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Surgical Management of Overextending Gutta-Percha: A Case Report

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Abstract

This case report presents the surgical management of overextended gutta-percha in a 46-year-old female patient. The patient presented with symptomatic apical periodontitis in a previously treated tooth, which was diagnosed using clinical and radiographic examinations. After unsuccessful non-surgical retreatment, a surgical approach was taken, and the extruded gutta-percha was removed. The root end was prepared, and mineral trioxide aggregate (MTA) was used as a root-end filling material. The patient showed uneventful healing of the respected area, and a porcelain jacket crown was placed on the tooth. This case report highlights the importance of accurate diagnosis and treatment planning, accurate working length determination, bio-mechanical preparation and accurate obturation of the canal in the management of overextended gutta-percha. The use of MTA as a root-end filling material and careful planning and execution in the surgical management of overextended gutta-percha are also emphasized.

Keywords: Overextending gutta- percha, Periapical surgery

Introduction

Overextension of gutta-percha beyond the apex of the tooth is a complication that can arise during root canal treatment, leading to a foreign body reaction in the surrounding tissue. This reaction can trigger an immune response, resulting in the formation of granulation tissue, chronic inflammation and eventually, the destruction of the surrounding bone. The consequences of overextended gutta-percha can be severe, including persistent pain and inflammation, swelling and drainage, and tooth loss due to persistent infection and inflammation.[1][2]

The management of overextended gutta-percha is challenging and requires a comprehensive approach. Non-surgical retreatment is often the first line of treatment, involving the removal of the overextended gutta-percha and re-obturation of the canal. However, in cases where non-surgical retreatment is unsuccessful, surgical intervention may be necessary. Periapical surgery involves the removal of the overextended gutta-percha, periapical curettage and root-end filling with a biocompatible material.[3]

Mineral trioxide aggregate (MTA) is a popular material used for root-end fillings due to its superior biocompatibility and ability to promote tissue regeneration. MTA has been shown to promote the formation of cementum and periodontal ligament, leading to the regeneration of the periapical tissue. However, the use of MTA requires careful handling and placement to ensure optimal results.[4]

This case report describes the surgical management of overextended gutta-percha in a 46-year-old female patient. The patient presented with persistent pain and inflammation in the upper right back tooth region, which was diagnosed as symptomatic apical periodontitis in a previously treated tooth. After unsuccessful non-surgical retreatment, a surgical approach was taken, and the extruded gutta-percha was removed. The root end was prepared, and MTA was used as a root-end filling material.

Case Report

A 46-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in the upper right back tooth region for five months. Patient presented with no medical history.

The patient's dental history revealed a root canal treatment which was done five months back in tooth 14, followed by an amalgam restoration placed as post obturation restoration. Patient had a history of mild intermittent pain in tooth that had undergone root canal treatment. Clinical examination revealed pain on percussion with respect to tooth 14.

Radiographic examination showed overextended gutta-percha with no periapical radiolucency, as shown in figure 1. A provisional diagnosis of symptomatic apical periodontitis in a previously treated tooth was made.

Figure 1: Preoperative Radiograph

A treatment plan was devised, initiating with a non-surgical approach aimed at removing the overextended gutta-percha. However, despite diligent efforts, the non-surgical intervention proved unsuccessful in retrieving the extruded material. Consequently, a surgical approach was deemed the treatment of choice, wherein the overextended gutta-percha was meticulously removed,

followed by a retrograde filling with mineral trioxide aggregate (MTA), ensuring a comprehensive and effective resolution to the patient's presenting complaint. The tooth was anesthetized, and coronal access cavity was prepared by removing the old permanent restoration. The obturating material was removed using a 25#H file, but the extruded remnant gutta-percha remained intact as seen in figure 2.

Figure 2: Old Gutta-percha removed

The working length was determined using a 15#K file and electronic apex locator. Radiograph revealed two separate canals – buccal and palatal with two different orifices as shown in figure 3a & 3b.

Figure 3a: working length palatal canal

Figure 3b: working length buccal canal

Despite another attempt to remove the extruded gutta-percha, it remained in place. Bio-mechanical preparation was done using a step-back technique with #2%K files with copious irrigation using 3% sodium hypochlorite which was agitated by sonic irrigator, followed by saline. Calcium hydroxide dressing was given, and the patient was kept under observation for 2 weeks and patient was sent for CBVI (cone beam volumetric imaging). CBCT reports revealed 4mm of gutta-percha extruding 4mm beyond the palatal canal as shown in figure 4.

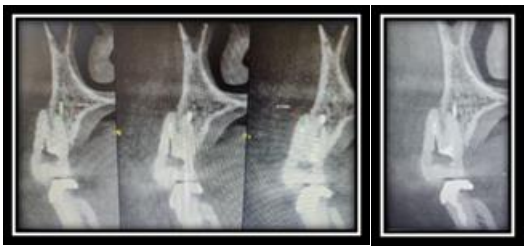

Figure 4: CBVI report- gutta-percha extruding 4mm beyond the palatal canal

Due to persistent symptoms surgical intervention was decided. The canals were flooded with 17% aqueous EDTA (Dent Wash, Prime Dental Products Pvt. Ltd, India) for a minute to assure removal of the smear layer prior obturation and the tooth was obturated 1-day prior using AH plus sealer with cold lateral compaction technique by using #40-2% master cone and #20-2% accessory cones as shown in figure 5.

