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# Combined non-surgical and surgical management of misdiagnosed cutaneous sinus tract of endodontic origin – 15 months CBCT follow-up

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## ABSTRACT

**Introduction and aim.** An extraoral cutaneous sinus tract of endodontic origin represents a skin condition that appears due to an infection that could be primary or secondary to trauma accompanied by alveolar bony changes. It may be easily misdiagnosed and inappropriately treated due to lack of inadequate expertise on part of medical professionals followed by faulty treatment which can complicate the case further.

**Description of case.** This case report intends to highlight a case of a sixteen-year-old male patient referred for an extraoral cutaneous sinus tract misdiagnosed and insufficiently treated by a general physician followed by general dentists for more than a month due to lack of proficiency in the field of endodontics. The clinical and radiographic examinations confirmed the pulpal origin due to trauma related to permanent mandibular incisors. A combination of non-surgical root canal therapy followed by periapical surgery was performed leading to a significant healing of the lesion.

**Conclusion.** Accurate diagnosis is the key to treat draining sinus tracts of endodontic origin. Root canal treatment and endodontic surgery should be used judiciously for effectively eliminating the pathogens thus providing healing and repair mechanisms a chance to achieve the desired result.

**Keywords.** CBCT, cutaneous sinus tracts, diagnostic errors, healing, root canal treatment, surgical management

## Introduction

Chronic periapical abscess of pulpal or endodontic origin may drain through a sinus tract intraorally or extraorally. Cutaneous sinus tract of endodontic origin is relatively rare and generally may get misdiagnosed

and inappropriately treated because of the absence of any specific signs and symptoms.<sup>1</sup> Cutaneous sinus tract is defined as a pathologic canal leading from an enclosed area of inflammation or infection that opens to an epithelial surface of the face or the neck.<sup>2</sup> The causes of chronic periapical abscess may include pulpal inflammation due to caries, trauma, parafunctional habits etc. The drainage of sinus tract depends upon various factors such as the location of the involved tooth, position of the tooth root's apex in relation to muscle attachments, virulence of the microflora, decreased immunity of the host and least resistance provided by the underlying structure.<sup>3</sup>

There are several factors influencing the success rate of apical surgery that must be considered when considering apical surgery as a treatment alternative which includes: lesion size, preoperative pain, tenderness to percussion, fistula and resurgery.<sup>4</sup>

### **Aim**

The main objective of this case report is to present a case of a sixteen-year-old male patient who was earlier misdiagnosed for an extraoral cutaneous sinus of endodontic origin and after identification of cause and proper diagnosis underwent a combination of non-surgical and surgical endodontic treatment with a follow up of 15 months CBCT.

