ABSTRACT

Background: Periapical cyst is slow-growing cysts and usually asymptomatic until they are secondarily infected. The choice of treatment may be determined by factors such as the lesion extension, relation with noble structures, origin, and clinical characteristics, cooperation, and patient’s systemic condition. Hence, the present study was conducted to assess the surgical and non-surgical intervention for the management of radicular cyst.

Materials and Methods: A total of 28 cases of progressively increasing swelling in the anterior region were included in the study, of which 20 being males and 8 females. Radicular cyst was confirmed by clinical examination and radiograph for the entire patients. The total group was divided equally into non-surgical and surgical intervention groups. Independent sample t-test and Chi-square test were performed for analysis.

Results: At 1\textsuperscript{st} and 6\textsuperscript{th} months, the mean radiographic lesion of non-surgical group was 1.80 ± 0.31 and 0.67 ± 0.27 and surgical group was 1.55 ± 0.24 and 0.37 ± 0.29. The p values were P < 0.027 and P < 0.013 between two groups which were statistically significant. Satisfaction level did not show much significance where 11 patients in the surgical group were very satisfied after 1 month and both the groups were very satisfied after 6 months. In the surgical group, the number of patients with severe pain was slightly more but pain significantly reduced in surgical group compared to non-surgical group after the 1\textsuperscript{st} month.

Conclusion: Combination methods such as the root canal and decompression yield better result in radicular cyst with non-vital pulp.

Keywords: Decompression, Healing, Radicular cyst, Root canal treatment.

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INTRODUCTION

Following the death of the dental pulp, epithelial residues (cell rests of Malassez) in the periodontal ligament generate as a consequence of inflammation and a cyst is formed called as radicular cyst. These are the most common odontogenic cystic lesions of inflammatory origin which affect the jaws. The most common location is at the apices of the involved teeth; the lateral aspects of the roots in relation to lateral accessory root canals can also be involved.\cite{1}

Periapical cyst is slow-growing cysts and is usually asymptomatic until they are secondarily infected. A debate still exists over its management even though it represents 40–50% of all apical lesions.\cite{2} Few authors have reported that if the intraradicular infection is eliminated through non-surgical endodontic treatment,\cite{3} The immune system itself can promote repair of such lesion, while others suggest that surgical intervention is compulsory.\cite{4}

Clinical studies show that the proportion of the radicular cysts increases as the periapical lesions increase in size. However, few large lesions have shown to be granulomas.\cite{5} Only a histological examination can give the definitive diagnosis of a cyst. However, the following helps to make a preliminary clinical diagnosis of a periapical cyst: (a) One or more non-vital teeth is involved with the periapical lesion, (b) the size of the lesion >200 mm\textsuperscript{2}, (c) radiographically the lesion is a circumscribed, well-defined radiolucent area which is bound by a thin radiopaque line, and (d) on aspiration or drained through an accessed root canal system, it produces a straw-colored fluid.\cite{6}

The novel method of treating periapical cysts is a combination of chemomechanical preparation of root canal with repeated long-term intracanal dressing and intracanal medication with cal(OH)\textsubscript{2} and iodoform (Metapex).\cite{7}

There is a chance for inadvertent undesirable consequences when surgical curettage is done in case of very
extensive lesions, and hence, marsupialization or tube decompression methods are indicated. Without periapical curettage, large periapical lesions are reduced by a surgical decompression procedure called marsupialization. Healing by osseous regeneration is favored by decompression as it allows continuous drainage from periapical lesion eliminating conditions leading to expansion of periapical pathosis. Therefore, this paper studies about the management of large radicular cyst with two interventions.

MATERIALS AND METHODS

Patient Selection
Progressively increasing huge swelling between the age groups of 18- and 40-year-old has been included in the study. A total of 28 cases were selected for the study, of which 20 were males and 8 were females. Clinical examination and the radiograph were done for the entire patient to confirm the presence of radicular cyst. Written consent was obtained from all the patients.

