

## Management of foreign body reaction to the extruded gutta percha with large periapical lesion: A case report

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**Abstract:** Traumatic injuries in childhood may disrupt root development leading to a tooth with open apex. The absence of an apical constriction makes the teeth more vulnerable to extrusion of a foreign body to the periapical region during conventional root canal treatment. This could cause endodontic failure by triggering inflammation and foreign body reaction. The aim of the present case report is to describe the endodontic surgical treatment of an iatrogenic displacement of a foreign body (Gutta percha) into periapical tissues and its clinical and radiographic follow up over a period of 6 months.

**Key Words:** Traumatic injury, Open Apex, Gutta Percha, Apicoectomy, Periapical Lesion, Foreign Body reaction.

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### I. Introduction

Most dental trauma occurs in the 7 to 12 year old age group and is mainly due to falls and accidents near home or school. It occurs primarily in the anterior region of the mouth, affecting the maxillary more than the mandibular teeth<sup>1</sup>. The completion of root development and closure of the apex occurs up to 3 years following eruption of the tooth. When trauma occur during this period, it will result in pulp necrosis and cessation of root formation. Consequently, the root canal becomes wide, with thin and fragile walls, and the apex remains open. Management of teeth with wide open apex with pulpal necrosis is a challenge to the clinician because, these features impair root canal instrumentation, canal disinfection and prevent the achievement of an adequate apical stop. An ideal treatment option for such teeth is to induce regeneration of incompletely formed tissue or to create an artificial apical barrier to prevent extrusion of filling material and apical leakage. Inadequate knowledge about the management of open apex leads to iatrogenic challenges such as extrusion of filling material which further complicates the treatment outcome<sup>2</sup>.

### II. Case Report

An 18 year old male patient reported with pain and swelling in relation to upper anterior teeth. The patient gave a history of dental trauma followed by root canal treatment 5 years back. Oral examination revealed discolored right upper central incisor with periapical swelling and pus discharge in relation to 11 and 12. Both teeth were tender on percussion.

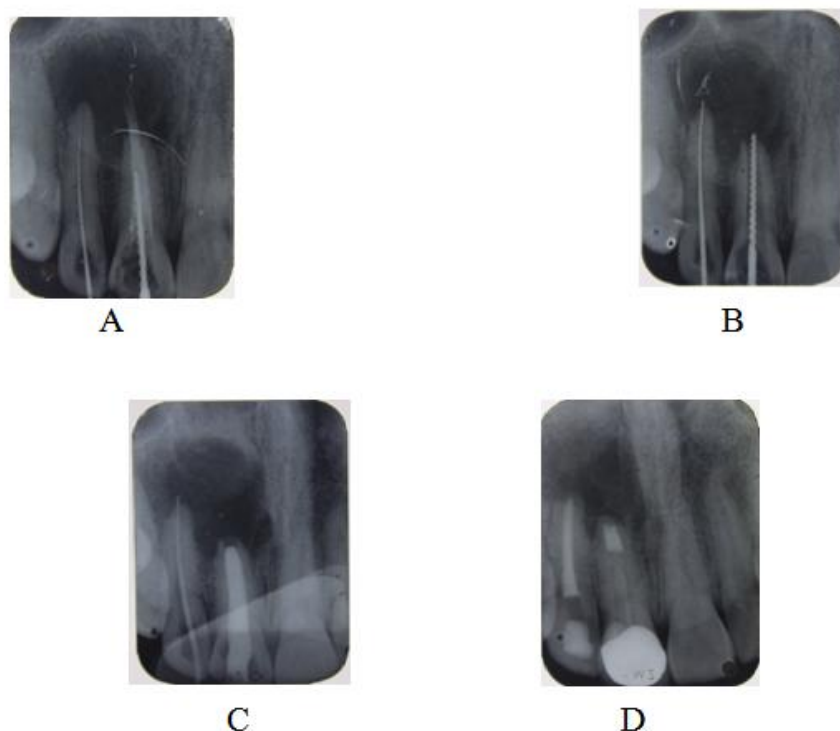
Radiographic examination revealed obturated 11, but the apex was not sealed and there was extruded gutta percha in the periapical tissue. There was a well defined periapical radiolucency with respect to 11 and 12 of size approximately 1.25cm × 1.25 cm. These radiographic findings are suggestive of large periapical cyst-like lesion in relation to 11 and 12. Electric pulp testing and cold testing were negative for 12. It was decided to plan a non surgical retreatment of 11 with creation of artificial barrier and root canal treatment of 12. This is to be followed by root reinforcement with custom made fibre post and post endodontic restoration of 11.

