

## Case Report

# Non-surgical endodontic retreatment of immature permanent anterior teeth with iatrogenic overextended filling

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## Abstract

The completion of root development and closure of the apex occurs up to 3 years after eruption of the permanent tooth. The treatment of pulpal injury during this period provides a significant challenge for the clinician. Conventional endodontic treatment in a non-vital tooth will result in overfilling of the obturating material as there is no apical stop for the obturating material. Hence knowledge of the biological process of root development is must to avoid endodontic failure. Here we present a case report where nonsurgical endodontic retreatment was successfully done to remove the overextended gutta-percha from immature permanent teeth. Apexification was carried out by placing an apical plug of MTA. This paper even throws light on causes of endodontic failures, option available to retrieve the old filling material and the significance of preoperative radiograph in establishing the root condition before carrying out any endodontic procedure.

## Keywords

Non-surgical endodontic retreatment, Apexification, MTA, Endodontic failure

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## Introduction

The main cause of endodontic failure making retreatment necessary is insufficient cleaning and inadequate obturation (1,2). The goal of nonsurgical retreatment is to remove material from the root canal space and if present, address deficiencies or repair defects that are pathologic or iatrogenic in origin (3). In 1986, Dr. Herbert Schilder quoted the term 'retreatodontics' and said that the future of endodontics lies in the retreatment of endodontic failures (4).

It is generally agreed that all root canal filling materials should be confined to root canal space. However in clinical endodontics, it is not uncommon for overfilling to occur, especially in case of immature, resorbed or over instrumented root canal apices. Higher failure rate is found in such cases. Over instrumentation and over filling of teeth evokes persistent chronic inflammation with a tendency towards epithelial proliferation and cyst formation. It has also been demonstrated that extrusion of root canal elements in the periapical tissue produces inflammation and may cause necrosis of cementum, periodontal ligament and bone (5).

Apexification is a method of inducing root end closure of an incompletely formed non vital permanent tooth by removing the coronal and non-vital radicular tissue just short of the root end and placing a biocompatible agent such as calcium hydroxide in the canals for 2-4 weeks to disinfect the canal space. Root end closure can be accomplished with an apical barrier such as MTA (6). This material was first introduced in 1993 and received Food and Drug Administration (FDA) approval in 1998 (7).

The success of endodontic retreatment is directly related to the complete removal of the obturating material from the root canal. A number of techniques

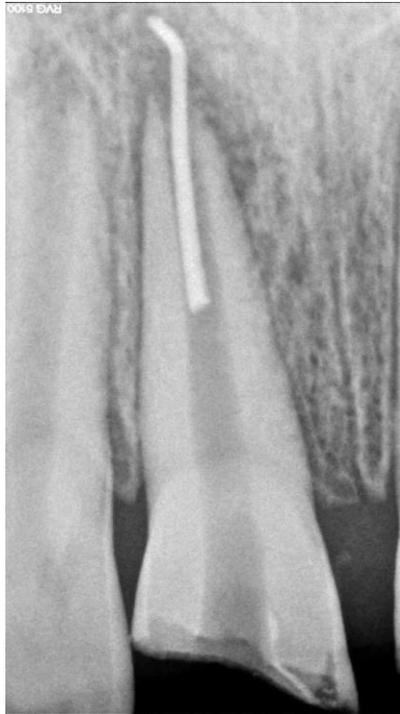
have been proposed to remove the obturating material from the canal system, including the use of manual files, rotary instruments, gates glidden burs, heat, ultrasound and adjunctive solvents (8,9,10).

Gutta-percha is the most common obturating material used (11). The relative difficulty in removing gutta-percha varies according to the obturating technique previously employed, compactness of the material, time elapsed since original treatment and further influenced by canals length, cross sectional dimension, curvature and internal configuration. Dividing the root into thirds, gutta-percha may be initially removed from the canal in the coronal one-third then the middle one-third and finally eliminated from the apical one third. At times single cones in a larger and straighter canal can be removed with one instrument in one motion (12).

