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Case Report

Aesthetic Rehabilitation with a Cantilever Crown on a Post-Traumatic RCT-Treated Maxillary Central Incisor Adjacent to a Submerged Ankylosed Tooth: A Staged Endodontic and Prosthetic Approach

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ABSTRACT:

Background: Dental trauma to the anterior maxilla can lead to pulp necrosis, discoloration, and structural weakening of affected teeth, even without complete avulsion. Adjacent teeth may sustain more severe trauma, such as avulsion and reimplantation, leading to ankylosis and eventual replacement resorption. Endodontic treatment of traumatized teeth plays a key role in preserving their structural and functional integrity before planning interim or definitive prosthetic rehabilitation. **Case Presentation:** A 25year-old male presented with esthetic concerns following dental trauma that occurred approximately **10 years ago**. The left maxillary central incisor (21) was **avulsed and reimplanted** immediately after the accident. After many years,about 10 months ago, it fractured at cervical level and recent radiograph showed root reduced in size and bone deposition around the coronal portion of the root suggestive replacement resortion. The right maxillary central incisor (11) had**oblique crown fracture**(ellisclass IV)that was initially restored with composite. Years later, the composite fractured, and the tooth developed **progressive discoloration** due to trauma-induced pulpal degeneration. Root canal treatment was performed on 11 to eliminate necrosis, stabilize the tooth, and allow it to serve as an abutment. Since 21 was ankylosed and unrestorable but maintained ridge contour, an **interim cantilever zirconia crown** was fabricated on 11 to temporarily replace 21. This solution restored esthetics and preserved soft tissue architecture while waiting for the ankylosed root to undergo replacement resorption, after then implant placement will be planned. **Conclusion:** This case highlights the essential role of **endodontic therapy in managing post-traumatic pulp necrosis** before prosthetic rehabilitation. By performing RCT on 11, the tooth was preserved and used as an abutment for a temporary cantilever pontic. Staged management—endodontic stabilization first, interim esthetic restoration second, and delayed implant therapy—ensures biological preservation, esthetic satisfaction, and improved long-term outcomes.

Keywords: Dental trauma, pulp necrosis, ankylosis, replacement resorption, root canal treatment, cantilever pontic

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INTRODUCTION

Dental trauma involving the maxillary anterior teeth is common in children and adolescents. Such injuries often lead to long-term complications, including pulp necrosis, discoloration, and weakening of the affected tooth, even if avulsion does not occur. In more severe trauma, some teeth may undergo avulsion, reimplantation, and subsequent ankylosis with replacement resorption. These sequelae complicate long-term management, requiring careful staging of biological and restorative interventions.

When an ankylosed tooth becomes infraoccluded after reimplantation, it cannot be restored permanently but may temporarily maintain alveolar ridge contour. Definitive treatment involves **surgical removal of the ankylosed root followed by implant-supported restoration**, but this is ideally delayed until replacement resorption is complete to preserve ridge volume and improve implant prognosis.

Meanwhile, adjacent traumatized teeth that develop pulp necrosis must be **stabilized endodontically** to prevent further structural deterioration. After endodontic therapy, **interim prosthetic solutions** such as cantilever pontics can restore appearance and maintain gingival contours while waiting for definitive implant therapy.

In this case, **21 was avulsed and reimplanted**10years back due to fall ,about10 months ago itfractured cervical level and became ankylosed and infraoccluded. **11 had oblique crown fractureellis class 4**, initially restored with composite that later failed. Due to post-traumatic discoloration and necrosis, **root canal treatment of 11 was performed to preserve the tooth and allow it to serve as an abutment.** After endodontic stabilization, a **temporary cantilever pontic** was fabricated on 11 to maintain esthetics until implant placement becomes possible after replacement resorption of 21.

CASE REPORT

Chief Complaint

A 25-year-old male presented with the chief complaint of *"broken and discolored upper front tooth and a missing adjacent tooth, which affects my smile."* He was primarily concerned about the esthetics of his maxillary anterior teeth.

