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Healing exhibited by Large Cyst-like Periapical Lesions Managed variedly by Orthograde Decompression at times, along with Long term Calcium Hydroxide/Chlorhexidine Intracanal Dressings, followed by Metapex, Triple Antibiotic Paste, Mineral Trioxide Aggregate : A Case Report.

Dr. Sonam R. Bhore, Dr. Rana K. Varghese, Dr. Malwika Sisodia, Dr. Raunak Singh, Dr. Naveen K. Gupta, Dr. Nitin Agrawal

[1] *Post graduate student, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh.*
[2] *Dean, Professor and HOD, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh,*
[3] *Reader, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh,*
[4] *Reader, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh,*
[5] *Reader, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh,*
[6] *Senior Lecturer, Department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh.*

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ABSTRACT

Large periapical lesions with well circumscribed borders are usually treated initially with conservative nonsurgical procedures. Long-term success of endodontic treatment is dependent on adequate and appropriate cleaning and shaping of the root canal, intracanal medicaments used, if necessary along with three dimensional obturation of the entire prepared space. This case narrates the clinical and radiographic outcome of large cyst-like lesion treated using triple antibiotic paste also orthograde decompression and long-term intracanal use of calcium hydroxide mixed with 2% chlorhexidine digluconate, followed by apical plug using MTA. Nonsurgical procedures were performed, including apical patency, orthograde puncture of cyst like exudates, chemo mechanical preparation and placement of intracanal Ca(OH)2/CHX dressings, which were periodically replaced. Antibiotic sensitivity and culture test were also done, since the canals kept on weeping. It was followed by many calcium hydroxide dressings.The root canals were then filled with gutta-percha and calcium hydroxide based sealers. The follow up periods ranged from 6, 12 and 18 months, the treatment outcomes, both clinical and radiographic, were highly satisfactory thus concluding that with appropriate diagnosis, the size of a periapical lesions are not a major determining factor in the decision to perform conventional root canal treatment or surgical removal of the lesion. Even large cyst-like periapical lesions can heal following nonsurgical root canal treatment.

KEYWORDS: Calcium hydroxide, Large cyst-like periapical lesions, Mineral Trioxide Aggregate, Nonsurgical endodontic therapy, Periapical healing, Tripple Antibiotic Paste.

I. INTRODUCTION

Pulpal diseases and long term bacterial infection of the pulp space, end up in periapical lesions depending on the severity [1]. During routine radiographic examinations or followed by patient's history of extreme pain sensation these lesions are usually diagnosed and are further classified as dental granulomas, abscesses or radicular cysts, [2, 3, 4]. Among all periapical lesions, the incidence of cysts varies from 6% to 55%, granulomas spans from 9.3% to 87.1%, and of abscesses from 28.7% to 70.07% [5],[6]. Clinical evidence says, lesions that are larger in size, are most likely radicular cysts. Still, some of these large lesions may appear to be granulomas [7] .The primary goal of all endodontic procedures, specially cleaning and shaping, is to eliminate necrotic tissue and infective bacteria [8]. Root canals are usually

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not adequately prepared in apical third and thorough disinfection of this zone cannot be achieved therefore, complete three dimensional obturation of the prepared, cleaned and shaped canal space is necessary[9]. The chances of coronal leakage and bacterial recontamination are reduced sealing the apex from periapical tissue fluids and the remaining irritants are entombed within the canal [14] . Returning the involved tooth to a healthy and functional condition without surgical involvement, should be the ultimate goal in endodontic treatments [15]. Primarily all inflammatory periapical lesions should be treated with conservative nonsurgical procedures (e.g. orthograde root canal therapy) [16]. Only after failing of nonsurgical techniques, surgical intervention is suggested [17]. Moreover, surgery has many disadvantages, which limits its use in the treatment of periapical lesions [18, 19]. Endodontic treatment of teeth with periapical lesions, have been reported to have a success rate of 85% [20, 21]. A 94.4% incidence of complete and partial healing of periapical lesions after nonsurgical endodontic therapy has also been stated [22] . It is important to note that only through histopathological examination one can make the absolute diagnosis of the nature of the periapical lesion. However, a primary clinical diagnosis of a radicular cyst can be approximately made based on the following facts: If the periapical lesion is a cyst, it is associated with one or more nonvital teeth, the lesion size is usually greater than 200 mm2, the lesion is described radiographically as a circumscribed, well defined radiolucent area with a thin radiopaque lining and finally, it produces a pale, brownish, yellow-colored fluid upon aspiration or when drainage is accomplished throughout the accessed root canal system [23].

