the apex is part of the operation. Nonetheless, calcium hydroxide-induced apexification has obvious drawbacks, such as the length of time required to build a barrier at the apex (for a porous barrier, 6 to 24 months). Secondly, the approach encourages apical closure rather than total root development (5,18,19).

Apexification drawbacks, such as the fact that the root canal walls are made of are still thin, and root formation process may not be completed, and more likely to fracture after endodontic treatment(3).

Scientists would discover a method of stimulating the organism's ability to finish root growth, including apex closure, has ushered in a new period of regenerative endodontic procedures, which attempt to repair damaged, inadequate, and missing structures with healthy freshly created tissues, restoring the mouth tooth pulp-dentin complex's natural function shape and function (4).

In the last decade, regenerative endodontic procedures have emerged as a realistic, simple option for allowing the entire the development of young teeth's roots (20,21). When treating Revascularization pulp necrosis and/or apical periodontitis in young permanent teeth techniques are advised (22), which the root is elongated as a result of the deposition of hard tissue canal walls thicken, and the entire root growth of young permanent teeth is stimulated (23). According to Chueh et al.(17), young children have a higher capacity than adults for healing and have greater stem cell potential regeneration.

Furthermore, immature teeth heal more quickly at the apical level and continue root development, indicating that young children's teeth have a lot of potential for regeneration. Lower premolars revascularization is most commonly used to treat teeth higher incisors, which are more susceptible to pulp necrosis susceptible to shatter according to most case reports and research (5,6,15,16,17,24,25,26,27) Nygaard Ostby (28,29) made the attempts to repair pulp tissue were made in the beginning. In both cases, the root canals were purposefully excessively instrumented to elicit just short of the root apices, gutta-percha with Kloroperka N-O paste obturation is performed. In cases where necrosis was apparent, they disinfected the canals with a 4 percent formaldehyde solution. Mineral tissue accumulation was found connective tissue and the root canal walls during histological studies.

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Revascularization is foreseeable in optimum conditions and with chemical cleaning of the root surface, according to recent studies (3,16,17,23,24,27). Banchs and Trope(16), Cotti et al(24), Thibodeau and Trope(5), Wang et al(25), Ding et al(6) Chen et al (23) and Shin(15), Root canal biomechanical preparation and isolation with rubber barrier are excellent settings.

A fissured diamond bur and plenty of water are used to prepare a cavity access. An auxiliary chemical substance is irrigated liberally at the pulp chamber's entrance. The majority of revascularization therapy procedures do not use root canal mechanical instrumentation, smear layer deposition might clog dentin walls and tubules, not only do juvenile teeth have thin dentin walls, making them more susceptible to shattering, but smear layer deposition can obstruct dentin walls and tubules (5,6,15,17,23,24). Thus, chemo-mechanical preparation because infection control offers a favorable environment for pulp and periapical cells to engage in healing and regeneration, it tries to clean, lengthen, and shape the root canal (23).

According to the literature, some researchers utilize sodium hypochlorite irrigation in the same way as traditional root canal preparation, which comes in a variety of concentrations: NaOCl with a concentration of 5.25 percent (3,6,16,23,24), 2.5% NaOCl(17), 1.25 percent EDTA(27), 6% NaOCl + saline solution + 2% chlorhexidine gluconate + NaOCl(5,25), 1% NaOCl + EDTA(27), 6% NaOCl (15). This is owing to sodium hypochlorite's powerful antibacterial and proteolytic activity, which dissolves organic matter, kills microbes, and destroys necrotic tissue. Using sterile paper, the root canal is carefully dried sheets once the process is completed. Because new tissue stops developing when bacteria are discovered in the root canal space, revascularization success is dependent on the lack of microorganisms within the root canal (30,31). For this reason application to the complement canal with a triple antibiotic paste decontamination. During revascularization procedure, carious dentin and necrotic root canals can be decontaminated using a variety of topical antibiotic combinations. The triple paste, which contains metronidazole, ciprofloxacin, and minocycline, is one of the combinations employed. It has been shown to be effective in destroying infections found in the canal root system. (3,7,15,16,23,25), as well as in removing microorganisms from deeper within the root dentin (which can survive even after endodontic treatment). Ciprofloxacin, metronidazole, and minocycline are a combination of antibiotics that enter the tubules of the dentin and destroy germs in the diseased root dentin, according to Sato et al.(26). Topical administration of such medications can cleanse diseased this is how root dentin is formed. Ciprofloxacin and minocycline were used in conjunction with metronidazole in this study utilized to detoxify polluted because they produce fibroblasts that are prone to toxicity, root dentin should be avoided testing and biocompatible with the tissues.(32).

