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REVIEW

Periapical Actinomycotic Infection: Review of Published Case Reports

Mehdi Abrishami[1], Atousa Aminzadeh Gohari[2], Laleh Hoveida[3], Bardia Hasani[4]*, Hila Abdollahzadeh[5], Majid Mohammadi Demneh[6]

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Abstract

Background: The purpose of this study was to review the epidemiology and management strategies of previously reported cases of actinomycotic periapical lesions for better control of disease.

Methods: In this review, free full-length case reports in the English language were selected from PubMed and Google Scholar, focusing on publications between 2015 and 2025. After applying the inclusion criteria of year and publication type, selected studies were reviewed and those articles that specifically addressed Periapical Actinomycosis were selected to be included in the article.

Results: After final review, 8 case reports were selected and included in the study. The age of patients was between 20 and 80 years.13 patients were studied, of whom 10 were females and 3 were males, with various treatment modalities.

Conclusion: This study indicates that practitioners should remain vigilant for periapical actinomycotic infections, particularly in instances of recurrent sinus tracts and inadequate responses to conventional treatments. Confirmation of this diagnosis should be achieved through biopsy and microscopic evaluation. The proposed management strategies for periapical lesions associated with actinomycotic infection were varied among patients depending on the extent of the lesion and the risk of developing a cervicofacial infection. Main treatments used were endodontic re-treatment, periapical surgery with or without 0.2% chlorhexidine mouthwash and antibiotics and prolonged follow-up.

Keywords: Periapical, Actinomycosis, Jaw, Infection, Radicular cyst, extra-radicular infection

Introduction

Actinomycosis is an infection of filamentous, branching, gram-positive anaerobic bacteria. These bacteria are normal inhabitants of the oral cavity in healthy patients (1,2) .These bacteria colonize in the tonsillar crypts, dental plaque, calculus, carious dentin, bone sequestrum, salivary calculi, gingival sulci, and periodontal pockets. Actinomycetes predominantly infect the cervicofacial, thoracic, and abdominal regions, with almost 55% of all cases diagnosed in the cervicofacial region (3,4). Actinomycotic infections can show an acute and rapidly progressing course of disease or chronic and slowly spreading lesions associated with multiple draining sinuses and eventual fibrosis, if left untreated (5,6). Actinomyces israelii is the causative organism in the majority of cases, followed by A. viscosus, A. naeslundii, A. odontolyticus, A. meyeri, A. pyogenes,

Corresponding author: Bardia Hasani

Department of Endodontics, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
Email: bardia.hasani@iau.ir

1. Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
2. Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
3. Department of Microbiology, Fal.C., Islamic Azad University, Isfahan, Iran
4. Department of Endodontics, Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
5. Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran
6. Faculty of Dentistry, Isf.C., Islamic Azad University, Isfahan, Iran

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and A. bovis (7-10). Bacteria can be identified in the yellowish discharge of infected tissue called sulfur granules, although not always present, by using various laboratory methods. One method is culture, but fewer than 50% of cases show accurate results due to the presence and overgrowth of other bacteria, prior antibiotic therapy, or improper specimen preparation and handling (2). Thus, it is believed that Gram staining of infected tissue or purulent material is more useful and sensitive compared to culture (9, 11). Some molecular techniques, such as PCR, can be used to identify the bacterial species in paraffin-embedded specimens. Histopathologically, the tissue removed from areas of active infection demonstrates chronically inflamed granulation tissue with a peripheral band of fibrosis and large collections of neutrophils. The bacterial colonies consist of club-shaped filaments that form a radiating rosette pattern. In hematoxylin and eosin (H&E) stains, the central core stains basophilic, and the peripheral portion is eosinophilic (2).

Actinomycotic infections usually respond well to antibiotics containing the beta-lactam ring, especially penicillin or amoxicillin, which are known as the first line of Actinomycosis treatment. Third-generation cephalosporins are considered active against A. israelii, but they are less frequently used. Drug resistance is usually not a concern in actinomycosis infections; however, it is important to note that some species are resistant to ceftriaxone (12,13). It has been reported that the traditional treatment for cervicofacial actinomycosis is high-dose penicillin for a prolonged period (6 months to 1 year, depending on disease severity) (14).

Localized colonization of Actinomycetes has been reported in the apical region of teeth with refractory apical periodontitis, clinically and radiologically indistinguishable from apical periodontitis (3, 15-17). This form of infection often occurs when bacteria gain access to the periapical tissues, which can be via dental procedures or the presence of untreated dental caries in teeth (18,19). Although the incidence of periapical actinomycosis is low, it should be considered in the differential diagnosis of periapical radiolucencies (20, 21). It has been emphasized that intracanal irrigants and medicaments such as sodium hypochlorite and calcium hydroxide are very important in the elimination of this infection and achieving a proper symptom-free treatment of the patient (22). This study aims to highlight the importance of periapical actinomycosis by gathering findings from previous research, focusing on its clinical, pathological, and epidemiological aspects, as well as associated prevention strategies and management approaches.