II. CASE REPORT

A 33-years-old man with no relevant medical history presented with complaints of pus discharge in relation to the right upper lateral incisor since 1 year. He was possessing a fixed prosthesis from tooth #12 to tooth #21, with missing tooth #11 since years, following a road traffic accident then. No evidence of root canal treatment with teeth #12 and #21. His dental history revealed past episodes of pain and swellings which eventually subsided with intermittent drainage over the past one year. Seeing the obvious correlation with the presenting situation, the prosthesis was removed prior to further radiographic evaluation. A preoperative orthopantomogram radiograph and RVG revealed a well-circumscribed radiolucency involving teeth #12 and #13. (Fig.1).

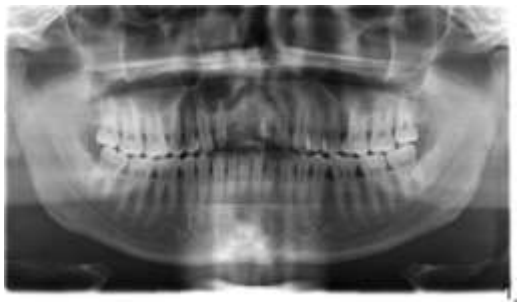

Fig.1: Pre Operative Orthopantomogram

The patient had continuous discharge of pus even when the digital pressure was applied palatally near tooth #12 with the index finger, the tissue beneath was depressible depicting a considerable cortical bone loss and he also experienced discomfort and tenderness on palpation. An intraoral examination revealed a discharge of pus from the corresponding buccal gingival sulcus (Fig.2).

Fig.2: Pre Operative Clinical Photograph

On pulp vitality testing , both the maxillary right lateral incisor and the left central incisor showed negative response, but were tender on percussion, whereas the maxillary right canine showed a delayed response to the cold vitality test, so it was kept under observation.

A decision was made to treat tooth #12 endodontically without surgical intervention by disinfecting the canal until its reasonably dry by making use of multiple calcium hydroxide dressings, triple antibiotic paste, followed by MTA apical plug and obturation. A routine endodontic treatment followed by cast post and core were planned with tooth #21. It was decided that the surgery would be performed only if there is no break through or positive treatment results achieved with conservative approach. The patient was informed about the treatment plan, prognosis and his consent was obtained. The entire treatment was performed under strict aseptic conditions.

During the access cavity preparation itself there was purulent discharge with tooth #12, later on

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the color of the fluid discharge turned to turbid and straw colored with a reddish tinge. (Fig. 3)

Fig.3: Fluid collection showing reddish tinge.

Once the drainage ceased after multiple dressings, at an interval of 14 days in a total span of 3 months.

3% sodium hypochlorite was used to irrigate the root canal. Apical gauging was performed, which confirmed the size of the apical foramen size 80 in tooth #21 and equivalent to file size 70 in tooth #12.

A 24-G needle attached to a 3-mL syringe was extended beyond the confines of the root canal into the periapex of tooth #12. Intracanal aspiration was performed while applying simultaneous digital pressure on the palatal aspect of tooth #12.

The sample specimen was sent for antibiotic culture and sensitivity test for narrowing the treatment modality since, patient had history of consumption of oral antibiotics without prescription. The report revealed Escherichia coli as the organism isolated (Fig 4) and resistant to ampicillin and salbactam group of drugs, accordingly the medications were prescribed.

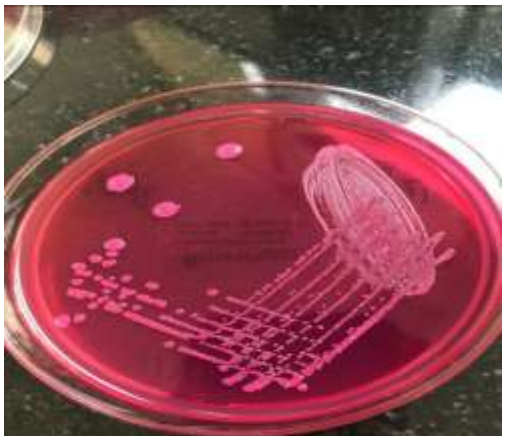

Fig.4: E. Coli colony morphology growth on MacConkey agar culture medium.

