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Fiber post retrieval and furcal perforation repair in maxillary molar: A case report with one year follow-up

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Abstract

INTRODUCTION. Furcal perforation is a complex endodontic complication that can jeopardize treatment outcomes. Accurate diagnosis and appropriate management are essential to prevent periodontal breakdown and tooth loss.

AIM. This case report aims to present the non-surgical management of a furcal perforation in a maxillary first molar caused by fiber post-placement, emphasizing the role of CBCT, biomaterials, and magnification.

MATERIALS AND METHODS. A 33-year-old female presented with mild pain and swelling in the upper left maxillary region. Clinical examination revealed a sinus tract near the cervical area. Cone Beam Computed Tomography (CBCT) confirmed a furcal perforation with extrusion of a fiber post. The fiber post was carefully removed under magnification using ultrasonic tips. Hemostasis was achieved, and a calcium hydroxide dressing was applied to the perforation site to promote healing. After 10 days, the site was sealed with mineral trioxide aggregate (MTA). The tooth was then permanently restored following core buildup.

RESULTS. At the one-year follow-up, the tooth was asymptomatic. CBCT showed bone healing at the perforation site, and the sinus tract had resolved. Clinical and radiographic evaluation confirmed successful tissue repair and preservation of periodontal health.

CONCLUSIONS. This case highlights the importance of early detection and precise management of furcal perforations. The use of CBCT, magnification, and MTA enables predictable, non-surgical repair. Even in delayed cases, MTA provides effective sealing and promotes long-term clinical success.

Keywords: mineral trioxide aggregate, furcal perforation repair, root canal treatment, perforation repair

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Удаление стекловолоконного штифта и герметизация фуркационной перфорации у моляра верхней челюсти: клинический случай с годовым наблюдением

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Резюме

ВВЕДЕНИЕ. Фуркационная перфорация – это сложное эндодонтическое осложнение, которое может негативно повлиять на исход лечения. Точная диагностика и своевременное лечение имеют решающее значение для предотвращения разрушения пародонта и потери зуба.

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ЦЕЛЬ ИССЛЕДОВАНИЯ. Настоящий клинический случай иллюстрирует нехирургическое лечение фуркационной перфорации первого моляра верхней челюсти, возникшей в результате установки стекловолоконного штифта, с акцентом на значение КЛКТ, биоматериалов и увеличения.

МАТЕРИАЛЫ И МЕТОДЫ. 33-летняя пациентка обратилась с жалобами на умеренную боль и припухлость в области верхней левой челюсти. При клиническом осмотре был выявлен свищевой ход в пришеечной зоне. Конусно-лучевая компьютерная томография (КЛКТ) подтвердила наличие фуркационной перфорации с экструзией стекловолоконного штифта. Удаление штифта было выполнено под увеличением с использованием ультразвуковых насадок. После остановки кровотечения в область перфорации была внесена повязка с гидроксидом кальция для стимуляции репарации. Через 10 дней перфорация была герметизирована минеральным триоксидным агрегатом (МТА). Затем зуб был окончательно восстановлен с формированием культи.

РЕЗУЛЬТАТЫ. Через год после лечения зуб оставался клинически асимптоматичным. По данным КЛКТ наблюдалось восстановление костной ткани в зоне перфорации, свищевой ход был полностью закрыт. Клиническая и рентгенологическая оценка подтвердили успешное восстановление тканей и сохранение пародонтального здоровья.

ВЫВОДЫ. Данный клинический случай подчеркивает важность раннего выявления и точного нехирургического ведения фуркационных перфораций. Применение КЛКТ, оптического увеличения и МТА обеспечивает предсказуемое и эффективное восстановление даже при отсроченном вмешательстве, способствуя долгосрочному клиническому успеху.

Ключевые слова: минеральный триоксидный агрегат, герметизация фуркационной перфорации, лечение корневых каналов, восстановление перфорации

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INTRODUCTION

Furcal perforation is one of the most undesirable and frequently encountered procedural accidents in endodontics, occurring at various stages of treatment. It is often caused by using burs with inappropriate dimensions, improper angulation during pulp chamber ceiling removal, or attempts to locate root canal orifices in calcified pulp chambers. Accidental perforations account for up to 29% of all endodontic mishaps, with 87% of these occurring in the pulp chamber of molars. The management of perforations can be approached surgically or non-surgically, depending on the clinical scenario [1; 2].

The prognosis and treatment planning for this complication are influenced by key factors, including the etiology, location, size, and time elapsed before repair. Small, fresh perforations located in the coronal or apical third of the root generally have a favorable prognosis. Conversely, untreated perforations in pulp chamber floors are linked to poor outcomes, historically often necessitating tooth extraction. Although calcium hydroxide emerged as a repair material offering an alternative to extraction, its limited physical and chemical properties often resulted in suboptimal outcomes, particularly for larger perforations [2].

