



Pulp Revascularization of immature teeth with Dens Invaginatus and Necrotic Pulp Tissue: Case Reports

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Introduction

Dens invaginatus is a developmental anomaly that poses treatment challenges when nonsurgical root canal treatment is considered to be necessary. Teeth with complex root canal morphologic variations often require a comprehensive treatment approach to effectively clean, shape, and disinfect the root canal space before obturation. One possible treatment approach could include pulp revascularization for the management of a dens invaginatus case in which the root apex formation is incomplete. The blood clot induced from the apical tissue is thought to provide a fibrin scaffold with platelet-derived growth factors (PDGFs) that promotes regeneration of tissue within the root canal system. The outcome of previous case reports indicated that it is possible to treat the necrotic immature tooth, leading to not only clinical and radiographic resolution but also thickening of dentinal wall and apical closure of root. However, several complications were also encountered during the procedure. The representative complications reported previously were discoloration of the crown and failure to produce appropriate bleeding into the canal space. The following case reports describe the regenerative endodontic treatment of immature permanent teeth and some modifications made to the procedure to solve the predictable problems.

CASE I

1. Patient Information

9Y10M / F

- #22 - dens invaginatus (type I) with open apex
- sinus tract associated, pus discharge
- percussion (+)
- periradicular radiolucency around #22~63



2. Treatment Process

2012.09.26.	- #63 extraction	
2012.10.15.	- Access cavity preparation - Canal irrigation with 2.5% NaOCl - Triple antibiotic paste : metronidazole, ciprofloxacin, cefaclor	
2012.10.22.	- Sinus tract (-), percussion(-)	
2012.11.05	- 2% lidocaine without epinephrine - Canal irrigation with 2.5% NaOCl - Sealing the dentinal tubules of the access cavity by dentin bonding agent - Intra-canal blood clot formation - White MTA application	
2012.11.26.	- RMGI base, Resin filling	
2013.04.18.		

3. Radiographic change



CASE II

1. Patient Information

10Y4M / M

- Referred from L/C
- #12 - dens invaginatus (type III) with open apex
- percussion / palpation (+/+)
- periapical radiolucency



2. Treatment Process

2012.09.25.	- CBCT taking - Calcium hydroxide dressing of infected invagination in isolation	
2012.10.16.	- Calcium hydroxide change	
2012.11.10.	- Access to the outline of invagination by using surgical operation microscope and ultrasonic instruments - Separate from the main root trunk - Triple antibiotic paste : metronidazole, ciprofloxacin, cefaclor	
2012.12.05.	- 2% lidocaine without epinephrine - Canal irrigation with 2.5% NaOCl - Intra-canal blood clot formation - White MTA application	
2012.12.17.	- RMGI base, Resin build-up	
2013.05.02.		

3. Radiographic change



Summary

On the basis of short-term results of the present cases, it appears that revascularization could be effective for managing immature permanent teeth with necrotic pulp tissue. And a blood clot induced from the apical tissue is potentially an ideal scaffold for this procedure. Considering the anatomical variations of root canal system, the case of immature tooth with type III dens invaginatus was decided to redesign the internal anatomy of the canal to gain better access for proper disinfection and sealing. The use of surgical operating microscope and ultrasonic instrumentation has provided new capabilities for visualizing and dealing with the anomalous structure that is sensitive to access. A common complication was encountered during the actual procedure of both cases with the difficulty in controlling placement of the MTA. Especially on the second case, the blood clot was not strong enough to hold the pressure to packing the MTA, resulting in an intrusion of the MTA deep into the canal space. Placing a solid absorbable collagen matrix above the blood clot against the MTA could be an additional treatment option to resolve the problem for the procedure.