After radiographic working length determination, using radiographic (RVG) and apex locator (Root ZX mini [J Morita Corp, Tokyo, Japan] (J Morita Root Zx Mini) tooth #12 was instrumented till no. 70 K-file (Dentsply Maillefer, Ballaigues, Switzerland) using step back technique.

In tooth #21, instrumentation was performed to achieve a final apical preparation size of 80 using hand K-files; no multiple calcium hydroxide dressings were done for #21, it was obturated in subsequent appointment and followed by post space preparation and cast post and core.

3% sodium hypochlorite (Septodont Healthcare India Pvt, Ltd, Mumbai, India) was elaborately used for irrigation throughout. For tooth #12 an endodontic irrigation needle with side vents (ProRinse; Tulsa Dental Specialties, Dentsply International, Tulsa, OK) was placed in the apical third of the canal, and the solution was delivered slowly into the canal. The canal was then dried using paper points while simultaneously compressing the swelling using digital pressure. Initially calcium hydroxide mixed with 2% chlorhexidine digluconate with the help of lentulo spiral was done and patient was recalled after every 14 days , since this increased the no of appointments, a premix of calcium hydroxide and iodoform (Metapex; META Biomed Co Ltd, Chungbuk, Korea) were placed as an intracanal medicament, and the access cavities were temporarily sealed with Cavit G (3M ESPE Dental Products, St Paul, MN). At 1 month follow-up, when the metapex was removed, the canal was not weeping and the paper points could elicit its dryness.

Further, intracanal dressings of a creamy triple antibiotic mix of ciprofloxacin, metronidazole, and minocycline as described by Takushige et al [24] mixed in kenacort® 0.1% gel was placed in tooth #12 using a lentulo spirals. The pulp chamber was lined with a bonding agent before insertion and meticulously cleaned of any remaining paste to prevent discoloration. The access cavities were temporarily sealed with Cavit G. The patient was recalled after a period of 2 weeks. In the subsequent visit, the patient was found to be comfortable with no swellings or pain. The triple antibiotic paste (TAP) was flushed out of the canal. An apical MTA plug of 4mm was achieved and then obturated with gutta-percha (Dentsply Maillefer) and Apexit Plus (a calcium hydroxide-based root canal sealer, Ivoclar Vivadent, Liechtenstein). A final restoration of glass ionomer cement (Ketac Molar; 3M Deutschland GmbH, Neuss, Germany) was performed. A three unit bridge was given as a prosthesis considering patient's aesthetics.

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Fig.5: Showing RVG images for tooth #21 from left to right.

Pre operative radiograph, Working length, Master cone selection, Obturation, Custom made metal post and core cementation, 3 unit bridge prosthesis cementation.

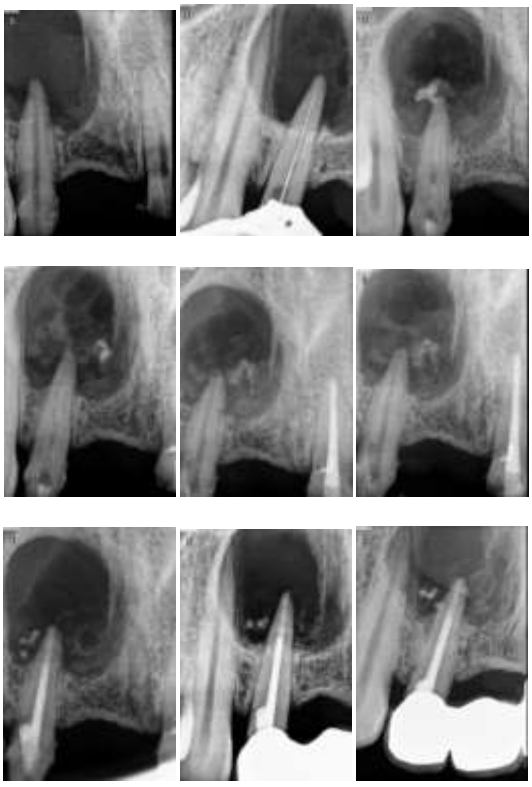

Fig.6: Showing RVG images for tooth #12 from left to right.

Pre operative radiograph, Working length, Multiple calcium hydroxide dressings along with Triple Antibiotic Paste, MTA apical plug followed by Master cone selection and Obturation, Prosthesis cementation, Follow up radiographs 6,12,18months.

