

**MULTIDISCIPLINARY MANAGEMENT OF RADICULAR CYST WITH
NONSURGICAL AND SURGICAL APPROACH: CASE SERIES****Dr. Dipti Limbekar*, Dr. Jaydip Tingare, Dr. Yogesh Doshi, Dr. Mona Shah, Dr. Srinivas Bakle,
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ABSTRACT

Radicular cysts are the most common odontogenic cystic lesions of jaws; these are inflammatory in origin. These cysts result from the proliferation of cell rests of Malassez in the periodontal ligament as a consequence of inflammation, following pulpal necrosis of a nonvital tooth. The condition is usually asymptomatic but can result in a slow-growth in the affected region. There are various treatment modalities for management of radicular cysts which includes conventional nonsurgical root canal therapy when the lesion is localized or surgical treatment like enucleation, marsupialization or decompression when lesion is large. The clinical and radiographic examination in each case led to a provisional diagnosis of a radicular cyst, which was confirmed by biopsy. This case series represents multidisciplinary management of radicular cyst where in case of localized small lesion the symptoms subsided with conventional endodontic treatment and where the lesion was very large in size it did not subside by nonsurgical approach and in such cases surgical therapy of enucleation of cyst followed by apicectomy of infected and involved roots of tooth with retrograde MTA filling was done.

KEYWORDS: Marsupialization, enucleation, apicoectomy, radicular cyst, odontogenic cyst.**INTRODUCTION**

A cyst is defined as a pathological cavity having fluid, semi fluid, or gaseous contents, which is created by accumulation of pus (Kramer, 1974).^[1] Cysts are classified into odontogenic and nonodontogenic based on the tissue they arise from. Odontogenic cysts are often broadly divided into developmental and inflammatory cyst based on their etiology. Radicular cyst and lateral periodontal cyst are classified as inflammatory odontogenic cysts.^[1]

The most common inflammatory odontogenic cysts in tooth bearing areas of the jaws are radicular cysts (apical periodontal cyst, dental root end cyst).^[2] They originate from epithelial cell rests of Malassez in periodontal ligaments secondary to inflammation.^[3] Radicular cyst is mostly seen during the third and fifth decades of life, and common in males.^[4] Clinically radicular cysts are symptomless and Patient usually complains of slowly enlarging swelling with pus discharge from infected tooth. Tooth may or may not be discolored varies from patient to patient. Even the size of radicular cyst varies it ranges from small localized well circumscribed radiolucent lesion to large ovoid radiolucency's. Oztan M (2002) has shown that larger periapical lesions, like cysts, respond well to non-surgical treatment with

calcium hydroxide paste.^[5] However, when root canal therapy proves ineffective, periapical surgery becomes a viable and dependable alternative.^[6] Lee et al. (2014), in their retrospective observational study, found that the most common treatment method for radicular cysts is removing the cyst through enucleation along with apicoectomy.^[7] This article describes multidisciplinary approaches for management of radicular cyst.

Case presentation**Case no. 1**

An 18-year-old female patient was referred to the department of periodontology and oral implantology with chief complaint of swelling in upper front right region of jaw since last one month. (figure1) Patient was a relatively asymptomatic 6 months ago, later noticed swelling on the palatal aspect that progressed further since past one month. Intraoral examination revealed large dome shape swelling in right side of palate extending from 11 to 14 (figure2). The Swelling was soft, localized, fluctuant and nontender. Spontaneous pus discharge was seen from gingival sulcus. The thickening was tender on palpation along with resorption of cortical plate on palatal side also resorption of labial cortical plate was detected on CBCT. Maxillary right central and lateral incisors were tender on Electric and cold pulp

vitality testing. Rest all other teeth were non-tender to percussion.

Preoperative CBCT scan was advised, the scan revealed large unilocular radiolucent lesion in periapical region of 11 and 12 (figure3). The dimension of the lesion was measured by using measurement scale which was around 12 x 2.5 x 2.5 mm. A fine needle aspiration of the swelling was done and it was sent for protein estimation, which was 6.6 g/ dl. From the history, clinical examination and investigation, a provisional diagnosis of infected radicular cyst in relation to 11 and 12 was made.

Treatment plan was formulated and after explaining it to the patient an informed consent was taken. Treatment involved 2 stages conventional root canal therapy and the surgical enucleation of infected cyst followed by apicectomy of involved tooth.

