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# Association of Periapical Lesions and non vital anteriors- an institution based study

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**ABSTRACT**

Periapical lesions may be due to periapical abscess, granuloma or a cyst. Seen only on radiograph as radiolucency, root canal treatment is established as the first choice of treatment. Periapical lesion usually found at the apices of non-vital teeth as periapical granuloma , abscess or radicular cyst. The treatment and prognosis may differ according to the lesion present. This study was aimed to establish an association between periapical lesions associated with non vital teeth and its management . A retrospective study was done based on data analysed from 86000 patients records collected in a dental outpatient department.Excel tabulation was done and the results obtained from SPSS version 20. Statistical test performed was the chi square test. From the total patient data of 138 patients were studied and prevalence of periapical lesion was assessed .Out of which periapical lesion was present in 40.1% of the cases , in which only 2.2% required surgical method of treatment. Within the limits of study, It can be concluded that surgical methods of treatment to be done only if there is a persistent lesion after primary endodontic therapy. Its proven that non vital teeth without lesions are treated non surgically with high success rates and is statistically significant ($p<0.05$). Hence, a routine root canal treatment can always be resorted to before attempting any surgical approach. Regular follow up is required to assess healing of lesion.

**Keywords**
Endodontics; Lesion; Non Vital teeth; Periapical Surgery.

## Introduction

The pulp and periapical tissues are in close contact to each which facilitate easy passage of pathogens to periapical or periradicular areas leading to granulomas or abscess. (1)Dental caries or trauma may initiate such diseases. Ramachandran et al(2) concluded that, out of all periapical lesions 50% where are granulomas, 15% cysts and 35%

abscess. The prevalence of periapical cysts in arteries is 42%(3,4).There are two types of cysts: true cysts and pocket cysts (5) True cysts usually need surgical intervention or retreatment procedure, as they do not heel simultaneously.(6) Studies have also shown large periapical lesion to heal simultaneously.(7,8)Periapical lesions are a common pathology of the alveolar bone, it occurs in relation to surrounding tissues around the apex of the tooth, periodontium and the alveolar bone.(9–11). Periapical lesions are formed as a result of prolonged pulpal inflammation or pulpal necrosis(12). In some cases such as a neoplasm, a periapical lesion can be formed without any pulpal involvement(13). After pulp necrosis occurs, proliferation and colonization of microbes occurs in the root canal.(14), These microorganisms release inflammatory mediators and toxins that start an inflammatory response in tissues surrounding the apex of the tooth,(12). This leads to activation followed by proliferation of epithelial cell rests which gradually enlarge and lead to bone resorption.(9)Further proliferation may lead to formation of periapical granulomas or cysts.(15)

Root canal microbial flora plays an important role in development and maintenance of a periapical lesion. Complete removal of such bacteria is a vital factor in success of endodontic treatment used widely to treat non vital teeth with periapical lesions(16).Apart from root canal treatment decompression technique, aspiration and irrigation technique, lesion sterilization and repair therapy and apexum procedure(17,18).As a consequence of the the complex root canal anatomy , root canal medications such as calcium hydroxide are used in adjunct with mechanical preparation and instrumentation.Ultimately , the goal of any dental treatment is to restore health and function of teeth and in particular endodontics deals primarily with non surgical mode of treatment to achieve this.All periapical lesions should be treated primarily by non surgical endodontic therapy and surgical method of treatment to be preferred only in cases of failed non surgical techniques.Recent advancement, root canal medicaments and technique has improved the overall quality of work done and decreased the need for any surgical intervention.(16,17)

Such studies reported almost 90% success rate however certain study still believe periapical lesion frequently requires retreatment and the success rate to be around 30%.(18–21).Previously numerous clinical trials(22–25)literature reviews(26–31) public awareness studies(32,33) and in-vitro studies(34–36) over the past 5 years have been done on various areas of interest such root canal medicaments, management of non vital teeth and endodontic management techniques. However,There are no significant studies comparing incidence of periapical lesions and not vital teeth. This study aims to establish an association between periapical lesions associated with non vital teeth and its management .

**Material and methods**

**Study design and setting:**
The study setting is university based study. A retrospective study was conducted on 49188patients in a hospital setting among which 137 patients were selected based on the inclusion and exclusion criteria..However,the drawback of this study is that there were geographic limitations and the people involved in the study were from an isolated population and belonged to the same ethnic group. The internal validity of the study was carried out by analysing the age and gender of patients who reported with non vital anteriors.. The external validity was determined by the type of treatment done.