Past Dental and Trauma History

- The patient experienced anterior dental trauma approximately 10 years ago due to a fall.
- The left maxillary central incisor (21) was avulsed and reimplanted by a general dentist.The patient is unaware of any root canal treatment done on 21.
- About 10 months ago, 21 fractured at the cervical level .Patient consulteda dentist and had some pervious radiograph showing fracture root at cervical level.
- A recent radiograph showed bone formation, reduction in the size of the root and loss of lamina duraat the cervical level suggestingof replacement resorption
- The right maxillary central incisor (11) sustained an Ellis Class II oblique fracture and was restored with composite.
- Over time, the composite restoration failed, and 11 became discolored due to pulpal necrosis.

Clinical Examination

- **Tooth 11**:
  - Oblique crown fracture with fractured and worn composite restoration.
  - Yellowish-brown discoloration of the crown.
  - No response to electric and thermal pulp vitality testing.
  - Normal mobility, but slight tenderness on percussion.
- **Tooth 21**:
  - missing
- Interdental papillae and alveolar ridge contour were preserved.

Radiographic Findings

- **Tooth 11 (Right Maxillary Central Incisor):**
  - Root appears intact with well-defined periodontal ligament space.
  - No signs of inflammatory or replacement resorption.
  - No periapical radiolucency detected.
- **Tooth 21 (Left Maxillary Central Incisor):**
  - **Radiograph presented by the patient (10 months prior):**
    - cervical level fracture.
    - Irregular bone margin noted at the coronal portion of the root.
  - **Current radiograph (on examination):**
    - Submerged root present.
    - Evidence of coronal bone formation over the root.
    - Reduced root length consistent with ongoing replacement resorption.
    - Loss of lamina dura in the coronal and middle root areas.

Diagnosis

- **11**: Post-traumatic **pulp necrosis** with discoloration secondary to oblique crown fracture.
- **21**: Ankylosis with infraocclusion and mid-root fracture after avulsion and reimplantation.

Definitive Treatment Planning

For Tooth 11 (Right Maxillary Central Incisor):

- Diagnosed with discoloration and pulp necrosis following a past crown fracture.
- Root canal treatment (RCT) was performed.
- Tooth was restored with a **full-coverage crown** to improve function and esthetics.
- Used as an **abutment** for a cantilever prosthesis.

For Tooth 21 (Left Maxillary Central Incisor):

- Avulsed and reimplanted 10 years ago by a general dentist.
- Fractured at the **middle third** of the root approximately 10 months ago.
- Past radiograph confirms mid-root fracture; the patient was unsure if any RCT was done.
- Present radiograph shows **replacement resorption** in progress.
- Implant was planned but deferred to **allow complete root resorption** and **ridge preservation**.
- As an **interim solution**, a **cantilever ovate pontic** was provided to maintain esthetics and soft tissue profile.

Esthetic Treatment Plan

- **For 11 (right maxillary central incisor):**

1. Perform root canal treatment to manage post-traumatic pulp necrosis and discoloration.
2. Restore the tooth with a full-coverage crown to improve esthetics and structural integrity.
3. Use 11 as the abutment for a temporary prosthetic solution.

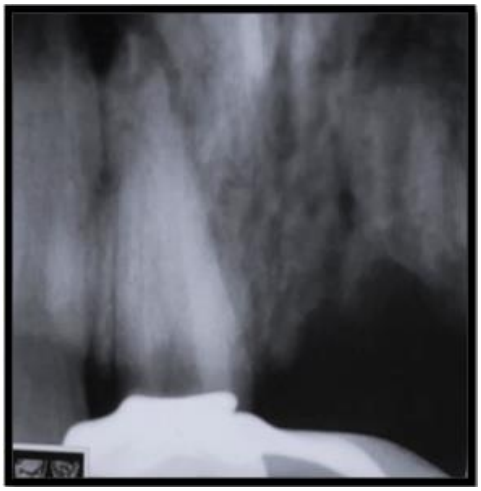
- **For 21 (left maxillary central incisor):**

1. Treatment options discussed in 3 stages:
   - Fixed partial denture (FDP) → Patient refused, as he did not want to prepare/alter adjacent natural teeth.
   - Removable partial denture (RPD) → Patient declined due to esthetic and comfort concerns.
   - Implant-supported crown → Patient agreed.
2. Implant wasdelayed because the ankylosed submerged root will undergo replacement resorption, preserving alveolar ridge contour.
3. As an interim esthetic solution, fabricate a cantilever crown with a pontic replacing 21, supported by 11.