### **Description of the case**

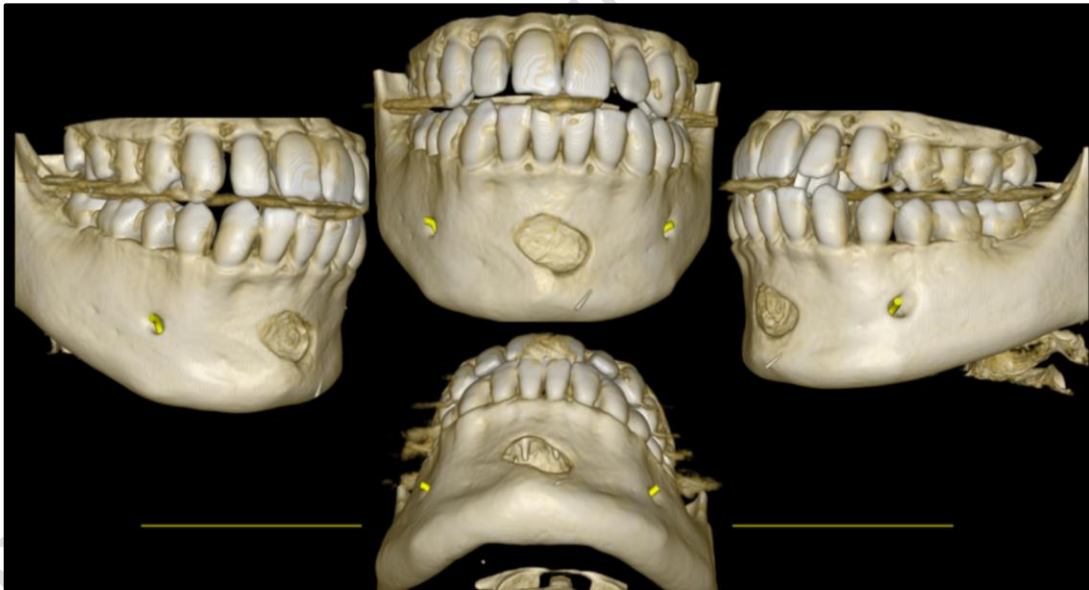
A sixteen-year-old healthy male patient of Indian origin reported to Department of Conservative Dentistry and Endodontics with a chief complaint of occasional pus discharge and pain in lower front tooth region and chin for the past month. Medical and family history was found to be non-contributory. Dental history revealed a history of a bike accident one year prior. There was no history of unconsciousness and bleeding from the mouth or nose. The patient went to a local medical practitioner to show his chin area initially and then to a general dental practitioner where root canal treatment was initiated in 31, 32, 41 and 42. Also, a second general dental practitioner who reattempted root canal therapy in 31, 32, 41 and 42 one week back because patient's symptoms were not getting relieved. The patient also gave history of being prescribed antibiotics course and painkillers, the course of which he duly completed.

Clinical examination revealed an extra oral draining sinus in the chin area (Fig. 1). Intraoral examination revealed access opening done in 31, 32, 41 and 42. There was no pus discharge intraorally. Radiographic examination revealed ill-defined radiolucency in periapical area w.r.t 31, 32, 41 and 42. Radiopaque root canal filling was seen in 31 and 41 extending periapically and radiopaque material was seen in the internal structure of the lesion suggestive of a piece of Gutta Percha.



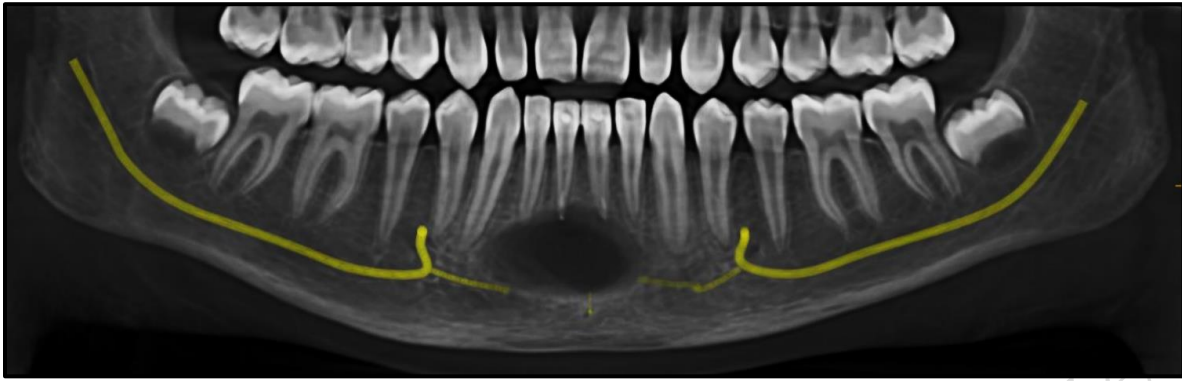
**Fig. 1.** Preoperative clinical photograph showing extraoral draining sinus on the chin

CBCT was conducted for the patient. It showed a well-defined periapical lesion with size 18 mm (Mesio-distally), 14.3 mm (Superio-inferiorly), 11.5 mm (Anterio-posterior) crossing the midline with destruction of labial cortical plate and intact lingual cortical plate in the symphyseal region and a broken piece of Gutta Percha was visualized (Fig. 2).



