Management of a Complicated Crown Fracture by Partial Pulpotomy and Reattachment of a Two-Piece Fragment

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I. Objective

Complicated crown fracture involves enamel and dentin with pulp exposure. When it is treated early, inflammation is usually confined to the superficial pulp, so partial pulpotomy can preserve pulp vitality and has shown a high success rate in young permanent teeth. If the fragment is recovered and kept moist, reattachment is the most conservative option, reproducing the original shape, shade, and translucency. This report describes a complicated crown fracture whose fragment had split into two pieces, managed by partial pulpotomy and reattachment of the reassembled fragment.

II. Case Presentation

<Case I>

1. Sex/Age : Male/11
2. Chief Complaint (C.C) : Referred from pediatric dentistry – “I hit my upper front tooth against a wall while playing and it broke.”
3. Present Illness (P.I) : #21 mesioincisal complicated crown fracture with pulp exposure, per(+, finger), mob(-). Fractured tooth fragments were preserved in saline but were separated into two pieces.
4. Impression : Complicated crown fracture on #21
5. Treatment plan : #21 partial pulpotomy and reattachment of the two-piece crown fragment

III. Conclusion

In a young patient, preserving pulp vitality is preferable to root canal treatment whenever the pulp can be saved. A vital pulp keeps the tooth responsive to stimuli and avoids the loss of tooth structure associated with root canal treatment. In this case, partial pulpotomy was performed with a calcium silicate-based cement after hemostasis with sodium hypochlorite. As the crown fragment had been recovered in two pieces, the segments were first bonded into a single unit extraorally, then reattached with a universal adhesive and flowable composite. The tooth was asymptomatic and stable at follow-up. When the fragment is well preserved and securely bonded, reattachment—even of a fragment divided into two pieces—combined with vital pulp therapy offers a conservative and esthetic option for complicated crown fractures in young patients.

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Multidisciplinary Management of Traumatized Maxillary Anterior Teeth: A Case Report

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I. Object

Restorative rehabilitation of multiple traumatized anterior teeth is challenging because the amount of remaining tooth structure, pulpal involvement, periodontal condition, and occlusal loading may differ among the affected teeth. An appropriate restorative approach should preserve sound tooth structure while providing adequate retention, resistance, esthetics, and functional stability. This case report describes the esthetic and functional rehabilitation by multidisciplinary approach of traumatized maxillary anterior teeth using tooth-specific restorative approaches.

II. Case Presentation

<Case I>

1. Sex/Age : M/20

2. Chief Complaint (C.C) : “My teeth were broken and fall out after I fell while I’m drunk.”

3. Present Illness (P.I) : **#13** Class II Crown fracture, per(+) mob(-); **#11,12** Tooth Avulsion(EOT 3h 30m), class II Crown fracture; **#21** Tooth Avulsion(EOT 3h 30m), class III Crown fracture; **#22** class III Crown fracture, per(+) mob(-)

4. Impression :

#11,12 Tooth avulsion with uncomplicated crown fracture with closed apex; **#21** Tooth avulsion with complicated crown fracture with closed apex; **#22** Concussion of tooth with complicated crown fracture; **#13** Concussion of tooth with uncomplicated crown fracture

5. Treatment plan :

Tooth Replantation of #11,12,21; #15-14-13-12-11-21-22-23-24 resin-wire splint; #11,12 RCT & class IV direct resin restoration; #13 class IV direct resin restoration; #21 RCT & Post-Core and zirconia crown; #22 RCT & surgical crown lengthening(2mm) & Post-Core and zirconia crown

Ⅲ.Conclusion

The restorative management of traumatized anterior teeth should be individualized according to the amount of remaining tooth structure, the presence of a ferrule, and the patient’s occlusal condition. In this case, direct composite resin restorations were selected for teeth with sufficient remaining structure, whereas crown lengthening and post-supported zirconia crowns were used for severely compromised teeth. The tooth-specific restorative approach provided satisfactory esthetic and functional outcomes at the 6-month follow-up. Nevertheless, continued clinical and radiographic monitoring is required to evaluate the long-term prognosis of traumatized teeth.

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Clinical Application of a Browser-Based CIELab Image Analysis Program for Objective Assessment of Tooth Whitening Outcomes: A Case Report

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I. Objective

Tooth whitening outcomes are conventionally evaluated with visual shade guides, which are subjective and poorly reproducible across serial visits, whereas spectrophotometry is costly and limited to point measurements. This report describes the clinical application of a browser-based image analysis program that quantifies tooth color change directly from routine clinical photographs using the CIELab color space.

II. Case Presentation

A browser-based single-file web application was developed using HTML and JavaScript, operating offline without installation. Serial intraoral photographs taken at each visit were loaded into the program, and the region of interest on the tooth surface was delineated with a brush tool supporting both automatic and manual selection modes. Mean sRGB values within the selected region were converted into the CIELab color space, and ΔL*, Δa*, Δb*, and ΔE_{00} (CIEDE2000) were calculated relative to the baseline image and presented as a table and a time-series plot.

<Case I>

1. Sex/Age: M/40
2. Chief Complaint (C.C): Discoloration of tooth #21, patient does not want to extract #21
3. Present Illness (P.I): Discoloration of tooth #21 was noted and extraction was recommended at a local dental clinic. Medical history was non-specific; tooth #21 had received root canal treatment approximately 25 years previously.
4. Impression: Discoloration and periapical lesion on tooth #21
5. Treatment plan: Root canal re-treatment and Non-vital bleaching of tooth #21

The patient underwent internal (walking) bleaching of tooth #21. Clinical photographs taken at the initial visit and at each recall visit were analyzed with a browser-based image analysis program: the region of interest on the labial surface was delineated with a brush tool, mean sRGB values were converted into the CIELab color space, and ΔL*, Δa*, Δb*, and ΔE_{00} (CIEDE2000) were calculated relative to the baseline image. Lightness increased progressively over successive visits while redness and yellowness decreased, and the cumulative color difference at the final visit substantially exceeded the reported clinical acceptability threshold. The tooth was subsequently restored, and the patient was satisfied with both the esthetic outcome and the preservation of a tooth for which extraction had initially been recommended.

III. Conclusion

Region-based CIELab analysis of routine clinical photographs allowed the color change following whitening treatment to be documented objectively and followed over time, and served as a practical, low-cost adjunct for patient communication regarding treatment outcomes.

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Direct Composite Management of Pathologic Migration in Maxillary Incisors

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I. Objective

This case report presents a staged periodontal-restorative protocol for managing pathologic tooth migration (PTM) in the maxillary incisors. It highlights an early restoration-first strategy using direct composite reconstruction before definitive periodontal surgery and guided tissue regeneration (GTR), compared with a conventional delayed restoration approach.

II. Case Presentation

<Case I>

1. Sex/Age : Female / 84
2. Chief Complaint (C.C) : “My upper left incisor feels loose and appears to be protruding.”
3. Present Illness (P.I) : #11 per(-), pal(-), mob(0), Cold(+), EPT(+)
   #21 per(+), pal(-), mob(1), Cold(-), EPT(-)
4. Impression : Necrosis of pulp, Cemental tear with localized periodontitis
5. Treatment plan : Nonsurgical endodontic treatment and Surgical curettage with Guided tissue regeneration(GTR) on #21, Direct composite veneer restorations on #12-22

<Case II>

1. Sex/Age : Female / 60
2. Chief Complaint (C.C) : "The filling between my front teeth fell out and my upper left front tooth feels a little loose."
3. Present Illness (P.I) : #11 per(-), pal(-), mob(0), Cold(+), EPT(+)
   #21 per(-), pal(-), mob(1), Cold(-), EPT(+)
4. Impression : Recurrent PTM with fracture of previous composite restoration
5. Treatment plan : Nonsurgical periodontal therapy, Replacement of the failed anterior interproximal restoration, Guided tissue regeneration(GTR) on #21

III. Conclusion

A restoration-first approach using direct composite restorations may provide immediate functional and esthetic rehabilitation while maintaining favorable periodontal regenerative outcomes. Early restorative intervention can serve as an effective bridge between patients' immediate esthetic demands and definitive periodontal healing, offering a practical multidisciplinary strategy for the management of pathologic tooth migration.

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Multiple-Crown Rehabilitation of Severely Affected Molars in a Young Patient with Molar-Incisor Hypomineralization: A Case Report

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I. Object

Molar-incisor hypomineralization (MIH) is defined as a demarcated qualitative defect of enamel affecting at least one first permanent molar and is frequently associated with involvement of the permanent incisors. The clinical presentation of MIH varies in severity, ranging from demarcated opacities to extensive enamel loss, particularly on occlusal surfaces. Hypomineralized enamel is highly porous and susceptible to post-eruptive enamel breakdown. Enamel breakdown and the resulting rough surfaces promote biofilm accumulation, thereby increasing the risk of dental caries and compromised gingival health. In addition, the increased porosity of hypomineralized enamel may compromise the adhesion of restorative materials, resulting in a higher risk of restoration failure and the need for retreatment. In the present case, severe hypomineralization affected four consecutive teeth in the left maxillary region, from the first premolar to the second molar. All severely affected posterior teeth were rehabilitated with zirconia crowns.