28 cases were divided equally and grouped into non-surgical and surgical intervention groups.

Non-surgical Management
The canal irrigated with 2.5% sodium hypochlorite after the caries part was removed. K-file, 30 number instrument introduced beyond the radiographic apex. At this moment, through the root canal, an abundant serum, purulent, and hemorrhagic exudates flowed. The canal was dried with paper points after the exudates stopped. The whole canal in the periapical region was filled with preformed radiopaque calcium hydroxide paste (Metapex) following which a radiograph was done.

Using the lateral condensation technique, the root canal was obturated with gutta-percha cones (Dentsply India) and zinc oxide eugenol (Dentsply India) after 1 month then a definitive restoration was placed. After 6 months, the patients were recalled for the clinical and radiographic evaluation. Radiographs were taken at baseline, 1st month, and 6 months to evaluate the periradicular healing.

Surgical Management
Local anesthesia was given using lignocaine with 2% adrenaline. Following procedures such as opening the access, pulp extirpation, determination of working length, cleaning, and shaping were done. Intracanal medicament calcium hydroxide was given for a week and later obturated. No. 15 BP blade was used in the surgery in the present study to give vertical incision at the mucoperiosteum between root eminences. To remove granulation tissues, irrigation of the surgical site with saline and deep curettage was done. To stabilize the drain on either side, two interrupted sutures were placed. For irrigation with normal saline and to remove sutures, the patient was recalled after 48 h. The patient was asked to self-irrigate the lesion with normal saline and needle after removing the cannula.

After 1 month, the drain was removed and patients were advised to continue to irrigate the aperture. Radiographs were taken at baseline, 1st month, and 6 months to evaluate the periradicular healing.

Statistical Analysis
Independent sample t-test and Chi-square test analysis were performed in SPSS version 20 software. When \( P \leq 0.05 \), results were considered statistically significant.

RESULTS
In Table 1, the comparison between the treatment groups and radiographic lesion at the baseline is shown. Both groups showed almost the same values in the mean radiographic lesion (non-surgical - 2.28 ± 0.43 and surgical - 2.20 ± 0.36). Moreover, no significant difference between the groups was found (\( P > 0.608 \)).

The comparison between the treatment groups and radiographic lesion after 1st and 6th months is shown in Tables 2 and 3. There was a statistically significant difference in the mean radiographic lesion between the non-surgical group (1.80 ± 0.31 and 0.67 ± 0.27) and

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<th>Table 1: Comparison between the treatment groups and radiographic lesion at the baseline</th>
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<td>SD: Standard deviation, SEM: Standard error of the mean</td>
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<th>Table 2: Comparison between the treatment groups and radiographic lesion after 1 month</th>
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<th>Table 3: Comparison between the treatment groups and radiographic lesion after 6 months</th>
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surgical group (1.55 ± 0.24 and 0.37 ± 0.29), \( P < 0.027 \) and \( P < 0.013 \), respectively.

Table 4 and Graph 1 depict the satisfaction grade where the majority (11 patients) of the patients in the surgical group were very satisfied after 1 month, and after 6 months, both the groups were very satisfied, but it failed to show not any significance.

There was more number of patients having severe pain in the surgical group which is depicted in Table 5 and Graph 2 but pain significantly reduced in surgical group when compared to non-surgical group after 1st month.

**DISCUSSION**

There is a dilemma between surgical and non-surgical intervention for the management of a radicular cyst. Moreover, there are no much studies to compare the surgical and non-surgical management of radicular cyst. There are two distinct identities in radicular cyst, which is the True cyst and the Pocket cyst[9] where the latter is more common and is also epithelium-lined cavity which opens to the root canal space of the affected tooth and the periapex communicates with the infected root canal space. Thus, it has been accepted as the first line of treatment to remove the etiological agent from root canal system through non-surgical method which helps to creates a favorable environment for repair of the lesion.[10]

In this study, at 1st month and 6th month, the mean radiographic lesion of non-surgical group was 1.80 ± 0.31 and 0.67 ± 0.27 and surgical group was 1.55 ± 0.24 and 0.37 ± 0.29. These results showed similarity to the Nobuhara and del Rio,[11] as reported by Nair et al.[12] Nonmicrobial etiological factors such as true cystic lesions, extraradicular infection, presence of foreign bodies, and endogenous cholesterol crystals must be taken into consideration and surgically treated.