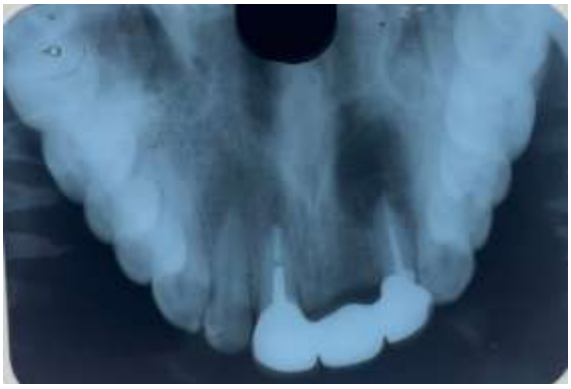

Fig 7a: 12 months follow up occlusal radiograph.

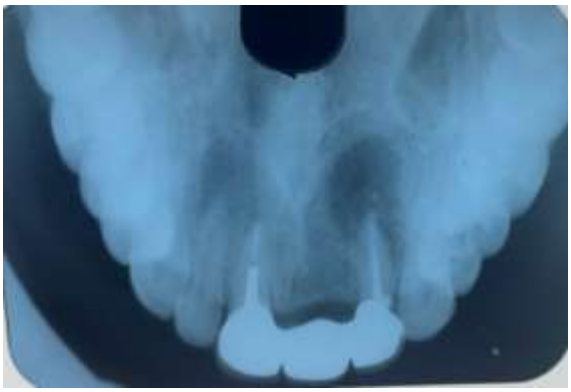

Fig 7b: 18 months follow up occlusal radiograph.

At 3, 6 months, the patient was totally asymptomatic with slight resolution of radiolucency, and at 12 months (Fig 7a) a partial resolution of radiolucency could be appreciated with hard tissue formation around the apex. At 1 year 6 months (Fig 7b) interval more dense bony trabeculae formation can be appreciated showing signs of healing.

III. DISCUSSION

In this case report we describe the complete healing of a maxillary cyst-like periapical lesion,

including a particularly extensive main lesion, following a conservative treatment approach. Some studies [27, 28] have suggested that apical true cysts are unlikely to be resolved without surgical removal, because they are independent of the root canal system. These studies have focused on cystic epithelial cells or cyst "cavities," which are considered key factors in long-term healing . However, the fate and nature of a cyst is determined by connective tissue surrounding its epithelial lining [27,28,29],which is connected to the apical root surface. Because the nature of the epithelium is determined by its underlying stroma [30]. On the basis of a combination of many factors involving epithelial-stromal interaction, the cyst will disappear of its own, along with its surrounding pathologic connective tissue, which will disappear after termination of the supply of inflammatory sources originating from the root canal system; this occurs as a result of thorough endodontic treatment [25, 29, 31, 33]. Intracystic fluid pressure is thought to be involved in odontogenic cyst growth . Therefore, the decompression technique may be effective in reducing the size of cystic lesions [26]. However, Lin et al [25] suggested that apical true cysts are not the cause of apical periodontitis lesions, and could not prevent periapical wound healing after nonsurgical root canal therapy. After complete elimination of root canal infection, periapical inflammation gradually subsides, and periapical wound healing should take place. Decompression by orthograde drainage may just accelerate the wound healing by enabling prompt discharge of proinflammatory cytokines, inflammatory mediators, necrotic debris, and irritants in cystic lesions As a result, the drying of root canals for root canal obturation was achieved without any difficulty. When confining the definition of "complete healing" to the total disappearance of periradicular rarefaction and reformation of normal or slightly widened periodontal ligament space [34], the outcome in this case report, after 1 years and 6 months and of follow-up, could be considered successful. "Complete healing" of periradicular lesions of endodontic origin could be ensured only after cessation of the influx of inflammatory sources from root canals. "Cleaning and shaping" of root canals is composed of 3 aspects: mechanical, chemical, and "the aspect of time." In the field of endodontic treatment, the importance of mechanical and chemical aspects has long been known to clinicians. The use of multiple Calcium Hydroxide dressings, Tripple antibiotic paste, high concentration NaOCl with lengthy contact time was reported for successful treatment of infected root canals [35] Although it did not have an experimental basis at that time, later studies revealed that prolonged contact time with high-concentration NaOCl was necessary to eliminate bacterial biofilms and suppress bacterial regrowth . [36, 37]

IV. CONCLUSION

Successful management of large periapical lesions can be achieved with non-surgical root canal treatment and if required, with aspiration, thorough irrigation, multiple medicament dressings and antibiotic therapy. Surgical management should be performed if the lesion does not show signs of healing.

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Conflict of Interest: 'None declared'.

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