The inclusion criteria was all patients who reported with non vital anteriors. The exclusion criteria was any incomplete data that wasn't recorded properly . The patient records were reviewed and analysed between June 2019 and March 2020. All available data was included in the study to minimise sampling bias. Patients of all age groups were included in this study. Collected data was cross verified using photos and case sheets. Data collected was then tabulated in Exclusion criteria as incomplete data. Inclusion criteria consisted of all patients with non vital anteriors. All data was collected and tabulated methodically using MS Excel.

**Statistical Analysis**
After tabulation using MS Excel, the data was exported to IBM SPSS software [Version 20: IBM
Corporation NY USA] for statistical analysis. Descriptive statistics was done to calculate the gender correlation with periapical lesions due to non vital teeth . The dependent variable was non vital anterior teeth. The independent variable was type of treatment associated with non vital teeth and presence of periapical lesion Pearson chi square test was done to statistically analyze the data and assess the incidence of retreatment in cases of non vital teeth associated with periapical lesions.Pearson chi square test was used to identify any significant level of variation of association the significance level was set at 0.05

**Ethical Approval**

The ethical approval for the retrospective study was obtained from the institutional ethics board.Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320.

**Results**

A total of 137 patients with non vital anteriors were selected for the study. 59.85% of the patients reporting with non vital anteriors, associated periapical lesion was absent and in 40.15% a periapical lesion was present (Figure 1). Figure 2 shows non surgical treatment to be successful in treating patients with non vital anteriors in the absence of a periapical lesion(59.85%). 2.19% of cases required surgical intervention in cases of a periapical lesion associated with non vital anteriors.From the Table 1 we observed that there is a significant success in treating non vital teeth not associated with periapical lesions with regular endodontic therapy.p value - 0.032 ($p<0.05$) . Hence, data collected is statistically significant.[ IBM SPSS software Version 20: IBM Corporation NY USA]. Root canal therapy proved to be highly successful in treating non vital anteriors and only few cases required further surgical intervention due to persistent lesion.

**Discussion**

From the study it is evident that 28% of males and 11.7 % of females had periapical lesions associated with non vital teeth.it was seen that regular endodontic therapy showed a lot of success ( 98%). Only in 2.2 % of cases show persistent lesions and retreatment was required.(Figure I) (37) showed a success rate of 75% in endodontically treated teeth. In the current study, most treatments were multi-visit. Studies suggest there is a significant difference between single and multiple visit endodontics. There is also a lot of literature that advocate the benefits of multi-visit RCT, involving intracanal medicaments such as calcium hydroxide.(38–40),

Many destructive lesions that cause bone resorption closely look like common lesions treated endodontically. Some of these non endodontic lesions involve, central fibroma,central giant cell lesions,central hemangioma, ameloblastoma, fibrous dysplasia, metastatic neoplasms and inflammatory bone diseases.(41,42) These teeth linked with non endodontic lesions usually give a vital response to various pulp testing methods. It is absolutely essential that the practitioner arrives at the correct diagnosis to avoid unnecessary treatment of vital healthy teeth. Primary goal of endodontics being a non surgical method of treatment in case of persistent lesion surgical method of treatment can be considered. Surgical mode of retreatment depends on various factors.

In case of close proximity to vital structures, injury to blood vessels or nerves may occur. Patient age also has to be taken into consideration,(41) Old age patients can't tolerate surgical procedures. Increased healing time , Post operative pain and discomfort are the major drawbacks for surgical treatment such periapical surgery.(43) However, calcified canals, broken instruments or ledges can lead to poor access to the apical formanen.In such cases periapical surgery can be in need.(44)

Success of treatment also depends upon the size of lesion however no significant correlation was established. alişkan stated that in approximately 70% of cases with periapical lesion, the healing was apparent within 2 years of treatment.10 In some cases, the teeth that were obturated after 6 months and were further followed up for next 18 months. After which complete healing of the lesion was seen(45).Weiger et al (3) showed small lesions (<5mm) had better outcomes than larger one.