II. Case Presentation

1. Sex/Age: Female/21
2. Chief Complaint (C.C): I have difficulty chewing on my upper left molars and food gets stuck between them.
3. Present Illness (P.I): #24 restoration loss, enamel hypomineralization, air(-) per(-) mobility(-) EPT(+) pain(-)
   #25, 26, 27 enamel hypomineralization, air(-) per(-) mobility(-) EPT(+) pain(-)
4. Impression: #24-27 enamel hypomineralization (molar-incisor hypomineralization)
5. Treatment Plan: Crown restoration

Ⅲ. Conclusion

Full-coverage crowns may be indicated for posterior teeth with extensive coronal destruction associated with MIH, as they provide adequate strength and durability under substantial occlusal loads. Following definitive restoration, the patient reported resolution of tooth sensitivity and was able to masticate comfortably. Food impaction during meals was reduced, and decreased biofilm accumulation around the restored teeth contributed to the maintenance of healthy gingival tissues. The definitive restorations also demonstrated favorable esthetics and satisfactory retention. In the present case, zirconia crowns provided favorable functional and esthetic outcomes for the rehabilitation of severely affected posterior teeth.

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Aesthetic Rehabilitation of Maxillary Anterior Teeth Using Direct Composite Resin Restorations: A Case Report

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I. Objective

To restore the maxillary anterior teeth using direct composite resin restorations in a patient with loss of restorations on the maxillary central incisors and an adjacent enamel fracture, and to demonstrate how simultaneous restoration of the lateral incisor can contribute to harmonious anterior aesthetics through a minimally invasive approach.

II. Case Presentation

<Case1>

1. Sex/Age : M/72
2. Chief complaint(C.C) : “I want to restore my broken upper anterior teeth.”
3. Present Illness (PI) : #11,21 Complete loss of previous porcelain laminate veneers, air(-) per(-) mob(-) EPT(+) PD=WNL; #12 Class I crown fracture, air(-) per(-) mob(-) EPT(+) PD=WNL,
4. Impression : #11,21 Uncomplicated crown fracture with debonded porcelain laminate veneers, #12 Uncomplicated crown fracture
5. Treatment plan : Direct resin laminate restorations on #11 and #21 with aesthetic recontouring of #12 using direct composite resin.

III. Conclusion

Direct composite resin restoration is a conservative and minimally invasive treatment option for anterior aesthetic rehabilitation when sufficient enamel is preserved. Careful case selection and treatment planning, including evaluation of the remaining tooth structure, anterior guidance, and occlusal relationships, are essential for long-term success. In this case, restoration of the maxillary central incisors, combined with simultaneous aesthetic recontouring of the fractured lateral incisor, resulted in improved tooth symmetry and harmonious anterior aesthetics.

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Space Closure of Peg Lateral Incisors Using the Injectable Composite Resin Technique

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I. Object

Peg-shaped maxillary lateral incisors are a common developmental anomaly that often causes esthetic concerns.

Various treatment options, including orthodontic treatment, direct composite restoration, and indirect ceramic restoration, can be considered to improve esthetics. Among these, direct composite restoration offers a conservative approach with minimal tooth reduction.

Recently, a digital workflow using an intraoral scanner and the Injectable Composite Resin (ICR) technique has emerged as a predictable and minimally invasive treatment option. This case report is about the use of intraoral scanner for design and use of ICR technique for space closure.

II. Case Presentation

1. Sex/Age : F/20
2. Chief Complaint : I want to improve the shape of my front teeth.
3. Present Illness : #12, 22 peg lateralis, spacing on #12(m,d) and #22(m,d)
   #12 ,22 Per(-) bite(-) pal(-) PDL: WNL
4. Impression : #12, 22 peg lateralis
5. Treatment plan : Space closure on #12 and #22 using the ICR technique
   Intraoral scan (3Shape, Trios) and transparent silicone index (Any-Flex Clear, MDCLUS)

Ⅲ.Conclusion

Conventional direct composite restoration requires multiple laboratory procedures and is technique-sensitive.

Compared with conventional direct restorative techniques, the Injectable Composite Resin (ICR) technique reduces chair time, is less technique-sensitive, and accurately reproduces the diagnostic wax-up. In this case, a precise digital model was created using an intraoral scanner, and the ICR technique was applied for esthetic rehabilitation of bilateral peg-shaped maxillary lateral incisors.

The ICR technique can be a predictable and minimally invasive option for efficient esthetic restoration of peg-shaped lateral incisors.

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Direct Composite Restoration of a Labially Extended Subgingival Complicated Crown Fracture Using a Putty Index and Twin Anterior Matrices

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I. Object

This case report presents a predictable direct composite restorative approach for the management of a labially extended subgingival complicated crown fracture using a putty index and Twin Anterior Matrices (TOR VM, Russia). Preservation of the palatal tooth structure and the presence of an anterior open bite provided favorable conditions for stable matrix adaptation and reduced functional loading after restoration. This minimally invasive technique may represent a practical treatment option for pediatric patients with special healthcare needs and limited cooperation.

II. Case Presentation

<Case I>

1. Sex/Age : M/10
2. Chief Complaint (C.C) : “My child fell at school three days ago and fractured two front teeth.”
3. Present Illness (P.I) : #11 Crown fracture, Per(-), Mob(-), EPT(+, 3/10)
   #21 Crown fracture with pulp exposure, Per(+), Mob(-)
4. Impression : #11 Uncomplicated crown fracture, #21 Complicated crown fracture
5. Treatment plan : #11 Direct composite restoration
   #21 Root canal treatment, post and core build-up, gingivectomy, direct composite restoration

Ⅲ. Conclusion

This case highlights the importance of individualized treatment planning based on both patient- and tooth-related factors. In this patient with special healthcare needs, limited cooperation rendered indirect restorative treatment impractical, whereas the presence of an anterior open bite provided favorable conditions for direct composite restoration. Soft tissue management in combination with a putty index and the Twin Anterior Matrices system allowed predictable reconstruction of the labial cervical emergence profile and proximal contours while minimizing finishing procedures and reducing chair time. Within the limitations of a single case report, this minimally invasive technique may represent a practical and effective treatment option for the management of selected labially extended subgingival complicated crown fractures.

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Single-Visit Esthetic Rehabilitation of a Complicated Crown-Root Fracture by Fragment Reattachment: A Case Report

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I. Object

Traumatic complicated crown-root fractures of anterior teeth can compromise esthetics and function and often require both endodontic and restorative treatment. When the original tooth fragment is available and can be accurately repositioned, fragment reattachment provides a conservative approach that enables rapid recovery of the natural tooth morphology, color, and translucency. In cases with limited remaining coronal tooth structure, a fiber post may provide additional retention for the reattached fragment. This case report describes the single-visit esthetic rehabilitation of a fractured maxillary central incisor through root canal treatment, fiber post cementation, and immediate reattachment of the original tooth fragment.

II. Case Presentation

1. Sex/Age: Female/67
2. Chief Complaint (C.C): I fell yesterday and broke my front tooth.
3. Present Illness (P.I): #11 Crown-root fracture with pulp exposure
   (labial: gingiva-level fracture line; palatal: 1mm supra-gingival fracture line)
   air (+), percussion (+), mobility (−), EPT (+), pain (−)
4. Impression: #11 complicated crown-root fracture
5. Treatment Plan: Single-visit root canal treatment, fiber post cementation, and fragment reattachment

Ⅲ. Conclusion

In this case, root canal treatment, fiber post cementation, and reattachment of the original tooth fragment were completed in a single visit. This approach enabled immediate recovery of esthetics and function while preserving the original tooth morphology, color, and translucency and minimizing the removal of sound tooth structure. Fiber post-assisted fragment reattachment may be considered a conservative treatment option in carefully selected cases when the fragment is intact, accurate repositioning is possible, and adequate isolation can be achieved. Regular long-term follow-up is required to evaluate the clinical stability of the reattached fragment.

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Extraoral Management of External Cervical Resorption in a Mandibular Second Molar Induced by an Adjacent Impacted Third Molar via Intentional Replantation

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I. Object

External cervical resorption (ECR) is a loss of dental hard tissue that begins in the cervical region of the root and can progress toward the pulp. One of its causes is pressure from an adjacent impacted tooth. As the lesion progresses, it may involve the pulp and require root canal treatment. The treatment approach therefore depends on the extent of the defect and whether the tooth remains restorable. When the defect is on a subgingival surface that cannot be reached intraorally, an extraoral approach through intentional replantation can be considered. This case presentation describes the management of ECR caused by an adjacent impacted tooth using intentional replantation.

