ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 2, Issue – 2, March - April - 2019, Page No. : 123 - 126

A Review of Technique of Lesion Sterilization and Tissue Repair in Primary Teeth

Dr Geetanjali Jadhav[1]*, Assistant Professor, DY Patil Dental School, Pune.
Research Scholar, Symbiosis Centre for Research and Innovation, Pune
Dr Lalit Patil[2], Assistant Professor , Dr. D Y Patil Vidyapeeth, Dr. DY Patil Dental College and Hospital, Pimpri, Pune.
Dr Smita Patil[3], Dental Surgeon, Bharati Vidyapeeth Dental College and Hospital, Pune.

Corresponding Author: Dr Geetanjali Jadhav, Department of Paedodontics, D Y Pati Dental School, Lohegaon, Pune, India

Type of Publication: Review Paper

Conflicts of Interest: Nil

Abstract

Various studies had demonstrated the role of the microorganisms in the development of pulp and periapical diseases. The most important principle in the treatment of these lesions is the elimination of the bacteria. In the recent years concept of the "Lesion sterilization and tissue repair (LSTR) has been introduced that uses the combination of the antibacterial drugs for the disinfection of the oral infections including dentinal, pulpal and periapical lesions. The present article reviews this technique and its importance in primary teeth.

Keywords: Periapical lesion, Primary teeth, Pulpal lesions, LSTR.

Introduction

Teeth with the infected root canal and those infections reaching periradicular pathosis are particularly common problems for the primary dentition. Early loss of the primary tooth can results in development of the various problems with the dentition in the future. Therefore it is very important to preserve these primary teeth in the arch.[1] Nonsurgical treatment includes conventional root canal treatment with or without adjunctive therapy. It is of utmost importance that the clinician be familiar with root and root canal anatomy. Performing apical surgery on every case with a periapical lesion will most likely enhance healing kinetics. Nevertheless, it can hardly be justified because surgery has repercussions for the well-being of the patient; swelling, pain, and discomfort are among the expected side effects. Furthermore, many anatomic locations preclude apical surgery either because of inaccessibility or risk to adjacent structures. In accordance, the American Association of Endodontists recommends performing apical surgery only in cases that cannot be treated otherwise.[2]

Various research studies have confirmed that simple nonsurgical treatment with proper infection control can promote healing of large periapical lesions.[2,3] Various methods for non-surgical management of periapical lesions includes: conservative root canal treatment without adjunctive therapy, decompression technique active nonsurgical decompression technique, aspiration and irrigation technique, aspiration through root canal technique, by using calcium hydroxide, lesion sterilization and repair therapy (LSRT), apexum procedure. All the other methods are invasive except LSTR and by using calcium hydroxide.[4]

Technique

In recent years, the Cariology Research Unit of Niigata

University School of Dentistry has developed the concept of lesion sterilization and tissue repair (LSTR) therapy that employed a mixture of antibacterial drugs for disinfection. Repair of damaged tissues can be expected if lesions are disinfected.[5,1]

This technique is also called as "Noninstrumental endodontic treatment (NIET). Lesion sterilization and tissue repair (LSTR) therapy is a technique that allows disinfection of dentinal, pulpal, and periradicular lesions using a combination of antibacterial drugs. LSTR technique uses combination of the three broad spectrum antibiotics of Metronidazole, Ciprofloxacin and Minocycline.[6,7,8]

Bacterial constituents of carious dentin, pulp, infected root dentine, necrotic pulp, periapical lesions and infected cementum has been analyzed under strict anaerobic conditions to understand the target bacteria in LSTR endodontic treatment. In addition, bacteria in dental plaque, tongue plaque, periodontal pockets and osteomyelitis also been analyzed with strict anaerobic procedures because they were possible sources of bacteria in endodontic lesions. According to these and other results of various studies, antibacterial drugs were selected.[1]

Metronidazole was the first choice because it has wide bactericidal action against anaerobes, which were common in oral sites. However some bacteria may be resistant to metronidazole and thus, two more drugs, ciprofloxacin and minocycline should be mixed with metronidazole in an effort to eliminate all the bacterias.[1]

