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Role of LSTR in root canal therapy particularly against *Enterococcus faecalis* and *Enterococcus faecium*

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Endodontic treatment success generally depends on the microbial suppression in the root canal and periapical region. Endodontic instrumentation alone cannot achieve a sterile condition during RCT. Sterilization of bacteria in root canal system is one of the prominent problems. Occasionally some bacteria could remain in root canal even after using conventional medicaments. Evidence suggested that *Enterococcus faecalis* (*E. faecalis*) and *Enterococcus faecium* caused substantial root canal infections. It is important to evaluate root canal obturation because inadequate obturation may not only produce areas where bacteria may remain and survive, but also provides routes through which bacteria may migrate to the periradicular tissues. Radiographs have often been used to examine root canal systems and evaluate obturations of the root canal, partly because of its non-destructive nature. Consequently, elimination of such organism is important to achieve endodontic treatment success. Endodontic failures would then routinely undergo re-treatment based on the attending clinician's best judgment. A possible alternative treatment for such cases is Lesion Sterilization and Tissue Repair (LSTR) therapy. The basic concept of this therapy is the elimination of the cause of infection, in this case, bacteria, by introducing the appropriate antibacterials into the tooth thereby resulting in disinfection of the lesion and resolution of inflammation. The main component of LSTR therapy is a macrogol-propylene glycol-antibiotic mixture (3Mix-MP). *Enterococcus faecalis* & *faecium* are the species most frequently isolated from failed endodontic treatments because it can survive under stress conditions imposed by root canal treatment. In vitro antibacterial efficiency of a mixture of ciprofloxacin, metronidazole, and minocycline (3Mix antibiotics), against oral bacteria of children was assessed by Sato et al. The antibiotic combinations were observed to be effective against both carious and endodontic lesions in vitro. Hoshino et al determined that 25 µg each/ml of ciprofloxacin, minocycline, and metronidazole antibiotic mixture to be effective in sterilizing the infected root dentin in vitro. Sato et al studied the ability of a mixture of ciprofloxacin, minocycline and metronidazole (0.5mg of each) in an in vitro study to eliminate experimental infection in deep layers of root dentin by *E. coli*. In other, in vitro study, the minimal inhibitory combination for ciprofloxacin and minocycline against *E. faecalis* and *E. faecium* were found to be 5 and 20 µg respectively and metronidazole was reported to have no inhibitory effect. However, as the combination (100µg each /ml) they inhibited the growth of every strain completely. Thus this suggests 3mix may be effective in persistent endodontic infection. Resistant bacteria *E. faecalis* may result in Root Canal Treatment (RCT) failure. It may impregnate in tiny dentinal tubules. It usually not killed by most of the medicament or any single antibiotic. The present study shows that LSTR-3mix MP therapy has a significant antibacterial effect on *E. faecalis* when compared to a single antibiotic. Two antibiotics of LSTR- 3mix showed susceptibility with *E. faecalis* except for metronidazole. It was also useful in pulpotomy and pulpectomy for primary or premature permanent teeth.⁸ Therefore, it can be considered that LSTR-3mix therapy could be effective in root canal sterilization and retreat the RCT failure case by eliminating the *E. faecalis*. Further clinical study is needed to confirm the results. Although inconclusive, it must be noted that the mixture of MP may have been essential to the consistent penetration of the dye mixture to the apex. This may suggest that MP could be a good vehicle to carry the prescribed antibacterials within a filled root canal. Being such, the antibacterials + MP mixture (3Mix-MP) need only be placed at the orifice of the canal and allowed to penetrate the obturation. By following the prescribed protocol of LSTR therapy, it may be possible to perform an endodontic re-treatment without having to remove the existing obturation. Researches have been and are still presently being conducted to investigate the possibility for such form of treatment to be considered as a possible alternative endodontic re-treatment procedure for certain endodontic failures especially those which are deemed to be caused by viable bacteria remaining within a filled canal of the tooth.

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