II. Case Presentation

<Case I>

1. Sex/Age : Male/55
2. Chief Complaint (C.C) : “My lower right back tooth hurts when I chew."
3. Present Illness (P.I) : #47 per(−), bite(+), mobility(−)
   #48 mesioangular impaction with a cervical resorptive defect on the distal aspect of #47
4. Impression : #47 : External cervical resorption associated with the adjacent impacted #48
5. Treatment plan : removal of the resorptive tissue on the distal root, sealing of the defect with MTA, and overlying restoration with composite resin — followed by intentional replantation and subsequent root canal treatment of #47

Ⅲ.Conclusion

External cervical resorption can be arrested when the resorptive tissue is completely removed and the defect is tightly sealed. In this case, the defect was located on a subgingival surface that was inaccessible intraorally, so the tooth was atraumatically extracted, the resorptive tissue was removed extraorally. MTA was applied to the pulp-exposed area, and the remainder of the defect was restored with composite resin. Because the resorptive defect had extended into the pulp space, root canal treatment was performed after replantation. Intentional replantation allows direct access to defects that cannot be reached intraorally, and can be a useful, tooth-preserving option for external cervical resorption in such cases, as long as atraumatic extraction and a definitive seal are achieved.

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Management of Furcal Strip Perforation in a Mandibular First Molar Using Hemisection : A Case Report

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I. Object

Iatrogenic strip perforation in the furcation area of mandibular molars presents a significant clinical challenge, compromising both periodontal and endodontic prognoses. When persistent infection and incomplete healing occur despite surgical repair, hemisection may provide a conservative alternative to complete extraction by removing the compromised root while preserving the sound root. This case describes the staged management of a mandibular first molar with persistent periapical pathology. During periapical surgery, a furcal strip perforation involving the mesial root was identified and repaired. Despite surgical repair, infection and incomplete healing persisted. The compromised mesial root was subsequently removed by hemisection, followed by socket preservation with a collagen plug and fixed prosthetic restoration using the remaining distal root.

II. Case Presentation

1. Sex/Age : Female/28
2. Chief Complaint (C.C) : I want to get root canal retreatment on my lower right molar. (Referred from LDC)
3. Present Illness (P.I) : #46 Canal filled and crown (7 years ago)
   Sinus formation on buccal gingiva of #46
   Periapical radiolucency, per(-) mob(-) pain(-)
4. Impression : Chronic apical abscess
5. Treatment plan : Endodontic microsurgery on mesial root of #46
   Hemisection, socket preservation and prosthetic restoration of #45-46

Ⅲ. Conclusion

When persistent infection remains following apical surgery and surgical repair of a furcal strip perforation, hemisection may provide a conservative treatment option to avoid complete tooth extraction. In this case, removal of the compromised mesial root by hemisection, followed by socket preservation and fixed prosthetic restoration utilizing the remaining periodontally sound distal root, resulted in successful preservation and functional rehabilitation of the tooth. Hemisection may be a viable treatment option for mandibular molars with furcal strip perforation when initial surgical repair fails to achieve adequate healing and the remaining root has a favorable periodontal and endodontic prognosis.

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Conservative Retreatment of a Relapsed Midline Diastema Using the Bioclear Matrix : A Case Report

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I. Object

Retreatment of a relapsed midline diastema presents a major clinical challenge, particularly when adult patients refuse orthodontic intervention. The purpose of this case report is to present the successful, conservative retreatment of a relapsed anterior diastema using the Bioclear matrix. Using anatomical matrices and heated composite resin injection molding, the Bioclear matrix creates seamless interproximal contacts and natural emergence profiles, providing a predictable and minimally invasive alternative to orthodontic retreatment.

II. Case Presentation

<Case I>

1. Sex/Age : F/58

2. Chief Complaint (C.C) : I want to re-close the gap between my upper front teeth, but I do not want orthodontic treatment.

3. Present Illness (P.I) : #11,21 mobility (-) percussion (-) bite test (-) cold test (+) pain(-)

Recurrent spacing between #11-21

4. Impression : Relapsed midline diastema between #11 and #21

5. Treatment plan : Diastema closure on teeth #11 and #21 using the Bioclear matrix with heated composite resin injection molding, followed by strict occlusal adjustment, periodic recall

Ⅲ.Conclusion

The Bioclear matrix is an effective, non-invasive option for the retreatment of relapsed midline diastemas without orthodontic intervention. In this case, meticulous occlusal adjustment contributed to the elimination of adverse occlusal forces, thereby preventing secondary space relapse and stress concentration at the restoration margins. Careful occlusal management and regular follow-up may help maintain the long-term stability of restorations after conservative diastema retreatment.

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Management of Traumatized Maxillary Incisors: Vital Pulp Preservation and Restoration

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I. Objective

Crown fractures of maxillary incisors are the most frequent dental injuries, requiring differentiated treatment strategies depending on whether the pulp is exposed. The objective of this case report is to present conservative management protocols that focus on maintaining pulp vitality and restoring natural tooth morphology in traumatized anterior teeth..

II. Case Presentation

<Case 1>

1. Sex/Age: F/17
2. Chief complaint (C.C): "I fell while riding a bike and broke my teeth “
3. Present Illness (P.I): #11 per (+), pal (-), mob (0), cold (+), EPT (+)
   #21 per (+), pal (-), mob (0), cold (+), EPT (+)
4. Impression: #11, 21 crown fracture without pulp exposure
5. Treatment plan: #11 resin restoration/ #21 indirect pulp capping , resin restoration

<Case 2>

1. Sex/Age: F/17
2. Chief complaint (C.C): " I fell and broke my front teeth"
3. Present Illness (P.I): #11 per (+), pal (-). mob (0), cold (+). EPT (+)
4. Impression: #11 crown fracture with pulp exposure
5. Treatment plan: #11 partial pulpotomy & direct resin restoration

III. Conclusion

A customized conservative strategy based on pulp status is essential for the successful management of traumatized maxillary incisors. Preserving pulp vitality through indirect treatment or MTA partial pulpotomy, paired with structured direct composite resin techniques, offers a predictable aesthetic outcome. With careful material selection to prevent tooth discoloration, integrating appropriate biological and restorative approaches provides a highly reliable solution for anterior tooth trauma..

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Postoperative Discoloration Following Tooth Fragment Reattachment in a Complicated Crown Fracture

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I. Object

Tooth fragment reattachment is a minimally invasive treatment option that preserves the patient's natural tooth structure and esthetics. This case report presents a complicated crown fracture managed with direct pulp capping and fragment reattachment, with a focus on the clinical impact of fragment dehydration and postoperative color change.

II. Case Presentation

1. Sex/Age : Female / 14 years old
2. Chief Complaint (C.C) : "I lost consciousness and collapsed in the bathroom at home."
3. Present Illness (P.I) : A 14-year-old female presented with traumatic injury to the maxillary anterior teeth following a syncopal episode. The fractured fragment of #11 had been stored in saline prior to the visit.
4. Impression : #11 Complicated crown fracture, Concussion
5. Treatment plan : Direct pulp capping and reattachment of the fractured fragment were planned. Under local anesthesia (2% lidocaine, 1 ample), approximately 2 mm of exposed pulp tissue was removed and Endocem was applied for direct pulp capping. RMGI (shade A2) was placed as a base material. The original tooth fragment was reattached using G-aenial Universal Flo (shade A2) and Estelite (shade OA2). At the 2-week and 1-month follow-up visits, discoloration of the reattached fragment was observed, and periapical radiographs were taken.

Ⅲ.Conclusion

Tooth fragment reattachment is a conservative and esthetic treatment modality that utilizes the patient's own natural tooth structure, offering excellent color compatibility and structural integration. However, postoperative discoloration of the reattached fragment may occur and represents a potential clinical challenge. Based on the literature, dehydration of the fragment significantly affects both bond strength and color stability; therefore, adequate storage in an appropriate medium (e.g., saline) and sufficient rehydration prior to bonding are critical factors. Careful selection of adhesive materials and reattachment technique also play important roles in achieving favorable long-term esthetic and functional outcomes.

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Orthodontic Extrusion Using a Mini Tube Appliance (MTA) in a Subgingivally Fractured Maxillary Central Incisor: A Case Report

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I. Object

Management of subgingivally fractured maxillary anterior teeth presents a significant clinical challenge, primarily because of the difficulty in establishing adequate biologic width for definitive restoration. Although extraction followed by prosthetic rehabilitation is a conventional treatment option, it may not always be the most conservative approach. This case report describes the clinical application of orthodontic extrusion using a Mini Tube Appliance (MTA) as an esthetic and conservative treatment approach for the rehabilitation of a subgingivally fractured maxillary anterior tooth.

II. Case Presentation

1. Sex/Age: Male / 43
2. Chief Complaint (C.C): My front tooth was broken after a fall.
3. Present Illness (P.I): #11 Crown-root fracture with pulp exposure
   (palatal: 2mm sub-gingival fracture line)
   air (-), percussion (-), mobility (−), EPT (-), pain (−)
4. Impression: #11 Complicated crown-root fracture
5. Treatment Plan: #11 Root canal treatment and orthodontic extrusion using an MTA tube

Ⅲ. Conclusion

Esthetics is a critical concern when managing orofacial injuries in the maxillary anterior region. In this case, the tooth treated with orthodontic extrusion using a Mini Tube Appliance (MTA) remained functionally and esthetically stable. Appropriate anchorage control with the MTA minimized esthetic compromise during treatment and facilitated controlled forced eruption, resulting in a favorable esthetic and functional outcome in harmony with the surrounding periodontal tissues. This conservative approach allowed preservation of the natural tooth and maintenance of the alveolar bone, which may also be advantageous for future implant placement if required. Considering these factors, forced eruption using the MTA may represent a conservative, clinically predictable, and esthetically favorable treatment option for managing subgingivally fractured anterior teeth.

