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### Clinical presentation and treatment outcome of non-surgical endodontic intervention for extraoral cutaneous fistula of chronic periapical lesions in Kashmiri population: A randomised clinical trial

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#### Abstract

**Background:** To present a study investigating the clinical characteristics, morphology, diagnosis and treatment of an Extraoral cutaneous fistulas of odontogenic origin.

**Methods:** This study was performed at Govt. Dental College & Hospital, Srinagar from Jan 2016 to Dec 2017. Following clinical and radiographic examinations, the paths and origins of sinus fistulas were determined. Investigated factors were gender, age, morphology, location, originating tooth, time to evolution, recurrence, and treatment method.

**Results:** Fifteen patients were examined & fifteen fistulas were diagnosed as odontogenic cutaneous fistulas. The most common morphology was dimpling (n=7, 46%). The most common site was the mandibular body. The majority of patients had experienced recurrence after treatment in previous clinics that had failed to diagnose odontogenic cutaneous fistula. Non-Surgical Endodontic treatment was performed in all cases. None showed signs of recurrence.

**Conclusion:** Extraoral and dental examinations are required to make a diagnosis of odontogenic cutaneous fistula. Thus, cooperation between dermatologists and dentists is essential.

**Keywords:** Extraoral cutaneous fistula, Odontogenic, non-surgical treatment

#### Introduction

Cutaneous sinus tracts of dental origin have been well documented in Medical [1, 2], Dental [3, 4, 5] and Dermatological [6] literature. However, these lesions continue to be a diagnostic dilemma. Extraoral fistula of odontogenic origin can be misdiagnosed and confused with traumatic injuries, furuncles, bacterial infections, carcinomas, osteomyelitis, pyogenic granulomas, foreign objects and congenital fistula. Due to this array of diagnostic possibilities unsuccessful therapies are used commonly before the correct differential diagnosis is defined [7-9] resulting in ineffective and inappropriate treatment [10]. Cantore *et al.* [11] estimated that half of the patients with Extraoral fistula are submitted to multiple dermatological surgical operations and long-term antibiotic therapy before the correct diagnosis is established.

The most common cause of a cutaneous sinus tract is a chronic periradicular abscess. These abscesses arise from bacterial invasion, chemical irritation, or trauma. The most common initiating factor of the periradicular abscess is carious exposure and subsequent bacterial invasion of the tooth pulp [12]. The inflammatory process begins in a necrotic pulp and spreads into the surrounding periodontal ligament and bone. The first pathological change is apical periodontitis. The inflammatory and immunological processes then induce bone resorption resulting in the formation of a localized abscess, the inflammation then spreads peripherally until the cortex of the bone is destroyed and a sub periosteal abscess forms [13]. The periosteum is pierced. Then, depending on factors like gravity, virulence of microorganisms and, most importantly, anatomic arrangement of adjacent muscles and fasciae, either a cutaneous sinus or an intraoral sinus forms [14].

When a draining lesion is encountered on the skin of the face and neck, differential diagnosis should be carefully made with a thorough examination and the following entities should be considered: Pustule, draining cyst, chronic apical abscess or osteomyelitis, salivary gland fistula,

sinus, lateral cervical sinus, actinomycosis, dacrocystitis [15, 16]. Those of an odontogenic origin usually present a challenge in the diagnosis. Symptoms and/or location may not suggest a dental infection since the patient does not have any dental pain and the stoma of the sinus tract may not be adjacent to the involved teeth [17]. The teeth may appear sound and may be completely asymptomatic even if they are nonvital.

Several studies have reported unsuccessful cutaneous therapies due to difficulties in diagnosing Extraoral fistula of odontogenic origin [18, 19]. It is important that interaction occurs between physicians and dentists to avoid submitting patients to multiple biopsies and unnecessary surgery before definitive endodontic treatment [20].

The following randomised clinical study presents fifteen patients with cutaneous sinus tracts that were misdiagnosed initially, with the purpose to provide morphologic, diagnostic & treatment guidelines and data associated with reported cases.