The introduction of mineral trioxide aggregate (MTA) in the 1990s marked a significant advancement in managing perforations. MTA, a calcium silicate-based material composed of mineral oxides such as tricalcium silicate, tricalcium aluminate, and tricalcium oxide, has been extensively studied and is recognized

for its superior performance in various clinical applications, including perforation repair, apexification, and pulp capping. With a high pH of 12.5 and the ability to set within approximately four hours in the presence of moisture, MTA offers enhanced sealing ability, biocompatibility, and long-term stability, making it a gold standard for managing complex cases of perforation [3; 4].

The objective of this case report is to describe the management of a pulpal floor perforation in a maxillary first molar, caused by the placement of a fiber post extending beyond the furcation area. The fiber post was carefully retrieved under a dental operating microscope, and the perforation was successfully repaired using mineral trioxide aggregate. Clinical and radiographic outcomes were evaluated over a one-year follow-up period.

CASE REPORT

A 33-year-old female patient visited the Department of Conservative Dentistry and Endodontics, reporting swelling in the gums and mild pain in the upper left back region of her oral cavity. Her dental history revealed that she had undergone endodontic treatment on the upper left first molar three months prior, and a post and core had been placed during the last procedure. The patient's medical history was non-contributory.

Upon initial clinical examination, a sinus tract was observed in the gingival mucosa near the radicular cervical region of the maxillary left first molar with small swelling (Fig. 1, A).

