Apicoectomy Of Bilateral Infected Glandular Odontogenic Cyst Of Maxilla
– Report Of A Rare Case

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Dental traumatic injuries may directly or indirectly affect the teeth and alveolar bone. Necrosis of the pulp and chronic apical periodontitis with cystic changes are the most common sequelae after dental trauma if the affected teeth are not treated immediately. Nonsurgical endodontic therapy is obvious in most cases, but surgery may be indicated to treat persistent peri-radicular lesions unresponsive to non-surgical approaches. When indicated, endodontic surgery comprises the elimination of diseased soft tissue, root-end resection followed by retrograde root filling, for the formation of new bone at the site of the lesion. The diseased tissue every time should be subjected to histopathological investigation as this would determine the final prognosis of the case. The present case was diagnosed as an infected glandular cyst which is an aggressive lesion and demands for frequent follow up.
INTRODUCTION:
Untreated pulpal necrosis may lead to periapical pathologies, which represent a response of the bone surrounding the apex. Periapical healing can be achieved by an endodontic treatment that aims to remove the microorganisms from the root canal system and establish effective barriers against recontamination of the root canal.\(^1\),\(^2\) When traditional endodontic treatment fails, endodontic surgery becomes an alternative treatment for periapical pathologies to remove unreachable infected areas and seal the root canal as the preservation of the natural tooth as well as the tooth root is one of the ultimate goals of modern dentistry.\(^3\) An apicoectomy was well defined by J. Farrar in 1884 as “It is a bold act, which removes the whole cause of infection and which will lead to a permanent cure which may not be the finest in the end, but the most considerable.” According to Black, the approach for root-resection (root apex amputation) derived as a treatment for “pyorrhea alveolaris” complicated by a dental abscess in the late years of the 19th century as a credible replacement to dental extraction.\(^4\) The foremost aim of endodontic surgery is not the eradication of intra-radicular infection from the whole root canal but the removal of microorganisms from the apical third of the root by removing this part completely and by preventing the survival of microorganisms to the peri-radicular tissue by the placement of retrograde filling material.\(^5\) In cases of dental trauma, the anterior region of the mouth is widely affected and may affect the teeth and sometimes alveolar bone. It may involve the pulpal tissue and periodontal ligament directly or indirectly. Dental trauma is one of the factors which is associated with the disruption of blood supply to the pulpal tissue which is responsible for eventual pulpal necrosis and later endodontic infection. Pulpal infection may be immediate or delayed which can result in pain, psychological problems, facial disfigurement and if untreated, traumatic teeth may develop radicular cysts.\(^6\) Developmental odontogenic cysts are rare in these sites and if present can get infected and be misdiagnosed as radicular cyst and treated accordingly. If enucleation is complete then the chances of recurrence are minimal and depend on the nature of the pre-existing cyst. Follow-up after apicoectomy becomes imperative to describe the prognosis of such cases. Herewith, we are presenting a case report of a 26 years old male patient, who presented to the Department of Conservative Dentistry and Endodontics with a history of trauma and multiple carious teeth.