Management of Periapical lesions are primarily by non surgical methods. Conventional root canal therapy is the first choice of therapy.Various other techniques can also be used such as the decompression technique in which a drain is placed into the lesion followed by periodic maintenance and irrigation for periods of time(46), Active non surgical decompression where a Endo-eze vacuum system is used to form a negative pressure, which aids in the decompression of periapical lesions commonly associated with non vital teeth,(47) Lesion Sterilization and Tissue Repair therapy which makes use of a triple antibiotic paste comprised of ciprofloxacin, metronidazole and minocycline(48,49) and apexum procedure which involves the use of two sequential rotary instruments, the Apexum NiTi Ablator and Apexum PGA Ablator. Using which the periapical tissues are accessed and upon low speed rotation the periapical tissues are minced and removed. This followed by washing out the minced tissues. Surgical endodontics is resorted to in cases of failed non surgical methods of treatment of periapical lesions (50). High success rates over 80%(51) have been reported due to efficient modern surgical techniques, instruments for microsurgery, ultrasonic instruments ,magnification devices and high quality root end filling materials .(52) Biodentine and MTA are commonly used root end materials .In periapical surgery access is gained to the area affected , to evaluate and assess the root canal properties and strength.

Peters et al(53). showed a success rate of about 75% in 115 teeth with periapical lesion; 20% lower than the patients who reported without periapical lesions.Abundant studies have been done that show gender and age to not significantly affect primary endodontic treatment.(19,38,53).
Repair of periradicular tissue post endodontic therapy is complex process that involves bone, periodontal ligament and cementum regeneration.Lesion present in anterior portion of both maxilla and mandible show easy and fast healing as both the buccal and lingual plates are closer than in the posteriors.(54)
The benefits of nonsurgically treating patients with huge periapical radiolucencies is that the mental stress the patient has to undergo is less thereby ensuring a more comfortable patient experience. The periapical tissues are richly innervated with blood and capillary supply, lymphatic supply, and plenty of undifferentiated cells. All these structures are associated with the inflammation and tissue repair. Along these lines, the ability of periapical tissues to possibly recuperate is fairly high and treatment of periapical lesions ought to be coordinated toward just elimination of the major etiological factors.(55) The findings of the study is consistent with general consensus that simple endodontic therapy was successful in treating periapical lesions irrespective of patient age,gender or lesion size and only a small percentage of cases needed retreatment like periradicular surgery. A Larger study on a more diverse population can provide better results. The study was done in an institution hence the study population was limited to a certain ethnic group. Previously our team has a rich experience in working on various research projects across multiple disciplines The (56–58)(59–70)

**Conclusion**
Within the limits of study, It can be concluded that surgical methods of treatment to be done only if there is a persistent lesion after primary endodontic therapy. Its proven that non vital teeth without lesions are treated non surgically with high success rates and is statistically significant ($p<0.05$). Hence, a routine root canal treatment can always be resorted to before attempting any surgical approach. Regular follow up is required to assess healing of lesion.

**Limitations** :
The study is performed in a different etinic group of people which might alter the overall consensus with the previous studies and also the study can be conducted only among patients who report with non vital anteriors thus not generalised to all patients.

**Future scope** :
The study can provide more efficient clinical diagnosis and treatment planning in order to improve the quality care provided to patients.

**CONFLICT OF INTEREST**: The authors have no conflict of interest.

**AUTHOR CONTRIBUTIONS**
Suhas Manoharan carried out the retrospective study, planning the study design, collection and analysis of data and drafted the manuscript.Surendar Sugumaran and Aravind Kumar S aided in conception of the topic, supervision and appraisal of the manuscript.