This case report discusses a case of iatrogenic extrusion of gutta-percha into the periapical area of a tooth with open apex and successful management of the case surgically.

Under rubber dam isolation access re-opening done in 11. Gutta percha removal was done carefully using xylene and Hedstrom file and the canal was re negotiated. Gutta Percha was removed from the root canal and the periapical lesion showed blackish & rusted appearance indicating classical signs of foreign body reaction to the extruded gutta percha. The gutta percha extruded periapically could not be retrieved with the non surgical procedure. As this can act as a nidus of foreign body reaction, it was decided to do surgical intervention to retrieve the remaining gutta percha and to seal the open apex.

Access opening was done in 12 and canal was located and negotiated, followed by copious irrigation using 5.25% NaOCl and normal saline. After completion of bio-mechanical preparation in both 11 and 12, calcium hydroxide dressing was given and canals were sealed. Analgesics and antibiotics were given and the patient was recalled after 1 week.

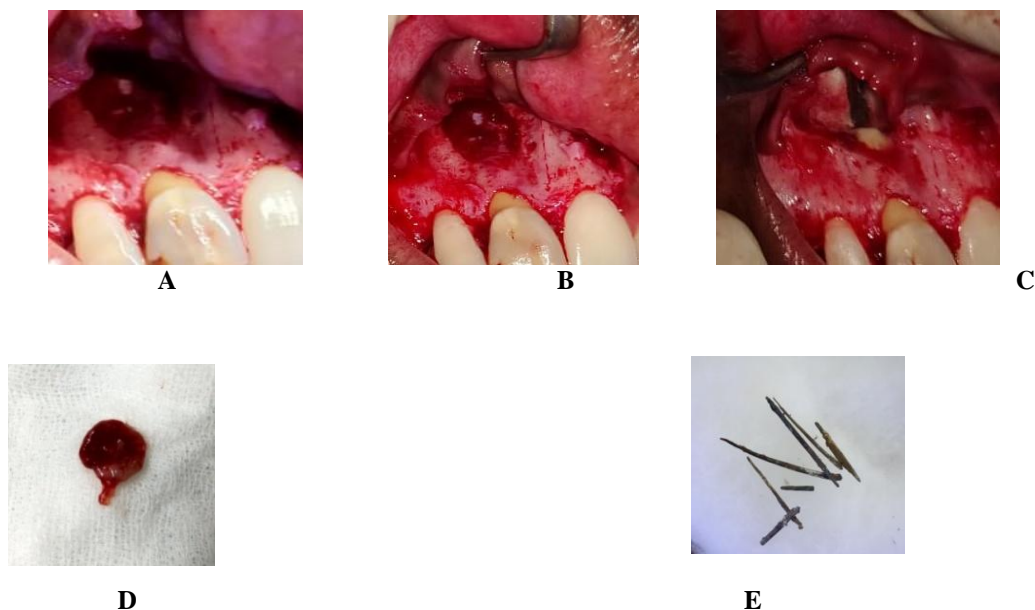
There was reduction in the symptoms. Pain and swelling had subsided. The root canal was re-opened, thoroughly instrumented and irrigated with saline in order to remove the intra canal medicament. Then custom made gutta percha cone was prepared using roll cone technique for 11 and master cone was selected for 12. Both were confirmed using IOPA & obturation was done before surgical management.



**Fig-1,** A) Preoperative Periapical Radiograph showing extruded gutta percha, B) Working length radiograph, , C) Obturated 11 and master cone Radiograph 12 , D) Postoperative Periapical radiograph showing Obturated 12 and 11 with fibre post and ceramic Crown.