## Material and Methods

This study was carried out in the Department of Conservative Dentistry & Endodontics, Govt. Dental College & Hospital Srinagar by analysing patients having persistently secreting lesion on their face who visited from Jan 2016 to Dec 2017. All patients had a clinical and radiological diagnosis of odontogenic cutaneous fistula. X-ray (IOPA) and intraoral examinations were used for dental evaluations. Fifteen patients were enrolled in the study. Clinical data included gender, age, morphology, location, and originating tooth, time to evolution, recurrence, and treatment method. All patients were followed up for at least 1 year after non-surgical endodontic treatment.

In all cases odontogenic cause was confirmed and the offending teeth identified after pulp testing (electric and thermal, cold, test) and periapical radiography. Thus, a diagnosis of pulpal necrosis with chronic suppurative periradicular periodontitis was made in all cases. Non-surgical endodontic treatment was done in all offending teeth. After local anaesthesia and rubber dam placement, root canal treatment was initiated with pulp chamber access and biomechanical preparation of the root canals. Irrigation during instrumentation was carried out with 5.25% sodium hypochlorite and final irrigation with EDTA, which remained for 3 min in the canal (Teixeira *et al.* 2005) [21]. Calcium hydroxide paste was used as the intracanal medicament for 2 weeks after which obturation was done using gutta-percha along with AH plus sealer. After 1 week of endodontic therapy drainage had ceased (Fig. 2D) in all cases. At the 1-year recall, healing of the Extraoral fistula had occurred in all cases (Fig. 2E). Radiographic examination showed the repair of periapical tissue (Fig. 2F).

## Results

Fifteen patients were treated over a 2-year period. Extraoral cutaneous sinus fistula in these patients were diagnosed as odontogenic in origin after clinical and radiologic evaluations. The patients consisted of 9 males and 6 females with an average age of 29.7 years (range 10~50 years) (Table 2). The predominant morphology was dimpling, which occurred in 7 fistulas (46%). Other morphologies were nodule & abscess (Table 1, Fig. 1). The most frequent location was the mandibular body (6 fistulas, 40%). Other locations in decreasing order of occurrence were; the chin (mentum), submandibular region & Nasolabial fold (Table 3). Cutaneous lesions were adjacent to causative teeth in all the cases. To examine the affected teeth in each patient, IOPA X-ray was taken (Fig. 2A). Of the 15 fistulas, 13(86.6%) originated from

a mandibular tooth, and the other 2 (13.3%) originated from a maxillary tooth. The teeth most frequently affected were molars followed by incisors, canines and premolars. Relationships between locations and affected teeth are summarized in Table 3. A clinical diagnosis of an odontogenic origin was made in all patients (100%). All these cases had been misdiagnosed previously, resulting in one or more recurrences. Initial misdiagnoses included epidermal cyst (5 cases, 33.3%), furuncle (4 cases, 26.6%), foreign body granuloma (2 cases, 13.3%), Tuberculous lesion (1 case, 6.6%), Osteomyelitis (1 case, 6.6%) & squamous cell carcinoma (1 case, 6.6%) (Table 2).

In all cases affected teeth were endodontically treated (Fig.2C). Once the primary odontogenic aetiology was properly eliminated, the sinus tract and cutaneous lesion resolved within a few weeks without treatment, which included no antibiotic therapy (Fig.2D). All 15 patients were followed up for 1 year. No recurrence was encountered.

## Discussion

Odontogenic cutaneous fistula is characterized by the presence of a draining sinus fistula originating from a localized area with pus and surrounded by granulation tissue in alveolar bone of the affected tooth. Its main causes are pulpal degeneration due to a carious tooth, tooth fracture, remaining tooth (root rest), and periodontal infection [22]. The majority of odontogenic sinus fistulas have an intraoral opening [4], but in cases of chronic dental infection, the local inflammatory destructive process progresses slowly as an alveolar bone abscess. Once the inflammation passes through cortical bone and periosteum, it may spread into the surrounding soft tissue, limited by muscle attachments and facial regions [13, 14].