Calcium hydroxide and formocresol, on the other hand, have been successfully employed as intracanal dressings during revascularization treatments to decontaminate root operations on apical periodontitis/abscess in a young permanent tooth with pulp necrosis (6,7,16,17,23,24,33).

A K-file #25 device is used to apply the polyantibiotic combination, which is 3 mm shorter than the length calculated radiographically. The tooth is then temporarily removed restored. The patient returns after a length of time, and the tooth is sedated using anesthesia that does not contain a vasoconstrictor, allowing for isolated and accessible bleeding. After removing the antibiotic paste with a new irrigation procedure, the canal is dried with paper sterile points. A K-file #40 device is used to irrigate apical tissues in order to induce bleeding and the formation of blood coagulum within the root canal, as well as to guide tissue invagination (3,5,16,23,25,27,32,34). The periapical region's blood coagulum is made up of a fibrin network that serves as a pathway for cell migration, including macrophages and fibroblasts. Blood coagulum, on the other hand, not only serves as an inactive scaffold, but also as a source of growth and differentiation components vital to the healing process (3,5,6,25). Additionally, it contributes to tissue inner growth (3,5,16,25).

. Invagination of blood into the root canal can have two outcomes: destruction by microbes and phagocytosis of necrotic remains. The most essential benefit, however, is the organizing of in the apical third, blood coagulum forms and fibrous tissue forms. It's likely that blood coagulum, which comprises platelet-derived growth factors, as well as dentin-derived growth factors, is present inside the decontaminated and empty root canal space walls, acts as a protein-rich scaffold essential for population survival, cell differentiation, and root development (3,5,6). According to Ding et al(6), blood coagulum production should continue throughout revascularization treatment till the cemento-enamel interface is 3 mm below. After that, over the blood coagulum, an MTA plug is created preventing prior to revascularization, microorganisms from entering the root canal.

MTA has been utilized to aid in the sealing of pulp. It is biocompatible with neighboring pulp tissue and can encourage pulp cell growth, in contrast to calcium hydroxide.

Furthermore, MTA has great marginal adaptability and can keep a higher pH for a longer period of time. Due to its favorable characteristics during therapy, it has also been employed as a coronary plug (3,15,33)

Conclusion

Revascularization for non-vital permanent children's teeth with insufficient root growth and necrotic pulp, is a biologically based alternative to existing treatment procedures. The thickening and/or continued expansion of the root walls is caused by revascularization of non-vital necrotic-pulp teeth, resulting in increased fracture resistance. Randomized clinical trials are clearly required to assess the long-term clinical consequences of this novel medication strategy.

Conflict of Interests.

There are non-conflicts of interest .

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علاج حشوات الجذور التجديدي للأسنان الدائمية غير الناضجة "عرض للمؤلفات"

الخلاصة

يعتبر علاج الاسنان الدائمية غير الناضجة المصابة بنخر العصب تحدي لمعالجي جذور الاسنان العلاج التقليدي للأسنان الدائمية الفتيه غير مكتملة الجذور والمصابة بنخر العصب يشمل استعمال ماده هيدروكسيد الكالسيوم لفتره طويله من اجل حث عملية تكوين الجذر. وقد اكتشف العلماء طريقه لتحفيزالاعضاء لتصبح قادرة على اكمال نمو الجذر، والتي تشمل اغلاق فتحة الجذر الامر الذي فتح عهد لحشوات الجذور التجديدي.

ان هذه العملية صممت لكي تعوض عن التراكيب والأنسجة المتضررة والمفقودة بأنسجة صحية ومنتجه حديثا، والتي هي قادره على ترميم الشكل والوظيفة للأسنان.

عملية ((إعادة تكوين الأوعية)) أصبحت طريقة جديده للعلاج تهدف الى تعزيز اكمال تكوين الجذر بواسطة انغلاق للأنسجة الرابطة الجديدة في الفراغ الداخلي لتجويف اللب. لذألك فأن عملية إعادة تكوين الاوعية هي طريقة ذات جدوى في إنضاج الجذر مع زيادة في سمكه، والذي بدوره سوف يقود الى تقوية جدران جذورالاسنان الدائمية الفتيه.

الكلمات المفتاحية: حشوات الجذور التجديدي –إعادة تكوين الاوعية –الاسنان غير الناضجة