**Fig. 2.** CBCT reconstructed images showing the lesion and dislodged Gutta Percha point

Bilateral incisive canals were found to be in contact with the lesion (Fig. 3). Preoperative 3D volume was 1350 mm<sup>3</sup> and it was calculated using ITK-Snap software (Version 4.0.0).

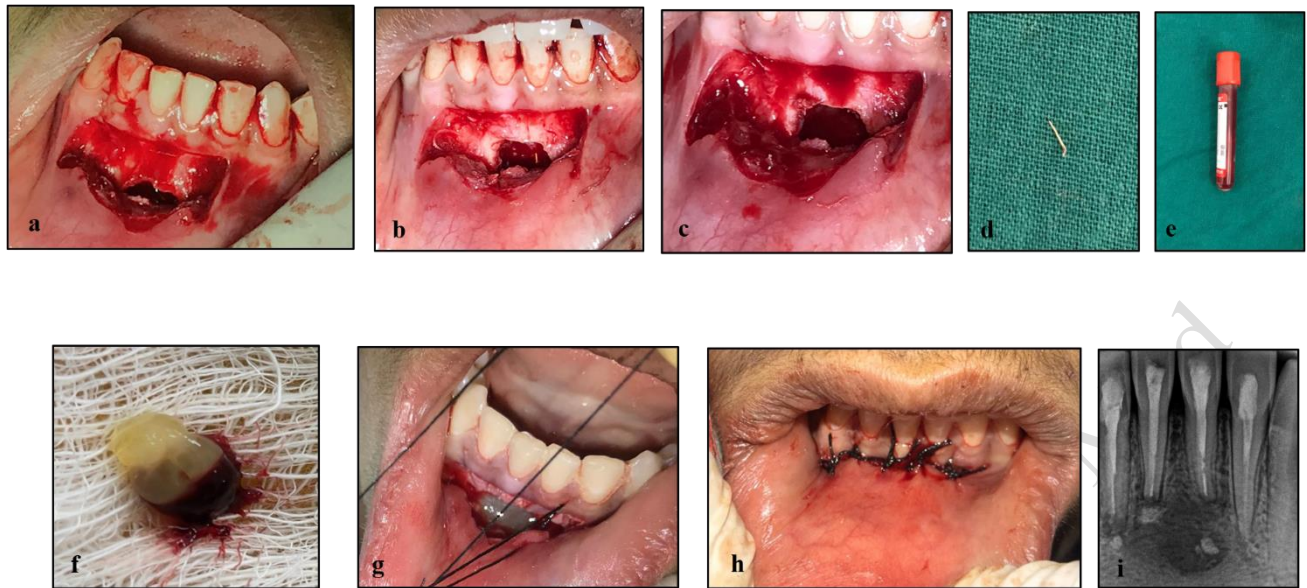


**Fig. 3.** CBCT reconstructed panoramic image showing the lesion and the course and the proximity of bilateral mandibular incisive nerve

A final diagnosis of previously treated 31, 32, 41 and 42 with chronic periapical abscess with extraoral cutaneous sinus tract in relation with 31 and 41 due to trauma was given. The treatment plan was formulated advising re-root canal treatment in 31, 32, 41 and 42 followed by apicoectomy in 31, 32, 41, 42 along with surgical removal of dislodged Gutta Percha.