Surgical management was done under local anesthesia and a full thickness rectangular muco periosteal flap was raised from distal of 12 to the mesial of 22. Upon flap elevation a large bony defect was discernible and a small window was prepared to approach the root apex of 11. Thorough curettage was done to remove the granulation tissue and the extruded gutta percha completely. Periapical lesion was removed in toto.

Root resection of 3 mm was done in relation to 12. Root end cavity preparation was done and root end filling was completed using glass ionomer cement. Following this, flap was repositioned and sutured. The patient was recalled after 3 days for suture removal. The healing of the site was uneventful. The patient was recalled every 3 weeks.



**Fig-2, A), B),** Buccal flap raised showing bony defect. **C)** Root apex 11, **D) & E)** Periapical tissue and gutta percha points retrieved from the site showing brownish black discoloration and rusted appearance showing foreign body reaction.



**Fig-3, A)** Preoperative Photograph **B)** Post operative photograph showing cemented ceramic crown

After 2 months, radiographic examination revealed signs of healing. A post and core restoration using custom made fibre post was done for 11 followed by ceramic crown. The patient was reviewed periodically.

### III. Discussion

The extrusion of a foreign body to the periapical region is an unfortunate accident that can occur during endodontic procedures and could cause failure by triggering chronic inflammation and a foreign body reaction<sup>3</sup>. The incidence was reported to be as low as 3% of endodontic failures<sup>4</sup>. Extrusion of obturation materials beyond the radicular foramen is more common in teeth with open apex.

Root canal filling materials (Gutta percha, sealers etc.), separated endodontic instrument and food particles may reach the periapical tissues and cause a foreign body reaction that may be associated with periapical radiolucency remaining asymptomatic for many years. This become symptomatic if infected<sup>5</sup>.

Gutta percha is the most widely used solid root canal filling material. This is commercially prepared from gutta percha (transpolyisoprene), derived from *Plaquium gutta* tree. Dental gutta percha cones are composed of about 20% of gutta percha, 60–75% zinc oxide and varying amounts of metal sulfates for radio opacity, waxes and coloring agents<sup>6</sup>.

Based on animal studies, intentional placement of gutta percha cones are considered to be biocompatible and well tolerated by tissues. In any case, the mere placement of filling materials outside the canal system is not a major cause for alarm if the canal space is three-dimensionally obturated. However, with the clinical observation, the presence of gutta percha in excess is associated with interrupted or delayed healing of the periapex<sup>7,8</sup>.

In general, biomaterial surface properties play an important role in modulating the foreign body reaction in the first two to four weeks following implantation, bulk forms of sterile materials with smooth surfaces placed within bone or soft tissue evoke a fibrous tissue encapsulation, while particulate materials

induce a foreign body and chronic inflammatory reaction<sup>9</sup>. Tissue response studies of gutta percha using subcutaneously implanted teflon cages reveals two distinct types of tissue reaction<sup>10</sup>.

Large pieces of gutta percha were well encapsulated by collagen and the surrounding tissue was free of inflammation. In contrast, fine particles of gutta percha evoked an intense, localized tissue response, characterized by the presence of macrophages and giant cells. The accumulation of macrophages in conjunction with the fine particles of gutta percha is significant for the clinically observed impairment in the healing of apical periodontitis, when teeth are root filled with excess of gutta percha.

The chemical composition of gutta percha is also of significance for inducing foreign body reaction, apart from the particle size. Leaching zinc oxide from gutta percha cones has been shown to be cytotoxic *in vitro*<sup>11</sup>, tissue irritating *in vivo* and associated with adjacent inflammatory reaction<sup>12</sup>.

Further, commercial gutta percha cones may become contaminated with tissue-irritating substances that can initiate a foreign body reaction at the periapex. Pieces of gutta percha cones in periapical tissue can gradually fragment into fine particles that in turn can induce a typical foreign body reaction and activate macrophages. The latter are known to release intercellular mediators that include proinflammatory cytokines and modulators that are involved in bone resorption<sup>7,10,13,14</sup>.