Methods

In this review, free full-length case reports in English were selected from PubMed and Google Scholar, focusing on publications between 2015 and 2025. After applying the inclusion criteria of year and publication type, selected studies were reviewed and those articles that specifically addressed Periapical Actinomycosis were selected to be included in the article.

Results

After final reviews, 8 case reports were selected and included in the study. The age of patients was between 20 and 80 years.13 patients were studied, of whom 10 were females, and 3 were males.

Huang et al. (16) reported a case of a periapical granuloma with actinomycosis. They reported a case of a well-defined radiolucent lesion in a 32-year-old male patient with mild, persistent pain, along with a sinus tract. The lesion was located in the periapical region of his lower right central incisors. The diagnosis of the lesion was confirmed histopathologically in hematoxylin and eosin-stained

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tissue sections. To confirm the microscopic diagnosis, periodic acid-Schiff (PAS) and Gram stains were employed, which both showed positive results. The recommended treatment plan for this patient was endodontic therapy, followed by periapical surgery and a short-term (7–10 days) antibiotic therapy. Post-treatment recovery and healing procedures were uncomplicated, underscoring the effectiveness of the treatment approach. The authors of this article note that periapical actinomycosis is more prevalent than previously assumed, underscoring the need for heightened awareness among dental professionals. Importantly, the findings reveal that such infections are not effectively managed solely with conventional nonsurgical endodontic treatments. Rather, they can typically be resolved with proper periapical surgery, which should be accompanied by a short course of antibiotic therapy lasting 7 to 10 days. Thus, in instances where a diseased tooth displays a recurrent sinus tract and poor responses to standard nonsurgical endodontic treatments and antibiotic management, practitioners should maintain a high index of suspicion for peri-radicular actinomycotic infection (16).

In the case report by Yeoh et al. (23), it was highlighted that actinomycosis contributes to the persistence of periapical radiolucency following root canal therapy. They documented the case of a 35-year-old woman who experienced ongoing pain and swelling in the region of an endodontically treated mandibular premolar. Despite multiple interventions and re-medication of the canal, the tooth remained symptomatic, and a draining sinus tract continued to develop. Ultimately, an apicoectomy was performed, and all the diseased tissues were removed. Subsequent microscopic evaluation of the submitted tissue confirmed the diagnosis of periapical actinomycosis. Here, the authors advised the patient to rinse with 0.2% chlorhexidine mouthwash twice daily for 1 week, and no antibiotics were prescribed. The patient's postoperative recovery was favorable, exhibiting no complications.

Asgari and Roghanizadeh (24) have reported actinomycosis as a cause of persistent peri-radicular lesions in a 50-year-old female patient who had persistent symptoms after root canal therapy and underwent retreatment and periapical surgery. During surgery, a whitish-yellow, granular material was secreted from the lesion, which was diagnosed as an actinomycotic infection. After the definitive histopathological diagnosis, oral penicillin V was prescribed for the patient and continued for four weeks. In a 2-year follow-up, the affected bone showed complete healing.

Jamshidi et al (22) have reported a case of extra-radicular actinomycosis, which caused failure of endodontic treatment. In this case report, a 40-year-old woman was described with a chief complaint of a cutaneous sinus tract developing after several previous endodontic treatments. At the time of referral, as the quality of root canal filling was acceptable, clinicians decided to perform a periapical surgery without endodontic retreatment. At the periapical area of the involved tooth, granulation tissue was observed, which was excised and sent for histological evaluation. Analgesics and Chlorhexidine 0.2% mouthwash were prescribed after surgery. In a long-term follow-up, the patient had no complications.

Dastgir and Sohrabi (19) presented a case of periapical actinomycosis in a 34-year-old female patient who had persistent pain and slight mobility in the mandibular right second premolar and first molar. Notably, the patient's medical history revealed no significant systemic conditions or prior dental interventions that could have contributed to her presenting symptoms. A comprehensive initial evaluation via orthopantomography revealed an uninoculated, radiolucent lesion that encircled the apices of the involved teeth, suggesting possible inflammatory or

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infectious processes. Subsequently, an incisional biopsy was conducted to obtain tissue samples for histopathological examination. The histological analysis revealed a suppurative exudate resembling "sulfur granules," a hallmark of actinomyces infections. The surgical management of this case consisted of thorough curettage of infected tissues and peripheral ostectomy to ensure complete removal of any affected bones.

In a study by Gomes-Silver et al. (25), the clinicopathological features of 6 cases (4 females and 2 males) with periapical actinomycosis were analyzed. Similar to the case reports mentioned here, the study reported that the mean age of patients was 34 years. Two cases were symptomatic. The lower jaw and anterior region were the most commonly affected sites.

Seki et al. (26) reported a case of periapical granuloma with actinomycosis and medication-related osteonecrosis of the jaw in a patient prescribed high-dose ibandronate who was successfully treated with a root canal filling followed by sequestrectomy without any complications.

Verma et al (27) reported a case of periapical actinomycosis in an otherwise healthy 26-year-old female patient with a chief complaint of tooth mobility in the mandibular right anterior region with a one-month duration, which had undergone root canal treatment 18 months ago. An endodontic root canal therapy was performed for the patient, followed by surgical debridement, and an antibiotic was prescribed for 1 week twice daily. The 6-month follow-up period was uneventful, but the antibiotic therapy continued for 1 month.

