Case Report

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Dentistry Section

XP-Finisher as an Alternative to Surgical Approaches in Overextended Gutta Percha Removal from Maxillary Sinus: A Case Report

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ABSTRACT

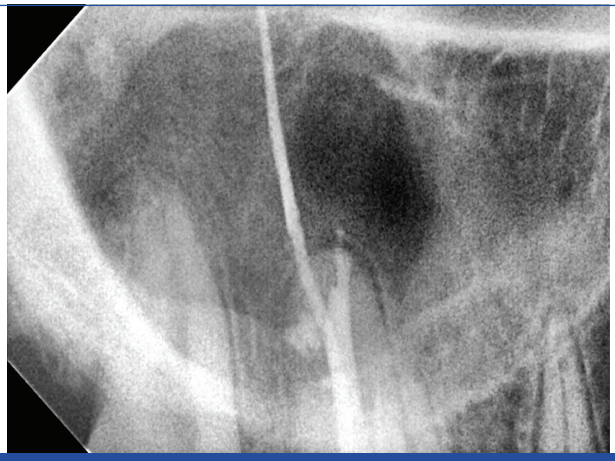
Iatrogenic complications in endodontic treatment, particularly involving maxillary molars, can present significant clinical challenges due to complex root canal anatomy and their proximity to vital structures such as the maxillary sinus. Among these complications, the inadvertent extrusion of thermoplastic Gutta-Percha (GP) into the maxillary sinus is rare but potentially serious, often requiring surgical intervention. However, advancements in non-surgical techniques offer promising alternatives for managing such cases conservatively. This case report details the successful orthograde retrieval of extruded thermoplastic GP from the maxillary sinus associated with tooth No. 16, which exhibited a C-shaped palatal canal morphology. A 34-year-old male patient presented with discomfort in the maxillary right first molar region following recent root canal therapy. Cone-Beam Computed Tomography (CBCT) revealed GP overextension into the sinus through the palatal canal. Using dental operating microscopy and enhanced irrigation protocols, the extruded GP was safely retrieved with the XP-Endo Finisher instrument. The palatal canal was subsequently re-cleaned and obturated using a controlled, apically limited thermoplastic technique. This case highlights the utility of advanced imaging, magnification, and innovative instrumentation in managing endodontic mishaps without resorting to surgical procedures. Importantly, it demonstrates that orthograde retreatment, when executed with precision, can be a viable and minimally invasive solution for GP extrusion into the sinus. Further clinical studies are recommended to establish standardised protocols and to assess long-term outcomes for such conservative approaches.

Keywords: C-shaped canal, Endodontic complications, Gutta-percha extrusion, Maxillary sinus

CASE REPORT

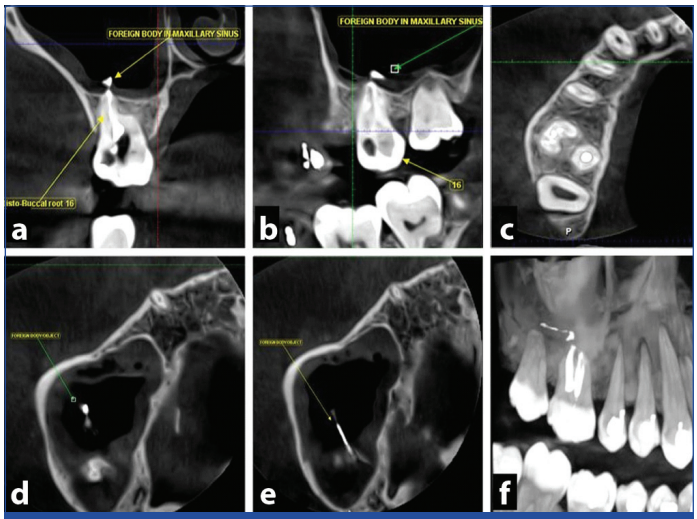
A female in her early 40s reported severe pain in the right malar region, which was intermittent and throbbing in nature, lasting for seven days. The patient had a history of root canal treatment performed seven days prior at a private dental clinic, from where she was referred to the centre for the removal of excess Root Canal Filling (RCF) material.

Upon clinical examination, a temporary restoration was noted, along with severe pain on percussion with tooth 16. Normal probing depths and no mobility were observed. Based on the clinical presentation, a provisional diagnosis of persistent apical periodontitis was formulated, and an Intraoral Periapical Radiograph (IOPA) was advised [Table/Fig-1]. Upon evaluation, it was found that the RCF material was present in the palatal canal, with an overfill of 16 and 15.5 mm extending into the maxillary sinus.



