

**MANUSCRIPT TYPE: CASE REPORT.**

**TITLE:** Non-surgical management of periapical lesion with extraoral sinus opening – Case Report.

**Authors:**

Dr. Aanchal Chaudhary\*, Dr. Supratim Tripathi, Dr. Pradyumna Misra, Dr. Shagufta Bano, Dr. Benafsha Shabir, Dr. Seema Gulzar

**Corresponding author:**

Dr. Aanchal Chaudhary;

Career Post Graduate Institute of Dental Sciences and Hospital, Lucknow, U.P.

Email- [chaudharym92@gmail.com](mailto:chaudharym92@gmail.com)

**ABSTRACT: Introduction:** An essential objective of endodontic therapy is total tissue debridement followed by fluid tight obturation of the prepared space as stated by Grossman. Odontogenic sinus tracts can open intraorally and extraorally. Time and accurate diagnosis of such cutaneous sinus tracts have remained a challenge. **Case Report:** This article presents a case report of periapical pathology with extraoral sinus opening which are treated using calcium hydroxide as an intracanal medicament and povidone iodine as an intracanal irrigant. Improvement towards success in follow-up visits were observed and recorded. Following is the case report of a clinical condition diagnosed as Periapical abscess involving the root apex of mandibular right central incisor with a draining sinus. **Conclusion:** The present case report demonstrates nonsurgical conservative endodontic management of extraoral sinus opening with odontogenic origin with calcium hydroxide as an intracanal medicament and povidone iodine in diluted form as an intracanal irrigant . This resulted in the elimination of a cutaneous sinus tract of dental origin with minimal scar formation

**Keywords:** Periapical pathology, Extraoral Sinus, Non-surgical approach, Intracanal medicament, Endodontics, Povidone iodine, Betadine.

## INTRODUCTION

The term sinus tract “refers to a tract leading from an enclosed area of inflammation to an epithelial surface” (a annotated glossary of terms in endodontics). It also states that the term dental fistula “should be discouraged, and the more proper term sinus tract should be used.”

Odontogenic sinus tracts can open intraorally and extra-orally. Time and accurate diagnosis of such cutaneous sinus tracts have remained a challenge, as the initial appearance of these lesions are similar to some other conditions such as skin infections, furuncles, ingrown hair or occluded sweat gland ducts, osteomyelitis, neoplasms, tuberculosis, actinomycosis, congenital midline sinus of the upper lip and carcinomas.<sup>[1]</sup>

Sinus tracts are said to occur more frequently in the mandibular than maxillary teeth (Kulkarni et al., 2012). Approximately 80% of the documented data suggests its link to mandibular teeth, while 20% are linked to maxillary teeth (Jose et al., 2016).<sup>[12]</sup>

In 1961, Bender and Seltzer reported that sinus tracts are lined with granulation tissue not epithelium. Cutaneous sinus tracts of dental origin are often initially misdiagnosed and inappropriately treated because of their uncommon occurrence and the absence of symptoms in approximately half of the affected individuals. Patients often report with a recurrent or chronic cyst, a furuncle, or an ulcer on the face or neck.<sup>[12]</sup> In general, patients are heedless that there is an underlying dental etiology as they first present to physician most commonly for seeking treatment of the cutaneous lesion. These cutaneous lesions do not always arise in close vicinity to the underlying infection, and only about half of all patients ever recall having had a toothache.<sup>[2]</sup> This often leads to the misdiagnosis of the condition resulting in inappropriate treatments for a long period of time. Such patients may undergo multiple surgical excisions, biopsies, systemic antibiotic regimens and also radiotherapy, but all fail with the recurrence of the sinus tract. This is because the primary etiology is diagnosed inaccurately. Furthermore, since the cutaneous lesions can mimic other disorders, such as basal cell carcinoma or furuncle, several inappropriate surgeries and courses of antibiotics are commonly used before definitive therapy is actually executed. Apt treatment results in predictable and rapid healing of these lesions.

The development and advancement of the periapical lesions is associated with the presence of microorganisms in the root canal system. Dental caries, trauma, or failed

endodontic treatment are often responsible for an infection of the pulpal tissue causing the necrosis of pulp .<sup>[1]</sup> As a consequence of pathological changes in dental pulp, the root canal system can dock numerous irritants. Egression of these irritants from infected root canal into the periradicular tissue can initiate the formation of periradicular lesion.

A diverse mix of anaerobic bacteria colonizes the root canals when the intact pulp chamber is breached.<sup>[12]</sup> A specialized mixed anaerobic biofilm colonizes the walls of the necrotic root canals. Asymptomatic necrosis of the pulp being a common condition, abscess formation usually occurs only when the bacteria and their toxic products gain entry into the periapical tissues through the apical foramen and induce inflammation and pus formation.

