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Case Report

Management of Apical Consequences of Longstanding Dental Traumatic Injury and Dental Caries in The Dental Clinic: Events From A Secondary Healthcare Facility in Benin City, Nigeria

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Abstract

Longstanding, untreated traumatic dental injuries and dental caries are significant causes of periapical pathology.

In resource-constrained settings, delayed presentation of such incidents as traumatic dental injuries and dental caries is common leading to complications and escalating the complexity of management from simple restoration to advanced endodontic or surgical intervention.

This article highlighted the clinical presentation, diagnosis and management of neglected traumatized/infected teeth in a secondary health center in Benin-city, Edo state, Nigeria. It reported two cases of periapical pathologies in a 34-year old male and a 38-year old male who presented with complications arising from longstanding dental traumatic injury and untreated dental caries respectively. The duration between initial injury or onset of caries and presentation ranged from 5 to10 years.

Clinical, radiographic and histological findings revealed periapical pathologies (radicular cyst in the case involving the 34-year old male and periapical granuloma in the case involving the 38-year old male).

The affected teeth were managed using appropriate intervention such as incision and drainage of abscess, enucleation, apicoectomy with root end closure, root canal therapy and restoration with full coverage crowns to restore aesthetics and function, extraction and curretage.

Adjunctive pharmacological therapy and follow up evaluations were also conducted to monitor outcomes.

Both cases demonstrated clinical resolution of lesions following treatments.

This case series highlighted significant periapical complications associated with delayed care following traumatic dental injury and dental caries but also demonstrated that effective management can be achieved with appropriate diagnostic and therapeutic protocols.

In conclusion, longstanding dental trauma and untreated caries may result in significant periapical pathologies

Authors thereby recommend early presentation, diagnosis, timely intervention, improved oral health awareness and strengthened access to dental care to prevent avoidable complications.

Keywords: Traumatic Dental Injury; Dental Caries; Periapical Pathologies

Introduction

Periapical pathologies arise secondary to infection that originates from necrotic pulp tissue, commonly resulting from extensive dental caries or traumatic injury. When microorganisms and their toxins extend into the periapical region, they trigger a host immune and inflammatory response within the surrounding tissues. This reaction may subsequently lead to the formation of different periapical pathologies such as periapical granulomas, radicular (periapical) cysts, or periapical abscesses [1].

Primary inflammatory changes in the periapical tissues may develop in any tooth and can involve a single canal, multiple canals, or all the root canals within the affected tooth. Dental caries and traumatic injury are the leading etiological factors [2].

When a tooth fracture occurs and the inflammatory response fails to subside on its own, root canal treatment can be carried out [3]. However; secondary inflammation may occur in teeth that have already received root canal treatment. This may be due to residual necrotic or infected pulp tissue, insufficient cleaning, shaping, or obturation of the canals, complex root canal anatomy, missed canals, or technical shortcomings during the initial endodontic procedure. The resulting secondary infection can also lead to periapical pathologies [4].

Globally, it is estimated that about 52% of adults have had at least one tooth affected by periapical pathology [5]. The global prevalence underscores its public health relevance, particularly in populations with limited access to definitive endodontic care.

The condition appears slightly more common in populations from developing countries than in developed regions, a difference that is often linked to variations in access to dental care and levels of patient education. In addition, people with systemic illnesses tend to show a greater prevalence of the disease [5,6].

Clinically, periapical lesions may be asymptomatic and discovered incidentally on radiographic examination as well-defined radiolucencies at the root apex. In other instances, patients may present with pain, swelling, sinus tract formation, or acute exacerbation, reflecting the transition to periapical abscess [7].

The accurate clinical, radiographic, and histopathological identification of periapical lesions has long posed significant difficulties for dental practitioners and researchers. Distinguishing among the different types of lesions that occur in the periapical region continues to be a complex issue and remains an unresolved topic in ongoing scientific investigations. Despite advances in diagnostic techniques, reliably differentiating these lesions is still challenging [8]. The most definitive and dependable method of diagnosis currently available is an invasive histopathological examination obtained through biopsy. Recent advances in imaging technologies including digital radiography, densitometry, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound, and cone beam computed tomography (CBCT) have enabled clinicians to detect density differences, thereby improving the accuracy of preoperative diagnosis [8,9].

The treatment of large periapical lesions may vary from conservative root canal therapy to more aggressive surgical interventions, including apicoectomy or tooth extraction [10]. In line with minimally invasive endodontic principles, nonsurgical root canal therapy is typically recommended as the initial treatment option. This approach aims to thoroughly disinfect the root canal system by markedly decreasing or eradicating microbial presence, thus creating an optimal environment for healing and regeneration of the periapical tissues [11]. The outcome of healing largely depends on the treatment approach used, especially the selection of irrigation solutions and intracanal medicaments [12]. These elements are critical not only for eliminating microbial contamination but also for enhancing the body's immune defense and facilitating tissue healing and regeneration. The overarching goals of endodontic treatment are to resolve periapical disease and to prevent future reinfection.