1. Non-Surgical Part

After explaining the entire treatment procedure to patient informed consent was taken from patient. Under local anesthesia 1:80,000 lignocaine with adrenaline, access opening was done with 11 and 12 continuous pus drainage was detected with 12 and an open apex was detected. pus discharge was done by manual compression of swelling on palatal region. Working length was detected with 11 and 12 followed by biomechanical preparation and irrigation with copious saline and NaOCl and CaOH intracanal medicaments were given for 14 days. (figure 4) later the final intracanal medicament TAP (Triple Antibiotic Paste) was given for next 14 days but the results weren't satisfying. So we proceeded with surgical management after obturation of 11 and 12 a day prior to surgical intervention. (figure 4).



Figure 1: Preoperative frontal.



Figure 2: Preoperative palatal view.

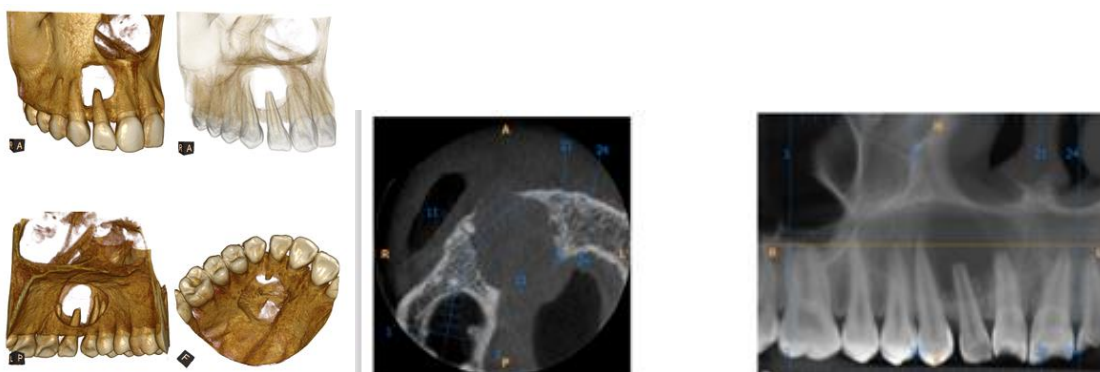
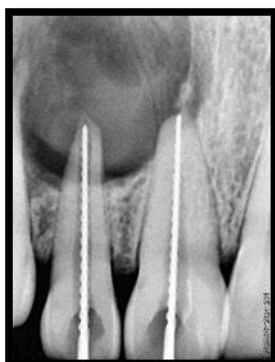


Figure 3: 3D CBCT scan and OPG.



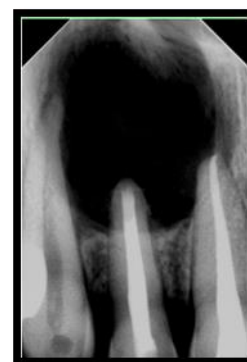
Preoperative Image



Working length



After obturation



Postop after MTA filling

Figure 4: Endodontic treatment of involved tooth.

2. Surgical Management

Since the lesion did not heal even after nonsurgical therapy enucleation of cyst and surgical apicoectomy with 11 was planned. After obtaining written informed consent, the surgical area was anesthetized with 5ml of 2% lignocaine with adrenaline 1:100000. A submarginal scalloped incision was made with two vertical releasing incision preserving the interdental papilla in region of 11,12,13 (Figure No.5). Luebke ochsenbein trapezoidal full thickness mucoperiosteal flap was elevated (Figure No 6). A cystic pus draining lesion with thin buccal cortical plate was noted with respect to 12 (Figure 6).

Later osteotomy window was made by removing thin infected labial cortical plate (Figure 7). Cystic fluid was collected for investigations (figure 8) and cystic lining was identified and thoroughly curetted to remove all debris and frequently irrigated with betadine and saline. A 3mm of root end of 12 was resected Followed by retrograde MTA filling with 12 (Figure No 4). The area was cleaned again with betadine saline irrigation flap was reapproximated with interrupted 4-0 silk suture (figure 9) Postoperative instructions were given and patient was recalled after 7 days for suture removal and after 15 days for follow up (Figure10).



Figure 5: submarginal scalloped with vertical releasing.



Figure 6: After flap reflection cystic lesion exposed with thin buccal plate with 12.



Figure 7: Cystic fluid was collected.



Figure 8: Osteotomy window made with 21.