CASE REPORT
A 26 years old male patient visited the institute with the chief complaint of pain in the upper front tooth region for a week, multiple decayed teeth, bleeding gums, swelling in the palatal region, and difficulty in chewing for 3 years. The patient gave a history of trauma to the upper front teeth 13-14 years back and he was relatively asymptomatic till the above symptoms appeared. The patient had a habit of smoking (4-5 bidis/day)
All the intraoral and extraoral examinations, OPG, CBCT, and Aspiration were done by the Dept. of Oral Medicine and Radiology, NPDCH. The patient was referred to the Dept. of Conservative Dentistry and Endodontic, for further treatments with the diagnosis of Radicular cyst in respect to 14-23.
On intraoral examination, the patient had palatal swelling in 15 to 24 regions, the overlying mucosa appeared normal (Fig. 1). On palpation, the swelling was firm, non-compressible, and non-tender with Eggshell cracking. (Fig. 2) Teeth 13 – 24 were grossly decayed with almost all the teeth exhibiting caries and root stumps and chronic generalized gingivitis. 15-24 teeth responded negatively to pulp testing.
OPG showed well-defined radiolucent lesion extending from 14 to 23 (Fig. 3), CBCT (Fig. 4) showed the lingual expansion of well-defined radiolucency involving buccal and palatal lingual plate in respect to 14-23. So, the treatment planned for enucleation of the radicular cyst after endodontic treatment of the affected teeth.
Enucleation of the radicular cyst after endodontic treatment of the affected teeth was planned as treatment. Blood-tinged straw-coloured fluid was obtained on aspiration which showed cholesterol crystals which suggested an inflammatory cyst.
Treatment was started with oral prophylaxis followed by access opening and biomechanical preparation of 15, 14, 13, 11, 21, 22, 24 was carried out and the open dressing was given in a single visit. Teeth 11 & 21
had open apex thus BMP was done using the step-
back technique. Only normal saline was used as an
irrigating solution during the whole procedure.
Obturations were carried out 1 day before the surgery.
During obturation, we couldn’t get dry canals. Access
to the surgical procedure was made through buccal
aspects (Fig. 5). After removal of cyst (Fig. 6), an
apicoectomy of teeth 13, 11, 21, and 22 was
performed. Root ends were resected about 3mm at a
shallow bevel angle related to the tooth-long axis
using traditional rotary bur (Fig. 7). MTA was used as
a root-end filling material (Fig. 8 & 9). Extraction of
_teeth 12 and 23 was performed during the surgical
procedure.
The enucleated specimen was sent for
histopathological examination. The H&E-stained
section showed cystic lining and inflamed stroma.
The cystic lining was comprised of the stratified
squamous nonkeratinized epithelium of variable
thickness with a flat interface with connective tissue
in most areas. Hobnail superficial cells and goblet
cells were seen with an area of pseudocyst formation.
Stroma showed thick collagen bundles with a patchy
distribution of chronic inflammatory cell infiltrate.
(Fig. 11, 12, 13)
Thus, histopathological features were suggestive of an
‘Infected glandular odontogenic cyst’. The patient
was kept under follow up and improving results were
observed 1 week, 1 month, and 2 months after follow-
up (Fig. 14, 15).

DISCUSSION
Pulpal response to dental trauma is variable. It can be
normal to necrotic. After dental trauma, the pulp
loses its potential to protect itself from bacterial
invasion through the dentinal tubules and colonizes
in the necrotic pulp which subsequently forms
periapical lesion. Following dental injury, if prompt
and appropriate treatment is provided, then it brings
out a successful endodontic outcome. Persistent
chronic infection is the foremost cause of the
development of a periapical cyst.6 Teeth associated
with periapical lesions are non-vital and appear
discoloured. Clinically, the cyst exhibits swelling of
the buccal or palatal region of the maxilla. As the cyst
enlarges the bony covering becomes very thin and as
only the periosteum is left the lesion exhibits egg shell
crackling.7 Hence, all the clinical and radiographical
features of the present case report of a 26 years old
male patient were suggestive of the long-standing
radicular cyst of the anterior maxilla. Root canal
treatment followed by apicoectomy was performed as
the cystic lesion was large and the canal couldn’t be
dried. The lesional tissue was subjected to
histopathological investigations which was
diagnosed as an ‘Infected glandular odontogenic
cyst’.
Glandular Odontogenic cyst (GOC) is an uncommon
developmental cyst of the jaw of odontogenic origin,
 ARISING FROM THE REMNANTS OF THE DENTAL LAMINA.
This cyst occurs in 0.012–1.3% of all jaw bone cysts and
has aggressive behaviour. Since it was first
described in 1987, 181 cases have been reported yet
world-wide. It appears as a slow-growing swelling
that is asymptomatic in nature thus, mimics other
odontogenic cysts and tumors clinically and
radiographically. Due to its aggressive potential,
detailed diagnosis and quick treatment are crucial.
Padayachee and Van Wyk in 1987, described it as a
"sialo-odontogenic cyst". Gardner et al.,
characterized it as a distinctive clinicopathologic
entity and described it as a "glandular odontogenic
cyst".8,9
World Health Organization (WHO) classified the
lesion as a sialo-odontogenic cyst or glandular
odontogenic cyst in the WHO histological
classification of odontogenic tumors. GOC has male
predilection and is most commonly found in the
mandible. In the maxilla, the anterior region is more
commonly affected as in the present case. GOC
occurs over a wide age range with, a preference for
the middle-aged adult population (4th and 5th
decades). Radiographically, it shows unilocular or
multilocular radiolucency with a well-defined
border. Management of GOC comprises curettage and
enucleation. As it is clinically aggressive with a
higher recurrence potential, resection of the
affected jaw with longer follow-up is preferred.8,9
The treatment for the present case was planned as per
the provisional diagnosis of a radicular cyst. Root
canal treatment was done followed by periapical
surgery as the lesion was large. As the final diagnosis
was glandular odontogenic cyst which is aggressive
and has a higher recurrence rate; the patient was
instructed for a regular follow-up to note any clinical
symptoms and radiological changes.
When indicated, an endodontic surgery comprises diseased soft tissue excision, root-end resection followed by retrograde root filling to close the path of communication between an infected root canal and peri-radicular tissues.\textsuperscript{2,4} When needed, application of bone graft material intensifies the formation of new bone at the site of the lesion.\textsuperscript{2} When performed for the first time, the success rate of endodontic surgery ranges from 53 to 98%.\textsuperscript{10} In apicoectomy, root-end amputation of about 3mm eliminates all of the apical ramifications (approx. 98%) including lateral canals (approx. 93%); hence, posing less risk of reinfection and eventual failure.\textsuperscript{6,7,10}

