



Case Report

IATROGENIC CANINE SPACE INFECTION FOLLOWING ROOT CANAL THERAPY OF A MAXILLARY CANINE: A CASE REPORT AND REVIEW OF LITERATURE

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ABSTRACT

Background: Iatrogenic infections can occur due to accidental extrusion of infected material beyond the apical region of tooth which led to the inoculation of microorganisms in the canine space. The canine space is very vulnerable due to its relationship with infraorbital region, nasolabial fold and upper lip.

Case Presentation: This case report describes a 50-year-old female patient who developed a iatrogenic canine space infection shortly after initiation of root canal therapy in relation to the maxillary left canine tooth. The patient presented with painful swelling of the left midfacial region, obliteration of the nasolabial fold, tenderness, and mild fever. Clinical and radiographic examination supported the diagnosis of iatrogenic canine space infection secondary to endodontic intervention. Management included drainage through the root canal system, antibiotics, supportive therapy, and completion of endodontic treatment after resolution of the acute phase. Significant clinical improvement was observed within 48 hours, with complete resolution at one-week follow-up.

Conclusion: This report highlights the importance of careful endodontic technique, adequate drainage, accurate working length determination, and early management of fascial space infections to prevent progression into deeper anatomical spaces.

Keywords: Root Canal Therapy, iatrogenic infections, peri apical abscess, cellulitis, maxilla, postoperative complications.

INTRODUCTION

Iatrogenic infections remain one of the rare causes of fascial space infections involving the maxillofacial region.^[1-2] The canine space is a potential fascial space situated between the levator labii superioris and levator anguli oris muscles.^[3] Due to the close proximity of the root apex of the maxillary canine to the canine fossa, infections arising from these teeth can readily spread into the canine space once cortical perforation occurs.^[4-6]

Root canal therapy is generally regarded as a highly successful and predictable treatment modality for pulpal and periapical diseases.^[7-8] However, procedural mishaps such as over-instrumentation, extrusion of infected debris beyond the apical

foramen, inaccurate working length determination, inadequate irrigation, contamination during treatment, or failure to establish proper drainage may predispose patients to acute fascial space infections.^[9-12] Canine space infections may progress rapidly and may lead to serious complications such as orbital cellulitis, infraorbital spread, facial cellulitis, deep cervical space infection, or cavernous sinus thrombosis if left untreated.^[13-16] Early diagnosis and prompt intervention are therefore essential.

The present case report describes an iatrogenic canine space infection that developed following initiation of endodontic therapy in a maxillary canine tooth and discusses its diagnosis, management, and clinical implications.

Patient Information

A 50-year-old female patient presented to the Department of Oral Medicine and Radiology with the complaint of pain and swelling on the left side of the face for two days. The patient reported that root canal treatment had been initiated in relation to the maxillary left canine tooth (23) at a private dental clinic three days earlier due to food lodgment associated with deep dental caries.

According to the patient, there is no swelling before the treatment which began gradually within 24 hours after canal instrumentation and progressively increased in size. She experienced discomfort while chewing, tenderness over the left side of the face, difficulty in smiling, and mild fever.

The patient's medical history was non-contributory. No history of diabetes mellitus, hypertension, allergy, or immunocompromised status was reported. Family and psychosocial history were non-significant.

Details of Previous Endodontic Procedure: As per the previous prescription shown by the patient the initial endodontic treatment had been performed at a private dental clinic three days prior to the presentation. According to the available clinical details, access opening was carried out on tooth 23 under local anesthesia to gain entry into the pulp chamber. Canal irrigation was carried out using 2.5%

sodium hypochlorite, delivered through a side-vented irrigation needle. Rubber dam isolation was reportedly not used during the procedure. Following instrumentation, calcium hydroxide paste was placed as an intracanal medicament. The access cavity was then sealed with a temporary restorative material pending further endodontic treatment.