Figure 9: interrupted suture placed



Figure 10: Follow up after 15 days

Case no. 2

A 34 years female patient was reported to the Department of Periodontics and Oral Implantology with chief complain of pain in upper front region of jaw. Patient was apparently alright 2 years ago later noticed

pain that aggravated since past one year the pain became severe since past one month. Patient had past dental history of amelogenesis imperfecta which was treated by full mouth prosthesis 20 years ago. Clinical examination revealed mild swelling in the labial vestibule whereas

intraorally there was sensitivity to percussion with 11,12,13,14 and 21,22,23,24. electric and cold vitality test showed negative response regarding the same teeth. preoperative CBCT scan of upper front anterior region was advised (Figure 11). The scan revealed large hazy radiolucent lesion extending from 21 to 24. A fine needle aspiration of the swelling was done and it was sent for protein estimation, which was 7.6 g/dl. From the history, clinical examination and investigation, a provisional diagnosis of infected radicular cyst involving tooth 21,22,23,24 was made.

Treatment plan: Based on all the examinations, since the lesion was large it was planned to do surgical enucleation of cyst. Initially root canal treatment was done of 11,12,13,14 and 21,22,23,24. After informing the patient about the treatment plan and obtaining proper consent, surgical enucleation of the cyst via apicoectomy and retrograde filling of the afflicted teeth with MTA was planned.

Surgical Management

Local anesthesia was given in area of surgical site. A crevicular incision with vertical releasing incisions was given from 14 to 24 region. (figure12 &13) A full thickness mucoperiosteal flap was reflected (figure 14). After reflection of flap cystic lesion with pus discharge was noted (figure 15). later the thin necrotic bone was removed with the help of round bur and osteotomy site was created to expose the thin cystic lining (figure16). The lining was separated from the nasal floor with Luca's curette (figure18). and was sent for histopathological examination. Apicectomy was performed of involved tooth i.e 21,22,23 followed by retrograde MTA filling (Figure17 & 21) The exposed area was irrigated with betadine and saline. And absorbable gelatin sponge was placed in the exposed cavity (figure 19) followed by approximation of flap with interrupted 4-0 resorbable suture. (figure20). postoperative instructions were given to the patient with antibiotics and analgesics. patient was called for follow up after 15 days (figure22)

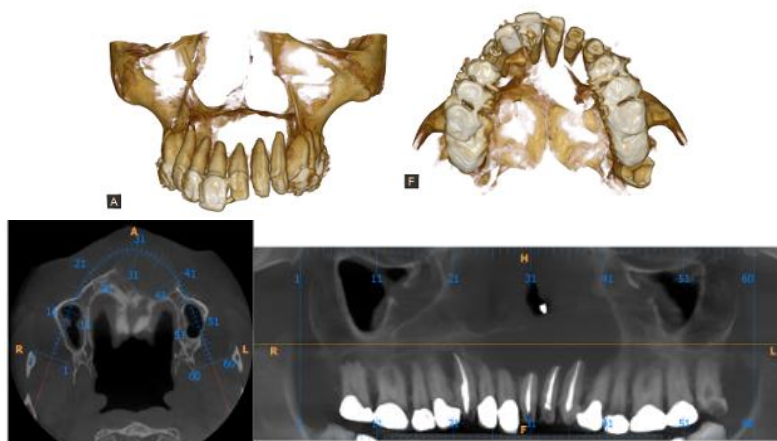


Figure11: Preoperative 3D CBCT Scan and OPG.



Figure12: Preoperative image.



Figure 13: crevicular with vertical releasing incision.



Figure14: Flap reflection.

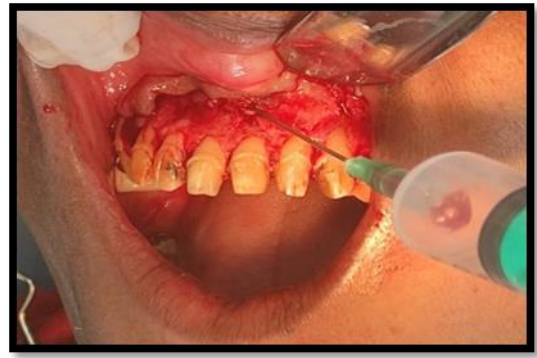


Figure15: Collection of cystic fluid.



Figure16: Osteotomy of necrotised bone.



Figure17: Apisectomy followed by retrograde MTA.



Figure18: Excised cystic lining approx 20mm.



Figure19: placement of abgel.



Figure20: interrupted Suture placed.