The steep bevel during root-end resection allows better accessibility and visibility but will expose the dentinal tubules in large numbers. In addition, bevelling often misses the lingually positioned apex, thus causing canal elongation and reduction of the root diameter, hence weakening it. The recommended steep bevel angle for root-end resection is 45-60 degrees.\textsuperscript{10} Ideal material for root-end filling should be nonabsorptive, non-corrosive, non-toxic, moisture-resistant, dimensionally stable, biocompatible, radiopaque, antibacterial, economical, easy to manipulate, adhesive to dentinal walls, make a tight seal, and induce cementogenesis.\textsuperscript{4} Previously, materials like dental amalgam, glass ionomer cement, and composites were used for the root end filling; but more recently MTA, SuperEBA, and IRM are the material of choice due to their higher biocompatibility and less solubility than any other materials.\textsuperscript{2}

In this case, MTA was used as a root-end filling material during apicoectomy of teeth 13, 11, 21, and 22. Toraminejad et al in 1993, introduced Mineral trioxide aggregate (MTA) as a retrograde root filling material that has an excellent sealing ability and induces osteoblastic activity. It is antimicrobial and less cytotoxic than amalgam, IRM, and SuperEBA. Some studies of MTA in dogs and monkeys stated that MTA is significantly less inflammatory than dental amalgam. It is labelled as a ‘tissue-friendly material’ as it induces cementogenesis directly over the MTA root-end fillings.\textsuperscript{2} Bismuth oxide, in MTA is highly considered during usage of MTA as a root-end filling material.\textsuperscript{11,12} As stated by Parirokh and Toraminejad, MTA encourages cementogenesis in 23% of specimens after 2-5 weeks of endodontic surgery, while greater than 80% of root-end filled cavities with MTA manifests cementogenesis 10–18 weeks post endodontic surgery in previous studies.\textsuperscript{6}

In this case, the follow-up examinations at intervals of 1 week, 1 month, and 2 months showed depletion of symptoms like pain, extra/intra-oral swelling, and trismus thus normal functions of the teeth were preserved. There was no sensory loss reported. On subsequent follow-ups, OPG reported clear and slow deposition of bone in the cavity after endodontic-surgical treatment.

\textit{Fig. 1 & 2: pre-operative clinical photographs}
**Fig. 3:** Pre-operative OPG showing well-defined radiolucent lesion extending from 14 to 23

![Fig. 3](image)

**Fig. 4:** CBCT showing lingual expansion of well-defined radiolucency involving buccal and palatal lingual plate in respect to 14-23

![Fig. 4](image)
**Fig. 5:** Cystic enucleation and **Fig. 6:** Infected glandular odontogenic cyst

![Fig. 5](image1.png) ![Fig. 6](image2.png)

**Fig. 7:** Root end resection and **Fig. 8:** Preparation for retrograde filling

![Fig. 7](image3.png) ![Fig. 8](image4.png)
**Fig. 9:** Retrograde filling with MTA and **Fig. 10:** Flap approximation and sutures taken

**Fig. 11:** H&E-stained section showing epithelial thickening with hobnail superficial cells

*And Fig. 12: H&E-stained section showing epithelial spherules*

**Fig. 13:** H&E-stained section showing mucus cells
CONCLUSION
The radicular cyst is the most common condition after dental trauma. The cyst goes unobserved due to its chronicity and rare potential of exceeding the palpable measurements. The presented case had a history of trauma and was non-vital, and was treated accordingly, but was diagnosed as ‘Infected glandular odontogenic cyst’ after histopathology. The treatment of radicular cyst would include complete enucleation but for GOC aggressive treatment is preferred due to its nature. Follow-up visits have confirmed the satisfactory healing of the large cyst which is responding favourably to successful endodontic surgery.

We would like to emphasize the importance of histopathological examination of the excised specimen which would help to know for any deviation in the provisional diagnosis. This would encourage the follow-up of the patient so that any changes can be noted which would help in determining the ultimate prognosis for the patient.

CONFLICT OF INTERESTS
The authors stated that there is no conflict of interests with regard to this publication.
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