There is variable data available for the ratio and proportion mixture of these antibiotics like 3:1:1 or 3:1:3 or 1:1:1, etc. The antibiotics are mixed with propylene glycol as a excellent vehicle and then used.[6,7,8]

Mechanism of action

Lesion Sterilization and Tissue Repair therapy is a novel caries, pulpal and root canal treatment system. Using an anti-bacterial drug combination, the therapy aims to eliminate causative bacteria from lesions, and after sterilization, the lesions are repaired or regenerated by the host's natural tissue recovery process. After sterilization, softened dentin will re-calcify, so both softened dentin as well as carious dentin can be intentionally left. An inflamed pulp, even with spontaneous pain, will recover after LSTR treatment.[9]

It has been reported that a mixture of antibacterial drugs, i.e., metronidazole, ciprofloxacin, and minocycline, can sterilize the root dentine. In root canal treatment, complete root canal preparation or root canal obturation is not essential due to the combination of the above mentioned antimicrobial drugs which can successfully eliminate the causative bacteria from dentin walls of the root canals.[9]

Composition

Several combinations of medicaments are tried over years. Some of the well-known combinations are[6]:

a. Metronidazole and ciprofloxacin plus minocycline (3-mix paste/ Triple Antibiotic paste).
b. Metronidazole and ciprofloxacin plus amoxicillin.
c. Metronidazole and ciprofloxacin plus cefaclor
d. Metronidazole and ciprofloxacin plus cefroxadine
e. Metronidazole and ciprofloxacin plus fosfomycin
f. Metronidazole and ciprofloxacin plus rokitamycin
g. Penicillin, bacitracin, or chloramphenicol and streptomycin (Grossman's polyantibiotic paste)
h. Ledermix paste (triamcinolone-a corticosteroid and demeclocycline-a tetracycline antibiotic).
i. Neomycin, polymyxin, and nystatin.
j. Calcium hydroxide pastes.
k. Chlorhexidine paste.

Among these, the 3- mix paste of Metronidazole and ciprofloxacin plus minocycline is discussed in detail.

Metronidazole and ciprofloxacin plus minocycline (3-mix paste/ Triple Antibiotic paste)

Sato et al, formulated the use of the present combination of antimicrobials- Metronidazole and ciprofloxacin plus which produced effective destruction of all kinds of endodontic pathogens (aerobic as well as anaerobic). Ever since, this combination has been popularly known as 3-mix paste/ Triple Antibiotic paste.[6]

Dosaging

Ciprofloxacin (200mg), Metronidazole (500mg), Minocycline(100 mg), Propylene glycol/ macrogol, Normal saline as carrier.[6]

Disadvantages of Polyantibiotic pastes

A disadvantage of this mixture is tooth discoloration to a bluish-grey hue. The discoloration brought about by tetracycline family is believed to be due to photo-induced reaction. Minocycline binds to calcium-ions through chelation reaction forming an insoluble comple. Patients and parents/guardians should be advised of potential staining and a subsequent need for bleaching.[6]

Method of dispensing

A 20 gauge needle isplaced1-2 mm short of working length and medication is introduced into the canal using a backfill approach to the level of the cemento-enamel junction or alternately paste filler or lentulospirals can be used.[6]

Method of preparation & storage[6]

1. Take clean mortars separately on which each tablets/capsules will be placed and ground.
2. Now equal ratio of tablet powder is mixed to produce a mixture; to which equal amount of propylene glycol is added to produce a creamy paste.
3. Resultant opaque paste can be stored in air-tight containers for future use.
4. Change of translucency of paste from opaqueness indicates contamination which should not be used.

Advantages[6,7,9]

1. Can successfully eliminate the causative bacteria from dentin walls of the root canals.
2. Healing of periapical lesions associated with infected primary teeth.
3. As obturation is not necessary it reduces the chair side time.
4. Its cost effective both to the dentist and to the patient
5. Number of visits are also reduced.

