

A retrospective analysis of root canal treatment done in maxillary premolars with non carious cervical lesions in patients attending a private dental institution in chennai

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ABSTRACT:

Tooth hypersensitivity is defined as pain caused by a non noxious stimulus. Teeth with exposed dentin or gingival recession are subject to dentin hypersensitivity. Tooth hypersensitivity can occur owing to abrasion, erosion and abfraction. Non-carious cervical lesions are most common in the middle to older age group. So the aim of our study was to report the number of root canal treatment done in maxillary premolars with non-carious cervical lesions. 150 patients case records with maxillary premolars in which root canal treatment was done was taken as the study population. Results were obtained and statistically analysed through SPSS software. Chi square test was done with age, gender and tooth number as parameters. The analysis showed that out of the 150 case records examined 25 cases had root canal treatment done due to non-carious cervical lesions. Within the limitations of our study, it has been concluded that most of the root canal therapies are done in older age group mainly due to abrasions, erosion and abfraction. So when encountering hypersensitivity or pain in older age group, non-carious cervical lesions should be considered as the main etiology.

Keywords: Dentin hypersensitivity; Gingival recession; Non-carious cervical lesions; Root canal treatment.

INTRODUCTION:

Tooth hypersensitivity is defined as pain caused by a non noxious stimulus. Teeth with exposed dentin or gingival recession are subject to dentin hypersensitivity.¹ Tooth hypersensitivity can occur owing to abrasion, erosion or attrition of the enamel surface, which exposes the underlying dentin, or to gingival recession,² which exposes the root surface.³ Such exposed surfaces near the gingival crest are referred to as "NCCLs."⁴ Hypersensitivity generally is

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ascribed to fluid flow in open dentin tubules exposed by lesion progression.⁵The authors of a comprehensive 2011 review regarding the etiology and prevalence of NCCLs pointed out the multifactorial causes of these lesions, including occlusion (abfraction) as a contributing factor.⁵ This review, when extended to consider restorative strategies, led the authors to suggest RBC restoration of these lesions on the basis of the results of studies one year or more in duration.⁶ Results from a 1998 study of dentists' diagnosis and treatment of NCCLs indicated that the majority treated NCCLs via restoration, confirming earlier findings by Bader and colleagues.⁷ Guidelines published by the American Academy of Operative Dentistry in 2003 suggest a more conservative approach.⁸ Much of the clinical research regarding NCCLs in the last few years has concentrated on bonding agents and the type of RBC used in the restoration.⁹ The factors affecting bonding to cervical dentin also have been reviewed. Other reviews of the etiology and management of NCCLs appeared in 2011.¹⁰ Investigators in an extensive 1994 review of the etiology of NCCLs discussed the multifactorial causes of these lesions, and several subsequent reviews supported its contentions.¹¹ Bader and colleagues¹ established these causes of NCCLs in a case-control study.¹² Prevalence and risk factors reported in China in 2011²⁴ and previously in Trinidad are in line with findings in the United States and Europe. Although a review of articles published before 2005 showed little evidence that occlusion causes NCCLs, occlusion more recently was implicated as an important factor in several reviews.¹³ Results from the most recent comprehensive review of clinical studies suggests that this relationship still is in question, and proponents of abfraction noted the multifactorial etiology for NCCLs as the basis for a substantial proportion of these lesions.¹⁴The most comprehensive clinical study of NCCLs is that of Lussi and Schaffner, who examined 204 participants in two age groups (26–30 and 46–50 years).¹⁵ At six years after evaluation, each of 55 participants was reexamined by the treating dentist by using the same indexes. NCCL defects were more pronounced in the older group at each recall. Lesions exhibited a distinct progression, and multiple regression analysis revealed that the progression of wedge-shaped lesions positively correlated with frequency of toothbrushing and age. Hyper-sensitivity remained the same as these lesions progressed. Lesion development and progression also has been followed in a dental student population. Sleep bruxism appears to be related to NCCLs. Previously our team has a rich experience in working on various research projects across multiple disciplines The ^{16-18,19-30}.