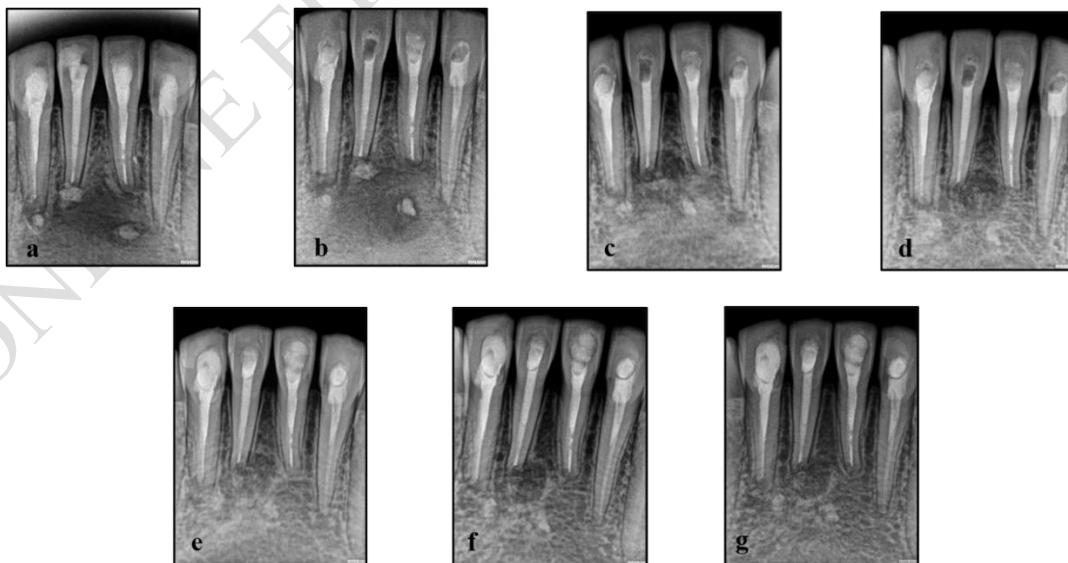
The complete treatment plan, benefits and risks were explained to the patient and consent was taken prior to the commencement of the treatment. Also, blood hemogram tests were conducted before surgery, revealing the values to be within normal physiologic limits. Indicated teeth were endodontically retreated. Access opening was modified and thorough biomechanical preparation was done followed by placement of calcium hydroxide dressing. Teeth were restored with cavities and the patient was then recalled after 2 weeks. On the next appointment, after removal of calcium hydroxide and thorough irrigation, the canals were obturated with MTA as obturating the canals with MTA offers a novel method to treat complicated endodontically involved teeth that may not have responded using traditional filling materials and sealers when extensive periapical pathosis is present.

On the day of surgery, all the steps were carried out in aseptic conditions. Preoperative mouth rinse with 0.15% chlorhexidine was done for the patient. Local anesthesia 2% lignocaine (LIGNOCAD ADR, Cadila Pharmaceuticals) containing 1:200000 epinephrine solution was administered. After the incision, a full mucoperiosteal flap was raised. Osteotomy was performed under copious water spray using a straight micromotor handpiece with a bone-cutting bur. Removal of granulation tissue was done using curettes. The dislodged Gutta Percha piece was visualized and removed from the periapical area. Bony cavity was debrided and copious irrigation with saline was done. Apical 3 mm of root were resected in 31, 32, 41 and 42. 5 ml of blood was collected from the patient and fresh PRF was formed in a centrifugation machine (10 min) followed by its placement in the bony cavity to provide growth factors and enhance healing. Interrupted sutures were placed and post-operative instructions and medications were prescribed (Fig. 4). Suture removal was done after 1 week.