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Evaluation of the Correlation between Crack Treatment and Crack Severity Using Quantitative Light-induced Fluorescence

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I. Objective

Cracked teeth present a diagnostic challenge because clinical symptoms are often inconsistent with the severity of the crack, making accurate assessment and treatment planning difficult. Conventional diagnostic methods have limitations in objectively evaluating crack progression. Quantitative Light-induced Fluorescence (QLF) has recently been introduced as a noninvasive imaging modality capable of detecting structural changes in dental hard tissues by measuring fluorescence alterations. This study aimed to evaluate the relationship between treatment stage and crack severity using QLF image parameters and to investigate the clinical applicability of QLF as an adjunctive diagnostic tool for cracked teeth.

II. Materials & Methods

This retrospective study included 46 patients that visited Seoul St. Mary's Hospital from June 2025 to February 2026. After excluding three control cases from the statistical analysis, 43 cracked teeth were analyzed. According to the treatment received after diagnosis, teeth were classified into four treatment stages: resin restoration, inlay restoration, crown restoration, and root canal treatment. QLF images were obtained using the Qraypen C (AIOBIO, Seoul, Korea) system under standardized conditions, and fluorescent images were analyzed using Q-ray software version 1.45 (AIOBIO). Four quantitative parameters (|ΔF|, |ΔFmax|, ΔR, and ΔRmax) were measured to evaluate fluorescence changes associated with crack severity. Clinical variables, including crack status, number of crack lines, symptoms, pulp status, apical lesion, existing restorations, caries, and cervical abrasion, were also recorded. Statistical analyses were performed using the Jonckheere–Terpstra trend test, Kruskal–Wallis test, Wilcoxon rank-sum test, and Spearman correlation analysis, with statistical significance defined as $P < 0.05$.

III. Results

QLF parameters demonstrated a significant increasing trend according to treatment stage. Teeth requiring more advanced treatment, including crown restoration and root canal treatment, exhibited greater fluorescence loss and higher red fluorescence values than teeth treated with resin or inlay restorations. Significant positive trends were observed for |ΔF|, |ΔFmax|, ΔR, and ΔRmax, indicating that fluorescence changes increased as treatment severity progressed. Furthermore, crack presence and a greater number of crack lines were significantly associated with increased QLF parameter values. In contrast, no significant association was observed between clinical symptoms and QLF measurements. These findings suggest that QLF parameters reflect structural crack severity more accurately than subjective clinical symptoms.

IV. Conclusion

Within the limitations of this study, QLF image parameters showed significant correlations with treatment stage and crack severity in cracked teeth. Increased fluorescence loss and red fluorescence were associated with more advanced treatment stages and greater crack severity, whereas clinical symptoms were not significantly correlated with QLF findings. These results suggest that QLF image analysis provides an objective assessment of crack progression and may serve as a useful adjunctive diagnostic tool for evaluating crack severity and supporting clinical decision-making in the management of cracked teeth.

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A Dual-template Silicone Index Technique for Direct Composite Restoration of a Crowded Anterior Tooth with a Class IV Fracture

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I. Object

Accurate reproduction of tooth morphology remains challenging in direct composite restoration of Class IV fractures in crowded anterior teeth, particularly in reconstructing the proximal contour and labial transitional line angles. Conventional silicone index techniques facilitate reproduction of the palatal anatomy and incisal edge but provide limited guidance for proximal and labial contours.

This case report presents a modified dual-template silicone index technique that enables predictable reconstruction of the palatal anatomy, proximal contour, and labial transitional line angles in a crowded anterior teeth with a Class IV fracture.

II. Case Presentation

<Case I>

1. Sex/Age : F/31
2. Chief Complaint (C.C) : “I fell off my bicycle, and my front teeth were knocked out and fractured.”
3. Present Illness (P.I) : #11 Avulsion & crown fracture without pulp exposure
   percussion(+), palpation(+), EPT(-/10), cold test(-)
   labioversion with mesial rotation (associated with anterior crowding)
4. Impression : #11 Avulsion and uncomplicated crown fracture (class IV)
5. Treatment plan : #11 Root canal treatment followed by direct Class IV composite restoration using a dual-template silicone index technique.

Ⅲ. Conclusion

The dual-template silicone index technique enabled predictable reproduction of the palatal wall, proximal contours, and labial transitional line angles in a crowded anterior tooth with a Class IV fracture. This technique reduced the need for extensive finishing procedures and facilitated accurate three-dimensional reconstruction of tooth morphology. Therefore, it may serve as a useful and reproducible clinical approach for the esthetic restoration of a crowded anterior teeth with a Class IV fracture.

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Application of the Occlusal Matrix Technique in Patients with Limited Mouth Opening and Gagging

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I. Object

Successful restorative treatment depends not only on operator technique but also on the patient's ability to tolerate the procedure. Trismus and an exaggerated gag reflex are two distinct but frequently coexisting conditions that reduce patient cooperation: the former by mechanically limiting access, and the latter by provoking involuntary reflexive movement whenever the posterior oral cavity or soft palate is stimulated. Together, they considerably shorten the practical working time available to the clinician and increase the risk of an inaccurate restoration if conventional freehand techniques are attempted. The occlusal matrix technique offers a practical solution by allowing the restorative anatomy to be pre-determined outside the mouth and reproduced through a brief, guided intraoral step. This report illustrates the application of this technique in a patient with both limited mouth opening and a pronounced gag reflex, highlighting its role in improving both procedural efficiency and patient comfort.

II. Case Presentation

<Case I>

1. Sex/Age : Male/19
2. Chief Complaint (C.C) : I noticed some black discoloration on the biting surface of my tooth. Could it be decay?
3. Present Illness (P.I) : caries of dentine on #46, 47 ice (+) mob(0) EPT (2/10)
4. Impression : caries of dentine on #46, 47
5. Treatment plan : Direct resin restoration on #46, 47

Ⅲ.Conclusion

In patients with limited mouth opening and gagging, conventional freehand layering of composite resin is technically demanding due to limited visibility and restricted instrument access. The occlusal matrix technique allows the clinician to reproduce the pre-existing occlusal anatomy indirectly, minimizing the amount of intraoral shaping required and reducing treatment time. In this case, the resin index fabricated from the pre-operative model allowed accurate reproduction of occlusal anatomy despite the patient's restricted mouth opening and gagging. This technique should be considered a conservative, time-efficient option for restorative treatment in patients with limited mouth opening and gagging.

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Management of Multiple Traumatized Teeth with Different Restorative Approaches : A Case Report

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I. Object

Traumatic crown fractures frequently involve the maxillary anterior teeth and may significantly affect esthetics and function. Treatment should be tailored to the extent of the fracture, pulpal involvement, and availability of the fractured tooth fragment. This case report describes the esthetic and conservative management of adjacent maxillary central incisors with different types of crown fractures using tooth fragment reattachment and direct composite resin restoration.

II. Case Presentation

1. Sex/Age: Male / 52
2. Chief Complaint (C.C): I fell off my bicycle and broke my front teeth.
3. Present Illness (P.I): #11 Crown-root fracture with pulp exposure; fractured tooth fragment available
   air (-), percussion (-), mobility (−), EPT (+), pain (−)
   #21 Crown fracture without pulp exposure; fractured tooth fragment unavailable
   air (-), percussion (-), mobility (−), EPT (+), pain (−)
4. Impression: #11 Complicated crown-root fracture, #21 Uncomplicated crown fracture
5. Treatment Plan: #11 Partial pulpotomy followed by tooth fragment reattachment
   #21 Direct composite resin restoration

III. Conclusion

Traumatic crown fractures may require different treatment approaches according to the clinical condition of each tooth. In this case, partial pulpotomy followed by tooth fragment reattachment was performed for the complicated crown fracture of #11, whereas direct composite restoration was used for the uncomplicated crown fracture of #21. Fragment reattachment enabled preservation of the original tooth morphology and esthetic characteristics, while direct composite restoration provided conservative reconstruction of the missing tooth structure. These findings demonstrate that individualized selection of minimally invasive restorative techniques can achieve favorable esthetic and functional outcomes in the management of multiple traumatized anterior teeth.

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Multidisciplinary Management of a Subgingival Crown–Root Fracture Using Orthodontic Extrusion: A Case Report

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I. Objective

Subgingival crown–root fractures present a clinical challenge because an insufficient amount of supragingival tooth structure may compromise both periodontal health and the retention of the final restoration. Orthodontic extrusion can expose sound tooth structure while preserving the supporting alveolar bone. This case report describes the multidisciplinary management of a severely fractured maxillary lateral incisor using root canal treatment, orthodontic extrusion, and definitive prosthetic restoration.