## Case Report

A nine Year old boy was referred to our college by local dentist as he couldn't retrieve gutta-percha from the canal following endodontic failure due to over extension of filling material in blunderbuss canals. Root canal obturation was done before one week and retreatment was attempted by the dentist as the child had experienced pain following obturation. The tooth had mild tenderness on percussion. Diagnostic radiograph revealed an immature right upper central incisor with single fractured gutta-percha cone in middle third extending 4-5 mm periapically (Figure 1). Decision had to be made between nonsurgical endodontic retreatment and surgical treatment. Extraction was the last and the least preferred resort.

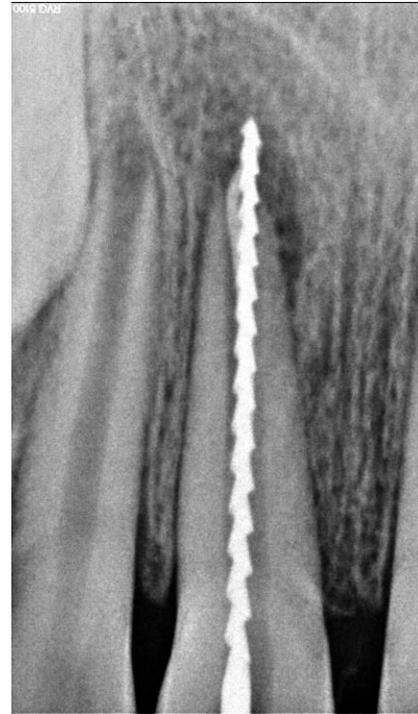
We planned to retrieve the remaining gutta-percha manually using endodontic files. If the gutta-percha would have been unintentionally cut off while attempting to



**Figure 1:** Radiograph showing single fractured gutta-percha cone extruding beyond apex.

retrieve the same, then surgical retreatment would be the next option in hand. The line of treatment was explained to the parents and approval was taken. An attempt was made with Hedstrom file to bypass the single gutta-percha cone and engage into its mass. Hedstrom files, size 60, 70, 80 were used in a circumferential, quarter-turn, push-pull filing action to pull out the gutta-percha. While performing the procedure a series of radiographs were taken using RVG to assess the level of gutta-percha and proximity of hand files to gutta-percha (Figure 2, 3).

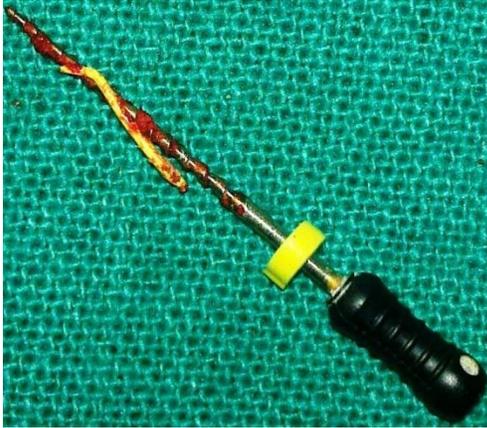
While pulling out the 80 size file from the root canal space, Gutta-percha came along with the file in single piece (Figure 4). Radiograph was again taken to confirm the complete removal of obturating material (Figure 5). After removing gutta-percha, the canal was irrigated with sodium hypochlorite and chlorhexidine.



**Figure 2:** Hedstrom File placed in root canal space to engage the gutta-percha.



**Figure 3:** Gutta-percha partially pulled out from periradicular area by hand instrumentation.



**Figure 4: Retrieval of whole gutta-percha cone in single piece with H-File.**



**Figure 5: Radiograph taken to confirm complete removal of obturating material.**

Cleaning and shaping of the canal was done within 1 mm of radiographic apex with light parietal action to avoid canal widening and weakening of root canals. The canal was dried and filled with calcium hydroxide paste. The access cavity was temporarily sealed with IRM. Calcium hydroxide conditioning was performed to allow complete disinfection, control acute

symptoms and to allow further treatment. After two weeks, the tooth was asymptomatic. Calcium hydroxide dressing was removed using manual files and irrigation. MTA plug was placed into root canal using mashing gun and condensed to apical end of root with a plugger. Cotton moistened with sterile water was placed in the canal for twenty four hours to produce ambient humidity for the MTA to achieve its solidification. Back filling of the remaining canal was done with thermo plasticized gutta-percha Obtura II after MTA apical barrier formation was confirmed (Figure 6).