MATERIALS AND METHODS:

The present study was conducted in the department of conservative dentistry and endodontics, Saveetha dental college and hospitals. 150 patients case records with maxillary premolars in which root canal treatment was done was taken as the study population. Results were obtained and statistically analysed through SPSS software (version 9.0.2.) Inclusion criteria: patient aged between 17 to 80, endodontically treated maxillary premolars. Exclusion criteria: Root canal treated molars, canines and incisors. The collected data was entered in Microsoft excel sheet and grouping of parameters done in excel sheet. The three parameters in these studies were age of the patient, gender, tooth number. After grouping of parameters, data were analysed using SPSS software. The statistical analysis between different groups was carried out using chi square test, which was done to compare root canal treated premolars with three parameters - age, gender, teeth number.

RESULTS & DISCUSSION:

The analysis showed that out of the 150 case records examined 25 cases had root canal treatment done due to non-carious cervical lesions. The most common affected group was 39 years, followed by 52 years and 36 years. Females were more affected than males in gender distribution. 14 was the mostly affected tooth due to NCCL followed by 24. Graph 1 shows association between age and root canal therapies with cervical lesions X axis shows age distribution and Y shows frequency of root canal therapies done in non carious cervical lesions. Graph 2 shows association of gender distribution and root canal therapies done in non carious cervical lesions. X axis shows gender distribution Y axis shows frequency of root canal therapies non carious cervical lesions. Graph 3 shows association of root canal therapies done in non carious cervical lesions and the teeth number. X axis shows teeth number and Y axis shows no of root canal therapies due non carious cervical lesions. Chi square test was performed and it was found that the P-value to be <0.05 which shows a positive correlation between the two parameters (gender and tooth no). Our findings indicate that, across the limited time course of this study, there was no statistically significant difference between clinician-stimulated or patient-reported sensitivity reduction in NCCLs between the restoration and sealant treatments.

³¹ Whether these findings will hold for longer periods remains to be determined. The low loss rates for both groups by

six months (3 percent or less) and continuing reduction in sensitivity across time suggest that these treatments generally are successful; but the range in sensitivity scores was 0 to 8 for the sealant group and 0 to 7 for the restoration group at six months, indicating that the treatment was not effective for some participants.^{32 33} In laboratory evaluations of replicas, the sealant did not appear to be wearing at the six-month recall. Considering the comparative cost and time involved, the use of the one-step self-etching bonding agent followed by coating with a hydrophilic sealant appears effective as compared with restoration across the limited time of this study.³⁴ Ideally, the active-treatment participants in our study would have been recalled at two years and the groups compared again, but funding did not permit this. We found the potassium nitrate dentifrice to reduce sensitivity significantly at each recall.^{35 36} Results from a previous study of a 5 percent potassium nitrate-containing dentifrice in reducing sensitivity indicated continued effectiveness across four- and 12-week recalls.⁵¹ Such a continuing effect was noted in 2011 in a six-month study in which investigators used a dentifrice containing calcium sodium phosphosilicate with and without an in-office application of a paste formulation.⁵² Investigators have published reviews of recent desensitizing formulations and their associated clinical studies.³⁷ Only a few studies of desensitizing dentifrices extend beyond eight weeks' duration, and most are completed at 12 weeks as per label requirements. It remains to be determined whether the continued reduction in sensitivity we observed in the dentifrice group would continue across time and become equivalent to that of the other treatments. It also remains to be determined from our data if there is a relationship between open dentin tubules observed in clinical replicas and the effectiveness of the dentifrice. The inclusion criterion of NCCLs at least 1 mm in depth defines a lesion that may differ from the traditional initial sensitive depression in dentin, which may be site and depth dependent. The deeper lesions in our study may initiate defensive pulpal reactions that self-limit hypersensitivity and may be a confounding variable in long-term dentifrice studies.^{38 39} Regardless of the NCCL depth, different loading sites showed strain fluctuations in this study. The stress was prominent when loading at the buccal or lingual cusp (BI, BC, LI, or LC) and obscure when loading at the proximal marginal ridge or fissure site (M, D, or CO), under the strain used in this study. Another report has mentioned that the cusps exert a bending effect that induces prominent tensile strain at the reciprocal site, while the central pit has a shortening and barreling effect on the crown. However, the marginal ridge deviates from the bucco-lingual line axis with more restrictions from the proximal enamel, leading to a smaller value. The results of strain at the buccal and lingual cusps in this study were consistent with Kuroe's report indicating that the loading site plays an important role in the strain pattern and magnitude and could exaggerate the stain distribution in NCCLs.⁴⁰ Although the tensile strain exerted from LC and LI (considered be related to the formation of abfraction became smaller with increasing NCCL depth, the persistent appearance of tensile strain from such loading sites may imply the prolonged exertion of destructive stresses on the surrounding hydroxyapatite, which could worsen the configuration of the NCCL.