The reported success rate for non-surgical endodontic retreatment ranges between 74% and 82%, while periapical surgical procedures have a success rate that varies from 60% to 91% [10].

Literature review did not reveal any report of periapcal pathologies in patients with initial injuries or caries of the teeth which indicate long duration. We hereby report two cases of periapical pathologies presenting as complications arising from longstanding dental traumatic injury and untreated dental caries

Case Presentation

Case 1

A 34 year old Male Ibibio farmer, presented to the dental clinic with a complaint of swelling of 4 months duration of the upper anterior region and tooth discoloration of the upper anterior tooth.

The patient reported a history of trauma to his anterior teeth following a fall 10 years prior to presentation. The patient did not seek dental care at the time of the injury with symptoms progressing to tooth discoloration and swelling.

Intraoral examination revealed discoloration of 21 and a mid-palatal swelling measuring 2cm by 4cm and extending the to the left side of the palate and to the mucogingival area of the labial surface of 21. The swelling was soft and fluctuant. Aspirate yielded a pus-filled exudate. The Pulp Vitality test yielded an unresponsive upper left central incisor to pulp tester (Vitalometer). Periapical X-Ray reveals a well circumscribed radiolucency at the periapical region of the upper left central incisor suggestive of a periapical cyst associated with a non-vital tooth.

A diagnosis of periapical (radicular) cyst was made.

Incision and drainage, enucleation and debridement was carried out and tissue was sent for histological analysis. Apicoectomy was done on 21 and Glass Ionomer Cement was used to seal the root apex. Patient was placed on Tabs Amoxicillin and Clavunalic acid combination 1gram, BD and Metronidazole (400mg, TDS) for 1 week and Diclofenac (50mg, BD) for 3 days as well as Vitamin C (100mg, TDS) for 2 weeks. The patient was given a 2-week ppointment for review and further treatment appointment. Histological report confirmed the lesion to be a radicular cyst.

On the following appointment, Root canal therapy was done on 21 and 11 following standard endodontic protocol.

On review after 2 weeks, There was resolution of the swelling. Both upper central incisors (11, 21) were prepared for crown fabrication and restored with full coverage zirconia crowns and the patient was satisfied with the aesthetics and function.

Follow up visit after 6 months showed absence of clinical symptoms and resolution of the periapical lesion.

Figure 1: Mid-palatal swelling.

Figure 2: Periapical X-Ray showing a well circumscribed radiolucency at the periapical region of the upper left central incisor.

Figure 3: Patient before placement of zirconium crown

Figure 4: Patient after placement of zirconium crown.

Case 2

A 38 year old Male Nigerian, a junior public servant with no known debilitating condition presented with 5 years history of carious lesion and one year history of discharging sinus, clinical examination revealed class 2 carious lesion on the lower left 6 with associated extra-oral discharging sinus tract with OHI-S score of 4.2 an indication of poor oral hygiene according to simplified oral hygiene index.

There was generalized chronic marginal gingivitis with periodontal depth pockets of 5 mm.

An OPG (orthopantomogram) was done and revealed widened Periodontal ligament space of lower left 5, coronal radiolucency of Lower left 6 communicating with the pulp and periapical radiolucency related to the roots of lower left six with roots resorption, it also revealed the impaction of the lower left 8. A diagnosis of Periapical granuloma was made.

Scaling and polishing was done followed by extraction of Lower left 6 with curetting of the socket due to periapical lesion and tissue was collected and sent for pathological analysis to confirm the diagnosis, the histogical report confirmed the lesion to be periapical granuloma. Post up instructions where given. Medications were given (Diclofenac 50 mg BD for 3 days, metronidazole 400mg TDS for 1 week, Amoxicillin/clavunalic acid combination 625 mg BD for 1 week).

The patient was given a one week post-up review. On recall visit, sinus tract has resolved significantly and extraction site healing satisfactory. Another recall visit 6 months later showed healthy clinical tissues with resolution of the lesion.

Figure 5: Carious lesion on lower left 6.

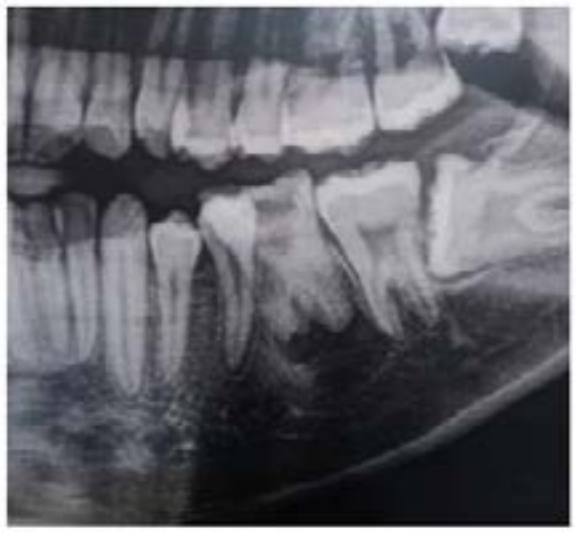

Figure 6: An OPG showing coronal radiolucency of Lower left 6 communicating with the pulp and periapical radiolucency related to the roots of lower left six with roots resorption.