Surgical intervention becomes unnecessary as decompression procedure reduces the size of the lesion,
or if necessary, it will be limited to the surrounding peri-
radicular tissues of involved teeth. The decompression
procedure eliminates internal osmotic pressure differ-
ential by disrupting the integrity of lesion wall and thus
helps healing by osseous regeneration.[13]

The choice of treatment may be determined by fac-
tors such as the lesion extension, relation with noble
structures, origin, and clinical characteristics, and coop-
eration and patient’s systemic condition determine the
choice of treatment. Many professionals do endodontic
therapy for these cysts as a conservative method, but the
treatment is still under discussion. Combination of end-
odontic treatment, decompression, or marsupialization
or even enucleation of the cyst is necessary for the treat-
mantle treatment in large lesions[14]

Venugopal et al.[15] found a significant difference
in the healing of periapical lesions following surgical
retreatment at 12 months but reduced to almost no dif-
ference between the surgical and non-surgical groups
by 48 months. Disadvantages of surgical management
are damage to vital structures, scar formation, and unple-
asant experience to the patient. However, surgical
intervention remains the last option when patient is not
responding to non-surgical endodontic therapy.

When periapical radiographs are taken for non-vital
teeth, a radicular cyst can be discovered, and the patients
usually have no complaints unless infected. However,
when they have, they give a history of slowly enlarging
swellings. The covering bone becomes very thin as the
cyst increases in size though initially it remains hard.
“Springiness” or “eggshell crackling” is found later
as the fragile outer cortical bone cracks. When it com-
pletely erodes the bone, it will become fluctuant.[16]

Few studies reported that radicular cysts and apical
granulomas are not easily distinguishable radiograph-
ically. The size of the lesion does not help in diagnos-
sis unless the radiographic lesion is 2 cm in diameter
or larger. Radiographic density is useful to differenti-
ate between radicular cysts and periapical granulo-
mas. Radiographically, radicular cyst is round or ovoid
radiolucent but has a well-demarcated radiopaque
margin. The radiopaque margin is absent in infected
and rapidly enlarging cysts. The floor of the maxillary
sinus may be displaced if the cyst involves sinus. When
compared to the sinus cavity, cyst’s internal structure is
homogeneous and radiopaque. Grossly, radicular cysts
have cholesterol crystals which appear as a soft brown
or yellow cheesy. Lining of radicular cysts is non-kerati-
nized stratified squamous epithelium.[17]

To reduce bacteria beyond the levels obtained with
mechanical preparation (areas that are unreachable by
instruments or irrigation solutions, such as dentinal
tubules and ramifications), root canal dressings between
sessions in root canal treatment of teeth with chronic
periapical lesions play an important role.[18] Leonardo
et al.[19] in their study, found that calcium hydroxide
with its hygroscopic properties reduces exudates, and
they also stated that at least 2 weeks are necessary for
calcium hydroxide bactericidal activity after analyzing
the pH and the concentration of calcium ions in the peri-
apical area.

Long-term observation time is important in
treated teeth with periapical lesions as opined by var-
ious authors.[20,21] To assess the healing of periapical
lesions, Shah suggested to recall patients at intervals of
3 months, 6 months, 1 year, and 2 years. Follow-up is
extremely essential for a period of at least 2 years as qui-
escent epithelial cells may be stimulated by instrumen-
tation in the apical region, resulting in proliferation and
cyst formation.[22]

CONCLUSION

This study concluded that combined root canal and
decompression method proved the better result in radic-
cyst with non-vital pulp.

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