Both buccal-side strains at each depth measured in both coronal and root NCCLs recovered ,approximately to the strain values of the intact tooth after resin composite restoration. In particular, the buccal sides of teeth with NCCL (1.5) prominently returned to normal after restoration, with no difference in relation to NCCL location ($p > 0.05$). The importance of restoring NCCL defects instead of ignoring them has been discussed by Grippo in the context of engineering principles. The strain recovery of the resin-restored-NCCL teeth in this study confirmed the necessity of restoration of NCCLs, as proposed by Grippo. The result of our study strongly suggests that an appropriate resin composite restoration of NCCLs could strengthen the weakened tooth to defend against and prevent the formation of deteriorative stresses caused by occlusal loading. In other words, the suitable application of an adhesive/resin composite to an NCCL not only restores the normal morphology and function [32], but also restores the stress distribution to its original condition. This might prevent the further deterioration of the cervical tooth structure and maintain normal tooth function. Therefore, the hypothesis that the depth of an NCCL is an influencing factor and that NCCLs can be treated by resin composite restoration to recover its original condition was supported. Based on our findings, it is recommended that an NCCL deeper than 1.5 mm should be treated aggressively. Failure to address an NCCL of this depth may cause progressive dentin destruction, hypersensitivity, and unexpected pulpitis.

There was no periodontal ligament like material used to mimic the clinical condition in this study. Periodontal ligament is known to play an important role of acting as a medium of force transfer during mastication. Therefore, the strain distribution around the cervical region of an NCCL-tooth might be higher than normal in-vivo conditions. It is important to add that the periodontal ligament can inhibit excessive stresses and hence, is necessary for simulating normal clinical conditions. This issue should be considered in future studies. Furthermore, the bonding between the restoration and the tooth was performed on sound dentin of the artificially prepared NCCLs instead of on sclerotic dentin. However, sclerotic dentin is usually observed in the dentinal portion of NCCLs, and the bond strength to sclerotic dentin has been reported to be lower than the bond strength to normal cervical dentin due to the different

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degree of hypermineralization in sclerotic dentin .Further studies addressing the presence of sclerotic dentin in teeth with cervical NCCLs are necessary to examine the strain recovery in NCCL.Our institution is passionate about high quality evidence based research and has excelled in various fields (⁴¹⁻⁵¹).

CONCLUSION:

Out of 150 root canal therapies done in maxillary premolars 25 RCTs were due to non carious cervical lesions. It has been concluded that most of the root canal therapies are done in older age group mainly due to abrasions, erosion and abfraction. So when encountering hypersensitivity or pain in older age group, non-carious cervical lesions should be considered as the main etiology.

