Journal of Dental Sciences 20 (2025) 2521–2523

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.e-jds.com

Correspondence

Bio-obturation in traumatized mandibular teeth: A complex case report

KEYWORDS
Endodontics;
Incisor;
Mineral trioxide aggregate;
Periapical periodontitis;
Tooth resorption;
Tooth root

Traumatic dental injuries involving luxation, intrusion, and root fractures often compromise the pulp and periapical tissues. If not adequately managed, these injuries may lead to pulp necrosis, external root resorption, and extensive periapical pathology.[1] Conventional root canal obturation with gutta-percha/sealer may be insufficient in complex cases complicated by incomplete treatment, fractured instruments, or severe bone destruction. Bioactive calcium-silicate materials, such as MTA and calcium-enriched mixture (CEM) cement, offer a biologically favorable alternative by promoting sealing, antibacterial effects, and periapical healing.[2] We presented a challenging case of five traumatized mandibular anterior teeth managed successfully using CEM-based bio-obturation.

A 25-year-old male presented with spontaneous pain, facial swelling, and systemic signs, including fever/malaise. The patient reported a traumatic incident about one month earlier, which resulted in luxation of the four mandibular incisors and intrusion of the left mandibular canine (tooth 33). Incomplete endodontic treatment had been initiated at another clinic. Incomplete endodontic treatment had been initiated at another clinic. The clinical examination revealed grade II-III mobility in the incisors, intrusion of tooth 33, and localized inflammation. Radiographic evaluation showed large periapical radiolucencies, a horizontal root fracture of tooth 33, severe external root resorption of tooth 42, residual intracanal materials, and a fractured endodontic file in tooth 33 (Fig. 1A and B).

A diagnosis of acute apical periodontitis was made for teeth 31, 32, 33, 41, and 42. Emergency endodontic treatment was performed under local anesthesia. Access cavities were refined, and root canal debridement was achieved using both hand and rotary instruments, with irrigation performed with 5.25 % NaOCl.[3] The separated instrument in tooth 33 was retrieved. Calcium hydroxide was placed in all canals as an intracanal medicament, followed by temporary restoration (Fig. 1C and D). The patient received systemic antibiotics and a 0.12 % chlorhexidine mouth rinse.

After three weeks, the patient was asymptomatic. Definitive bio-obturation was carried out using CEM cement.[4] The biomaterial was mixed per the manufacturer's instructions and placed into the root canals using a carrier. Apical compaction was performed with a hand-plugger one size smaller than the master apical file. Coronal compaction was done incrementally using appropriate hand pluggers (Fig. 1E and F). In tooth 42, extrusion of biomaterial occurred through a resorptive midroot perforation. All access cavities were permanently restored using composite resin.

At the six-month follow-up, the patient remained symptom-free. All treated teeth were functional, and