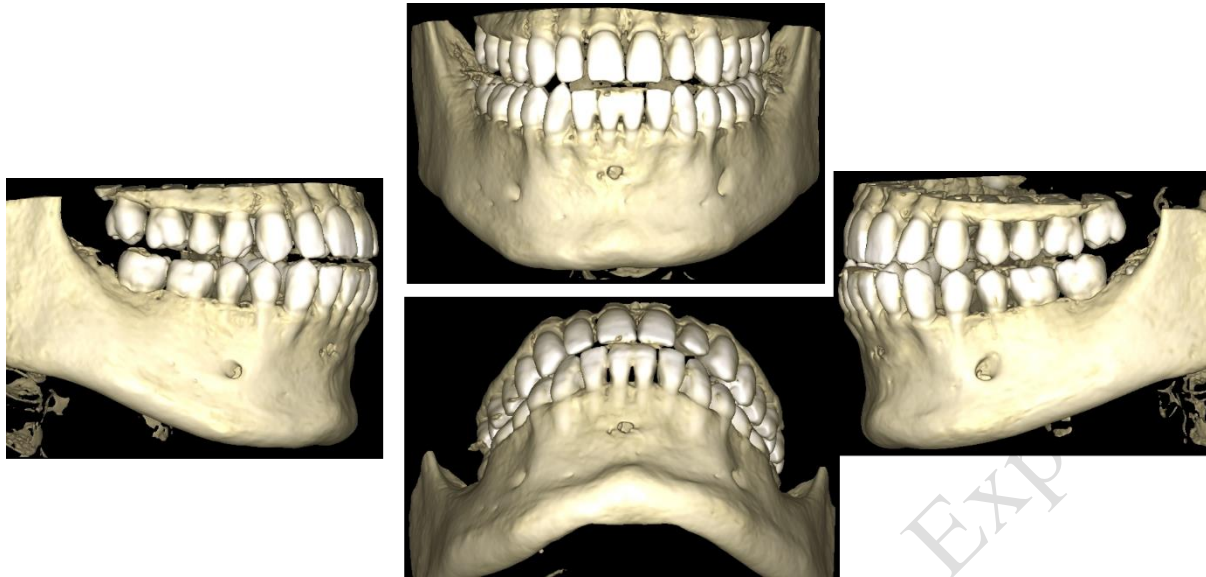


**Fig. 4.** Intraoperative records, A: Flap reflection, B: Visualization of GP in periapical area, C: Debrided bony cavity, D: Retrieved GP, E: Blood Sample collection, F: PRF formation, G: P RF placed, H: Flap repositioning and suturing, I: Immediate post-operative IOPA

Periodic follow-ups were done at 1 week, 1 month, 3 months, 6 months, 9 months, 12 months and 15 months to track down the periapical healing (Fig. 5). 15 months follow-up CBCT was also done for the patient (Figure 6) showing remarkable healing and bone formation. Postoperative 3D volume was  $52.87 \text{ mm}^3$  and it was calculated using ITK-Snap software (Version 4.0.0). The overall reduction in the volume of the lesion was determined to be approximately 96% at the end of 15 months.



**Fig. 5.** Periodic radiographic follow up, A: 1 week, B: 1 month, C: 3 months, D: 6 months, E: 9 months, F: 12 months, G: 15 months



**Fig. 6.** 15 months CBCT follow-up

## Discussion

Cutaneous sinus tract of endodontic origin are relatively uncommon lesions, so misdiagnoses and inappropriate treatment often arise.<sup>5</sup> Due to their presence in head and neck region, they are of special interest to medical fraternities as well especially dermatologists, ENT and general practitioners.<sup>1</sup> In our case also, the patient visited a general medical practitioner first followed by two general dental practitioners. However, the patient could not get appropriate treatment due the lack of their finesse in the field of endodontics. Such diagnostic and therapeutic misfortune highlights the importance of combined efforts and participation between medical and dental practitioners in the management of patients with head-and-neck lesions.<sup>6,7</sup>