II. Case Presentation

<Case>

1. Sex/Age : M/82
2. Chief Complaint (C.C) : “My upper front tooth broke.”
3. Present Illness (P.I) : #22 crown-root fracture, buccal fracture margin located approximately 1mm below the gingival margin, mob(-) per(-) bite(-) cold(-) EPT(-) probing depth (WNL)
4. Impression : Pulp necrosis associated with a subgingival crown–root fracture of the maxillary left lateral incisor.
5. Treatment plan : Root canal treatment followed by orthodontic extrusion, post-and-core restoration, and placement of a zirconia crown of #22

III. Conclusion

Orthodontic extrusion provided sufficient supragingival tooth structure for predictable restoration of a tooth with a subgingival crown–root fracture. This conservative approach allowed preservation of the natural tooth and supporting periodontal tissues while facilitating successful post-and-core restoration and crown placement. Careful control of the extrusive force, repeated fiberotomy, and an adequate stabilization period were important for achieving a favorable clinical outcome.

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Comparison of the antibiofilm efficacy of a high-frequency electrical device and a non-thermal plasma device against multispecies biofilms in a three-dimensionally printed root canal model

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I. Objective

This study aimed to evaluate the efficacy of a non-thermal plasma device and a high-frequency electrical device in eliminating multispecies biofilms and compare their antibacterial effects with those of 0.5% sodium hypochlorite (NaOCl). This study investigated the potential of these physical approaches as alternative or adjunctive root canal disinfection strategies.

II. Materials & Methods

A multispecies biofilm consisting of Enterococcus faecalis, Streptococcus mitis, and Campylobacter rectus was established on dentin specimens mounted in a three-dimensionally printed mandibular premolar model. Sixty specimens were randomly assigned to six groups (n = 10): distilled water control (CON), high-frequency electrical device (Endo-Wiz) applied once or three times, non-thermal plasma (Pla-Wiz) for 30 s or 60 s, and 0.5% NaOCl. Antibiofilm efficacy was assessed by colony-forming unit (CFU) counts, confocal laser scanning microscopy (CLSM), and field-emission scanning electron microscopy (FE-SEM). Statistical analysis was performed using one-way ANOVA with Dunn's *post hoc* test (α = 0.05).

III. Results

All experimental groups showed significantly lower CFU counts and bio-volume than the control ($p < 0.05$). The application of non-thermal plasma for 60 s and 0.5% NaOCl groups showed the greatest reductions, with no significant difference between them ($p > 0.05$). Non-thermal plasma treatment demonstrated a time-dependent antibiofilm effect, while repeated application of the high-frequency electrical device significantly improved antibacterial activity compared with a single application ($p < 0.05$), although its efficacy remained lower than that of plasma and NaOCl. CLSM and FE-SEM findings supported these results.

IV. Conclusion

Non-thermal plasma demonstrated antibiofilm efficacy comparable to that of 0.5% NaOCl against multispecies biofilms in a root canal model. Although the high-frequency electrical device showed limited antibacterial activity, repeated application improved its efficacy. These findings suggest that non-thermal plasma may serve as an adjunctive or alternative approach for root canal disinfection.

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Nonsurgical Retreatment Limited to Mesial Root of Permanent Mandibular First Molars Treated before Root Maturation: Two Case Reports

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I. Objective

Root canal treatment performed before completion of root maturation often leaves teeth with wide canals, thin dentinal walls, and poorly defined apical anatomy, complicating subsequent retreatment. When post-treatment apical disease is localized mainly to a single root of a multirooted tooth, retreatment confined to the affected root may manage the pathology while avoiding unnecessary intervention in unaffected roots. This report presents two pediatric cases of permanent mandibular first molars, initially treated before root maturation and subsequently managed by mesial root-limited nonsurgical retreatment.

II. Case Presentation

<Case 1>

1. Sex/Age: M/11
2. Chief complaint: No subjective symptoms; Referred for evaluation and treatment of tooth #46 because of previous discomfort and a periapical radiolucency associated with the mesial root.
3. Present Illness: #46 Percussion (-), Palpation (-), Mobility (0), Probing depth within normal limits
4. Impression: #46 previously treated tooth with asymptomatic apical periodontitis
5. Treatment plan: #46 Mesial root-limited nonsurgical retreatment

<Case 2>

1. Sex/Age: M/13
2. Chief complaint: No current symptoms; Referred because of previous discomfort and a periapical lesion involving the mesial root.
3. Present Illness: Percussion (-), Palpation (-), Mobility (0), Probing depth within normal limits
4. Impression: #46 previously treated tooth with asymptomatic apical periodontitis
5. Treatment plan: #46 Mesial root-limited nonsurgical retreatment

III. Conclusion

Retreatment of permanent molars that underwent endodontic treatment before completion of root development presents unique clinical challenges. In these two pediatric cases, careful localization of post-treatment disease allowed nonsurgical retreatment to be limited to the mesial root, with favorable clinical and radiographic healing. Long-term follow-up is essential for young permanent teeth treated before root maturation, and mesial root-limited nonsurgical retreatment may be a viable treatment option when persistent apical disease is clearly confined to the mesial root.

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Preserving the pulp tissue of the main canal in an Oehlers Type III Dens Invaginatus : A Case Report with 1-Year Follow-up

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I. Objective

Dens invaginatus is a developmental anomaly resulting from invagination of the enamel organ into the dental papilla before mineralization, most frequently affecting the maxillary lateral incisors. Oehlers classified it into three types, of which Type III penetrates through the root and communicates with the periodontal ligament either laterally through a pseudo-foramen (Type IIIA) or through the main apical foramen (Type IIIB). In Type IIIA, infection confined to the invagination may induce peri-invagination periodontitis while the main pulp remains vital. Depending on main pulp vitality, treatment may involve the invaginated canal alone or together with the main canal. This report describes an immature maxillary lateral incisor with Type IIIA dens invaginatus treated by selective endodontic treatment of the invagination alone with preservation of main pulp vitality, followed for one year.

II. Case Presentation

<Case I>

1. Sex/Age : F / 10
2. Chief Complaint (C.C) : “I have pain in the upper front tooth.”
3. Present Illness (P.I) : #12 per(+), bite(+), mob(-), ice(+), large apical lesion(+)
4. Impression : Dens invaginatus, normal pulp with peri-invagination periodontitis on #12
5. Treatment plan : Nonsurgical endodontic treatment of invagination on #12

III. Conclusion

Diagnosis and treatment planning of dens invaginatus depend on the extent of the invagination, the pulpal and periapical status, and the stage of root development. CBCT is an essential diagnostic tool for demonstrating the three-dimensional relationship between the invagination and the main canal. In this case, CBCT revealed peri-invagination periodontitis with an immature apex, while the main pulp remained vital. Selective root canal treatment of the invagination alone was therefore performed, with an MTA apical barrier placed in the invaginated canal. At the one-year follow-up, main pulp vitality was maintained and healing of the lesion was achieved.

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Effect of KR-12-a6 on the Odontogenic Effect and Anti-inflammatory Effect

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I. Objective

Pulp regeneration requires bioactive materials that promote reparative dentin formation while controlling inflammation. KR-12-a6, a peptide derived from LL-37, shows tissue-regenerative potential. This study evaluated the cytocompatibility, odontogenic differentiation, and anti-inflammatory effects of KR-12-a6 on human dental pulp cells (hDPCs), together with the involvement of MAPK signaling, to explore its potential as a pulp regeneration material.

II. Materials & Methods

hDPCs were treated with KR-12-a6, and cell viability and proliferation were assessed using an Ez-Cytox (WST-based) assay, while cell migration was evaluated by a scratch (wound-healing) assay. Odontogenic differentiation was assessed by the gene and protein expression of dentin matrix protein-1 (DMP-1) and dentin sialophosphoprotein (DSPP), alkaline phosphatase (ALP) activity, and Alizarin Red S (ARS) staining. Anti-inflammatory effects were evaluated under lipopolysaccharide (LPS) stimulation by the expression of TNF-α, IL-1β, IL-6, and ICAM-1. Time-dependent changes in the phosphorylation of p38, ERK, and JNK were analyzed by Western blotting. All experiments were performed independently at least three times, and statistical significance was determined by one-way ANOVA with Tukey's post hoc test, with $p < 0.05$ considered statistically significant.

III. Results

KR-12-a6 showed no cytotoxicity at 1–10 μg/mL, with no significant reduction in cell viability. Cell proliferation and migration were highest at 5 μg/mL and decreased at 10 μg/mL; therefore, the subsequent odontogenic and anti-inflammatory experiments were conducted at 0, 1, and 5 μg/mL. KR-12-a6 increased the expression of DMP-1 and DSPP and enhanced ALP activity and mineralized nodule formation, indicating the promotion of odontogenic differentiation. Under LPS-induced inflammatory conditions, KR-12-a6 decreased the expression of TNF-α, IL-1β, IL-6, and ICAM-1 and restored the mineralization suppressed by inflammation. At 5 μg/mL, KR-12-a6 alone increased the phosphorylation of p38, ERK, and JNK in a time-dependent manner, whereas the LPS-induced increase in their phosphorylation was attenuated by co-treatment with KR-12-a6.