The traditional consensus is that fistulas do not exhibit gender preference, with no significant relationship between prevalence and age [23]. However, in the present study, the males (9) seemed to be more affected than the females (6). In terms of duration, time to evolution was shorter in younger patients ( $\leq 21$  years of age) than in older patients ( $\geq 30$ ). In this study, mean time was 9 weeks for younger patients (range 4~18 weeks) and 40.1 weeks for older patients (range 7~90 weeks). Symptom duration was greatest (90 weeks) in an elderly patient with a previous diagnosis of chronic osteomyelitis of the mandible. Protracted evolution could also be due to a lack of diagnostic suspicion caused by the absence of significant dental symptoms in patients with a variety of clinical characteristics in skin [24]. This leads to misdiagnosis and unnecessary treatment.

The variable location of odontogenic cutaneous fistula is the main cause of diagnostic confusion, although locations are related to affected teeth. The most common location in this study was the mandibular body. Other sites were the chin (mentum), submandibular region & nasolabial fold (paranasal) region, similar to previous reports [25]. Further study is required to determine whether mandibular teeth tend to drain extra-orally more often than maxillary teeth. Although the most common cause of an intermittently suppurating cutaneous sinus fistula of the face and neck area is chronic dental infection, these lesions present a diagnostic Challenge [19]. Importantly, previous misdiagnosis and inappropriate medical treatment result in ineffective treatment and repeated recurrence [19]. In the present study, previous Diagnostic errors had led to multiple trials of antibiotics and unnecessary repeat surgical procedures. When a lesion develops, being unaware of its dental origin, patients seek treatment from general physicians, dermatologists or surgeons. Lack of dental examination possibly leads to inappropriate treatments [25].

Intraoral dental examination and radiographic imaging are critical for diagnosis (Fig. 2) [23]. The guideline for achieving an accurate diagnosis is that focus should be placed on the accurate evaluation of involved teeth.

The skin manifestations of odontogenic cutaneous fistulas are nonspecific and have rarely been mentioned in the literature. The orifice of a cutaneous sinus fistula can present as a dimpling, nodule, abscess, cyst, ulcer, draining lesion, or nodulocystic lesion with suppuration [26]. In this study, dimpling was the most frequently encountered manifestation (7 fistulas, 46%), though nodules and abscesses were also observed.

Permanent cure is obtained after proper dental treatment, such as, extraction or endodontic therapy, and appropriate treatment of the offending tooth can lead to lesion resolution within 7 to 14 days [27]. In fact, the sinus tracts in all our cases healed following the initial endodontic treatment session. Calcium

hydroxide is the preferred intracanal medicament due to its beneficial effects. Usage of calcium hydroxide paste was advocated for rapid and successful treatment of sinus tracts associated with necrotic teeth [28]. Intra canal Calcium hydroxide medication was utilized in all cases in this study for two weeks. Usually, there is no need for systemic antibiotics as the lesion is a localised entity. It has been observed that systemic antibiotic therapy will result only in a temporary reduction of the drainage and pseudohealing [19].

**Table 1:** Morphologies of the odontogenic cutaneous fistulas

Morphology	No. of cases
Dimpling	7 (46.6)
Nodule	5 (33.3)
Abscess	3 (20)

Values are presented as number (%)