[Table/Fig-1]: Preoperative intraoral periapical radiograph with 16.

Removal was attempted using H files, which was unsuccessful, and a small field of view CBCT scan was advised. Upon evaluation of the coronal, sagittal, and axial sections of the CBCT, a small focal radiopacity was observed within the right maxillary sinus, piercing through the sinus floor near the Distobuccal (DB) root of tooth 16 [Table/Fig-2a-f]. Mild mucosal thickening was noted on the floor of the maxillary sinus. The C-shaped DB canal was incompletely filled, with RCF material present in the mesio-buccal and mesio-lingual canals [Table/Fig-2c]. Radiographically, this was suggestive of a foreign body within the right maxillary sinus.

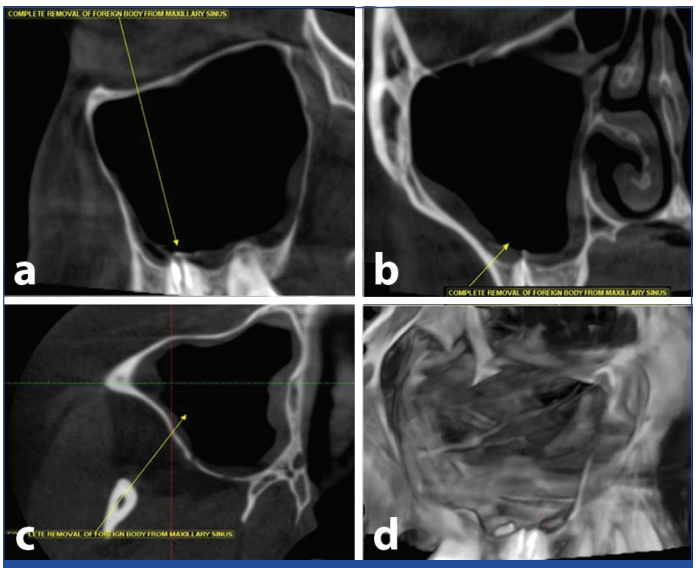


[Table/Fig-2]: Preoperative CBCT with 16.

The patient was informed about the findings and the available treatment options, which included non-surgical removal and surgical removal, comprising the Caldwell-Luc procedure, Functional Endoscopic Sinus Surgery (FESS), or a transoral approach. After obtaining procedural consent, an immediate non-surgical removal of the foreign body with selective re-treatment was planned.

The tooth was isolated under a rubber dam, and the Distobuccal (DB) canal was visualised under an operating microscope. GP was heated at the orifice with an obturation pen (Fi-P, Woodpecker, China), and GP was removed using H files (Mani, Japan) by engaging in a clockwise and pull motion until reaching the middle third, as this was a C-shaped canal with ample space for creating a glide path. The XP-Finisher (FKG Dentaire, Switzerland) was cautiously inserted into the sinus through the apical foramen of the DB canal and was activated 4-5 mm beyond the apex at 1000 rpm/1 Ncm before being pulled out. After two cycles, the XP-Finisher curled the extruded RCF material, and continuous activation pulled the RCF out of the apex and into the canal. This led to the successful removal of the extruded RCF. The canal was thoroughly flushed with normal saline to remove blood, followed by irrigation with 5.25% NaOCl and 17% EDTA, with saline flushing in between after ultrasonic activation for two minutes per canal. Working lengths were measured with Root ZX Mini (J Morita, USA): Mesiobuccal (MB)=17 mm and palatal and DB=18.5 mm. A closed dressing was placed on tooth 16, and Ibuprofen was prescribed as needed for three days.

To confirm the removal of the RCF, an inter-appointment CBCT of the right maxillary sinus was advised. To accommodate the machine's smaller field of view, the patient's position was modified, allowing for a complete visualisation of the maxillary sinus and the root apices of the posterior teeth on the right-side. The post-treatment CBCT scan, evaluated in coronal, sagittal, and axial sections, showed an empty maxillary sinus, indicating complete removal of the RCF [Table/Fig-3a-d].