IV. Conclusion

KR-12-a6 promoted odontogenic differentiation and suppressed the inflammatory response in hDPCs while maintaining cytocompatibility, and these effects were associated with modulation of the MAPK signaling pathway. These findings suggest that KR-12-a6 may serve as a promising bioactive material for dental pulp regeneration.

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Digitally Assisted Third Molar Autotransplantation for Replacement of Second Molar

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I. Object

When a permanent tooth becomes non-restorable because of extensive dental caries, extraction followed by implant placement is generally considered the standard treatment. However, when a suitable third molar is available, autotransplantation can serve as a biologically favorable alternative that preserves the periodontal ligament and restores function. Recent advances in digital technology, including cone-beam computed tomography (CBCT)-based surgical planning and three-dimensional (3D) printed tooth replicas, have improved the precision and predictability of this procedure.

This report presents a case of digitally assisted autotransplantation of the mandibular left third molar (#38) to replace a non-restorable mandibular left second molar (#37).

II. Case Presentation

<Case I>

1. Sex/Age : M/18
2. Chief Complaint (C.C) : My left lower molar is broken and I think it’s due to dental caries.
3. Present Illness (P.I) : #37 severe cemental caries, Per(+) bite(+) mob(-) air(++) ice(++, lingering)
4. Impression : #37 severe cemental caries, irreversible pulpitis w/ symptomatic apical periodontitis
5. Treatment plan : CBCT-based digital planning, 3D-printed donor tooth replica fabrication, extraction of #37, and autotransplantation of #38.

Ⅲ.Conclusion

CBCT-based surgical planning and 3D-printed tooth replicas can improve the precision and predictability of third molar autotransplantation by facilitating recipient site preparation while minimizing donor tooth manipulation. When appropriate case selection and surgical protocols are followed, autotransplantation represents a biologically favorable treatment option for replacing non-restorable molars and restoring functional occlusion in young patients. Further improvements in the accuracy of digital replica fabrication may enhance the reliability of digitally assisted autotransplantation.

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Root Canal Treatment of Mandibular First Premolar with Three Canals: Case Report

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I. Object

The majority of mandibular first premolars have a single root canal; however, variations in root canal morphology may occur. The incidence of two canals has been reported to be approximately 25%, while three canals have been observed in about 0.5% of cases. This case report presents the root canal treatment of a mandibular first premolar with three separate canals.

II. Case Presentation

<Case I>

1. Sex/Age : 78/M
2. Chief Complaint (C.C) : Referred from Department of Prosthodontics for #34 root canal treatment
3. Present Illness (P.I) : #34 caries, mob(-) per(-) bite(-) ice(-) EPT(-) probing depth(WNL), periapical radiolucency
4. Impression : Pulp necrosis with asymptoatic apical periodontitis of #34
5. Treatment plan : Nonsurgical root canal treatment of #34

Ⅲ.Conclusion

The success of root canal treatment depends on the effective removal and thorough cleaning of inflamed pulp tissue. In teeth with complex anatomical variations, it is essential to identify the canal morphology in advance using radiographs taken at different horizontal angles and cone-beam computed tomography (CBCT). Clinicians should be aware of possible variations in mandibular first premolars and incorporate this knowledge into their clinical procedures to enhance the success rate of endodontic treatment.

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Root Development after Revascularization of an Immature Permanent Tooth with Dens Invaginatus

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I. Objectives

Dens invaginatus is a developmental anomaly that predisposes an immature permanent tooth to early pulp necrosis and periapical disease, often occurs before root formation is complete. Managing such teeth is challenging, since conventional apexification does not restore the biological potential for continued root maturation. This report presents a case of an immature permanent maxillary lateral incisor with dens invaginatus and an associated apical lesion, treated by revascularization. The XP-endo Finisher was used to enhance intracanal disinfection and debris removal without additional dentin removal, and Biodentine was used as a coronal barrier following the induction of intracanal bleeding, in order to promote continued root development.

II. Case Presentation

1. Sex/Age : 10-year-old male
2. Chief Complaint (C.C) : A gingival swelling associated with a sinus tract was noted by the patient's guardian. The patient reported no pain.
3. Present Illness (P.I) : A sinus tract was present on the buccal gingiva. Clinical examination revealed a dens invaginatus involving the affected tooth. Radiographic examination revealed a diffuse periapical radiolucent lesion, along with a radiopaque invagination extending from the cingulum into the pulp space, consistent with Oehlers type II dens invaginatus. The root apex was incompletely formed, with an open apex and thin dentinal walls. The tooth showed no response to pulp sensibility testing, and a diagnosis of pulp necrosis was made.
4. Impression : A diagnosis of necrotic pulp with chronic apical abscess was made for tooth #22, associated with Oehlers type II dens invaginatus and an immature root with an open apex.
5. Treatment plan : #22 Revascularization — disinfection of the root canal system using the XP-endo Finisher after copious irrigation, followed by induction of bleeding from the periapical tissue to form an intracanal blood clot, and placement of Biodentine as a coronal seal.

III. Conclusion

At the 3-month and 6-month follow-up examinations, the sinus tract had resolved, and the tooth remained asymptomatic. Periapical radiographs obtained during the recall period demonstrated resolution of the periapical radiolucency, increased root length and dentinal wall thickness, and progressive apical closure, indicative of continued root development following revascularization. These findings suggest that revascularization, combined with thorough canal disinfection using the XP-endo Finisher and coronal sealing with Biodentine, may serve as a viable treatment option for immature permanent teeth with dens invaginatus and apical periodontitis, allowing continued root maturation.

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Intentional Replantation for a Pretreated Mandibular Second Molar with a C-shaped Canal and a Separated Instrument

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I. Object

The complex anatomy of C-shaped canals makes successful endodontic retreatment challenging. When combined with a separated instrument, complete canal disinfection through an orthograde approach may not be achievable, limiting the predictability of retreatment. Intentional replantation offers a conservative treatment alternative by enabling direct management of the apical pathology. This case report presents the successful management of acute apical periodontitis in a mandibular second molar with a C-shaped canal and a separated instrument by intentional replantation, root resection, and root-end retrofilling using Endocem MTA Premixed Heavy type.

II. Case Presentation

<Case I>

1. Sex/Age : Male/50
2. Chief Complaint (C.C) : “I have a dull aching pain when I chew on both sides. The left side bothers me more."
3. Present Illness (P.I) : #37 percussion(+), bite(+), mobility(−),
   previously root canal-treated, Gold Crown state, file separation state
4. Impression : Acute apical periodontitis on #37
5. Treatment plan : Intentional replantation with gentle curettage and copious irrigation of the periapical lesion, root resection of #37, and root-end retrofilling with Endocem MTA Premixed Heavy Type

Ⅲ.Conclusion

Intentional replantation can be a valuable treatment option for teeth with persistent apical periodontitis when conventional nonsurgical retreatment is limited by complex root canal anatomy and a separated instrument. In the present case, direct extraoral root-end management through root resection, root-end retrofilling with Endocem MTA Premixed Heavy Type, and thorough debridement of the periapical lesion, resulted in a favorable clinical outcome. This approach may provide a predictable, tooth-preserving alternative in carefully selected cases.

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Regenerative Endodontic Treatment of a Mature Permanent Tooth with Dens Invaginatus and Perforated Internal Root Resorption: A Case Report

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I. Objective: Dens invaginatus (DI) is a developmental anomaly characterized by enamel and dentin invagination into the dental papilla, predisposing affected teeth to pulpal infection because of their complex internal anatomy. Internal root resorption (IRR) associated with DI is uncommon, and root perforation further complicates treatment by weakening the remaining root structure and creating communication with the periodontal tissues. Conventional management generally consists of nonsurgical root canal treatment combined with perforation repair, surgical intervention, or extraction in severely compromised teeth. Recently, regenerative endodontic treatment (RET) has emerged as a biologically based alternative for selected mature teeth by promoting disinfection, tissue repair, and preservation of the remaining tooth structure. This case report presents the management of a mature permanent tooth with DI and perforated IRR using RET.

II. Case Presentation:

<Case I>

1. Sex/Age : M/10
2. Chief Complaint (C.C) : Referred from the Department of Pediatric Dentistry because of internal root resorption in tooth #22. “I never had any pain or discomfort.”
3. Present Illness (P.I) : #22 dens invaginatus, per(-) mob(-) bite(-) ept(-), internal root resorption with perforation(+), lateral radiolucent lesion (+)
4. Impression : #22 dens invaginatus with perforated internal root resorption
5. Treatment plan : Regenerative endodontic treatment (RET)

Ⅲ.Conclusion: Perforated internal root resorption is difficult to manage because conventional treatment may further weaken the already compromised root structure. In the present case, regenerative endodontic treatment successfully controlled infection and promoted radiographic healing while preserving the natural tooth. Sequential intracanal medication using calcium hydroxide followed by double antibiotic paste achieved adequate disinfection before regenerative procedures. Follow-up radiographs and CBCT demonstrated progressive healing of the lateral lesion and partial hard tissue formation around the perforation site. Within the limitations of a single case, regenerative endodontic treatment may be considered a biologically based alternative for carefully selected mature permanent teeth with perforated internal root resorption.