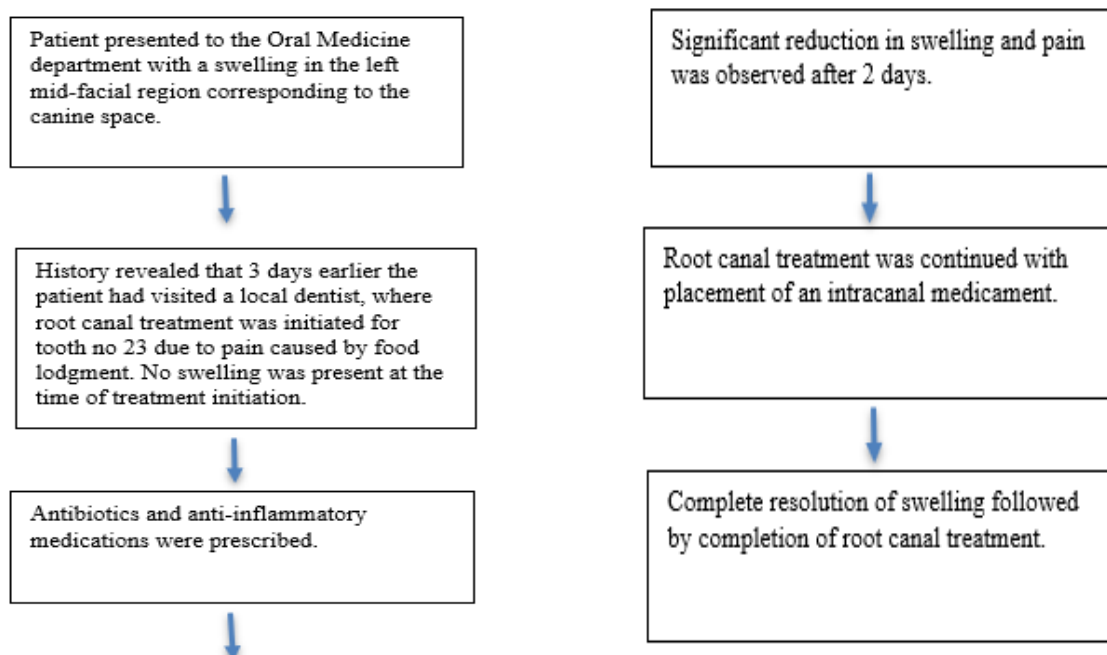
Clinical Findings:

Extraoral Examination: A diffuse swelling measuring about 3cm x 2cm was observed over the left midfacial region corresponding to the canine space. Obliteration of the nasolabial fold and mild elevation of the upper lip were evident. Superior extension of the swelling toward the infraorbital region and lateral extension into the cheek area were noted. The overlying skin appeared stretched with mild erythema. On palpation, the swelling was tender, firm in consistency, and warm to touch. No fluctuation or crepitus was detected. Left submandibular lymph nodes were palpable and tender.

Intraoral Examination: Intraoral examination revealed an access opening in relation to tooth 23. The tooth was tender on percussion. Vestibular obliteration was present in the canine fossa region, and minimal purulent discharge was observed through the access cavity.

Table 1: ?

Timeline	Clinical Event
Day 0	Initiation of root canal treatment in relation to tooth 23 at a private clinic.
Day 1	Gradual onset of facial swelling in the midfacial area just below the lower orbital fissure and pain in relation to the tooth and in the entire area of swelling.
Day 2	Progressive increase in swelling with discomfort during mastication and mild fever. The patient was prescribed antibiotics and analgesics by the operating dentist.
Day 3	Patient reported to Department of Oral Medicine and Radiology. Clinical and radiographic examinations were performed; diagnosis was established. Conservative management initiated with antibiotics.
Day 5	Significant reduction in swelling and pain observed
Day 10	Complete resolution of swelling; root canal treatment completed





Diagnostic-Assessment Clinical Diagnosis: Based on the history, clinical presentation, and radiographic findings, a provisional diagnosis of canine space infection secondary to endodontic intervention in relation to tooth 23 was made.

Radiographic Findings: Radiographic findings in iatrogenic cases involving fascial spaces are often limited. In our case, there is a small periapical lesion associated with the involved tooth which suggest localized and chronic odontogenic infection. But, before the dental procedure the patient was asymptomatic suggesting that the lesion alone could not have led to the fascial space involvement. It is more likely that the during the procedure inadvertent extension of instrumentation or entrapment of air facilitated the spread of microorganisms from the existing periapical lesion to the canine space.