Table1. A summary of the studied case reports

Author and year	diagnosis	sulfur granules	gender	Age	symptoms	location	Treatment	Follow up
Verma et al 2025 (27)	periapical granuloma with actinomycotic infection	yes	female	26	Tooth mobility	Anterior mandible	Retreatment Surgical debridement antibiotic	Without complication
Yeoh et al 2025 (23)	periapical granuloma with actinomycotic infection	No	female	35	Persistent pain and swelling, sinus tract	Premolar mandible	Retreatment. periapical surgery, 0.2% chlorhexidine mouthwash no antibiotic	Without complication
Dastgir and Sohrabi 2022 (19)	periapical granuloma with actinomycotic infection	yes	female	34	persistent pain and slight mobility	Molar and premolar Mandible	curettage accompanied by peripheral ostectomy	Without complication
Seki et al. 2022 (26)	periapical granuloma with actinomycotic infection	no	female	78	Bone sequestrum	palate	Retreatment sequestrectomy	Without complication
Huang et al. 2021 (16)	periapical granuloma with actinomycotic infection	No	male	32	Mild persistent pain, sinus tract	Incisor mandible	Retreatment, periapical surgery, and a short-term (7–10 days) antibiotic therapy	Without complication
Asgari and Roghanizadeh 2021 (24)	periapical granuloma with actinomycotic infection	yes	female	50	Persistent pain	Incisor Maxilla	Retreatment, antibiotic therapy	Without complication
Gomes-Silva et al 2019 (25)	periapical cyst, Lateral periodontal cyst, and abscess with actinomycotic infection	yes	4 females 2 male	34	Pain and purulent discharge	anterior mandible 2 anterior maxilla 1 molar mandible	Surgery	Not mentioned
Jamshidi et al 2015 (22)	periapical granuloma with actinomycotic infection	no	female	40	Cutaneous sinus tract	Molar maxilla	Peri-radicular surgery 0.2% chlorhexidine mouthwash no antibiotic	Without complication

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Discussion

A considerable debate exists regarding the administration of antibiotics for the treatment of periapical actinomycosis. Some researchers advocate the use of high concentrations of antibiotics, such as penicillin, to penetrate areas of dense fibrosis and eliminate microorganisms. In contrast, some believe that periapical actinomycosis often responds well to a brief course of antibiotic treatment, but insist that it is essential to closely monitor clinical and radiological responses.

In three reports by Yeoh et al. (23), Seki et al. (26), and Dastgir and Sohrabi (19), antibiotics were not prescribed, although patients were successfully treated. Dastgir and Sohrabi (19) mentioned that in cases of cervicofacial actinomycosis, surgical intervention combined with long-term antibiotic therapy should be used. However, the therapeutic approach to periapical actinomycosis differs markedly from that for other forms of cervicofacial actinomycosis. For periapical actinomycosis, endodontic treatment or retreatment is typically recommended as the primary strategy to eradicate the intrapulpal source of infection. Jamshidi et al. (22) believe that strains of Actinomyces involved in periapical actinomycosis are sensitive to sodium hypochlorite and calcium hydroxide; thus, antibiotics are not necessary in cases requiring endodontic therapy. Endodontic therapy might be performed with or without the accompaniment of periradicular surgery, depending on the severity and extent of the infection. Furthermore, dental extraction is advised as an effective measure to eliminate localized infection when other interventions are inadequate. It can be concluded from these studies that antibiotic therapy is not the first line of treatment in pulp and periapical actinomycotic infections (19). However, Ayoade et al (29) have reported two cases diagnosed with intraoral actinomycosis infection, one of the cases was seen in an otherwise healthy dentate 60-year-old male patient, and another case belonged to an immunosuppressed edentulous 70-year-old female patient with a history of multiple myeloma. Both reported patients recovered from infection after six months of penicillin therapy without any need for surgical intervention.

Conclusion

In summary, from the studied articles, it can be concluded that periapical Actinomycotic infection is a rare, chronic, suppurative infection caused by filamentous, Gram-positive, anaerobic bacteria, predominantly Actinomyces israelii. Periapical Actinomycotic infection can mimic endodontic lesions and neoplasms, underscoring the necessity of histopathological evaluation to reach a definitive diagnosis for refractory periapical lesions (28, 30).

Periapical actinomycosis can be associated with persistent periapical lesions that do not respond to conventional endodontic treatment, especially among younger patients with no gender predilection. The main reported symptoms were pain and a sinus tract. Dentists should remain vigilant for signs of peri-radicular actinomycotic infections, especially in patients presenting with persistent sinus tracts and those who show poor responses to standard endodontic treatments. Effective management strategies for actinomycosis should be tailored for each case but usually involve endodontic retreatment and periapical surgery as the first line of treatment, and proper antibiotics or mouthwash administered at carefully timed intervals to ensure optimal recovery and prevent future complications.

Conflict of Interests: The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial, in this article

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