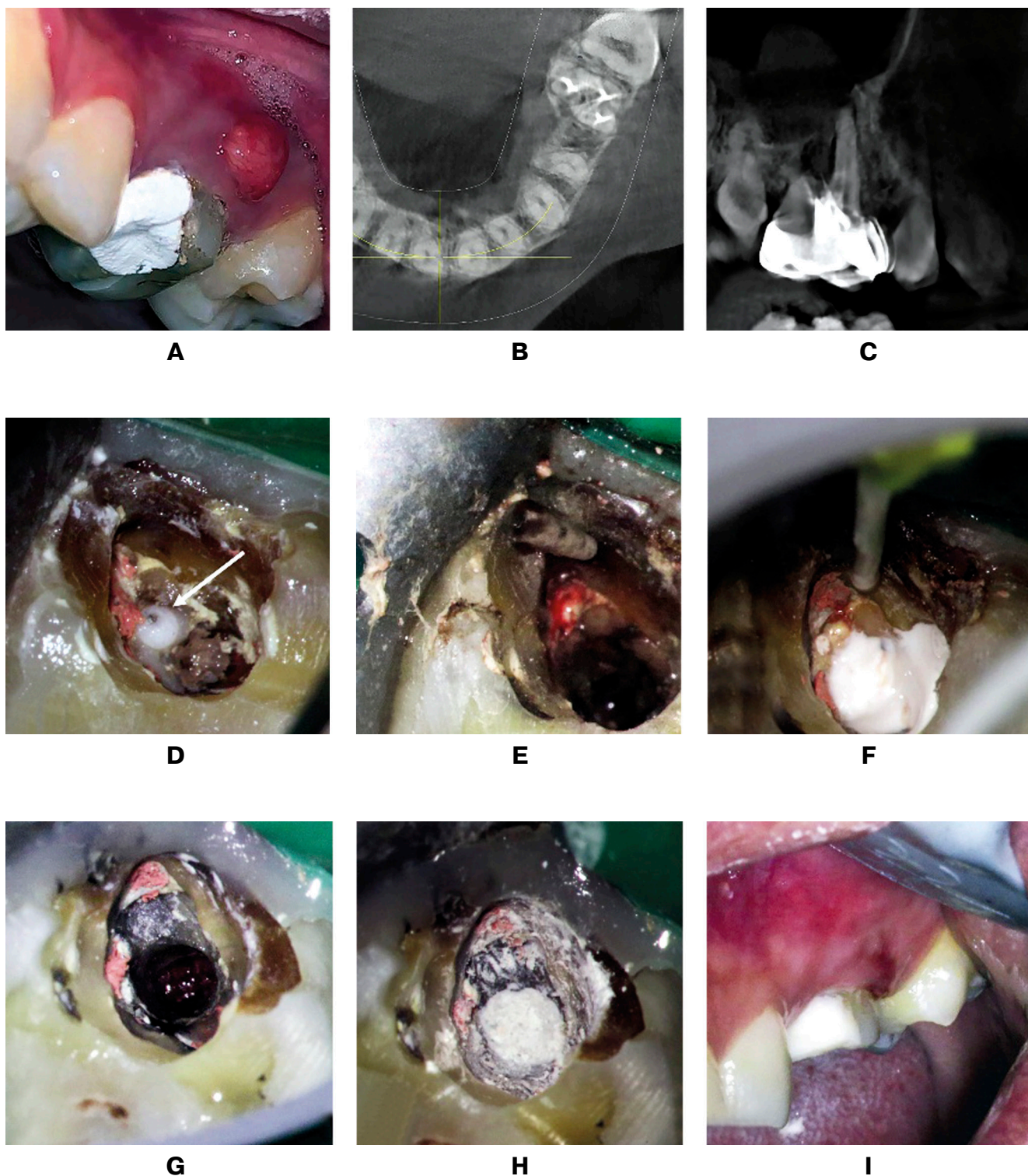


Fig. 1. Clinical examination of the patient: A – preoperative clinical image with sinus tract; B – axial CBCT showing perforation; C – coronal CBCT showing extruded fiber-post; D – pulp chamber floor with perforation (arrow); E – fiber-post retrieved; F – calcium hydroxide (CH) placement; G – follow-up after CH placement; H – MTA application; I – healed sinus

Рис. 1. Клинические обследования пациентки: А – предоперационное клиническое изображение с наличием свищевого хода; В – аксиальный срез КЛКТ, демонстрирующий область перфорации; С – корональный срез КЛКТ с визуализацией экструзии стекловолоконного штифта; D – дно пульпарной камеры с перфорацией (указано стрелкой); E – извлеченный стекловолоконный штифт; F – внесение гидроксида кальция (CH); G – контрольное обследование после размещения CH; H – аппликация минерального триоксидного агрегата (MTA); I – заживший свищ

No pocket was present at probing. A cone-beam computed tomography (CBCT) scan of the area, revealed a radiopaque structure extending beyond the furcation, suggesting a perforation with a post in the furcation from the floor of the pulp chamber (Fig. 1, B & C). Since the previous endodontic therapy was in an acceptable state, only perforation repair was planned. The patient was informed about all available treatment options, including the prognosis for each. With the patient's consent, a non-surgical endodontic treatment was planned, to be performed under the dental operating microscope.

Absolute isolation of the operative field was achieved before proceeding. After coronal access, visual inspection at the pulp chamber floor confirmed the presence of a furcal perforation. A portion of the fiber post remained, extending beyond the furcation, as corroborated by Cone Beam Computed Tomography (CBCT) findings. Active bleeding from the perforation site indicated an unhealed and persistent defect around the fiber post (Fig. 1, D). The portion of the fiber post extending beyond the furcation was carefully removed using ultrasonic tips (ED 12 ultrasonic tips (Guilen Woodpecker, China) (Fig. 1, E) Bleeding at the furcation site was controlled with 2.5% sodium hypochlorite, and no granulation tissue was found. To aid healing, a water-based calcium hydroxide dressing (Ultracal XS, Ultradent, Jordan) was placed at the furcation site for 10 days (Fig. 1, F).

At the 10-day recall, the sinus opening had fully healed the swelling had regressed completely, and there was no bleeding at the perforation site (Fig. 1, G). The perforation was sealed with MTA Angelus, and a moist cotton pellet was placed in the pulp chamber to maintain a humid environment conducive to MTA solidification (Fig. 1, H). A CBCT showed extrusion of MTA into the periradicular tissues and closure of the defect. The

tooth was temporarily restored with Cavit until the next appointment.

The patient returned in 3 days, reporting no symptoms or discomfort and resolution of the sinus (Fig. 1, I). The temporary restoration and damp cotton pellet were carefully removed, and an explorer was used to assess the hardness of the MTA. The perforation site was covered with type II glass ionomer cement, followed by dual-cure core buildup using a total-etch protocol. The tooth was temporized with a provisional crown for one month and restored permanently.

Follow-up clinical and CBCT examinations conducted 365 days after the intervention demonstrated successful bone repair in the interradicular area, and the absence of any clinical signs or symptoms indicated the healing of the furcal perforation (Fig. 2).

DISCUSSION

Perforations can be managed using both surgical and non-surgical approaches. However, surgical interventions are often associated with complications such as loss of periodontal attachment, chronic inflammation and furcation defects. In contrast, non-surgical management has shown success rates exceeding 70% [5].

The prognosis of perforated teeth depends on several factors, including the extent of periodontal damage, perforation size, proximity to the gingival sulcus, time elapsed before repair, quality of the seal, procedural sterility, and the biocompatibility of the repair material. Optimal healing outcomes are achieved when perforations are sealed immediately. Nevertheless, in our case, a perforation that occurred three months prior also demonstrated signs of healing, highlighting that delayed repair can yield positive outcomes and should be attempted when feasible [6–8].