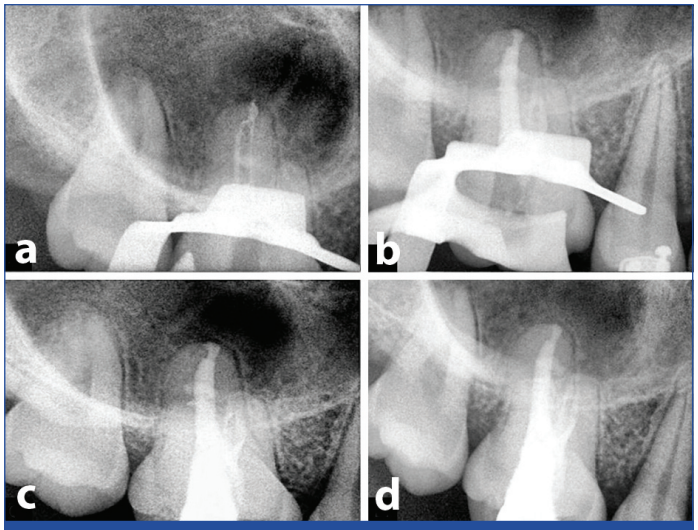
[Table/Fig-3]: Intraoperative CBCT of maxillary sinus confirming complete removal of extruded GP.

After seven days, the patient was recalled, and there was no history of spontaneous pain or tenderness on percussion with tooth 16. The canal was irrigated with normal saline, followed by activation with 5.25% NaOCl using the XP-Finisher. After drying the canals with 70% ethanol, the fused palatal and DB canals were completely obturated with Mineral Trioxide Aggregate (MTA) (Safe Endo, India), using the Micro Apical Placement System (Dentsply, USA). The mesiobuccal canal was obturated with a single cone of GP along with Bio-root Root Canal Sealer (RCS) (Safe Endo, India), followed by post-endodontic restoration with Everx Posterior (GC, Switzerland) [Table/Fig-4a,b].

After three months [Table/Fig-4c] and eight months [Table/Fig-4d], the patient was recalled for follow-up. The patient had no symptoms, and upon radiographic evaluation, healing of the periapical lesion was noted around tooth 26.

DISCUSSION

Achieving a three-dimensional seal of the root canal system while minimising periapical tissue damage is essential for successful



[Table/Fig-4]: a) MTA Plug with 16 with intraoral periapical radiograph; b) Postoperative intraoral periapical radiograph; c) Follow-up ntraoral periapical radiograph with 16 at 3 months; d) Follow-up intraoral periapical radiograph with 16 after eight months.

endodontic therapy [1]. However, the proximity of the maxillary posterior teeth to the maxillary sinus poses a significant risk for complications, specifically the unintentional extrusion of RCF materials into the sinus cavity [2]. Among these materials, thermoplasticised GP is particularly susceptible to overextension due to its softened consistency and the possibility of excessive apical pressure during obturation [3].

The C-shaped canal architecture, which results from inadequate fusion of the distal and mesial roots during development, is one anatomical difference that complicates endodontic treatment in maxillary molars. C-shaped canals have been observed in maxillary first and second molars, with a prevalence ranging from 2.7% to 10%, although they are more frequently seen in mandibular second molars [4,5]. Due to their uneven cross-sectional shape and potential for apical aberrations, these intricate canal networks present significant challenges in terms of cleaning, shaping, and obturation [6].

In C-shaped canals, the presence of auxiliary canals, apical ramifications, and thin dentinal walls increases the risk of over-instrumentation, which can result in periapical tissue injury and elevate the chances of RCF material extrusion and sodium hypochlorite accidents [7,8]. It has been found that between 20% and 40% of upper posterior teeth have endodontic complications involving the maxillary sinus [9]. Clinical symptoms may include chronic headaches, sinusitis, facial pain, and, in certain cases, fungal infections such as aspergillosis when GP or sealer extrudes into the sinus [10].

The inadvertent extrusion of thermoplastic GP into the maxillary sinus represents a rare yet clinically significant complication in endodontics. This case underscores the intricate challenges posed by C-shaped canals and the increased risk of overextension of obturation materials, particularly in maxillary molars. Due to the anatomical proximity of the maxillary sinus to the posterior dentition, the incidence of periapical extrusion is well documented, with reports ranging from 20% to 40%. While asymptomatic cases may remain undetected, symptomatic presentations often involve localised pain, maxillary sinusitis, or even opportunistic fungal infections such as aspergillosis [2,7,11].

C-shaped canals, although more commonly associated with mandibular second molars, represent a notable anatomical variant in maxillary molars, occurring in approximately 2.7% to 10% of cases [6,7,12]. In this case, the C-shaped configuration of the palatal and DB canals likely contributed to the apical overextension of thermoplasticised GP into the maxillary sinus due to the absence of an effective apical barrier during obturation.