Various studies done on LSTR

1. Sato et al investigated this drug combination in vitro and established it to be very effective in the decontamination of deep caries, necrosed pulp, and infected root canals of primary teeth.[10]
2. Hoshino et al determined that a combination of ciprofloxacin, metronidazole, and minocycline with a dilution of 25 g each per millilitre of paste has ability to decontaminate infected root canal dentin in vitro.[11]
3. Banchs F et al suggested that the MIC method may not be suitable for determining whether combinations of drugs can kill all the bacteria in a flora.[12]
4. Ozan U & Er K reported on endodontic treatment of a large cyst-like periradicular lesion using a combination of antibiotic drugs.[13]
5. Ozlem reported on use of triple antibiotic paste for a traumatized immature tooth with a periapical lesion.[14]
6. Primary teeth with periradicular lesions with or without physiologic root resorption were treated successfully by the LSTR endodontic therapy.[15]

Endodontic Regenerative Procedure (ERP)

ERP, as discussed includes conventional instrumentation either minimal or no instrumentation followed by placement of intracanal medication and later bleeding is induced from periapical region. The bleeding from periapex would lead a matrix for movement & growth of new vital tissue in root canal spaces.[6]

Conclusion

Lesion sterilization and tissue repair is a novel technique for the management of the pulpal and periapical lesions. It can become a technique in routine use if the knowledge of the technique and its uses were introduced to the general dental practitioners.

References

1. Takushige T, Cruz EV, Moral AA, Hoshino E. Endodontic treatment of primary teeth using a combination of antibacterial drugs. International Endodontic Journal 2004;37:132-8.
2. Lokade J., Wankhade S.V., Gade V.:Nonsurgical endodontic treatment of a periradicular lesion using LSRT therapy: a case report. Int. J. Dent. Clinics. 2012;4(3): 63-66.
3. Calıskan M. Prognosis of large cyst-like periapical lesions following nonsurgical root canal treatment: a clinical review. International Endodontic Journal. 2004;37(6):408-16.
4. Iwaku M, Hoshino E, Kota K. Lesion sterilization and tissue repair (LSTR) therapy: new pulpal treatment. How to conserve infected pulps Tokyo, Japan: Nihon-Shikahyoron. 1996.
5. Prabhakar AR, Shridevi E, Raju OS, Satish V. Endodontic treatment of primary teeth using combination of antibacterial drugs: An in vivo study. J Indian Soc Pedod Prevent Dent - Supplement 2008;s5-10.
6. Anila B, Murali H, Cheranjeevi J , Kapil RS. Lesion Sterilization and Tissue Repair (LSTR). A Review. Journal of Scientific Dentistry 2014;4(2):49-55.
7. Taneja S, Kumari M, Parkash H. Nonsurgical healing of large periradicular lesions using a triple antibiotic paste: A case series. Comtemporary Clinical Dentistry 2010;1(1):31-5.
8. Saleh AA, Eid HA, Abdelaziz KM. Lesion sterilization tissue repair as adjunct to conventional root canal treatment of combined periodontic-endodontic cases. World J Dent 2014;5(1):47-52.
9. Divya S, Retnakumari N. Lesion sterilization and tissue repair in primary teeth with periapical pathosis-case series. IOSR Journal of Dental and Medical Sciences 2014;13(3):7-11.
10. Portenier I, Haapasalo H, Rye A, et al. Inactivation of root canal medicaments by dentine, hydroxylapatite and bovine serum albumin. IntEndod J. 2001;34(3):184-8.
11. Bansal R, Jain A. Overview on the current antibiotic containing agents used in endodontics. N Am J Med Sci. 2014;6(8):351-8.
12. Kaufman AY, Solomonov M, Galieva D, et al. Allergic reaction to the tetracycline component of Ledermix paste: a case report. IntEndod J. 2014;47(11):1090-7.
13. Grieve AR, Friend LA, Plant CG. A clinical trial of three root canal medicaments. Br Dent J. 1973;134(5):188-93.
14. Kim D, Kim E. Antimicrobial effect of calcium hydroxide as an intracanal medicament in root canal treatment: a literature review - Part I. In vitro studies. Restor Dent Endod. 2014;39(4):241-52
15. Prabhakar A, Taur S, Hadakar S, et al. Comparison of Antibacterial Efficacy of Calcium Hydroxide Paste, 2% Chlorhexidine Gel and Turmeric Extract as an Intracanal Medicament and their Effect on Microhardness of Root Dentin: An in vitro Study. Int J ClinPediatr Dent. 2013;6(3):171-7.