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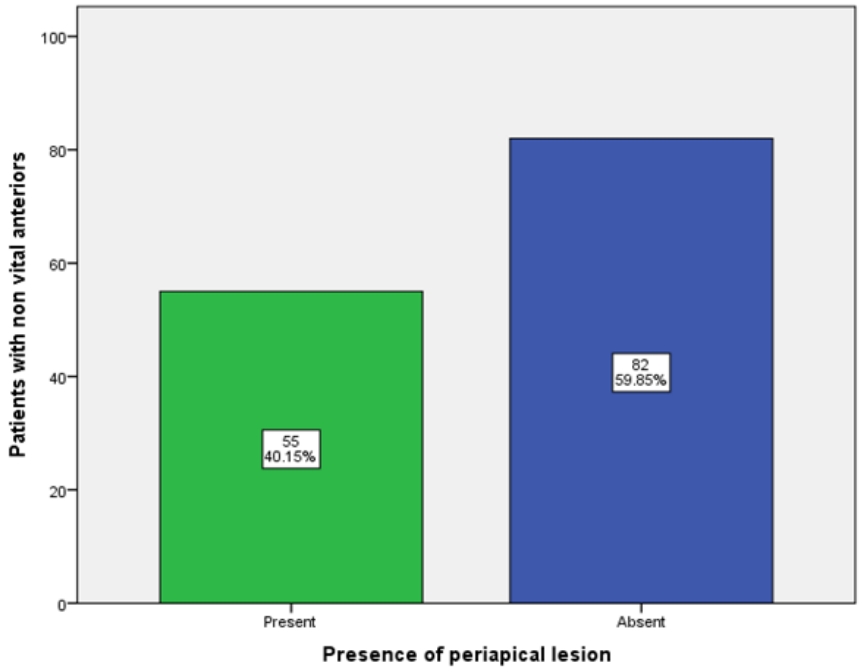


Figure 1: Bar chart depicting the distribution of periapical lesion in patients with non vital anteriors. X axis depicts the presence of periapical lesion. Y axis represents the patients with non vital anteriors. The graph shows that in 59.85% of the patients reporting with non vital anteriors, associated periapical lesion was absent(Blue) and in 40.15% a periapical lesion was present (Green).

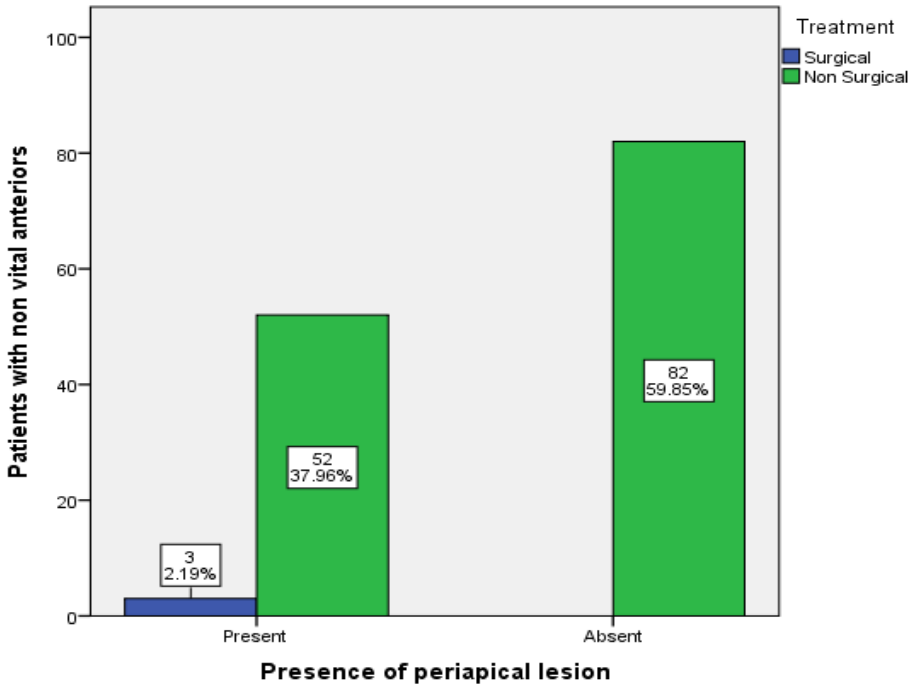


Figure 2. Bar graph depicting the association of type of treatment done and the periapical lesion. X axis denotes presence of periapical lesion and Y axis denotes number of patients with non vital anterior. Chi-square test, p value - 0.032 ($p<0.05$) shows statistical significance with only 2.19% of cases required surgical intervention(Blue).

| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 4.573[a] | 1 | .032 | | |
| Continuity Correction[b] | 2.381 | 1 | .123 | | |
| Likelihood Ratio | 5.576 | 1 | .018 | | |
| Fisher's Exact Test | | | | .063 | .063 |
| N of Valid Cases | 137 | | | | |

Table 1. Table showing association of type of treatment done in cases of non vital anteriors done using Pearson's Chi square test.p value - 0.032 ($p<0.05$) . Hence, data collected is statistically significant.[ IBM SPSS software Version 20: IBM Corporation NY USA]. Root canal therapy proved to be highly successful in treating non vital anteriors and only few cases required further surgical intervention due to persistent lesion.