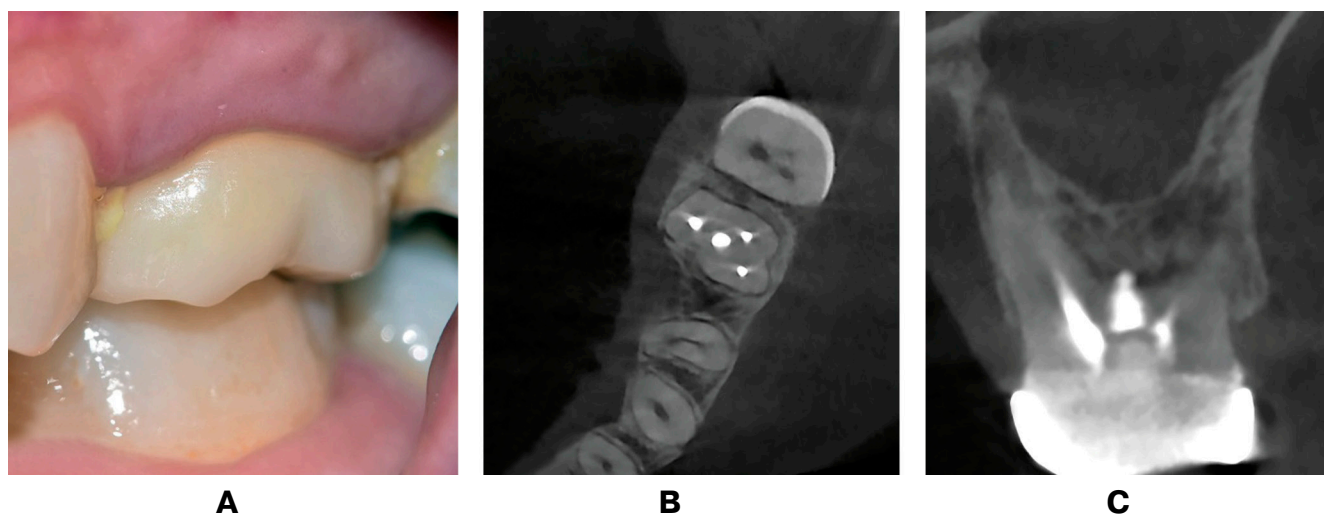


Fig. 2. One-year follow-up: A – clinical image showing absence of any sinus or swelling; B – axial CBCT showing sealed perforation area; C – coronal CBCT showing sealed perforation area

Рис. 2. Контроль через один год наблюдения: А – клиническое изображение, демонстрирующее отсутствие свища и отека; В – аксиальный срез КЛКТ, показывающий герметично закрытую область перфорации; С – корональный срез КЛКТ, демонстрирующий герметичную obturation зоны перфорации

As emphasized, accurately identifying the location of a perforation is essential for selecting the most appropriate repair material. In this case, CBCT imaging was instrumental in precisely locating the perforation and the position of the fiber post, thereby aiding in diagnosis. Additionally, CBCT provided detailed information about the defect's size, facilitated 3D reconstructions, and enabled evaluation of the morphology of surrounding structures [9].

The choice of repair material is critical to achieving favorable clinical outcomes. Ideal materials should possess appropriate physicochemical, antimicrobial, and biocompatible properties to effectively restore periodontal and dental architecture. These materials should induce minimal inflammation while promoting the formation of a mineralized tissue barrier over time [10; 11].

MTA has been extensively researched and is regarded as the gold standard for repairing furcal perforations. Systematic reviews of the histological response of the periodontium to MTA consistently highlight its ability to meet the criteria for an ideal repair material [12; 13].

One significant challenge in non-surgical perforation repair is preventing the extrusion of material into peri-

radicular tissues. Although various barriers have been proposed, their efficacy remains limited. MTA, with its superior sealing ability, biocompatibility, and capacity to promote cementum formation – even when extruded into periradicular tissues – is considered the ideal material for repairing large perforations, even in the absence of a barrier [13].

This case report underscores the importance of clinician experience and the use of magnification in successfully managing perforations, aligning with findings from other studies [14; 15].

CONCLUSION

This case report highlights the successful clinical management of furcal perforations repaired using MTA, demonstrating positive clinical outcomes. It underscores the importance of a systematic approach to diagnosis and treatment planning for achieving favorable clinical and radiographic results. Advances in imaging technology, biomaterials, and magnification have significantly improved clinicians' ability to handle complex perforations. CBCT serves as a valuable imaging modality that can be utilized in select cases to aid in diagnosis and treatment planning.

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Piyush Oswal – validation, data curation, writing – review & editing.

Ajay Praveen – project administration, validation, writing – review & editing.

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