

## Case Report

### Conservative management of large facial mid-root perforation: A Case report

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#### ABSTRACT:

Perforation is an artificial communication between the root canal system and supporting tissues of the teeth which can be either pathologic or iatrogenic. Root perforation complicates the treatment and affect the prognosis of tooth. A wide variety of materials and techniques are available to seal the perforation, but nonsurgical approach should be tried first in feasible cases. Successful treatment mainly depends on effective and timely sealing of the defect. Orthograde perforation repair can be challenging for clinicians because bleeding/exudation often makes access to the perforation area difficult. The purpose of this case report is to describe the conservative, non-invasive and orthograde approach for management of large facial mid root perforation on a maxillary central incisor with the help of Biodentine. The signs and symptoms ceased and the result was satisfactory at the 18 months follow-up visit.

**Key words:** Perforation; CBCT; Orthograde repair; Biodentine.

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#### INTRODUCTION

The American Association of Endodontists (AAE) Glossary of Endodontic Terms defines perforations as mechanical or pathological communications between the root canal system and the external tooth surface.<sup>1</sup> Iatrogenic root perforation is a procedural mishap which may occur at any stage of root canal therapy, from access cavity to post space preparation. According to Kvinnsland et al.<sup>2</sup>, 53% of iatrogenic perforations occur during insertion of posts (prosthodontic treatment); the remaining 47% are induced during routine endodontic treatment. Presence of pre-operative perforations were associated with increased failure rate in non-surgical retreatment procedures.<sup>3</sup> Both management and prognosis is associated with the site of the defect, size of the defect, and the time elapsed between the occurrence and repair. Several materials and techniques have been used earlier to address this kind of problem either surgically or nonsurgically.<sup>4</sup> Orthograde perforation repair can be challenging for clinicians because bleeding/exudation often makes access to the perforation area difficult.

A wide variety of materials to seal the perforations have been suggested in literature. There are many comparative studies showing the efficacy of one material over the other. An ideal material for perforation repair should be radiopaque, biocompatible, non resorbable, should seal the perforation against bacterial ingress, and should induce healing in periodontal tissues.<sup>5</sup> This paper presents the orthograde management of large facial midroot perforation on a maxillary central incisor with the help of Biodentine. Biodentine is a calcium silicate-based bioactive material. It is a powder liquid system, powder composed of Tri-calcium silicate, Di-calcium silicate, Calcium carbonate and oxide, Iron oxide, Zirconium oxide. Liquid consist of Calcium chloride, Hydro soluble polymer.

#### CASE REPORT

A 25-year-old female patient presented in the OPD with a history of a nonsurgical root canal treatment on the right maxillary central incisor 6 months back. She mainly complained about the recent development of small swelling on the labial aspect with respect to the same

tooth (Figure 1). The medical history was noncontributory; she had good oral hygiene and a normal healthy gingiva except at the labial surface adjacent to the involved tooth 11. Tooth 11 was discolored and showed an access cavity filled with a temporary dressing on the palatal surface of the crown. The probing of the gingival sulcus was normal but it was slightly responsive to percussion. An Introral periapical radiograph was taken which showed a radiolucency superimposed on the canal outline altering it. It also showed diminished canal outline denoting calcification in the apical third of root (Figure 2). Temporary restoration was removed carefully under rubber dam isolation. Upon direct examination perforation on labial aspect of the root was suspected (Figure 3a,b). To confirm the diagnosis of root perforation CBCT was performed, which clearly showed perforation on labial aspect at middle third level of the root and calcified apical third of canal.(Figure 4a,b)(Figure 5a,b). Decision to attempt a nonsurgical root canal treatment and repair of the perforation was made after informing the patient of the different treatment options.