When pressure within the abscess builds up, it tends to perforate and form a drainage duct for the suppuration produced by the abscess, which is commonly referred to as a *sinus tract*. The sinus tract may either occur intraorally or extraorally.

Formation of an acute periapical abscess leads to it draining along the path of least resistance. The odontogenic abscess may spread to deeper tissues causing fascial space infection or it may establish intraoral or extraoral drainage in the form of a sinus tract. Intraoral or extraoral sinus-tract opening depends on the location of the perforation in the cortical plate by the inflammatory process and its relationship to the facial muscle attachments

The inflammatory process begins in a necrotic pulp and invades the surrounding periodontal ligament and bone. The first pathological change usually seen is apical periodontitis. The inflammatory and immunological processes then induce bone resorption , with the involvement of the marrow spaces , resulting in the formation of a localised abscess – the suppurative osteitis. The inflammation then spreads peripherally until the cortex of the bone is destroyed and results in formation of subperiosteal abscess. The periosteum gets pierced, and depending upon factors such as gravity, virulence of microorganisms or most importantly, anatomical arrangement of adjacent muscles and fasciae, either a cutaneous sinus or an intraoral sinus will form.

## CASE REPORT

A 34 year old female patient reported to the clinic with persistent mild pain and pus discharge from chin region since 3 years. The patient gave a history of trauma to her anterior lower teeth 5 years back.



Figure 1(a)

Figure 1(b)

Extraoral examination revealed presence of sinus opening at lower chin region with on and off pus discharge. Intraoral examination revealed that teeth 41 was tender on percussion and was discolored. Teeth failed to respond to thermal and electric pulp testing; the adjacent teeth responded within normal limits. Normal gingiva health was confirmed on periodontal probing. Intraoral periapical radiograph revealed moderate size (3×3 mm diameter) periapical lesion with ill-defined borders involving the apices of teeth 41. GP tracing was done to trace the sinus tract upto the apex of the involved tooth.



Figure 2(a)

Figure 2(b)

Figure 2(c)

Non-surgical endodontic therapy was planned. Multiple visit Root canal treatment (RCT) was planned and recovery of the surrounding bone and the healing of the sinus tract were observed subsequently. Since it was chronic case and patient reported purulent discharge on and off, therefore multiple visit root canal treatment including copious betadine irrigation and intracanal calcium hydroxide medicament with closed dressing was planned for better healing of the sinus tract and the lesion.

Following access cavity preparation, pus discharge was seen. After drainage was ceased, working length determined. Chemomechanical preparation were done using protaper file. The canals were then thoroughly irrigated with warm saline and 2.5% sodium hypochlorite. The canals instrumentation was carried out using RC-Prep. After biomechanical preparation of canals till F1. The root apex was perforated and instrumentation was done approximately 1 mm beyond the root apex, to make a pathway for drainage of abscess and also antibiotic irrigant. Gutta percha point was inserted into the sinus opening to make a clear path of the subcutaneous tract. Betadine irrigation( via 10% betadene solution) was done in a way that when the irrigant was injected into the root canal, it gets extruded through the periapical foramen and then gets ejected from extraoral sinus opening after successful debridement and asepsis of the tract. This was followed by an open dressing. Since it was an old case of trauma and patient reported with on and off pus discharge, which means that sinus tract spontaneously got closed and open intermitantly. Therefore we decided for an open dressing on pretext of better prognosis, healing of lesion and minimal discomfort to the patient.

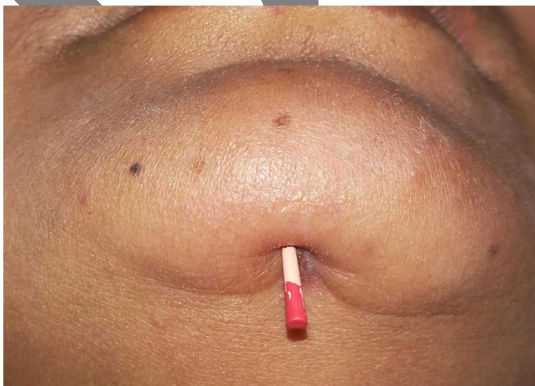


Figure 3(a)



Figure 3(b)

A week later, patient was asymptomatic. Again a GP point was used to clear the granulation tissue in path of the subcutaneous tract and fresh irrigation of betadine was done in the same way as prescribed above, followed by closed dressing. A week later, patient received a fresh dressing of calcium hydroxide with chlorhexidine, following an irrigation with betadine, followed by closed dressing. The same procedure was repeated again after 2 weeks and after 4 weeks.

The patient missed her scheduled appointment and reported back only after 5 months. However, the patient was asymptomatic and periapical radiograph revealed a significant resolution of the lesion with considerable bone formation. The cutaneous lesion had healed completely with minimum scar formation.