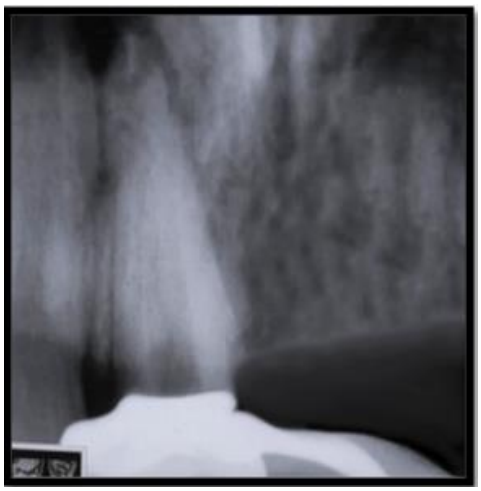
Step-by-Step Treatment Procedure

1. Diagnosis and Pre-Operative Records

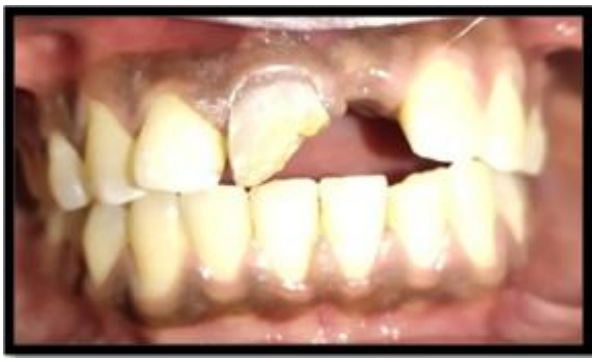
- Pre-operative clinical photographs and periapical radiographs were taken to document discoloration of 11 and ankylosis of 21.
- Vitality tests confirmed non-vital pulp in 11.
- Patient and parents were educated about staged management: **endodontic stabilization first, interim prosthetic solution, definitive implant later**.



Pre Op radiograph provided by patient Showing cervical root fracture



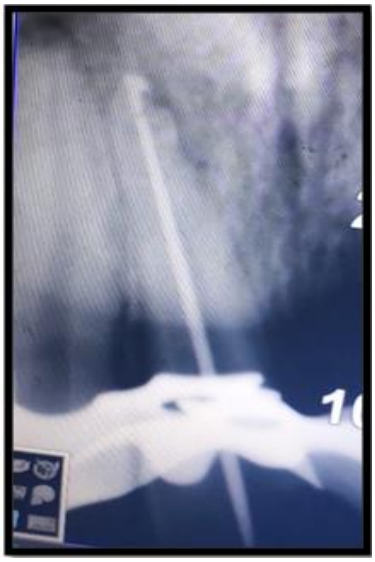
Pre Op radiograph at the time of examination showing bone formation in coronal portion of root



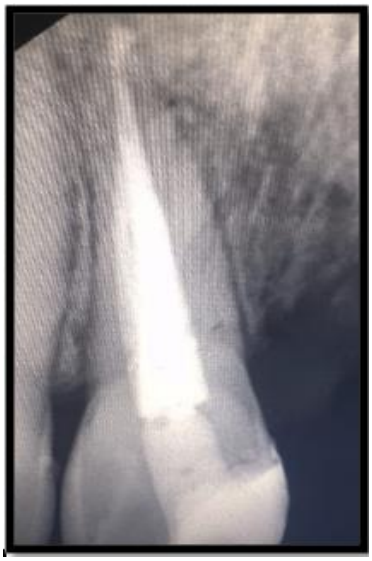
Pre Op Photograph

2. Root Canal Treatment of 11

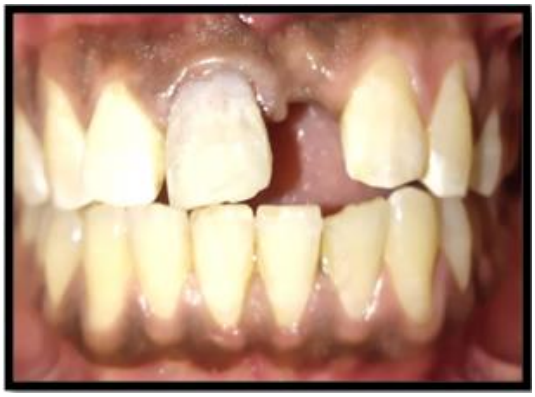
- **Access opening** was performed under rubber dam isolation.
- Working length was determined using an apex locator and confirmed radiographically with an **initial file radiograph**.
- Cleaning and shaping were done using rotary NiTi files and copious irrigation with 2.5% sodium hypochlorite and saline.
- **Master cone selection** was verified radiographically.
- Obturation was done with gutta-percha and resin sealer using lateral condensation.
- A **post-obturation radiograph** confirmed a well-compacted root canal filling.