The root canal was prepared by circumferential filing using H files with copious amounts of 3% sodium hypochlorite solution (Parcan, Septodont, Saint Maurice-Foss'es, France) between each instrument use. Once the cleaning and shaping was completed, the site of the perforation was cleaned with an ultrasonic tip (ET 18D, Act'eon, M'erignac, France) under sterile water spray. Canal and the perforation site were dried completely. A small moist cotton pellet was packed into the canal at the level apical to the site of perforation, to enclose the canal path and prevent inadvertent falling of the cement inside the canal. Then the mixture of Biodentine powder (Septodont) with liquid was prepared according to the ratio recommended by the manufacturer . A first amount of the mixture was carried with a Micro Apical Placement System (Dentsply)), the excess of moisture was blotted with the blunt tip of a sterile paper point in order to stabilize the cement in situ, and the defect was completely filled in successive increments of material (Figure 6). The tip of a paper point was cut off and moistened with sterile water before being placed in contact with the dampened cement. Then a master cone x ray was taken and canal was obturated with the help of Gutta Percha and sealapex sealer according to the Schilder's warm vertical condensation technique (Figure 7). The access cavity was

filled with a glass ionomer cement (Ketac Fil, 3M ESPE, Saint Louis, MN) covered with a resin composite restoration (EsthetX, Dentsply Caulk, Milford, Delaware). Post operative CBCT was taken to confirm the complete sealing of perforation defect and canal (Figure 8).

At the recall appointment after 3 weeks, tooth 11 was completely asymptomatic, the swelling had disappeared. Then the case was planned for an All Ceramic crown. Tooth preparation was done (Figure 9) and All ceramic crown was placed rehabilitating the total form and function of tooth (Figure 10). Case was followed upto 18 months showing no sign or symptom either clinically or radiographically (Figure 11).



Figure 1: Preoperative image showing swelling on the labial aspect with respect to 11.



Figure 2: Preoperative IOPA showing a radiolucency superimposed on the canal outline altering it.



Figure 3: Upon direct examination of perforation site on labial aspect of the root was suspected after removal of temporary restoration under rubber dam.

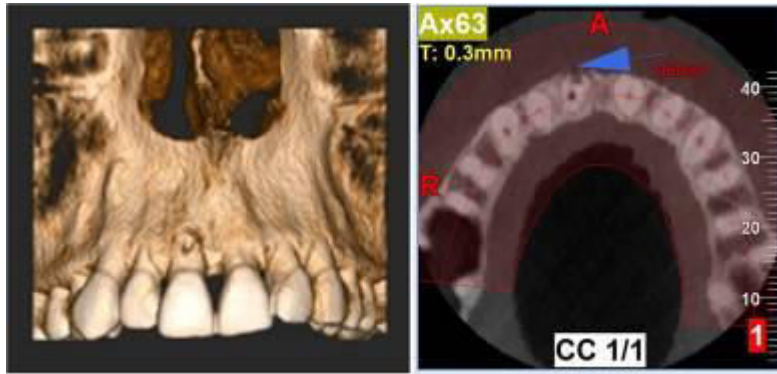


Figure 4: CBCT clearly showing perforation on labial aspect of the root.

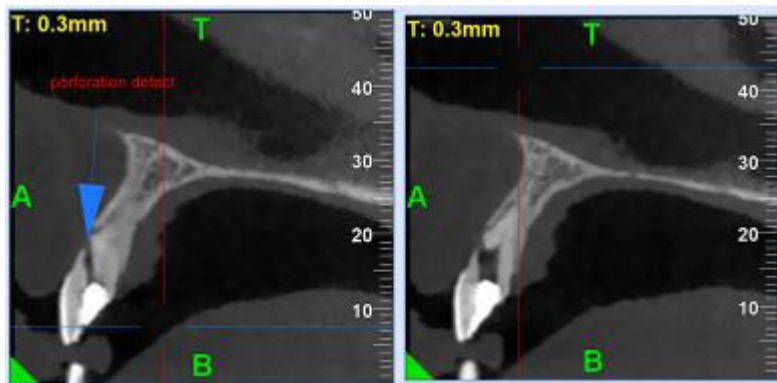


Figure 5: Sagittal section showing perforation at middle third level of the root and a calcified apical third.



Figure 6: IOPA showing perforation defect completely filled with Biodentine.



Figure 7: 11 obturated with the help of Gutta Percha and sealapex sealer.