The root canal was irrigated with 2% Chlorhexidine solution and fresh calcium hydroxide intracanal medicament was given for 14 days.

In the next visit, canal was cleaned and dried. Master cone selection was done corresponding to size F1. Canal was obturated using zinc oxide eugenol sealer and temporary restoration was done.



Figure 5(a)



Figure 5(b)

Patient was recalled after 7 days, for treating tooth discoloration by non vital power bleaching, followed by composite restoration.



Figure 6(a)



Figure 6(b)

## DISCUSSION

Regardless of any histological diagnosis of teeth with periapical pathologies, initial treatment options remain the same for all i.e. conventional root canal treatment, which is primarily aimed at reducing the microorganisms load within the root canal systems to the minimum as possible. Non-surgical resolution of any periapical lesions depends on the thorough neutralization of the infection from the root canal. Shaping and cleaning of the root canals aided with 2.5% sodium hypochlorite solution irrigation along with calcium hydroxide as intracanal medicament is recommended to achieve the above purpose. In the present case report calcium hydroxide was used as the intracanal medicament. Caliskan and Sen have demonstrated that the treatment with calcium hydroxide resulted in significant amount of healing of the periapical lesion with complete resolution of the periapical defect by osseous regeneration. Calcium hydroxide is well known as the most successful intracanal medicament for teeth with periapical lesions, having the anti-inflammatory, acid-neutralizing, cellular differentiation inducing and exotoxins neutralizing properties. All these actions subsequently lead to the periapical healing. The efficacy of calcium hydroxide root canal dressing is directly depends on the sustained release of calcium and hydroxyl ions to the root canals as well as periapical regions. Since these ions are continuously resorbed by periapical fluids, regular renewal of the dressing is required to enhance the periapical healing process. Hence in the present case report calcium hydroxide dressing was renewed on weekly basis.<sup>[11]</sup>

Also in this case report, betadine irrigations were done for asepsis and debridement of the extraoral sinus tract. Povidone-iodine is a broad spectrum antiseptic irrigation solution which has been used in wound management processes for decades. Povidone

iodine is one of the few topical antimicrobial solution known to be effective against bacteria, several viruses, fungi, spores, protozoa, and amoebic cysts. Povidone-iodine's antimicrobial activity, low potential for developing resistance or adverse reactions, wide availability, ease of use and low cost are the major advantages for its use in the treatment. This solution may be used in diluted form upon completion of biomechanical preparation for a contact time of 5 minutes.<sup>[7]</sup>

Povidone-iodine is a chemical complex of polyvinylpyrrolidone and elemental iodine. It acts by releasing free iodine, which disrupts microbial metabolic pathways, destabilizes structural components of cell membranes, and leads to irreversible damage to pathogens.<sup>[7]</sup>

In various antimicrobial tests, povidone-iodine has been shown to kill methicillin-resistant *Staphylococcus aureus* and other antibiotic-resistant strains within 20-30 seconds of exposure. Cichos et al also highlighted the in vitro polymicrobial efficacy of povidone-iodine against *Staphylococcus epidermidis*, *Haemophilus influenzae*, *Pseudomonas aeruginosa*, *Burkholderia cepacia*, and *Escherichia coli*.<sup>[7]</sup>

Most data exists on bacterial resistance and cross-resistance to antiseptics, including chlorhexidine, quaternary ammonium salts, silver and triclosan, as reported in strains isolated from clinical settings. Evidence of cross-resistance between antiseptics and antibiotics has also been documented. While, resistance to povidone iodine has not been induced in systematic testing till date. Thus, in contrast to other antiseptics (with the apparent exception of an absence of cross-resistance to silver), no acquired resistance or cross-resistance has been reported for povidone iodine in over 150 years of use.<sup>[7]</sup> This lack of resistance is likely due to iodine's multiple mechanisms of action.

Kumar et al. evaluated the effect of irrigation with Povidine iodine after apicoectomy of anterior teeth in reducing bleeding and the inflammatory process.<sup>[7]</sup> Chemical cauterization promoted by the Povidone iodine complex might have been the reason for cessation of bleeding. The authors suggested that Povidone iodine had anti-inflammatory action because it decreases the availability of cytochrome oxidase, thereby altering the synthesis of prostaglandins and influencing the initial stages of wound healing.<sup>[7]</sup>

Thus this antimicrobial solution was the most apt solution to be used in this case.



## CONCLUSION

It may be concluded that the accurate diagnosis is the key to treat sinus tracts. Successful management of odontogenic extraoral sinus tracts with pulpal pathology depends upon the proper diagnosis and removal of causative factors by proper bio- and chemo-mechanical preparation and three-dimensional obturation. The present case report demonstrates nonsurgical conservative endodontic management of extraoral sinus opening with odontogenic origin which resulted in the elimination of a cutaneous sinus tract of dental origin with minimal scar formation.

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