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Case Report

Successful non-surgical repair of a large furcal perforation using endodontic biomaterials: A case report of 30-month follow-up

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Iatrogenic furcal perforation is a highly challenging endodontic complication, often leading to poor outcomes from microbial leakage and periodontal tissue destruction.[1] The prognosis depends on several factors, including the size/location of the perforation, the delay before repair, and the sealability/biological properties of the repair material. While traditional materials, such as amalgam, have shown limited success, calcium silicate-based cements, including mineral trioxide aggregate and calcium-enriched mixture (CEM) cement, demonstrate superior performance.[2] These biomaterials offer excellent sealing, antimicrobial activity, biocompatibility, and the ability to stimulate hard tissue formation, i.e., cementogenesis/osteogenesis.[3,4] This report details the successful nonsurgical management of a large mandibular molar furcal perforation using CEM cement, with 30-month follow-up confirming complete healing and tooth preservation, underscoring the efficacy of this approach even in complex cases.

A 39-year-old female patient presented with the chief complaint of intermittent pain and recurrent swelling in the left posterior mandibular region. Her medical history was non-contributory. Clinical examination revealed a localized abscess in the furcation area of the mandibular left first molar (Fig. 1A). The tooth was restored with amalgam, exhibited no abnormal mobility, and was non-vital,

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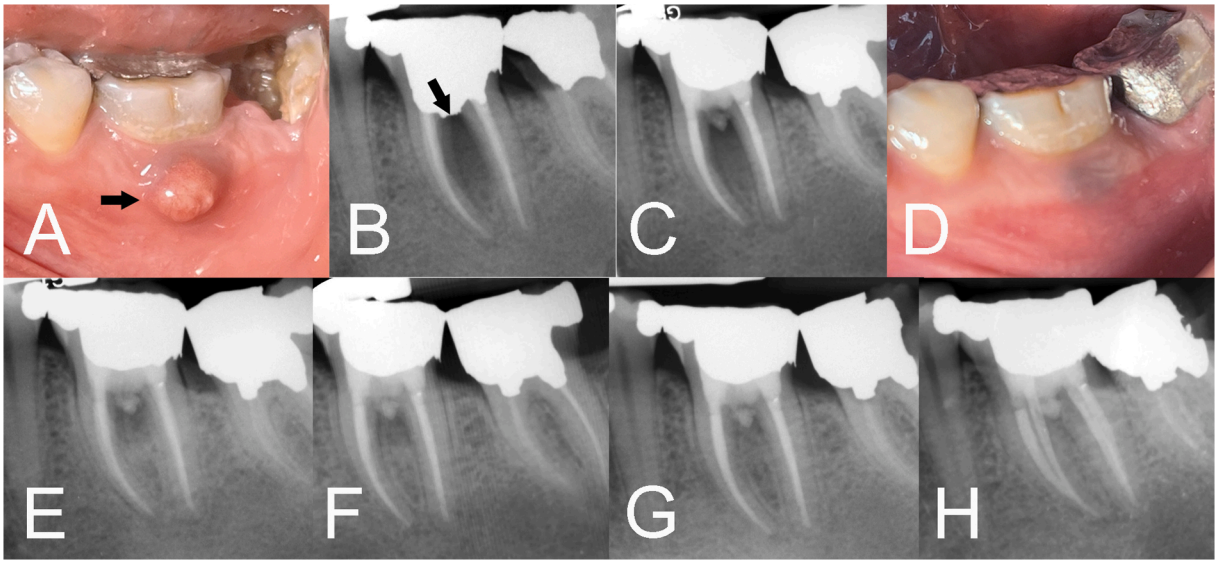

Figure 1 Clinical and radiographic sequence demonstrating the successful management of a large furcal perforation. (A) Preoperative intraoral photograph showing a localized abscess in the furcation region (black arrow) associated with the mandibular left first molar. (B) Preoperative periapical radiograph revealing a large intra-radicular radiolucent lesion in the furcation area (black arrow), consistent with a significant furcal perforation previously repaired with amalgam. The root canal treatments of both roots appear acceptable. (C) Immediate post-operative radiograph following endodontic re-intervention, demonstrating repair of the extensive furcal perforation with calcium-enriched mixture cement. A minor extrusion of biomaterial is visible; the repair material effectively seals the entire pulpal floor, including the perforation site, and serves as an orifice barrier. (D) Clinical photograph at the two-week follow-up showing complete resolution of the sinus tract and healthy gingival tissues. (E) Twelve-month follow-up radiograph demonstrating a marked reduction in furcal radiolucency with signs of bone regeneration. (F) Eighteen-month follow-up radiograph showing continued osseous healing and further reduction of radiolucency. (G) Twenty-four-month follow-up radiograph revealing complete resolution of the furcal lesion with well-defined trabecular bone formation. (H) Thirty-month follow-up radiograph confirming complete healing with restored periodontal architecture, thereby establishing the long-term success of the perforation repair.

consistent with previous root canal treatment (RCT). Periodontal probing depth was within normal limits (<3 mm). Initial radiograph revealed a large intra-radicular radiolucent lesion in the furcation area, consistent with a significant perforation (Fig. 1B). The image showed a previous amalgam repair. At the same time, the root canal fillings in both roots appeared radiographically acceptable. Importantly, the amalgam perforation repair procedure had been carried out ~1 year earlier, following the initial RCT, and was unsuccessful. Based on the combined clinical/radiographic findings, the case was diagnosed as a previously RCT-treated tooth with furcal perforation and chronic localized abscess.

Non-surgical endodontic re-intervention was performed. Following removal of the coronal restoration and previous repair material/amalgam, the perforation site was meticulously debrided and disinfected. The defect was then repaired with CEM cement. Immediate postoperative radiography demonstrated that the biomaterial sealed/filled the pulpal floor, including the perforation site, while also functioning as an orifice barrier. A small extrusion of biomaterial into the furcal lesion was evident (Fig. 1C). The tooth was subsequently restored with amalgam.

At the two-week follow-up, clinical examination revealed complete resolution of the localized abscess and healthy gingival tissues (Fig. 1D). Serial radiographic follow-ups at subsequent intervals (12, 18, 24, and 30 months, respectively) showed progressive resolution of the furcal radiolucency and evidence of complete bone regeneration, confirming long-term success of the repair (Fig. 1E–H). The patient expressed satisfaction with the outcome, noting relief of symptoms and preservation of her natural tooth.

This case highlights the importance of selecting advanced biomaterials in managing complex perforations. Despite the typically poor prognosis associated with a one-year delay after an unsuccessful amalgam repair, complete healing was achieved. The favorable outcome is attributed to the superior sealing ability, antibacterial properties, and bioactivity of CEM cement, which supported periodontal tissue repair/regeneration via bio-obturation.[5] This demonstrates that bioactive endodontic materials can provide predictable long-term outcomes and should be considered the material of choice for perforation repair.

Declaration of competing interest

The author has no conflicts of interest relevant to this report.

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