Figure21: Iopa after MTA filling.



Figure22: Follow up after 15 days.

Case no 3

A 21-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with chief complaint of fractured teeth and discoloration in upper front region of jaw. Clinical Examination revealed Ellis Class II fracture with 21 along with discoloration of tooth (figure24). Radiographically a large periapical lesion was associated with 21 and involving mesial of apical one third of 22. Electric pulp test and cold test was performed with 21 & 22, where 21 showed no response and 22 showed response. CBCT examination revealed large lesion of size 14.5×10 mm involving 21 & 22 with resorption of buccal and palatal cortical palate. (Figure23). Sinus tracing with gutta percha cone was done with 21 (Figure25 & 27).

Now the treatment plan involved two option 1. Non-surgical management which involves conventional root canal treatment followed by intra-canal medicament for 2-3 months if the lesion resolves will proceed for final obturation if the lesion persists then go for Surgical enucleation of cystic lining and apicoectomy.

Non-Surgical Management

After explaining the entire treatment procedure to patient an informed consent was obtained from the patient. Under the local anesthesia 1:80,000 lignocaine with adrenaline and rubber dam isolation access opening was done with 21 no pus discharge was detected. hand filing of canal starting from 10k to 60k was done, during biomechanical preparation normal saline and 5.25 % NaOCl was used. Activation of irrigants was done with ultra x ultrasonic activator. CaOH intracanal medicament was used for 7 to 14 days followed by Metapex for next 14 days as there were no signs of healing we shifted to triple antibiotic paste. Laser irradiation was done in canal before application of triple antibiotic paste. The paste was paced inside the canal for next two weeks. After 14 days good signs of healing with asymptomatic lesion complete resolvable of sinus tract with completely dry canal with 21 was seen. As there were no symptoms we proceeded with master cone selection followed by obturation with 21 (Figure 28). Patient was well-educated and motivated regarding the oral hygiene and a follow up was taken after 6 months. (Figure29 & 30).

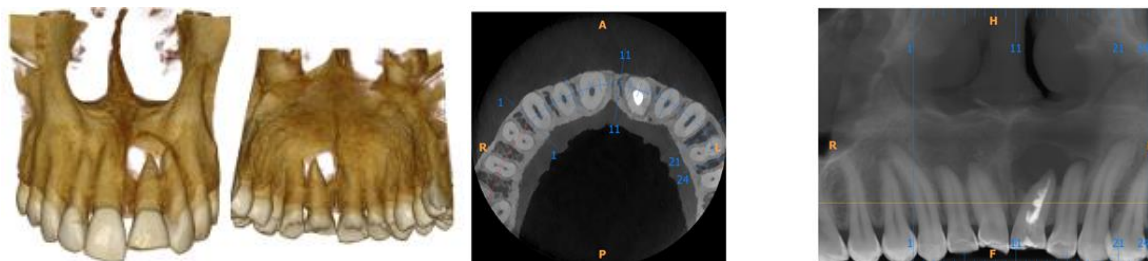


Figure23: Preoperative 3D CBCT Scan and OPG.



Figure24: Preoperative Frontal View.



Figure25: Sinus tract with Gutta percha.



Figure 26: Preoperative IOPA.



Figure 27: sinus tracing with Gutta percha point.



Figure 28: Obturation.



Figure 29: Follow up after 6 months.



Figure 30: Follow up after 6 months.

DISCUSSION

A radicular cyst is an odontogenic cyst of inflammatory origin leading to bone resorption and becomes enlarged and symptomatic when it is infected or due to nerve compression. Among odontogenic cysts, the periapical cyst is the most common type with an incidence rate of 52.3–70.7%, followed by the dentigerous cyst with 16.6 21.3% and odontogenic keratocysts with an incidence of about 5.4–17.4%.^[8]

Radicular cystic lesions are slow growing lesions they undergo asymptomatic evolution with crepitations followed by erosion and fluctuation of the overlying soft tissue. The bone within the surrounding area will be thinned out with springiness and egg shell crackling, resulting in cortical plate expansion.^[9] The epithelium encircling the cyst can come from several sources, including Malassez cell rest, crevicular epithelium, sinus lining, or fistulous tract epithelium.^[10] The usual consequences of these lesions include root resorption and displacement of surrounding teeth. It may also cause jaw swelling, pain, and tooth loosening.^[11]