**Table 2:** Age, Genders, and time to evolution

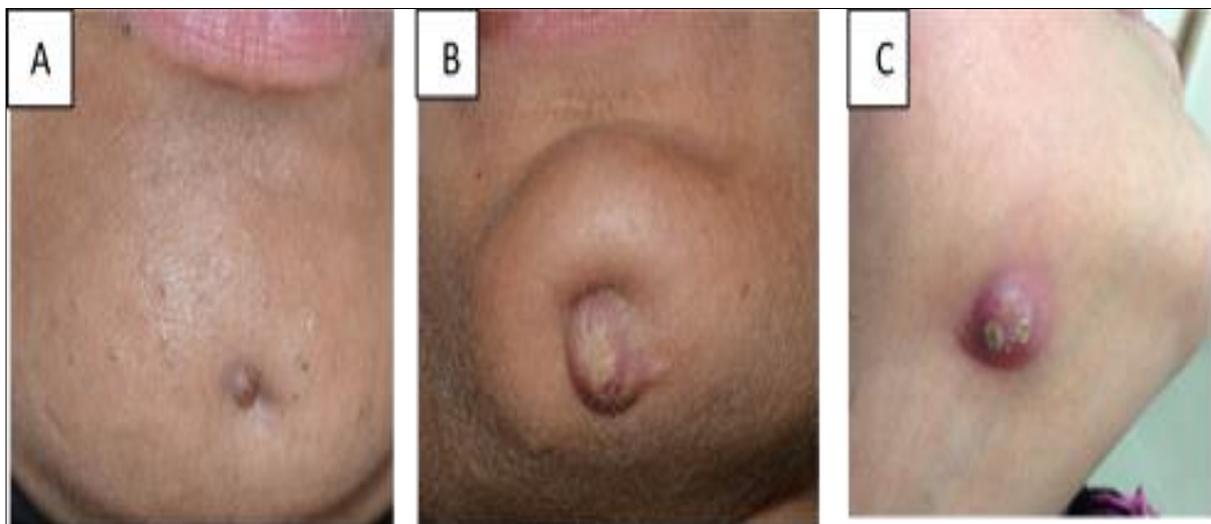
Case No	Age (yr)	Sex	Time to evolution in weeks	Previous diagnosis/treatment
01	37	M	68	Tuberculosis/ received antituberculosis drug therapy
02	19	M	18	Epidermal cyst /antibiotic therapy
03	10	F	6	Furuncle /antibiotic therapy
04	14	F	12	Epidermal cyst/Antibiotic therapy
05	50	M	90	Osteomyelitis / antibiotics both systemic & local/biopsy
06	21	F	4	Furuncle/ topical Antibiotics
07	35	M	32	Foreign body granuloma / dermatological surgery
08	28	F	8	Epidermal cyst/ Antibiotic therapy
09	45	M	79	Squamous cell carcinoma advised for biopsy
10	38	M	15	Foreign body granuloma/surgical drainage
11	29	M	32	Actinomycosis / Antibiotic therapy
12	22	F	5	Furuncle / Antibiotic therapy
13	42	M	53	Epidermal cyst/ Antibiotic therapy
14	44	M	23	Epidermal cyst/surgical drainage
15	32	F	7	Furuncle / Antibiotic therapy