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Evaluation of Apical Temperature Changes Using a High-Frequency Electrical Device with Various Irrigants and Activation Cycles

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I. Objective

The purpose of this study was to evaluate the temperature variations both within the internal apical region and on the external root surface at the apical third when using a high-frequency electrical device (EndoWiz) under different root canal irrigants across single and multiple activation cycles.

II. Materials & Methods

An freshly extracted human central incisor was prepared using a nickel-titanium rotary instrument system (ProTaper Next) up to size X3. The root canal was irrigated and activated using the high-frequency electrical device, which generates a high-frequency electrical signal of approximately 500 kHz. The device was set at 25 W for 1 second per activation. The samples were divided into three distinct groups based on the irrigant utilized: saline (S), distilled water (D), and 5.25% sodium hypochlorite (NaOCl, N). To evaluate both the intracanal efficacy and the safety of the surrounding tissues, temperature changes were continuously monitored at two distinct locations: the internal apical region and the external root surface at the apical third. Thermal profiles during a single activation (1 cycle) and repeated activations (3 cycles) were recorded and analyzed.

III. Results

The application of a high-frequency electrical device, which is designed for strong sterilization, resulted in distinct temperature profiles depending on the irrigant and the number of activations. During a single activation, NaOCl (N1) demonstrated the highest maximum temperature increase, reaching over 80°C, followed by saline (S1) at approximately 70°C, and distilled water (D1) showing the lowest peak near 50°C. When applying three consecutive activations, a significant cumulative thermal effect was observed. In the 3-activation groups, saline (S3) exhibited pronounced temperature spikes reaching near 90°C, while sodium hypochlorite (N3) showed peak temperatures around 80-85°C. Distilled water (D3) consistently showed the lowest temperature peaks across all protocols, although repeated activations significantly increased its peak temperature up to 75°C compared to a single activation. Despite these substantial internal temperature increases, the temperature on the external root surface at the apical third remained below 30°C across all groups and activation protocols.

IV. Conclusion

Within the limitations of this study, the high-frequency electrical device effectively generates substantial heat inside the root canal without causing a significant temperature rise on the external root surface. This localized internal heat is expected to exert a strong eradication effect on microorganisms in the root canal system. The results suggest that the high-frequency electrical activation into endodontic procedures might be a beneficial and reliable supplementary method for root canal irrigation protocols.

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Multidisciplinary Management of Dens in Dente-Associated Pulpitis in an Immature Maxillary Left Central Incisor: A Case Report

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I. Object

To report a case of dens in dente-associated pulpitis in an immature maxillary left central incisor (tooth #21) that required more than three years of combined prosthodontic and endodontic management, and to discuss the diagnostic and treatment considerations involved in coordinating provisional/definitive crown restoration with ongoing pulpal pathology in a developing tooth.

II. Case Presentation

1. Sex/Age: F/6 (at first visit)
2. Chief Complaint (C.C): Hot/cold sensitivity of the upper left central incisor (#21)
3. Present Illness (P.I): A tooth with dens in dente-associated pulpitis, managed conservatively for over three years through prolonged eruption, prosthodontic complications, and an incidental pulp exposure treated with direct pulp capping, ultimately progressed to irreversible pulpitis/pulp necrosis requiring definitive root canal treatment once apical closure was complete.
4. Impression: Irreversible pulpitis/pulp necrosis of tooth #21, secondary to dens in dente, now indicated for conventional root canal treatment following completion of apical closure.
5. Treatment plan: Completion of canal shaping and irrigation followed by replacement of the calcium hydroxide dressing; obturation to be performed once canal symptoms have resolved. Treatment will conclude with placement of the definitive prosthetic restoration.

Ⅲ. Conclusion

This case highlights the complexity of managing dens in dente-associated pulpal pathology in an immature, erupting tooth, where prosthodontic and endodontic care must be closely coordinated over an extended timeline. Sustained interdisciplinary follow-up was key to preserving tooth function and appropriately timing definitive intervention until root maturation was complete.

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Conservative Management of a Crown–Root Fracture by Intentional Extraction and 180-Degree Rotational Replantation: A Case Report

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I. Object

Crown–root fractures of anterior teeth often extend below the gingival margin, complicating restoration and periodontal management. This case report aims to describe the conservative management of a crown–root fracture of the maxillary right lateral incisor (#12) in an adolescent patient using 180-degree rotational replantation to establish a restorable supragingival margin.

II. Materials & Methods

A 16-year-old female patient presented fracture of the maxillary right lateral incisor (#12) following dental trauma. Clinical and radiographic examinations revealed a crown–root fracture with subgingival extension of the fracture line, predominantly on the palatal aspect. Intentional replantation combined with 180-degree rotation of the tooth was performed to reposition the palatal fracture margin to a supragingival position. The tooth was stabilized using a flexible splint, followed by endodontic treatment and placement of a definitive restoration. Clinical and radiographic follow-up evaluations were conducted to assess treatment outcomes.

III. Results

The 180-degree rotational replantation procedure successfully repositioned the palatal fracture margin to a restorable level without the need for surgical crown lengthening or orthodontic extrusion. Periodontal healing was favorable, with no signs of inflammatory root resorption, ankylosis, or marginal bone loss observed during the follow-up period. The tooth remained asymptomatic, functional, and esthetically acceptable.

IV. Conclusion

180-degree rotational approach using intentional replantation represents a conservative and effective treatment option for managing crown–root fractures in young patients. This technique allows preservation of periodontal structures and alveolar bone while facilitating definitive restoration and long-term tooth retention.

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Physicochemical Properties of Premixed Calcium Silicate–Based Root Canal Sealers under Different Moisture Conditions

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I. Objective

This study aimed to evaluate the effects of different moisture conditions on the physicochemical properties of various premixed calcium silicate–based sealers (CSBSs) by assessing solubility, Vickers hardness, pH, calcium ion release, and temperature-dependent flow characteristics.

II. Materials & Methods

Three premixed calcium silicate–based sealers (White Endoseal MTA; Maruchi, Wonju, Korea; One-Fil; Mediclus, Cheongju, Korea; and EndoSequence BC Sealer; Brasseler USA, Savannah, GA, USA) were evaluated and compared with a conventional epoxy resin–based sealer (AH Plus Jet; Dentsply DeTrey GmbH, Konstanz, Germany). Flow and solubility were measured according to ISO 6876. Flow was evaluated at room temperature, 60°C, and 100°C. Solubility, pH, and calcium ion release under different moisture conditions were assessed on days 3 and 7. Vickers microhardness was measured after setting material discs under distilled water or 20% fetal bovine serum (FBS). Data were analyzed using one-way ANOVA, Tukey's post hoc test, and independent *t*-tests using SPSS Statistics (version 24.0). Statistical significance was set at p value < 0.05.

III. Results

Heat application at 100°C significantly reduced the flow of all CSBSs, as well as that of AH Plus ($p < 0.05$). All CSBSs exhibited significantly higher solubility than AH Plus, with the greatest mass loss observed in White Endoseal MTA and EndoSequence BC Sealer ($p < 0.05$). Under complete moisture exposure, all CSBSs showed lower solubility and greater microhardness than under incomplete moisture conditions. In contrast, no measurable mass loss was observed for AH Plus ($p > 0.05$). All CSBSs maintained an alkaline pH and released more calcium ions than AH Plus on both days 3 and 7. Microhardness of all CSBSs decreased significantly after setting in 20% FBS compared with distilled water ($p < 0.05$), whereas the microhardness of AH Plus was not significantly affected by the setting medium ($p > 0.05$).

IV. Conclusion

Appropriate moisture conditions are critical for achieving the optimal physicochemical properties of hydraulic CSBSs. Although all CSBSs demonstrated higher pH values and greater calcium ion release than the conventional epoxy resin–based sealer, they also exhibited higher solubility and lower microhardness under inadequate moisture conditions and after setting in 20% FBS. These findings suggest that the clinical performance of CSBSs depends primarily on achieving complete setting rather than simply maximizing alkalinity of calcium ion release.

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Endodontic Management of Mandibular Anterior Teeth with Two Canals

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I. Objective

Mandibular anterior teeth generally have a single root and a single root canal; however, anatomical variations such as an additional canal or root may complicate endodontic treatment. Failure to identify additional canals may adversely affect treatment outcomes. This report presents the endodontic management of two mandibular anterior teeth with two canals and discusses clinical considerations for identifying and treating such anatomical variations.