**Figure 6: Apexification procedure carried out with MTA apical plug and canal obturated with thermo plasticized gutta-percha.**

## Discussion

One of the greatest technical difficulties faced by endodontists and general dentists in endodontic retreatment procedure is achieving complete removal of the filling material. Inability to remove material adequately from the root canal can invite repeated failures (13).

Apical over instrumentation and overfilling results in a higher frequency of new periapical lesions and significantly lower frequency of complete periapical healing<sup>14</sup>. In the present case over filling of the obturating material had occurred as there was no apical stop. This led to discomfort for the patient.

Traditionally, gutta-percha was removed by hand files, heated pluggers and ultrasonics along with solvents. These methods have been largely supplemented by Nickel titanium rotary instruments. Gates glidden burs and peso reamers were used before advent of Ni-Ti rotary instruments. The instruments specially designed for retreatment include Pro Taper Universal retreatment system and Safe Sider. Recently Ni-Ti instruments specially designed for removal of filling material introduced in market are MTwo Retreatment Files and R-Endo (15,11). Reciprocating system is also an alternative in retreatment with the advantage of being economical than Ni-Ti rotary system (16).

The use of hand files for root canal treatment has generally found to be tedious and time consuming especially when the canals are well condensed. However some studies have found Hedstrom files to be faster than RaCe™ rotary system (17). Hand instrumentation has also found to be more effective than reciprocating system which may be explained by decreased clinically perceived tactile sensitivity during filling removal in comparison with hand instrument group<sup>18</sup>. The efficiency of Hedstrom files is found to be similar to R-Endo Retreatment files in removing filling material from straight canals. Pro Taper Universal system has also performed well in straight root canals<sup>19</sup>. In the present case, the overextended gutta-percha cone in the relatively straight canal of permanent upper anterior teeth was removed using Hedstrom file. The design of the flutes of the Hedstrom

file facilitates the removal of gutta-perchazo. We preferred not to use any solvent as there was inadequate condensation of gutta-percha; secondly, we wanted to avoid any inadvertent contact of solvent to periradicular tissues especially in the apical part of the root canal.

The success rate of endodontic retreatment ranges from 56-84%. The success of retreatment depends on alterations in natural course of root canals caused by previous treatment and procedural errors (4). In the present case the overextended gutta-percha cone was acting as irritant to periradicular tissue and causing discomfort. We managed to retrieve the cone as single piece. The tooth became asymptomatic following placement of intracanal dressing for two weeks. This dressing probably helped in re-establishing healthy periapical tissue.

We did not opt for surgical treatment as the success rate with apicoectomy is less in immature teeth. The disadvantages of surgical intervention include the difficulty of obtaining the necessary apical seal in the young pulpless tooth with its thin, fragile, irregular walls at the root apex. These walls may shatter during preparation of the retrocavity or condensation of the filling material. The wide foramen results in a large volume of filling material and a compromised seal. Apicoectomy further reduces the root length resulting in a very unfavorable crown root ratio (7).

### Conclusion

Despite being a difficult and time consuming procedure, nonsurgical retreatment is undoubtedly the first choice for the management of endodontic failures when access to root canal is possible (21). Nonsurgical endodontic retreatment procedures have enormous potential for success if the guidelines for case selection are respected

and the most relevant technologies, best materials and precise techniques are utilized (12).

Several retreatment techniques have been investigated trying to describe an effective, faster and easier way to remove gutta-percha and sealer from the root canal but most results have shown that manual instrumentation still plays an important role in this procedure (20).

Careful case assessment and accurate pulpal diagnosis in the treatment of immature teeth is essential to avoid endodontic failure due to over instrumentation or overfilling of the canal space. The inefficiency of treatment to re-establish healthy periapical tissue results in endodontic retreatment (1).