Master coneradiograph



Obturation



Post op restoration

3. Full-Coverage Crown Preparation on 11

- After endodontic therapy, 11 was prepared for a **full-coverage crown** with 1.5 mm incisal reduction, 1.2 mm labial/palatal reduction, and a supragingival chamfer finish line.
- Gingival retraction cord was placed for precise margin exposure.
- A **final impression** was made using a two-step putty-wash polyvinyl siloxane technique.
- Shade selection was done using the Vitapan classical guide.
- Adequate coronal dentine remained, so a **fiber post was not required**.

4. Fabrication of Cantilever Crown with Ovate Pontic

- A **monolithic zirconia cantilever crown** was fabricated using CAD/CAM, incorporating an **ovate pontic for site 21** to maintain gingival contour and papillae.
- At try-in, marginal fit, pontic adaptation, shade, and occlusion were verified.
- **Final cementation** was done with dual-cure resin cement (RelyX U200, 3M ESPE).

5. Follow-Up

At **1-week and 1-month reviews**, 11 remained asymptomatic, the gingiva around the ovate pontic site was healthy, and the patient expressed high satisfaction with the esthetic outcome. The pontic successfully preserved the emergence profile and interdental papillae.

DISCUSSION

This case emphasizes the **importance of timely endodontic management** in anterior dental trauma before planning any prosthetic rehabilitation. Although 11 was not avulsed, it developed post-traumatic pulp necrosis and discoloration due to an oblique crown fracture. Without proper root canal treatment, the tooth would have further deteriorated and could not have been used as a stable abutment for any prosthetic solution.

In contrast, 21 suffered more severe trauma, was avulsed and reimplanted, and eventually fractured mid-root, becoming ankylosed and infraoccluded. Ankylosed teeth undergo **replacement resorption**, a gradual process in which the root is replaced by bone, preserving ridge volume and soft tissue contour but rendering the tooth unrestorable. For this reason, **immediate surgical removal of 21 was avoided**; instead, it was left in situ to maintain alveolar ridge integrity until resorption is complete, after which implant placement can be performed with less risk of ridge collapse.

Following endodontic therapy, 11 was structurally stable and biologically preserved, making it suitable as an abutment. A **temporary cantilever zirconia pontic** was chosen to replace 21 because it is conservative, requires minimal additional preparation, and provides optimal soft tissue support and esthetics in the anterior zone. The pontic helped maintain papillae and natural emergence profile, preventing esthetic defects like black triangles.

The choice of a cantilever ovate pontic was made as a provisional solution, taking advantage of 11 as an abutment while allowing esthetic replacement of 21. This approach also facilitates tissue contouring and psychological comfort until definitive implant therapy is planned. Literature supports such interim restorations in cases of delayed implant placement due to replacement resorption or patient-driven postponement of surgery

This staged approach—endodontic stabilization first, interim prosthetic rehabilitation second, and delayed implant therapy third—balances immediate esthetic requirements with long-term biological goals. Literature supports preserving ankylosed roots temporarily to maintain ridge volume and delaying implant placement until replacement resorption is complete. Such management minimizes surgical morbidity, optimizes esthetic outcomes, and preserves the patient's natural dentition as long as possible.

CONCLUSION

This case demonstrates that in anterior trauma, **endodontic therapy is the cornerstone of management** when pulp necrosis develops, even if avulsion did not occur. Root canal treatment of 11 stabilized the tooth, restored its function, and allowed it to serve as a biologically sound abutment for a temporary cantilever pontic.

Meanwhile, the ankylosed 21 was intentionally left to undergo **replacement resorption**, maintaining ridge contour for a more favorable implant site in the future. This staged approach—prioritizing endodontic preservation, providing interim esthetic prosthetic rehabilitation, and planning for delayed implant placement—ensures optimal biological preservation, esthetic satisfaction, and long-term functional success in complex anterior trauma cases.