The clinical differential diagnosis in such cases of cutaneous sinus tract includes pustule, actinomycosis, osteomyelitis, orocutaneous fistula, neoplasms, and local skin infections (carbuncle and infected epidermoid cyst). Other lesser common causes are salivary gland fistula, thyroglossal duct cyst, branchial sinus, dacryocystitis, and suppurative lymphadenitis.<sup>8</sup> Pustule(s) are frequently noted and generally found to have a superficial location and a short course. Actinomycosis generally shows multiple draining lesions and presence of fine yellowish granules in the purulent discharge is its characteristic finding. Osteomyelitis of jaw rarely gives rise to a cutaneous sinus and usually occurs secondary to some type of exogenic trauma, acquired infection after extraction of diseased or grossly carious teeth, impacted teeth, or retained roots. Neoplasms traditionally involves fixation to underlying structures. Carbuncle mostly shows involvement of hair follicles. Salivary gland fistula is a communication between the skin and mainly the parotid gland or the parotid duct that allows external drainage of saliva through the skin and mimics as a cutaneous sinus. Thyroglossal duct cyst and branchial sinus are developmental anomalies and they present as a midline neck

mass at or below the level of the hyoid bone. The presence of history of trauma and root canal therapy in mandibular anterior teeth along with clinical and radiographic findings helped us in concluding to the final diagnosis of previously treated 31, 32, 41 and 42 with chronic periapical abscess with extraoral cutaneous sinus tract in relation with 31 and 41 due to trauma.

Mineral trioxide aggregate (MTA) was incipiently introduced to dentistry as a root-end filling and perforation repair material exhibiting excellent biocompatibility and osteoconductivity properties. MTA canal obturation can offer noticeable benefits by promoting the repair of the periodontium and the supporting structures of the tooth. The induction of cellular repair responses by a filling material that can promote cementum deposition, encourage bone formation and periodontal ligament regeneration must be considered a significant step forward when treating teeth compromised by long-standing disease and failed conventional treatments. In our case also, the canals were obturated with MTA to prevent coronal microleakage as it was a retreatment case with complicated root canal anatomy with a colossal periapical pathosis due to previous attempt for treatment.<sup>9</sup> Bogen G and Kuttler S (2009) presented a review and case series demonstrating the use of MTA and its significance as an obturating material in diverse clinical situations.<sup>10</sup>

An apicoectomy (also known as surgical endodontics, peri-apical surgery, or peri-radicular surgery) should be considered only when conventional endodontic root filling or re-treatment (root canal treatment) techniques have failed. Periapical surgery has been found to have 37% to 91% success rate depending upon the skills of the operator and the specific techniques used; and is evaluated through clinical and radiographic follow-ups.<sup>11,12</sup> The clinicians should provide the patient with as much information as is appropriate and pertinent and should be in terms that the patient understands. The risks and benefits related to the treatment and prognosis should be personalized for that individual patient. Also, there should be enough time for the patient to understand the information given and get a second opinion if needed. The present case also showed momentous healing in six months radiographically after the periapical surgery.

PRF has a good healing potential with various growth factors. It accelerates the new bone formation and acts as a scaffold due to its dense fibrous nature. It releases growth factor for longer period as it gets slowly absorbed by the host. PRF in combination with bone mineral has been found to have the ability to increase the regenerative effects in intrabony defects.<sup>13</sup> The decision to use PRF as a grafting material was made in the present case to provide scaffold for growth factors and expedite the natural process of healing.

Cone beam computed tomography (CBCT) has become a well acknowledged imaging modality in the dentomaxillofacial region in recent times to evaluate the actual extension of the lesion and confirm the offending tooth. In comparison with periapical radiographs, CBCT examination allows more accurate measurements of the lesion limits in all three planes, the observation of its content, and also its direct relation to the root canal.<sup>14</sup> CBCT proved to be an adjunct in the true estimation of the size of the lesion,



localization of dislodged Gutta Percha, determination of nerve proximity and finally the healing status at the end of 15 months in this present case.

### ***Study limitations***

Authors suggest that the findings or treatment plan of this particular isolated case should be cautiously applied to the general population and more cases should be reported to enrich the existing scientific literature.

### **Conclusion**

Accurate diagnosis is the key to treat draining sinus tracts of endodontic origin. Successful management of odontogenic extraoral sinus tracts with pulpal pathology depends on both preoperative and intraoperative conditions. Surgical management can prove to be an adjunct for speedy management of such cases. Root canal treatment and endodontic surgery should be used judiciously for effectively eliminating the pathogens thus providing healing and repair mechanisms a chance to achieve the desired result.