Surgical intervention remains the primary modality for removing foreign bodies from the maxillary sinus, particularly in symptomatic cases or when secondary infection is anticipated. Various surgical approaches, including the Caldwell-Luc procedure, Functional Endoscopic Sinus Surgery (FESS) and transoral techniques, have been successfully employed in such instances [13]. The Caldwell-Luc procedure provides direct access and visualisation of the sinus cavity; however, it is associated with increased postoperative morbidity [10,14]. Conversely, FESS, a minimally invasive technique, offers reduced procedural trauma and enhanced recovery but may not always permit the complete removal of extruded materials, particularly in cases of extensive dispersion [15].

There are similar reported cases of mishaps in the literature that have been managed using surgical approaches [16,17]. These approaches offer greater predictability but also come with potential complications, such as haemorrhage, damage to vital structures, postoperative discomfort, and the need for careful postoperative care. In this case, a non-surgical approach was chosen, thereby allowing us to avoid these complications.

Notably, the non-surgical removal of extruded GP remains largely underreported in the literature. In this case, an innovative non-surgical approach utilising the XP-Finisher instrument was successfully employed. The XP-Finisher incorporates MAX wire technology, a proprietary Nickel-Titanium (NiTi) alloy characterised by its capacity to dynamically expand and contract in response to temperature fluctuations. This adaptive property enables the instrument to conform to the complex canal architecture, enhancing debridement efficacy and facilitating the removal of extruded materials [18]. Studies have demonstrated that the XP-Finisher achieves superior canal cleanliness, with reported reductions in residual GP of up to 98% compared to conventional retreatment methods [19,20]. Moreover, its ability to safely engage extruded material beyond the apical terminus while minimising unnecessary dentin removal renders it an invaluable tool for non-surgical removal [21].

In this case, controlled activation of the XP-Finisher beyond the apex allowed for successful engagement and removal of the extruded GP, circumventing the need for invasive surgical intervention. Postoperative CBCT imaging confirmed the complete resolution of the foreign body, further validating the efficacy of this approach. The XP-Endo Finisher can be utilised at high-speed clockwise rotation to aid in the removal of a loosened fractured instrument from a wider canal, which was already present in the discussed case. This is particularly effective when the instrument has been extruded beyond the large apical foramen into the apical tissues. By braiding the instrument, it creates a swirling fluid flow in the coronal direction, assisting in its removal, as stated by Terauchi Y et al., [21].

This case emphasises the significance of preoperative three-dimensional imaging to identify anatomical variations and assess procedural risks before endodontic treatment. CBCT is employed in cases where complex root canal anatomy is suspected, as routine periapical radiography is often insufficient to provide adequate anatomical detail. The use of an operating microscope in instrumentation and obturation is crucial for enhancing precision and minimising procedural errors, especially in cases with non-routine canal configurations.

Preventative Strategies and Clinical Implications

To mitigate the risk of GP extrusion in anatomically complex cases, clinicians should integrate multiple preventative strategies, including the routine utilisation of CBCT for enhanced diagnostic assessment and magnification-assisted instrumentation (via operating microscope or high-magnification loupes). Apical barrier techniques employing biocompatible materials such as MTA should be used to prevent overextension. Controlled delivery of thermoplasticised GP should be performed to avoid excessive apical pressure. The deployment of instruments such as the XP-Finisher to facilitate the removal of extruded materials without necessitating surgical intervention should also be considered as a viable treatment option.

This article highlights the possibility of retrieving extruded GP from the maxillary sinus without surgery, particularly in cases involving C-shaped canals. The XP-Finisher's potential as an effective alternative to traditional surgical methods in certain cases is demonstrated by the successful removal of the foreign body. To validate the effectiveness and reproducibility of non-surgical removal techniques in endodontic treatment, further clinical studies and long-term evaluations are required. Finally, to improve the outcomes of endodontic therapy and increase clinical success, intraoperative magnification, cutting-edge imaging technology, and thorough preoperative planning remain essential.

CONCLUSION(S)

This mishap was due to the underestimation of the complexities associated with C-shaped root canals, along with the absence of three-dimensional imaging preoperatively and magnification intraoperatively. In cases involving C-shaped canals, intraoperative apical plug visualisation under magnification is of paramount importance when using thermoplasticised GP systems, as two-dimensional images can be deceiving, as demonstrated in this case. Before planning for surgical interventions, non-surgical treatments should always be considered.

REFERENCES

[1] Nitzan DW, Stabholz A, Azaz B. Concepts of accidental overfilling and over instrumentation in the mandibular canal during root canal treatment. J Endod. 1983;9(2):81-85.

[2] Beck-Mannagetta J, Necek D, Grasserbauer M. Solitary aspergillosis of maxillary sinus, a complication of dental treatment. Lancet. 1983;2(8361):1260.