II. Case Presentation

<Case I>

1. Sex/Age : M/78
2. Chief Complaint (C.C) : “My lower front tooth is mobile and painful.”
3. Present Illness (P.I) : #41 percussion(+), bite(+), mobility(++), cold(-), EPT(-), a periapical radiolucency.
4. Impression : Pulp necrosis with symptomatic apical periodontitis of #41
5. Treatment plan : Nonsurgical root canal treatment of #41

<Case II>

1. Sex/Age : M/86
2. Chief Complaint (C.C) : Referred from the Department of Periodontics for treatment of deep caries in #33.
3. Present Illness (P.I) : #33 percussion(-), bite(-), mobility(-), cold(-), EPT(-), cervical caries
4. Impression : Pulp necrosis with normal apical tissues of #33
5. Treatment plan : Nonsurgical root canal treatment and composite resin restoration of #33

III. Conclusion

Clinicians should be aware of possible additional canals and roots in mandibular anterior teeth despite their relatively low prevalence. Careful evaluation of preoperative radiographs, appropriate extension of the access cavity, and adequate coronal enlargement can facilitate the detection and negotiation of additional canals. Horizontally angled periapical radiographs and CBCT may also be useful when complex canal anatomy is suspected.

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Long-Term Outcome of Transplantation of an Immature Third Molar with Delayed Root Canal Treatment

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I. Object

This report describes a long-term follow-up of transplantation of an immature tooth into an extracted molar site, in which the donor tooth was selected based on favorable morphologic compatibility with the recipient site. By preserving pulp vitality during continued root development after transplantation and providing endodontic treatment only after vitality was eventually lost, a favorable long-term outcome was achieved, highlighting the importance of appropriately timed endodontic intervention following tooth transplantation.

II. Case Presentation

<Case I>

1. Sex/Age : Female / 12 years old (at first visit)
2. Chief Complaint (C.C) : Pain due to severe caries on #47
3. Present Illness (P.I) : The patient first visited in 2010 with severe caries on #47.
4. Impression : Caries of dentine on #47
5. Treatment plan : Extraction of #47 and transplant #18 on #47 site.

Ⅲ.Conclusion

Transplantation of an immature tooth with an open apex allows continued root development and vitality preservation during the healing period. Even when vitality is eventually lost years later, timely endodontic intervention can achieve a favorable long-term prognosis. This case, followed for more than a decade, supports transplantation combined with appropriately timed endodontic treatment as a predictable long-term treatment option for hopeless molars in growing patients.

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Non-surgical Root Canal Treatment of Dens Invaginatus Based on Oehlers Classification: Two Case Reports

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I. Object

Dens invaginatus (DI) is a developmental dental anomaly in which the depth of the enamel-lined invagination, as defined by the Oehlers classification (Type I–III), directly determines the endodontic treatment strategy. This report presents two cases of asymptomatic apical periodontitis associated with Oehlers Type II and Type III dens invaginatus, managed with classification-specific nonsurgical root canal treatment.

II. Case Presentation

<Case I>

1. Sex/Age: Male/12
2. Chief Complaint (C.C): Gingival swelling at #12; a prior episode of severe pain two weeks earlier that resolved after medication.
3. Present Illness (P.I): Localized gingival swelling was noted at #12 on clinical examination, without other clinical signs or symptoms.
4. Impression: CBCT confirmed Oehlers Type II dens invaginatus on #12, with a pulpal diagnosis of pulp necrosis and an apical diagnosis of asymptomatic apical periodontitis.
5. Treatment plan: Removal of the invaginated structure followed by MTA apexification of the main canal, with future surgical endodontic treatment considered if needed.

The invaginated structure was removed using ultrasonic and rotary instrumentation to allow chemomechanical preparation and placement of calcium hydroxide together with the main canal. Gingival swelling resolved after the second visit and the canal was obturated with MTA and the access cavity restored with composite resin.

<Case II>

1. Sex/Age: Female/12
2. Chief Complaint (C.C): A fistula was found between #22 and #23 buccal gingiva during orthodontic treatment.
3. Present Illness (P.I): Gutta-percha tracing directed toward the mesial middle third of the root of #23, corresponding to the invagination; no pain or other clinical symptoms were present.
4. Impression: CBCT showed Oehlers Type III dens invaginatus on #23 and the invaginated canal did not communicate with the main canal. A positive response to electric pulp testing indicated a normal pulp in the main canal, while the invaginated canal was diagnosed with pulp necrosis and asymptomatic apical periodontitis confined to the invagination.
5. Treatment plan: Since the invaginated canal did not communicate with the main canal, nonsurgical root canal treatment was planned for the invagination canal only, with treatment of the main canal to be considered later if it lost vitality.

The invaginated canal was instrumented with a ProTaper NEXT X2 rotary file and chemomechanical preparation and placement of calcium hydroxide was done; the fistula and gingival swelling resolved by the following visit. After one additional disinfection appointment, the canal was obturated with MTA and the access cavity restored with composite resin.

III. Conclusion

The Oehlers classification of dens invaginatus directly guides treatment planning: Type II anomalies may require removal of the invaginated structure with apexification of the main canal, whereas Type III anomalies confined to the invagination can be managed with selective treatment that preserves main canal pulp vitality. In both cases, CBCT-based diagnosis and MTA obturation of the irregular canal anatomy led to resolution of periapical inflammation, supporting classification-specific, minimally invasive endodontic management of dens invaginatus in young permanent teeth.

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Non-Surgical Root Canal Treatment of a Maxillary Lateral Incisor with Peg Lateralis and Dens Invaginatus: A Case Report

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I. Objective

Dens invaginatus is a developmental anomaly characterized by infolding of enamel and dentin, creating highly complex root canal anatomy that complicates endodontic treatment. In Oehlers type II dens invaginatus, the invagination extends into the root as a blind sac without communication with the periodontal ligament. This case report presents the non-surgical root canal treatment of a maxillary lateral incisor with peg lateralis and Oehlers type II dens invaginatus.

II. Case Presentation

<Case I>

1. Sex/Age : M/74
2. Chief Complaint (C.C) : Referred from the Department of Prosthodontics for #12 root canal treatment
3. Present illness (P.I) : #12 mob(-) per(-) bite(-) cold(-) EPT(-) probing depth (WNL), PA lesion
4. Impression : #12 pulp necrosis with asymptomatic apical periodontitis, peg lateralis, dens invaginatus
5. Treatment plan : Non-surgical root canal treatment on #12

III. Conclusion

Successful endodontic treatment of dens invaginatus requires accurate diagnosis, careful assessment of the internal anatomy, and effective disinfection of the complex canal space. Cone-beam computed tomography (CBCT) is helpful for understanding the three-dimensional internal anatomy of dens invaginatus and for establishing an appropriate treatment plan. In this case, removal of the invaginated structure using ultrasonic instruments allowed adequate irrigation and obturation. Due to the wide apical opening, mineral trioxide aggregate (MTA) was used to achieve apical sealing, followed by gutta-percha obturation and resin restoration. This case illustrates that strategic use of CBCT and ultrasonic instruments can facilitate predictable non-surgical management of Oehlers type II dens invaginatus.

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Longitudinal Trajectory of Tooth Preparation Competency in Dental Students : An Analysis From Pre-clinical Courses to the National Licensing Examination

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I. Objective

Tooth preparation is a psychomotor competency that cannot be delegated to artificial intelligence and must be acquired through the learner's own repeated performance and feedback. Using a tooth preparation competency cohort established at Dankook University College of Dentistry, this study examined whether formative in-curriculum achievement predicts practical performance on the Korean Dental Licensing Examination (KDLE).

II. Materials & Methods

This single-class longitudinal observational study followed the 2020-entry class (N = 59; n = 58 for KDLE-related analyses) from admission to licensure across six tracking points (T0–T5). Variables comprised admission records including College Scholastic Ability Test (CSAT) percentiles, pre-clinical didactic and laboratory scores (2022–2023), session-level clinical instructor ratings and student self-assessments across two semesters of Comprehensive Clinical Practice (CCP, 2024–2025), and the prosthodontic, operative, and endodontic domain scores of the outcome evaluation of the Korean Dentist Clinical Skill Test (oeKDCST) of the 78th KDLE (September 2025). All variables were assigned to either a cognitive or a psychomotor track. Spearman rank correlations with Bonferroni correction, Mann-Whitney U, and Wilcoxon signed-rank tests were performed using IBM SPSS Statistics 30.0 (IRB approval: DKU 2025-12-063-001).

III. Results

All 58 examinees passed. After correction, no admission variable predicted oeKDCST scores and cognitive-track achievement showed no or weak predictive value, whereas psychomotor-track achievement correlated significantly; the Abutment Tooth Preparation Laboratory was the strongest single course-level predictor (ρ = .49). Prosthodontic session ratings began to predict oeKDCST performance from mid-CCP-1 onward and remained consistent across a change of raters. Student self-assessment correlated positively with oeKDCST scores (ρ = .34) and clinical instructor rating correlated most strongly (ρ = .59), whereas the self–instructor gap did not predict lower achievement (ρ = −.04, ns). The three examination domains showed low internal consistency (Cronbach's α = .04).

IV. Conclusion

Tooth preparation competency was explained not by admission scores but by hands-on in-curriculum achievement, suggesting that cohort-based longitudinal assessment can yield valid evidence for tracking competency development in dental education.

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