Discussion

Periapical inflammatory lesions are among the most common sequelae of untreated dental caries or dental trauma. They arise primarily as a result of pulpal necrosis and the subsequent spread of microbial infection through the root canal system to the periapical tissues. The two cases presented illustrate common but clinically distinct forms of chronic periapical pathology, radicular cyst and periapical granuloma, highlighting differences in pathogenesis, clinical presentation, diagnosis, and management.

Radicular cysts represent the most common odontogenic cysts of inflammatory origin. Persistent microbial infection stimulates epithelial proliferation, eventually resulting in cyst formation. In the present case, the patient reported a history of trauma to the maxillary anterior teeth many years prior to presentation, which likely resulted in pulpal necrosis of tooth 21. This finding is consistent with previous studies which report that traumatic dental injuries are a significant predisposing factor for pulpal necrosis and subsequent cyst formation, particularly in the anterior maxilla where teeth are more vulnerable to trauma [13].

Clinically, radicular cysts are often asymptomatic and may remain undetected until they enlarge sufficiently to produce swelling or are identified during routine radiographic examination. Radiographically, they typically appear as well-defined periapical radiolucencies associated with non-vital teeth. Similar findings were observed in the present case, where a circumscribed radiolucency was detected at the apex of tooth 21. However, previous studies have shown that radiographic features alone cannot reliably differentiate radicular cysts from periapical granulomas, making histopathological examination essential for definitive diagnosis [14].

Management of radicular cysts depends on the size of the lesion and the condition of the associated tooth. Some authors have reported successful resolution of smaller cystic lesions following conventional root canal therapy alone, as elimination of the intracanal infection allows periapical tissues to heal. In contrast, larger lesions may require surgical intervention such as enucleation or apicoectomy combined with endodontic treatment [15]. In the present case, surgical enucleation with apicoectomy was performed, followed by root canal therapy and prosthetic rehabilitation. This combined approach is consistent with the management strategies described in previous literature for large or persistent radicular cysts and resulted in complete clinical resolution at follow-up.

The second case presented a typical example of periapical granuloma associated with long-standing dental caries affecting the mandibular first molar. Chronic periapical infections may lead to the formation of a draining sinus tract, as observed in this patient. Chronic draining sinus tracts are common in long-standing periapical infections and often provide an outlet for purulent exudate, thereby reducing acute symptoms. Poor oral hygiene, as indicated by the patient's OHI-S score of 4.2, likely contributed to the progression of dental caries and periodontal inflammation observed in this case. Similar associations between poor oral hygiene, untreated caries, and periapical pathology have been reported in epidemiological studies [16].

Radiographically, periapical granulomas typically appear as ill-defined or moderately defined radiolucencies at the root apex, although they may sometimes resemble radicular cysts. Definitive differentiation between these lesions cannot always be achieved solely through radiographic evaluation; histopathological examination remains the gold standard for diagnosis [17]. In this case, extraction of the affected tooth followed by curettage of the socket allowed for removal of the lesion and collection of tissue for histological analysis, which confirmed the diagnosis of periapical granuloma.

Management of periapical granulomas depends on the restorability of the affected tooth and the extent of infection. When the tooth is severely compromised by extensive caries or structural damage, extraction is often the treatment of choice. Curettage of the extraction socket is recommended to remove residual inflammatory tissue and promote healing of the periapical region [18]. In this reported case, extraction and curettage of the extraction socket were carried out. Postoperative antibiotic therapy and analgesics were administered to control infection and pain, and the patient demonstrated satisfactory healing on follow-up visits. The complete resolution of the sinus tract and healthy tissue appearance after six months indicate successful treatment.

Both cases highlight the importance of accurate diagnosis and timely intervention in the management of periapical lesions. Delayed treatment of dental trauma or carious lesions can lead

to chronic pulpal infection and the development of periapical pathology. Additionally, the cases emphasize the significance of comprehensive treatment approaches that may include endodontic therapy, surgical management, and prosthetic rehabilitation depending on the clinical circumstances.

Furthermore, preventive strategies such as routine dental examinations, prompt management of traumatic dental injuries, and improved oral hygiene practices are essential in reducing the incidence of chronic periapical lesions.

Oral health education is particularly important in developing countries where access to dental care and awareness of oral health practices may be limited. Early intervention not only prevents the progression of periapical pathology but also preserves natural dentition and improves long-term oral health outcomes.

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