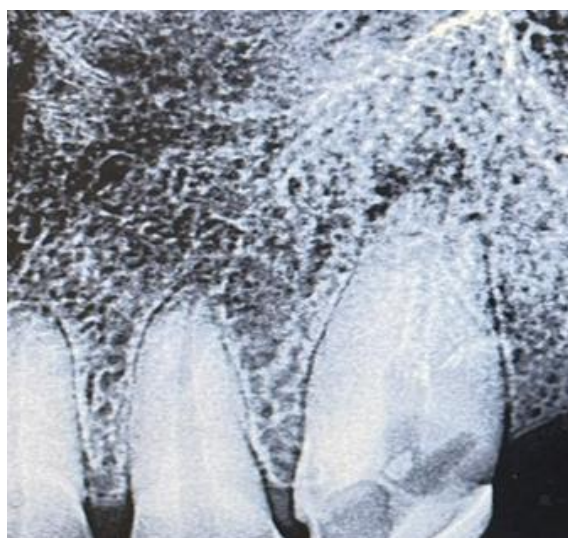


Image 1: Pre-treatment showing a linear radiolucency suggestive of access opening. There is a mild periapical pathology present along with widening of the PDL spaces in relation to 23.

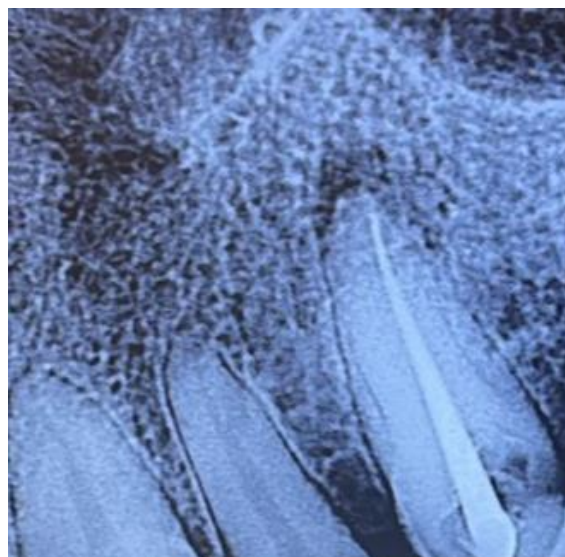


Image 2: Post treatment showing healing of the lesion and completion of the root canal treatment

Differential Diagnosis

The following conditions were considered:

- Buccal space infection
- Facial cellulitis
- Infraorbital abscess
- Allergic edema
- Salivary gland infection
- Angioedema
- Allergic reaction

Diagnostic Challenges: No major diagnostic challenges were encountered. The temporal relationship between the endodontic procedure and onset of swelling, combined with characteristic clinical findings, strongly supported the diagnosis.

Prognosis: The prognosis was considered favorable due to early diagnosis, adequate drainage, and prompt initiation of antimicrobial therapy

Therapeutic Intervention: The patient was managed conservatively with drainage through the root canal system, antibiotics, and supportive therapy.

Pharmacological Therapy

The following medications were prescribed:

- Amoxicillin 875 mg with Clavulanic acid 125 mg twice daily for 5 days
- Metronidazole 600 mg [Extended release] twice daily for 5 days
- Trypsin–Chymotrypsin combination three times daily before meals for 7 days
- Pantoprazole 40 mg once daily before breakfast for 5 days
- Analgesics as required
- Warm saline mouth rinses

Endodontic Management: Drainage was established through the root canal system, followed by thorough biomechanical preparation using rotary Nickel- Titanium (Ni Ti) instruments up-to size F1 with a taper of 6% in two sittings with calcium hydroxide placed as an intra canal medicament and under copious irrigation. Occlusal reduction was

carried out to minimize discomfort during mastication. Root canal therapy was completed after complete resolution of the acute infection. No adverse reactions to medications or treatment procedures were observed.

Follow-up and Outcomes: The patient was reviewed after 48 hours and demonstrated significant clinical improvement. Both pain and facial swelling had reduced considerably, and facial symmetry had begun to return. The patient reported marked symptomatic relief.

At the one-week follow-up visit, complete subsidence of swelling and absence of tenderness were observed. Healing was satisfactory, and the patient remained asymptomatic following completion of root canal treatment.

Treatment adherence was good, and the patient tolerated the prescribed medications well.