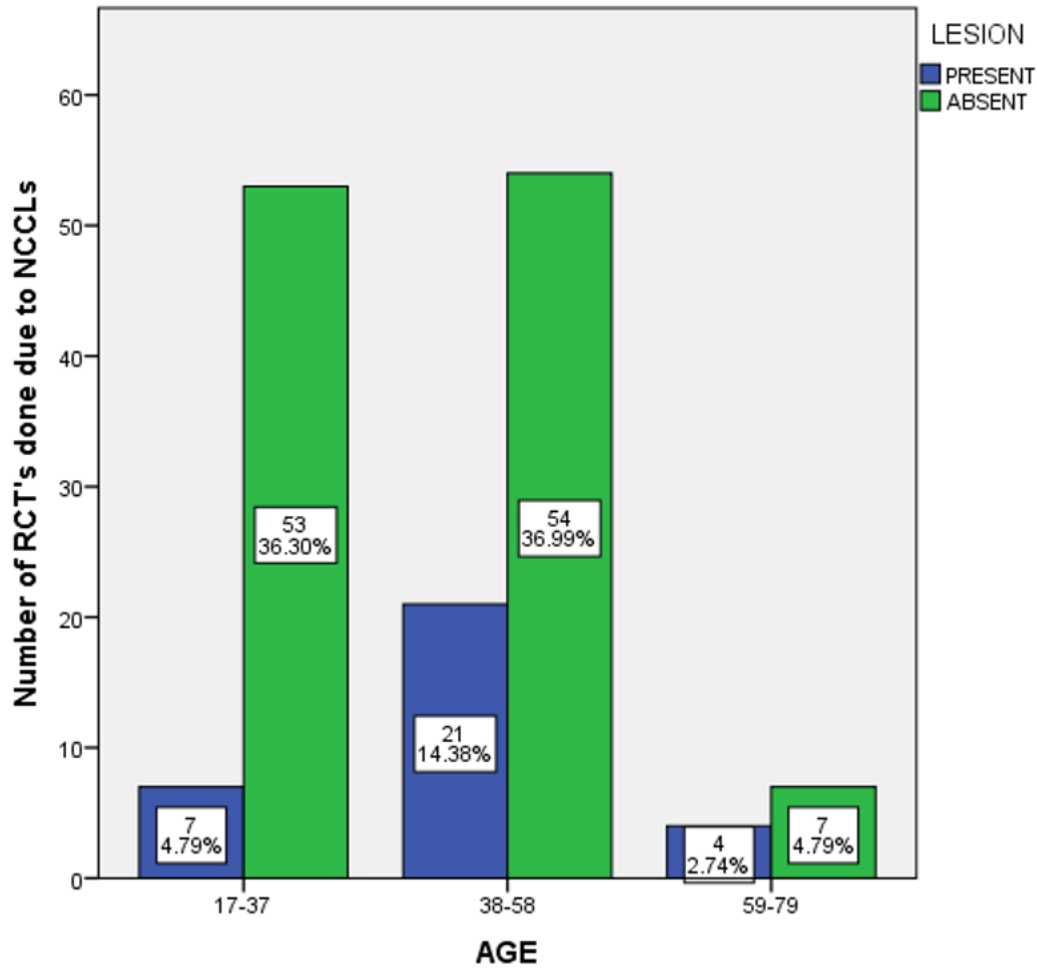
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Graph 1: This graph represents the association between the age and the number of root canal therapies done due to non-carious cervical lesions. X axis represents the age and Y axis represents the no of RCT's done due to NCCLs. Blue represents RCTs done due to NCCLs and green represents RCTs done without NCCLs. Graph 1 shows that the most common affected age group is 17-37 years, followed by 38-58 years and 59-79 years. Pearson's Chi square p value 0.036(<0.05) hence statistically significant.