Management of this case by orthograde retreatment alone was difficult as we could not completely remove the extruded gutta-percha. Management of such cases non surgically posed a problem as it was difficult to remove the offending objects and substances that exist beyond the root canal. Further, the great majority of post-treatment apical periodontitis cases are caused by infection persisting in the complex apical portion of the root canal system. It is not guaranteed that an orthograde retreatment of an otherwise well-treated tooth can eradicate the intraradicular infection. Also, presence of open apex with larger periapical lesion, further complicate in getting proper apical stop.

Therefore, we considered the necessity of apical surgery, to successfully treat the case. A surgical treatment in this case provided

- (i) an opportunity to completely remove the extraradicular agents that acted as a source of foreign body reaction
- (ii) allows a retrograde approach to remove any potential infection in the apical portion of the root canal system and seal the canal by a root end filling,
- (iii) To form a definitive barrier in order to prevent apical micro leakage through the open apex.

When the extruded filling material is removed by curettage with a hand instrument or by bur, the chronic inflamed tissue is also removed, allowing excellent healing in most cases. In the present case there was reduction in periapical radiolucency and evidence of healing in 3 months follow up.

#### **IV. Conclusion**

This case report shows that the iatrogenic displacement of a foreign body into the periapical tissues can be successfully treated by surgical endodontic procedure only. This is supported by clinical and radiographic follow up after 3 months.

#### **References**

- [1]. Saraswathi S, Kumar RP. Prevalence of Permanent Anterior Teeth Trauma in Children Between 8-12 Years in Urban and Rural Districts in Rohtak, Haryana, India. *Biomed Pharmacol J* Vol. 11(1), 469-475. 2018.
- [2]. Jose DJ. An Innovative Technique to Restore the Non Vital Teeth with Wide; Open Canals- A Clinical Study. *IOSR-JDMS* e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 14, Issue 9 Ver. VII (Sep. 2015), PP 71-74.
- [3]. Nair PNR. On the causes of persistent apical periodontitis: a review. *International Endodontic Journal*, vol. 39, no. 4, pp. 249–281, 2006.
- [4]. Al-Fouzan K, Pecora C, Pecora G, Baskaradoss J, Al-Sharif A, Al-Rejaie M, et al. Histological evaluation of the root apices of failed endodontic cases. *Saudi Endod J*. 2015. Vol 5. Issue 2.
- [5]. Simon JHS, Chimenti RA, Mintz GA. Clinical significance of the pulse granuloma. *J Endod* 1982; 8: 116–119.
- [6]. Ramachandran Nair PN. Non-microbial etiology: foreign body reaction maintaining post-treatment apical periodontitis. *Endodontic Topics*, vol. 6, no. 1, pp. 114–134, 2003. .
- [7]. Nair PNR, Sjögren U, Krey G, Sundqvist G. Therapy-resistant foreign body giant cell granuloma at the periapex of a root-filled human tooth. *J Endod*. 1990. 16: 589–595.
- [8]. Sjögren U, Häggglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. *J Endod*. 1990. 16: 498–504.
- [9]. Van Blitterswijk CA, Bakker D, Hesseling SC, Koerten HK. Reactions of cells at implant surfaces. *Biomaterials* 1991; 12: 187–193.
- [10]. Sjögren U, Sundqvist G, Nair PMR. Tissue reaction to gutta-percha particles of various sizes when implanted subcutaneously in guinea pigs. *Eur J Oral Sci*. 1995. 103: 313–321.
- [11]. Pascon EA, Spngberg LSW. *In vitro* cytotoxicity of root canal filling materials: 1. Gutta-percha. *J Endod* . 1990. 16: 429–433.
- [12]. Browne RM, Friend LA. An investigation into the irritant properties of some root filling materials. *Arch Oral Biol*. 1968. 13: 1355–1369.

- [13]. Leonardo MR, Utrilla LS, Rothier A, Leonardo RT, Consolaro A. A comparison of subcutaneous connective tissue responses among three different formulations of gutta-percha used in thermatic techniques. *Int Endod J* . 1990. 23: 211–217.
- [14]. Koppang HS, Koppang R, Solheim T, Aarnes H, Stølen SØ. Cellulose fibers from endodontic paper points as an etiological factor in postendodontic periapical granulomas and cysts. *J Endod* . 1989 . 15: 369–372.

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