## References

1. Valois CR, Navarro M, Ramos AA, Castro AJ, Gahvya SM. Effectiveness of the ProFile.04 Taper Series 29 files in removal of gutta-percha root fillings during curved root canal retreatment. *Braz Dent J.* 2001; 12(2): 95-99.
2. Abou-rass M. Evaluation and clinical management of previous endodontic therapy. *J Prosthet Dent.* 1982; 47(5): 528-534.
3. Ruddle CJ. Nonsurgical endodontic retreatment. *J Endod.* 2004 Dec; 30(12):827-45.
4. Bhat SV, Suvarna N, Shetty KHN, Varma KR. Comparison of efficiency of gutta percha removal in retreatment using protaper retreatment files, RaCe instruments with and without H files- an ex vivo evaluation. *Endodontology.* 2010; 22(2): 33-43.
5. Khabbaz MG, Papadopoulos PD. Deposition of calcified tissue around an overextended gutta-percha cone: case report. *Int Endod J.* 1999; 32(3): 232-235.
6. American academy of pediatric dentistry. Guideline on pulp therapy for primary and immature permanent teeth. Reference manual 2011-12; 33(6): 212-219.
7. Rafter M. Apexification: a review. *Dent Traumatol.* 2005; 21(1): 1-8.
8. Ezzie E, Fleury A, Solomon E, Spears R, He J. Efficacy of retreatment techniques for a resin-based root canal obturation material. *J Endod.* 2006; 32(4): 341-344.
9. Schirrmeister JF, Meyer KM, Hermanns P, Altenburger MJ, Wrbas KT. Effectiveness of hand and rotary instrumentation for removing a new synthetic polymer-based root canal obturation material (Epiphany) during retreatment. *Int Endod J.* 2006; 39(2): 150-156.
10. Cunha RS, De Martin AS, Barros PP, da Silva FM, Jacinto Rde C, Bueno CE. In vitro evaluation of the cleansing working time and analysis of the amount of gutta-percha or Resilon remnants in the root canal walls after instrumentation for endodontic retreatment. *J endod.* 2007; 33(12): 1426-1428.
11. Mollo A, Botti G, Goldini P, Randellini E, Paragliola R, Chazine M, Ounsi HF, Grandini S. Efficacy of two Ni-Ti systems and hand files for removing gutta-percha from root canals. *International Endodontic Journal.* 2012; 45(1):1-6.
12. Ruddle CJ. Nonsurgical endodontic retreatment. *J Calif Dent Assoc.* 2004; 32(6):474-84.
13. Friedman S, Stabholz A, Tamse A. Endodontic retreatment--case selection and technique. 3 Retreatment techniques. *J endod.* 1990; 16(11): 543-9.
14. Bergenholtz G, Lekholm U, Milthor R, Engstrom B. Influence of apical overinstrumentation and overfilling on re-treated root canals. *J Endod.* 1979; 5(10): 310-314.
15. Kfir A, Tsesis, Yakirevich E, Matalon S, Abramovitz I. The efficacy of five techniques for removing root filling material: microscopic versus

- radiographic evaluation. *International Endodontic Journal*. 2012; 45(1): 35-41.
16. Barletta FB, Rahde Nde M, Limongi O, Moura AA, Zanesco C, Mazocatto G. In vitro comparative analysis of 2 mechanical techniques for removing gutta-percha during retreatment. *J Can Dent Assoc*. 2007; 73(1): 65.
  17. Aguiar CM, Lima GAC, Bernart FD, Camara AC. Effectiveness of the Pro Taper Universal Retreatment system and manual technique in endodontic retreatment. *Acta Stomatol Croat*. 2011; 45(4): 239-246.
  18. Dall Agnol C, Hartann MS, Barletta FB. Computed tomography assessment of the efficiency of different techniques for removal of root canal filling material. *Braz Dent J*. 2008; 19(4): 306-312.
  19. Unal GC, Kaya Bu, Tac AG, Kececi AD. A comparison of the efficacy of conventional and new retreatment instruments to remove gutta-percha in curved root canals: an ex vivo study. *International endodontic Journal*. 2009; 42(4): 344-350.
  20. Bueno CE, Delboni MG, de Araujo RA, Carrara HJ, Cunha RS. Effectiveness of rotary and hand files in gutta-percha and sealer removal using chloroform or chlorhexidine gel. *Braz Dent J*. 2006; 17(2): 139-143.
  21. Hammad M, Qualtrough A, Silikas N. Three-dimensional evaluation of effectiveness of hand and rotary instrumentation for retreatment of canals filled with different materials. *J Endod*. 2008; 34(11): 1370-1373.