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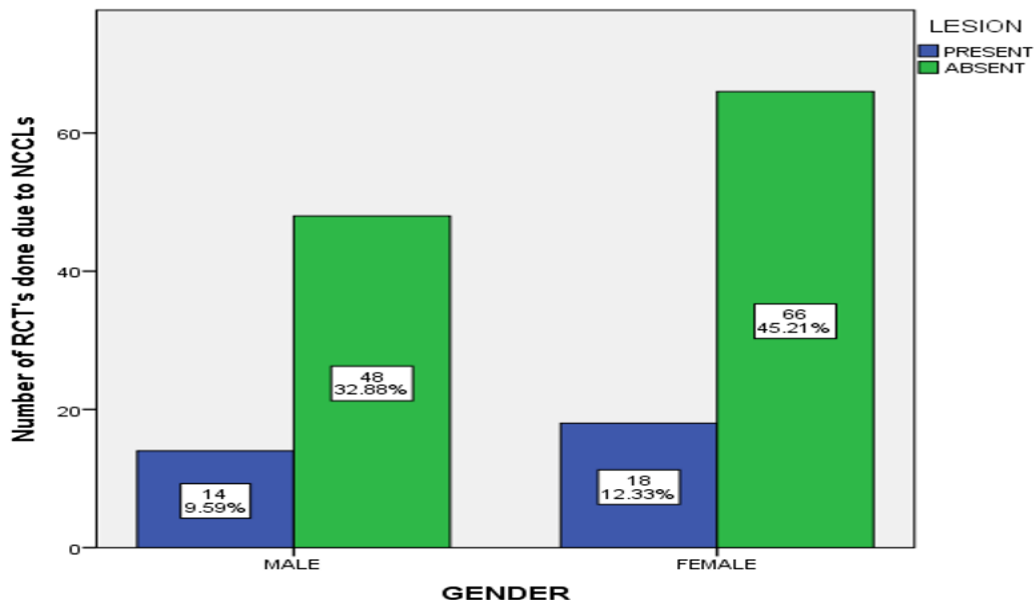
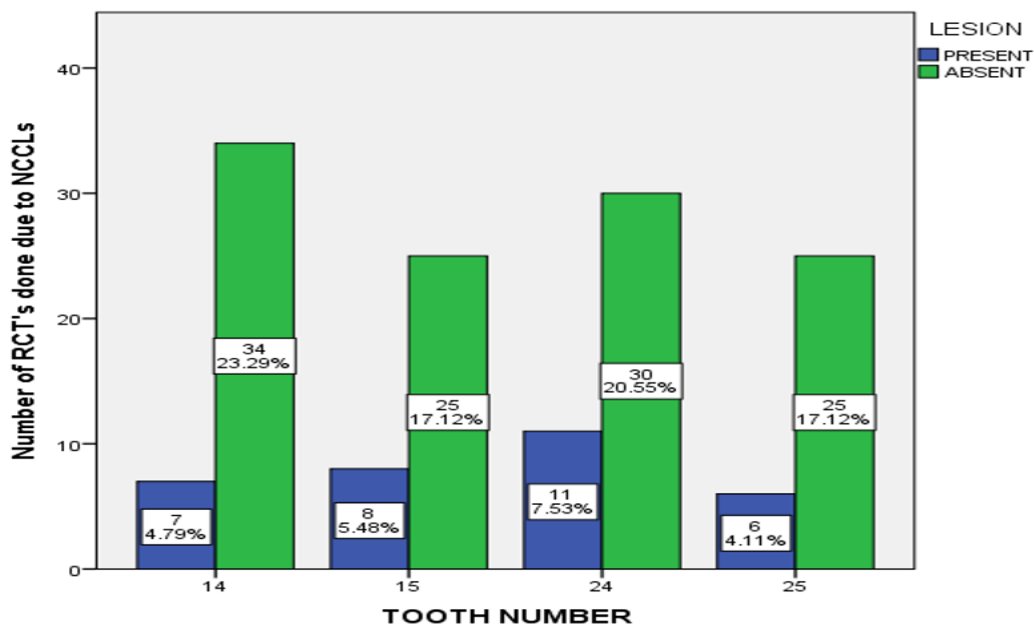


Table 2: This graph represents the association between the gender and the number of root canal therapies done due to non carious cervical lesions. X axis represents the gender and Y axis represents the number of RCT's done due to NCCLs. Blue represents RCTs done due to NCCLs and green represents RCTs done without NCCLs. Graph 2 shows females were mostly affected than males. Pearson 's Chi square p value 0.868(>0.05) hence not significant.



Graph 3 : This graph shows the correlation of tooth number and the number of root canal treatment done due to non-carious cervical lesions.. X axis represents the tooth number and Y axis refers to the no of RCT's done due to NCCLs. Blue represents RCTs done due to NCCLs and green represents RCTs done without NCCLs. Graph 3 shows that teeth number 14 is the mostly affected one followed by 24. Pearson's Chi square p value 0.714(>0.05) hence not significant.

