

Summary:

A total of 120 endodontic swab were collected from patients suffering from root canal infections, ranging from 20-55 years old of both genders whom admitted to the dental clinic of Al-Diwaniyah Teaching Hospital within the period from April to September 2010, in order to evaluate the antimicrobial activity of commonly used endodontic sealers and irrigants as separately and as a combination of these materials against aerobic and facultative anaerobic microbes that isolated from infected root canal.

Clinical observations of root canal infections revealed that the molar teeth were the most teeth types associated with root canal infections (49.1%) followed by premolar (35.8%), then anterior (15%).the present study showed that 71.7% of patients presented with symptomatic infections, while only 28.3% of them were asymptomatic. 64.2% of teeth understudy were vital compared with 35.8% non vital teeth. A strong association was recorded between tooth vitality and sign and symptom presentation ($p < 0.001$). Teeth with open canal formed 75% of total teeth that required endodontic treatment, whereas teeth with closed canal recorded only 25%, the teeth with open canal had a significantly higher rate of symptomatic infection (83.3%) compared to those with closed canal (36.7%)($p < 0.001$). Age group 20-29 years old recorded the highest percentage (41.6%) of infections than other groups, also female recorded a high percentage (63.4%) of infections compared with male (36,6%), There was no significant differences in rate of symptomatic infection between males and females.

By using VITEK 2- Compact system for definitive identification of microbiota associated with endodontic infections, *Streptococcus* bacteria were more frequently isolated including *S.pyogenes* (16.3%) , *S.mutans* (15.6%), *S.sangius* (9.5%), *S.angiosus* (6.8%), *S.pneumonia* (6.3%), *S.intermedius* (6.3%) *S.mitis* (4%), *S.salivarius* (3.4%), whereas *Enterococcus faecalis* recovered from 5(3.4%) root canals. The study showed that both *S.aureus* and *S.epidermides* recorded 11.5% and 5.4% of total bacterial isolates

respectively, only 5(3.4%) isolates of *Lactobacillus acidophilus* were recovered from infected root canals. *Candida albicans* isolated from 12(8.1%) teeth in tested isolations.

The sensitivity of endodontic isolates against different antibiotics were tested, most isolates were 95% sensitive to Amoxicillin + Clavulanic acid, the results also showed high susceptibility of the isolated microorganisms to Vancomycin (93.3%), the isolates were less susceptible to Erythromycin, Tetracycline and Ciprofloxacin, the percentage were 66.7%, 66.7%, 65% respectively, while the Ampicillin, Cephalosporin recorded the lowest percentages (36.7%, 41.7%), respectively.

Agar diffusion technique was used to determine the antimicrobial activity of different endodontic materials used in this study via measuring the diameter of inhibition zone, the results showed that the highest mean of inhibition zone for endodontic sealers was belong to Zinc oxide eugenol (14.9 mm) followed by resin based sealer (3.4 mm), then Calcium hydroxide (1.2 mm) with highly significant differences ($p < 0.001$). In the same way, results for testing the antimicrobial effect of endodontic irrigants indicated that the mean diameter of inhibition zone was the smallest with Hydrogen peroxide (2 mm), followed by Sodium hypochlorite 5.25% (5.2mm), while the greatest inhibition zone was in Chlorhexidin 2% (8.7mm) with highly significant differences ($p < 0.001$)

Results of mixing Calcium hydroxide with triple antibiotic solution and two types of irrigants (Chlorhexidin 2% and Sodium hypochlorite 5.25%) which were added in turn to Calcium hydroxide sealer to improve its antimicrobial properties showed that the use of triple antibiotics was associated with the highest mean diameter of inhibition zone (25.3 mm) followed by Chlorhexidin (19.2 mm) and Sodium hypochlorite (16.8 mm). These additives formed a significant differences comparing with Calcium hydroxide's single effect ($p < 0.001$). Also adding triple antibiotic solution to Zinc oxide eugenol sealer significantly increased the inhibition zone diameter to 28.3mm compared to the sealer effect alone (14.9mm). Statistical analysis indicated that the effect

of Zinc oxide eugenol combination (28.3 mm) was higher by only 10% compared to Calcium hydroxide combination (25.3 mm).

As a conclusion, the recent study indicated a potential complex interactions of species resulting in characteristic clinical pictures which cannot be achieved by individual species alone. A mixture of Metronidazole, Ciprofloxacin, and Tetracycline added to Calcium hydroxide sealer provided an excellent outcome in treatment of root canal microbiota.