### **Declarations**

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#### ***Author contributions***

Conceptualization, S.M. and S.R.; Methodology, S.G.; Software, S.R.; Validation, S.M., S.G. and S.N.; Formal Analysis, S.G.; Investigation, S.R.; Resources, M.M.; Data Curation, S.R.; Writing – Original Draft Preparation, S.R.; Writing – Review & Editing, S.M.; Visualization, S.G.; Supervision, S.G., S.N; Project Administration, M.M.; Funding Acquisition, M.M.

#### ***Conflicts of interest***

The authors display no conflicts of interest.

#### ***Data availability***

Data is available according to policy of the journal.

#### ***Ethics approval***

Informed written consent was taken from the patient.

## References

1. Latifa H, Dorsaf T, Amira K, Karim J, Nabiha D. Surgical management of an odontogenic cutaneous sinus tract misdiagnosed for 4 years. *Clin Case Rep.* 2022;10:05333. doi:10.1002/ccr3.5333
2. Cohenca N, Karni S, Rotstein I. Extraoral sinus tract misdiagnosed as an endodontic lesion. *J Endod.* 2003;29(12):841-843. doi: 10.1097/00004770-200312000-00015
3. Pasternak-Júnior B, Teixeira CS, Silva-Sousa YT, et al. Diagnosis and treatment of odontogenic cutaneous sinus tracts of endodontic origin: three case studies. *Int Endod J.* 2009;42:271-276. doi: 10.1111/j.1365-2591.2008.01519.x
4. Kreisler M, Gockel R, Aubell-Falkenberg S, et al. Clinical outcome in periradicular surgery: effect of patient- and tooth-related factors—a multicenter study. *Quintessence Int.* 2013;44(1):53-60. doi: 10.3290/j.qi.a28742
5. Bennani A, Jawad K. Cutaneous fistulas of dental origin. *Afr J Dent Implant.* 2018;13:8-18.
6. Kallel I, Moussaoui E, Kharret I, Saad A, Douki N. Management of cutaneous sinus tract of odontogenic origin: eighteen months follow-up. *J Conserv Dent.* 2021;24(2):223. doi: 10.4103/jcd.jcd\_56\_21
7. Lewandowski B, Mac-Pietrasz I. Problems with diagnosis and treatment of an odontogenic fistula of facial skin. *Pol Merkur Lekarski.* 1997;2(8):120-121.
8. Gupta M, Das D, Kapur R, Sibal N. A clinical predicament—diagnosis and differential diagnosis of cutaneous facial sinus tracts of dental origin: a series of case reports. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2011;112(6):132-136. doi: 10.1016/j.tripleo.2011.05.037
9. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. *J Endod.* 1999;25(3):197-205. doi: 10.1016/S0099-2399(99)80142-3
10. Bogen G, Kuttler S. Mineral trioxide aggregate obturation: a review and case series. *J Endod.* 2009;35(6):777-790. doi: 10.1016/j.joen.2009.03.006
11. Torabinejad M, Corr R, Handysides R, Shabahang S. Outcomes of nonsurgical retreatment and endodontic surgery: a systematic review. *J Endod.* 2009;35(7):930-937.
12. Friedman S. The prognosis and expected outcome of apical surgery. *Endodontic Topics.* 2005;11:219-262.
13. Pavlovic V, Ciric M, Jovanovic V, Trandafilovic M, Stojanovic P. Platelet-rich fibrin: Basics of biological actions and protocol modifications. *Open Medicine.* 2021;16(1):446-454. doi: 10.1515/med-2021-0259
14. Patel S, Brown J, Pimentel T, Kelly RD, Abella F, Durack C. Cone beam computed tomography in Endodontics – a review of the literature. *Int Endod J.* 2019;52(8):1138-1152. doi: 10.1111/iej.13115