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Management of Curved Canals in a third molar with radix : A Case Report

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Abstract

Management of curved root canals poses significant challenges in endodontics due to increased risk of procedural errors such as ledge formation, transportation, or instrument separation. Mandibular third molars, with their complex root morphology, often present additional difficulty in achieving thorough cleaning, shaping, and obturation. This case report describes the successful endodontic management of a mandibular third molar with severely curved canals in a young patient with irreversible pulpitis.

Keywords: curved root canals, transportation, mandibular third molar

Introduction

Endodontic treatment success depends on thorough cleaning, shaping, and obturation of the root canal system while preserving the original canal anatomy. However, root canal curvature presents a significant clinical challenge, increasing the risk of procedural complications such as ledge formation, canal transportation, apical zipping, and instrument separation. These difficulties are magnified in mandibular third molars, which often exhibit complex and variable root morphologies, including severe curvatures, accessory canals, dilacerations, and multiple root configurations.

The mandibular third molar, being the most posterior tooth in the arch, is further complicated by limited access, restricted mouth opening, and interference from surrounding soft tissues such as the cheek and tongue.

Successful management of such canals requires careful preoperative assessment using multiple angulated radiographs and, when available, cone-beam computed tomography (CBCT) for three-dimensional visualization. The choice of instruments and techniques is critical—flexible nickel-titanium (NiTi) files, the creation of a reproducible glide path, and the adoption of a crown-down or hybrid instrumentation technique can significantly reduce stress on the files and the tooth structure. Adequate irrigation with agents such as sodium hypochlorite and ethylenediaminetetraacetic acid (EDTA) is essential to aid in debridement and smear layer removal, especially in areas inaccessible to mechanical instrumentation.

Case Report :

A 32 year old female patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of severe pain in the lower left back region of the jaw. On clinical examination, deep occlusal caries was evident with tooth 38. The patient gave a history of continuous night pain and came to seek immediate treatment as the pain was unbearable.

On radiographic examination, the tooth 38 revealed a third root (radix) with extreme curvatures in all three roots. As the mouth opening was adequate and there was straight line access to the apical third, the treatment plan was conventional root canal treatment with flexible hand Ni-Ti files and rotary Ni-Ti files with meticulous management outweighing the risks of ledge formation, zipping, transportation and instrument fractures.

Pre-operative radiograph Treatment

In the first appointment, local anesthesia was administered by inferior alveolar nerve block. The patient was kept on analgesics as the pain was severe.

Rubber dam isolation was achieved and access opening of #38 was done with endo access bur.

DG 16 was used to locate the orifices of root canal. Then pulp chamber modification was done using Endo Z bur. On close examination of floor of pulp chamber 3 orifices were located (MB,ML & D). Straight line access was gained in all the three canals. 8 number hand files were placed into these orifices and radiograph was taken. Then coronal pre-flaring was done with orifice opener until coronal third of canals.

Then saline irrigation was done and no. 8 hand k file was used to negotiate the canals and curvatures apically. Once the canals were negotiated, the working length was determined using apex locator. Pulp tissue was removed. Cleaning and shaping was done using hand k files, hand NiTi files and rotary files. Hand filing was done till 15 k files with continuous intermittent recapitulation with 10k file.

Then canals were further enlarged with 15, 20, 25 no NiTi hand files. Balanced force technique was used for shaping of canals with hand files. After that rotary pathfinder 17 no 4% was used followed by preparation till 25 no 4% rotary file. The canals were irrigated in between with saline and 5.25 % sodium hypochlorite solution. The canals were dried using paper points.

The master cone gutta percha points (25 no. 4%) were placed and confirmation was done using radiograph. The canals were obturated with gutta percha and sealmax was used as root canal sealing material. Excess gutta percha was removed and condensed. Temporary dressing was placed.

Patient was recalled after 7 days and final post-obturation restoration was done. The patient was asymptomatic at 6 months follow-up.

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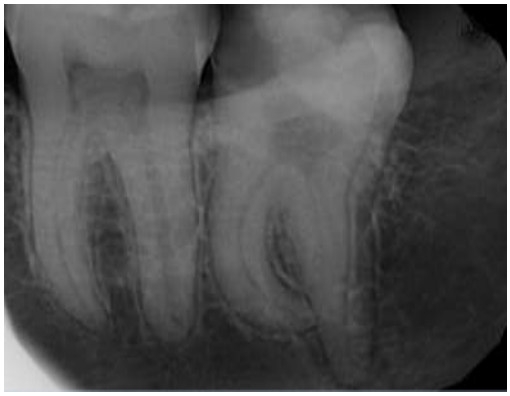
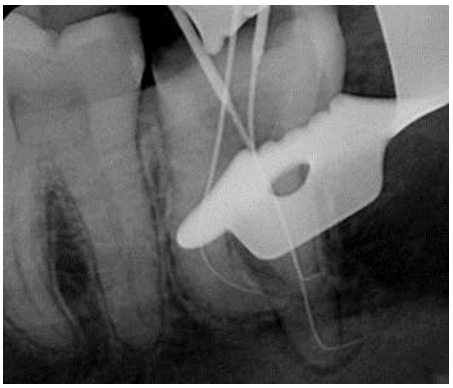
Pre-operative RVG with 38



Working length RVG with 38



Master cone IOPA with 38

Post-operative IOPA with 38

Post-operative IOPA 38 Follow-up after 6 months

Discussion

Managing severely curved canals remains one of the most technically demanding scenarios in endodontics because curvature magnifies the risks of ledging, transportation, zipping, strip perforation, and instrument separation. The foundational literature underscores that curvature must be described both by angle and radius, because a short radius ("abrupt" curve) imposes far greater stress on instruments than an identical angle with a long radius.

Historically, Schneider introduced a single-angle radiographic method, which remains widely cited; however, Pruett and co-workers advanced the field by incorporating radius, offering a more clinically relevant depiction of curvature severity and fatigue risk for NiTi instruments.

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A glide path is now considered non-negotiable in curved canals. Evidence indicates that establishing a manual or engine-driven glide path diminishes torsional stress, reduces canal transportation, and markedly lowers the fracture incidence of shaping files—sometimes extending instrument lifespan several fold. When used judiciously (e.g., ProGlider/slider files), the rotary glide path can be more centered than stainless steel in tight, curved anatomy. In our case, glide path creation allowed the definitive shaping file to progress with reduced torsional load and more predictable apical control.

Conclusion

This case report showcased the successful endodontic management of severely curved root canals in a mandibular third molar with an extra root. Successful endodontic management of curved canals requires meticulous assessment of canal anatomy, careful negotiation, and preservation of the original curvature. In this case, the use of a structured approach—combining accurate working length determination, glide path preparation, flexible heat-treated NiTi instrumentation, and activated irrigation—enabled thorough cleaning and shaping while minimizing procedural errors. Adherence to such evidence-based strategies can improve outcomes and reduce complications in challenging curved canal cases.

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