Figure 5: Obturation

The tooth was anesthetized, and a full mucoperiosteal trapezoidal flap was elevated as shown in figure 6.

Figure 6: Trapezoidal Flap elevate

The bone was found to be completely sound, and the location of the extruded gutta-percha was radiographically verified. A shallow indentation was made in the bone using a round bur in a slow speed straight hand piece. extruded gutta-percha was removed using a blade, and periapical curettage was performed as shown in figure 7

Figure 7: Osteotomy done to expose root-end

Three millimetres of the buccal and palatal root were resected. Root end preparation was done using an ultrasonic tip, and MTA was used as the root-end filling material as shown in figure 8a & 8b.

Figure 8a: Root resection

Figure 8b: MTA Retrograde filling

The flaps were approximated and sutured back to their original position by giving simple interrupted suture as shown in figure 9.

Figure 9: Simple interrupted suture

The patient was prescribed a five-day course of Amoxicillin 250mg, Enzoflam and chlorhexidine mouthwash. Follow-up evaluations were done at one week and three months post-surgery as shown in figure 10a & 10b.

Figure 10a: 1 week follow-up

Figure 10b: 3 month follow-up

The patient was found to be asymptomatic with uneventful healing of the surgical site. A porcelain jacket crown was then placed on tooth 14 as shown in figure 11a & 11b with 1 year follow-up

Figure 11a: 1 year follow-up

Figure 11b: 1 year follow-up clinical photo

Discussion

Gutta-percha (GP) is a popular obturation material due to its ability to adapt to temperature changes and be compacted into canals.[5] However, this characteristic can also lead to overfilling and overextention if an apical stop is absent or excessive pressure is used.[6] Extruded GP can irritate the periapical region, causing inflammation and pain. If not addressed promptly, this can lead to peri radicular lesion formation. [7]

Studies indicate the inflammatory response is proportional to the size of the GP extrusion. [8] Ironically, larger GP masses tend to be encapsulated and cause less intense, localized inflammation than smaller particles. Several studies have also linked extruded GP to neurological complications. [9] [10] [11]

Regardless of the material, any foreign body beyond the apex (like separated files, sealers or GP) can trigger a reaction in connective tissue. [12] The body attempts to either resorb these particles or encapsulate them to promote healing. In our cases, we immediately attempted orthograde retrieval of extruded GP upon detection to prevent future complications.

The present case report highlights the importance of accurate diagnosis and treatment planning in the management of overextended gutta-percha. The patient presented with symptomatic apical periodontitis in a previously treated tooth, which was diagnosed using clinical and radiographic examinations. The treatment plan involved re-root canal treatment followed by periapical surgery and retrograde filling with mineral trioxide aggregate (MTA).

The present case report also highlights the importance of accurate working length determination and bio-mechanical preparation in preventing the overextension of gutta-percha. [16] The working length was determined using an electronic apex locator and a periapical radiograph, and bio-mechanical preparation was done using a step-back technique using 2% Kfiles with copious irrigation.

The use of a step-back technique with copious irrigation is essential in preventing the overextension of gutta-percha.[16] This technique involves the use of a series of files with decreasing diameters to prepare the canal, followed by copious irrigation to remove any debris or bacteria. This technique was used to prepare the canal, and the patient showed uneventful healing of the respected area.

Sealers can also cause inflammatory reactions. The most common practice in endodontics is to obturate the canal system with gutta-percha and sealer. In vitro and in vivo animal studies have shown that most sealers when overfilled induce varying degrees of periapical inflammation.[17][18] In the present case, the canal was obturated using AH plus sealer and cold lateral compaction technique, which is a widely accepted method of obturation. The use of AH plus sealer and

cold lateral compaction technique ensures that the canal is properly sealed, preventing any bacteria or debris from entering the canal.

The surgical management of overextended gutta-percha is a complex procedure that requires careful planning and execution. The use of a full mucoperiosteal trapezoidal flap and radiographic verification of the location of the extruded gutta-percha are essential steps in ensuring the success of the procedure.[15] In the present case, a full mucoperiosteal trapezoidal flap was elevated and the location of the extruded gutta-percha was radiographically verified.

The use of MTA as a root-end filling material is supported by several studies, which have shown its superior biocompatibility and ability to promote tissue regeneration. [13] MTA has been shown to promote the formation of cementum and periodontal ligament, leading to the regeneration of the periapical tissue.[14] In the present case, MTA was used as a root-end filling material, and the patient showed uneventful healing of the respected area.

Conclusion

This case report underscores the efficacy of periradicular surgery in managing endodontic failures associated with overextended gutta-percha. The successful outcome of this case highlights the importance of a multidisciplinary approach, integrating non-surgical and surgical interventions, to achieve optimal treatment results. Furthermore, the use of Mineral Trioxide Aggregate (MTA) as a root-end filling material demonstrates its potential as a successful agent in sealing resected root ends. The report emphasizes the significance of meticulous attention to detail in endodontic therapy, including accurate diagnosis, treatment planning, and execution, to prevent obturation mishaps and ensure favorable treatment outcomes.

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