Values are presented as numbers

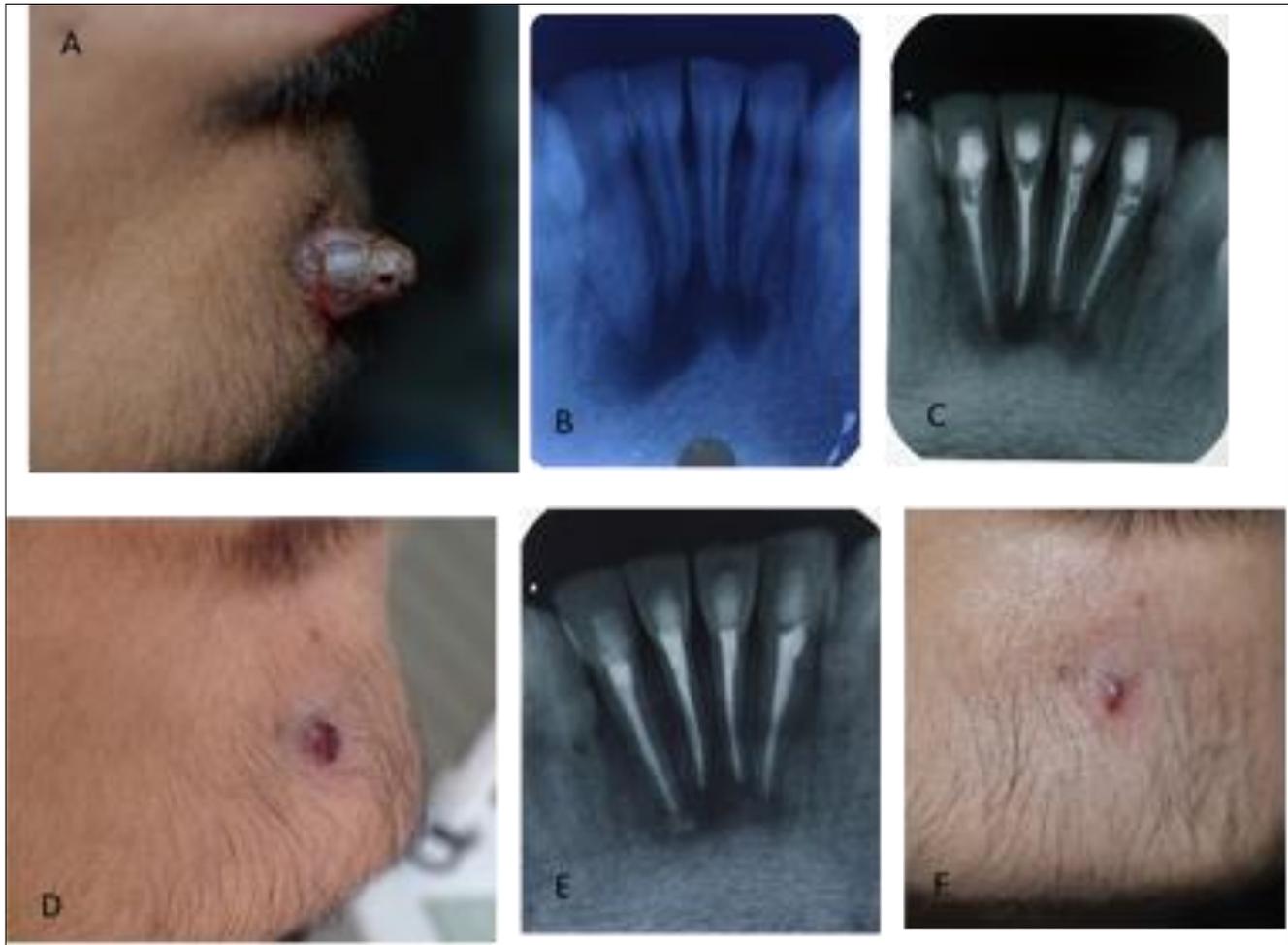
**Table 3:** Locations and affected teeth of the odontogenic cutaneous fistulas

Location	Right	Left	Midline	Total cases	Affected teeth
Mandibular body	4	2		6 (40%)	Man Premolars/Molars
Chin			4	4 (26.6 %)	Man. Incisors
Submandibular region	2	1		3 (20 %)	Man 1 <sup>st</sup> & 2 <sup>nd</sup> molars
Nasolabial fold	2			2 (13.3%)	Max. Canine

Values are presented as number (%)



**Fig 1:** Clinical photos showing the various morphologies of odontogenic cutaneous fistulas (A) Dimpling, (B) nodule, (C) abscess



**Fig 2:** Odontogenic cutaneous fistula of the Chin region. (A) Extraoral photo; showing abscess on chin. (B) Diagnostic preoperative IOPA radiograph of mandibular incisors showing periapical radiolucency associated with a cutaneous odontogenic fistula. (C) Endodontic treatment of mandibular centrals with Calcium hydroxide as intracanal medicament (D) Healing after 1 week of endodontic therapy (E, F) 1 year followup

### Conclusion

This study highlights the fact that dental aetiology should be considered as a part of a differential diagnosis for any orofacial skin lesion. In the cases reported here, the elimination of infection through nonsurgical root canal treatment led to the resolution of the sinus tracts and promoted periapical healing of the teeth involved. Communication between the dentist and the physician is imperative to provide timely recognition and treatment of such rare cases.

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