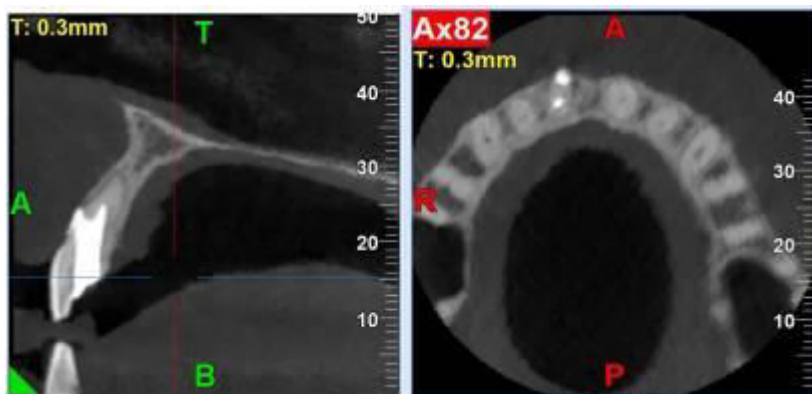


Figure 8: Post operative CBCT showing complete sealing of perforation defect and canal.



Figure 9: Tooth prepared for All ceramic crown.



Figure 10: Tooth prepared for All ceramic crown.



Figure 11: IOPA after follow up of 18 months showing no periapical or periodontal changes.

## DISCUSSION

The present article shows the non surgical orthograde approach to treat a case of iatrogenic radicular perforation with the help of BIODENTINE. Anatomical variations, misaligned use of rotary burs, significant crown-root angulations, calcified pulp chamber are often the factors which lead to perforations.<sup>6</sup> To avoid this complication, operator should be well acquainted with the location and size of the pulp chamber. Kvinnsland et al.<sup>2</sup> found that due to underestimation of the root inclination on the palatal side, most perforations on maxillary anterior teeth were located at the labial root aspect. Multiple, angulated

radiographs are essential for accurate diagnosis. However radiographs alone are not able to detect when perforation is present on buccal or lingual root surfaces. In such cases, three-dimensional imaging through computed tomography (CT) or cone beam CT scans can provide more definitive diagnosis.<sup>7</sup>

In the present case, the perforation was present on the labial surface at the mid third level of root, which might have been caused during access preparation. To avoid such situation anatomy of tooth should be followed while preparing access cavity. Perforation leads to ingress of bacteria and their toxic products from tooth into periodontal and periapical tissues and vice versa resulting in failure of the endodontic treatment.<sup>8</sup>

Perforations in the coronal third of the root have the worst prognosis in comparison to perforations in the other areas of the root.<sup>5</sup> It causes apical migration of the periodontal attachment (i.e., pocket formation) if left untreated. Once the pocket is formed even after repair of the perforation, tooth does not hold good prognosis. In the present case there was no periodontal pocket and the tooth had normal gingival probing depth. Repair of defect before formation of any periodontal defect favoured the prognosis of tooth. The perforation site was sealed completely with BIODENTINE which was confirmed with post operative CBCT.

“Biodentine” is a calcium silicate based product specifically designed as a “dentine replacement” material. Biodentine has a wide range of applications including root perforation repair, apexification and retrograde filling material in endodontic surgery. It can also be used as a pulp capping agent in restorative dentistry.<sup>9</sup>

In comparison to MTA, Biodentine is easier to manipulate having short setting time of approximately 12 minutes. A study by Gunesser et al. showed Biodentine performing better in comparison to MTA even after being exposed to various endodontic irrigants.<sup>10</sup> In the present case no clinical or radiographic signs/symptoms of disease were evident even after 18 months of follow up.

## CONCLUSION

Though it is not always possible to eliminate all iatrogenic errors in endodontics, but if we take adequate measures and follow the anatomy we can reduce the potential of problems for ourselves and our patients. Iatrogenic perforation can be very disappointing for the dentist. The purpose of this article is to present a case report in which Biodentine was used to seal the perforation site in a conservative and non-invasive manner. However, future investigations with a high level of evidence are needed to establish its superiority over the currently used materials like MTA.

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