DISCUSSION

Iatrogenic infections are unintended complications that occur during therapeutic or diagnostic dental procedures although it is less common it can occur while administering local anesthetics endodontic treatment or surgical procedures. In such cases the existing infections get introduced into the soft tissues which gets displaced into the adjacent fascial spaces.^[17]

The usage of three-way air syringe during root canal procedure is common among clinicians. If the gas gets introduced in the soft tissue spaces it can cause a problem. This can lead to air emphysema because of air entrapment in suborbital spaces resulting into air embolism. The radiographs are definitive diagnostic clue as there was no such radiological pathology to be seen apart from winding of the PDL space and a small periapical abscess. Most patients who developed subcutaneous emphysema have moderate local swellings, root canal treatment and prophylactic antibiotics generally cure such cases.^[18]

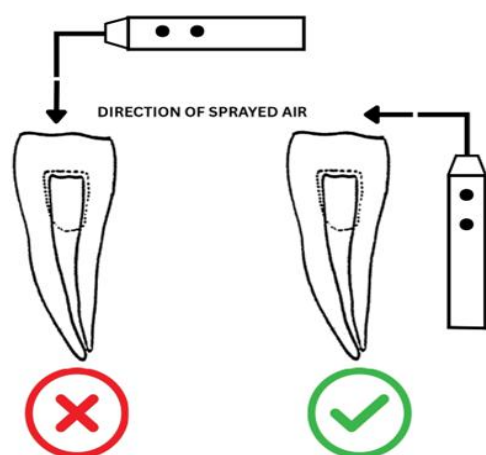


Image 5: Showing correct way of using three-way syringe during endodontic procedure

In the present case, extrusion of infected debris beyond the apex during instrumentation was considered the most probable cause of infection spreading into the canine space.^[19] Absence of rubber dam isolation may also have contributed to contamination during the procedure.^[20]

Clinically, canine space infections are characterized by painful swelling of the infraorbital region, obliteration of the nasolabial fold, elevation of the upper lip, tenderness, fever, and vestibular obliteration intraorally.^[21] Delay in management may lead to spread into adjacent fascial spaces including the infraorbital, buccal, orbital, and deep cervical spaces.^[22]

The strengths of this case include clear temporal association with endodontic intervention, characteristic clinical presentation, and favorable response to conservative management. However, limitations include lack of microbiological culture analysis and absence of advanced imaging such as cone-beam computed tomography.^[23]

Management principles include elimination of the source of infection, establishment of adequate drainage, administration of appropriate antibiotics, and supportive care.^[24] In severe cases, incision and drainage may be required. Prompt diagnosis and intervention are essential to prevent serious complications.^[25] Early complications involve retropharyngeal, mediastinal and peritoneal spaces which may lead to cardiopulmonary distress.^[26] Delayed complications are due to the secondary infection of the necrotic infraorbital tissues by *S. aureus* which leads to mortality from sepsis and air embolism.^[27]

A review of the literature identified only a few published case reports describing similar complications. Parkar et al. (2009) and Uyank et al. (2011) reported periorbital cellulitis of odontogenic origin following root canal treatment, emphasizing the importance of early diagnosis and prompt intervention.^[29,31] Mishra et al. (2014) described a suborbital abscess attributed to apical extrusion of infected material during endodontic therapy.^[30] Mascarenhas et al. (2019) reported infraorbital space involvement, while Singla et al. (2021) and D'Agostino et al. (2021) highlighted the role of CT imaging and surgical drainage in managing suborbital and periorbital infections.^[32,34-35] More recently, Padmanaban et al. (2024) and Shashidhar et al. (2025) documented similar cases involving the periorbital and suborbital regions, reinforcing that delayed diagnosis may lead to orbital complications.^[28,33] The present case is consistent with previous reports, demonstrating that postoperative facial swelling following root canal treatment of a maxillary canine should not be considered a routine flare-up. Early diagnosis, elimination of the source of infection, appropriate antibiotic therapy, and timely surgical drainage are essential to prevent the spread of infection and ensure a favorable outcome.

CONCLUSION

This case highlights how a small periapical pathology can progress to a fascial space infection when normal anatomical barriers are breached during a procedure.

Patient Perspective

The patient reported significant anxiety and discomfort following the sudden onset of facial swelling after the dental procedure. She expressed concern regarding the rapid increase in swelling and associated pain during eating and facial movements. Following treatment, the patient reported considerable relief in pain and swelling within two days and expressed satisfaction with the outcome and recovery after completion of therapy.

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