https://doi.org/10.1016/j.jds.2025.07.021

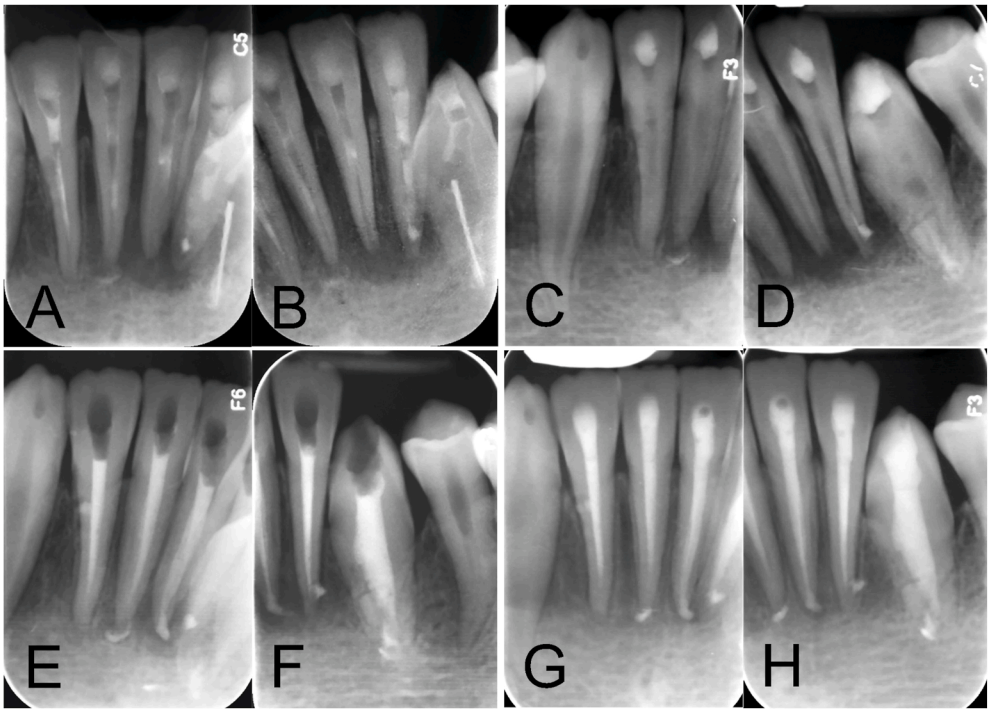

Figure 1 Radiographic progression of mandibular anterior teeth managed with bio-obturation using calcium-enriched mixture (CEM) cement. (A and B) Preoperative radiographs showed incomplete root canal treatment, extensive periapical radiolucencies, severe external root resorption of tooth 42, and a fractured endodontic instrument in the canal of intruded tooth 33. (C and D) Post-instrumentation views demonstrate near-complete removal of intracanal materials, retrieval of the broken instrument from tooth 33, persistent resorptive defects of tooth 42, and a horizontal midroot fracture of tooth 3. (E and F) Immediate post-obturation radiographs confirm complete CEM cement bio-obturation of the canals. Note biomaterial extrusion through a mid-root perforation in tooth 42. (G and H) Six-month follow-up images show complete resolution of periapical lesions and evidence of bony regeneration around all treated teeth.

radiographs showed complete healing of periapical lesions, with evident bone regeneration in previously compromised areas, including around the fractured and resorbed roots (Fig. 1G and H).

The favorable clinical outcome highlights the value of CEM cement as a bio-obturation material. Its high pH, hydroxyapatite-inducing capability, and antimicrobial properties contribute to its sealing ability and biocompatibility.[5] The material's adaptability to irregular canal anatomy and its tolerability when extruded into periapical tissues were evident in this case. Notably, the healing observed in tooth 42, despite material extrusion, supports its safety in clinical use.

This case illustrates that CEM-based bio-obturation can be an effective and biologically driven strategy for managing endodontic challenges associated with dental trauma, apical pathology, and procedural complications. We encourage further clinical studies to validate these findings and support the broader implementation of bio-obturation protocols using CEM cement.

Declaration of competing interest

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

Acknowledgements

NA.

References

1. Kao CI, Huang TH, Chiang HH. Delayed expression of dental trauma-induced external root resorption. *J Dent Sci* 2021;16:1308—9.
2. Kim B, Lee YH, Kim IH, et al. Biocompatibility and mineralization potential of new calcium silicate cements. *J Dent Sci* 2023;18:118998.
3. Mohammadi Z, Shalavi S, Giardino L, Palazzi F, Asgary S. Impact of ultrasonic activation on the effectiveness of sodium hypochlorite: a review. *Iran Endod J* 2015;10:216—20.
4. Asgary S. Bio-obturation: a novel approach in root canal treatment using endodontic biomaterials. *Iran Endod J* 2025;20:e15.
5. Asgary S, Aram M, Fazlyab M. Comprehensive review of composition, properties, clinical applications, and future perspectives of calcium-enriched mixture (CEM) cement: a systematic analysis. *Biomed Eng Online* 2024;23:96.

Saeed Asgary
Iranian Centre for Endodontic Research, Research Institute of Dental Sciences, Shahid Beheshti University of Medical

Sciences, 5th Floor, School of Dentistry, Daneshjoo Blvd., Evin, Tehran 1983963113, Iran
E-mail address: saasgary@yahoo.com

Received 21 July 2025
Final revision received 22 July 2025
Available online 5 August 2025