The treatment for these cysts are still under discussion. The first line of treatment of choice is a conservative approach using non-surgical endodontic treatment. For large lesions, endodontic treatment alone is not efficient and it should be associated with decompression, marsupialization, or even enucleation. When treating teeth with chronic periapical lesions with root canal therapy, it is important to use root canal dressings in between sessions to reduce bacterial levels more

effectively than with mechanical preparation, especially by penetrating areas that are inaccessible to instruments or irrigation fluids, such as dentinal tubules and ramifications. Due to its hygroscopic qualities, calcium hydroxide has also demonstrated therapeutic effectiveness in decreasing exudate. According to studies, the bactericidal activity of calcium hydroxide requires at least 2 weeks. Then, in the subsequent appointment, obturation is completed.^[12]

Root canal infections are polymicrobial and because of the complexity of the root canal infection, it is unlikely that any single antibiotic could result in effective sterilization of the canal. The most commonly used medicament is a combination of three antibiotics, referred to as a triple antibiotic paste (TAP) which contains metronidazole, ciprofloxacin, and minocycline. Metronidazole is a nitroimidazole compound. It is selectively toxic to anaerobic microbes and also exhibits broad spectrum antimicrobial activity against protozoa and anaerobic bacteria. Tetracycline, which includes doxycycline and minocycline are primarily bacteriostatic and they exhibit broad spectrum of activity against gram positive and gram-negative microorganisms. It also increases the level of interleukin-10, an anti-inflammatory cytokine. Ciprofloxacin is a synthetic fluoroquinolone with rapid bactericidal action. It exhibits very potent activity against gram negative bacteria but very limited activity against gram positive bacteria. Most of the anaerobic bacteria are resistant to ciprofloxacin. Hence, it is often combined with metronidazole in treating mixed infections.^[13] In our all three cases we have used triple antibiotic paste as root canal medicament. As the lesion was very large in case number 1 and 2, we proceeded with surgical enucleation and apicectomy of involved tooth with retrograde MTA filling when the lesion didn't subside with conventional root canal therapy.^[13]

Most radicular cysts develop slowly and rarely become large enough to extensively erode adjacent bony structures as in our case. Surgical treatments for odontogenic cysts include total enucleation of small

lesions, marsupialization for decompression of larger cysts, or a combination of these techniques. When surgical intervention becomes necessary, the clinician must decide whether to enucleate the lesion completely or to try “decompression”. Enucleation is the preferred treatment for odontogenic cysts.^[14,15] however, when the lesion is large, marsupialization can be performed owing to the risk of fracture or harming any important organ or tissue during the removal of the lesion by enucleation^[16] If marsupialization with decompression is attempted first, the size of the lesion will be reduced, which will make it less difficult to remove, with less risk of damage to the neighboring teeth and vital structures. Long-term follow-up is necessary because the re ossification of the cyst generally takes two years.^[17]

As a result, many treatment approaches are available for management of radicular cyst. An exact treatment approach in the management of radicular cyst is still a topic of discussion. The treatment varies depending on the size of lesion, the healing outcomes, whether infected noninfected etc.

In our present case series, we have presented 3 case reports of radicular cyst which varied in size radiographically case no 1 is localized and case no 2 is generalized lesions more than 3cm in size whereas case 3 is a localized lesion less than 3cm in size. Conventional root canal therapy was done for all but surgical intervention was required for case no 1 and 2 as the symptoms didn't subside and lesion was aggressive. Surgical intervention included enucleation followed of apicectomy of involved tooth with retrograde filling with MTA. Centenovic *et al* 2013 in his study presented possible clinical success rate with retrograde MTA filling.^[18] MTA was found to have good sealing properties and to enhance osteoblast activity.^[19]

Various factors, including dental caries trauma, can cause inflammation of the pulp and pulp necrosis. The bacterial infection then spreads into the canal system to the apex of the root and into the periapical tissues, causing periapical periodontitis, which leads to either an acute abscess or a chronic granuloma when left untreated persistent chronic infection can proceed into formation of a periapical cyst.^[20] In the present case report number 3 the patient had given history of traumatic injuries. Nonsurgical management showed good healing. endodontic surgery has a success rate of between 78 to 91% but is less successful in retreatment situations where there is a periapical lesion.^[20]

CONCLUSION

Multidisciplinary approach involving Endodontist, Periodontist and oral maxillofacial surgeons holds the key in management of large Radicular cysts. Long term follows up and radiographs taken at frequent intervals will help in eventual success of the treatment outcome.

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