[3] Liston PN, Walters RF. Foreign bodies in the maxillary antrum: A case report. Aust Dent J. 2002;47(4):344-46.

[4] Yamaguchi K, Matsunaga T, Hayashi Y. Gross extrusion of endodontic obturation materials into the maxillary sinus: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007;104(1):131-34

[5] Brooks JK, Kleinman JW. Retrieval of extensive gutta-percha extruded into the maxillary sinus: Use of 3-dimensional cone-beam computed tomography. J Endod. 2013;39(9):1189-93. Doi: 10.1016/j.joen.2013.04.006.

[6] Fan B, Cheung GSP, Fan M, Gutmann JL, Bian Z. C-shaped canal system in mandibular second molars: Part I--Anatomical features. J Endod. 2004;30(12):899-903.

[7] Kim Y, Lee SJ, Woo J. Morphology of maxillary first and second molars analyzed by cone- beam computed tomography in a korean population: Variations in the number of roots and canals and the incidence of fusion. J Endod. 2012;38(8):1063-68.

[8] Nasiri K, Wrbas KT. Management of sodium hypochlorite accident in root canal treatment. J Dent Sci. 2023;18(2):945-46. Doi: 10.1016/j.jds.2023.01.022. Epub 2023 Feb 2. PMID: 37021210; PMCID: PMC10068487.

[9] Lopatin AS, Sysolyatin SP, Sysolyatin PG, Melnikov MN. Chronic maxillary sinusitis of dental origin: Is external surgical approach mandatory? Laryngoscope. 2002;112(6):1056-59.

[10] Adams M, Bailie N. Maxillary fungal sinusitis secondary to extrusion of endodontic gutta percha points. BMJ Case Rep. 2015;2015:bcr2015210193. Doi: 10.1136/bcr-2015-210193. PMID: 26150641; PMCID: PMC4493219.

[11] Blitzer A, Lawson W. The Caldwell-Luc procedure in 1991. Otolaryngol Head Neck Surg. 1991;105(5):717-22. Doi: 10.1177/019459989110500514.

[12] Regezi JA, Sciubba J, Jordan RCK. Oral pathology: Clinical pathologic correlations. Elsevier Health Sciences; 2016. 492 p.

[13] Sodnom-Ish B, Eo MY, Lee JY, Seo MH, Kim SM. Functional rehabilitation of the maxillary sinus after modified endoscopic sinus surgery for displaced dental implants. Int J Implant Dent. 2023;9(1):25.

[14] Taschieri S, Torretta S, Corbella S, Del Fabbro M, Francetti L, Lolato A, et al. Pathophysiology of sinusitis of odontogenic origin. J Investig Clin Dent. 2017;8(2):e12202. Doi: 10.1111/jicd.12202.

[15] Manandhar S, Khan SA, Pokharel A, Shah D. Revolutionizing chronic rhinosinusitis treatment with functional endoscopic sinus surgery: Insights from a low-middle income country. Medicine (Baltimore). 2025;104(18):e42382. Doi: 10.1097/MD.0000000000042382.

[16] Scartezini GR, Souza POC, Mathne JST, Felter M, Ferrari-Piloni C, Rodrigues LG, et al. Extrusion of endodontic material to the maxillary sinus: Avoidable intercurrence? Int J Odontostomat. 2019;13(4):392-97.

[17] Tanasiewicz M, Bubilek-Bogacz A, Twardawa H, Skucha-Nowak M, Szklarski T. Foreign body of endodontic origin in the maxillary sinus. J Dent Sci. 2017;12(3):296-300.

[18] Alkahtany SM, Alfadhel R, AlOmair A, Durayhim SB. Characteristics and effectiveness of xp-endo files and systems: A narrative review. Int J Dent. 2024;2024:9412427. Doi: 10.1155/ijod/9412427. PMID: 39720541; PMCID: PMC11668552.
[19] Matoso FB, Quintana RM, Jardine AP, Delai D, Fontanella VRC, Grazziotin-Soares R, et al. XP Endo Finisher-R and PUI as supplementary methods to remove root filling materials from curved canals. Braz Oral Res. 2022;36:e053.
[20] Hassan R, Elzahar S. Cleaning efficiency of XP Finisher, XP Finisher R and passive ultrasonic irrigation following retreatment of teeth obturated with TotalFill HiFlow bioceramic sealer. Eur Endod J. 2022;7(2):143-49. Doi: 10.14744/eej.2022.39358.
[21] Terauchi Y, Ali WT, Abielhassan MM. Present status and future directions: Removal of fractured instruments. Int Endod J. 2022;55(Suppl 3):685-709. Doi: 10.1111/iej.13743.

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