

Management of Ellis Class II Fracture in Young Permanent Maxillary Central Incisor

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ABSTRACT

Background: Tooth fracture is a condition of missing or lost fragments of a complete tooth. Tooth fracture usually occurs simultaneously with another oral injury. **Objective:** This case report discussed the management of Ellis class II fractures on an immature permanent central incisor of a patient who reported to Jenderal Achmad Yani University (Unjani) Dental Hospital. **Case:** An 11-year-old girl revealed a broken upper left tooth, sensitive to cold drinks that interfered with her appearance one year ago. The patient had a good general condition, no abnormalities during an extraoral examination, and a history of pain on the lower back tooth since a year ago. **Case Management:** Management of Ellis class II fracture in young permanent central incisor was conducted by using a class IV composite resin restoration. **Conclusion:** The management of Ellis class II fracture should be conducted holistically and systematically with subjective, intraoral, extraoral, and adjunctive examinations which should be performed correctly and considering the child's psychology.

Keywords: Composite Resin, Oral Trauma, Tooth Fracture

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INTRODUCTION

Oral trauma is a condition of injury to the hard tissues of the teeth, pulp, alveolar bone, periodontal tissue, gingiva, and oral mucosa.¹ Oral trauma is a common occurrence, which comprises 5% of all traumas.² Trauma to permanent teeth increases in school children with active exercise and playing activities. A study stated that 30% of children experienced trauma to their primary teeth and 22% of children experienced trauma to the permanent teeth.³ Other than that, the most prevalent dental trauma was luxation, which accounted for 51% and fracture injuries 49%.⁴ In both primary and permanent dentition, maxillary incisors are the most frequently affected teeth by trauma.⁵

One common type of dental trauma that affects both primary and permanent teeth is coronal fractures of the anterior teeth. Different degrees of harm to the teeth or the soft tissues that support them are involved in traumatic dental injuries.⁶ Age is a significant factor in tooth fracture.⁵ Trauma mostly occurs in 7-12 years old children and predominantly affects boys than girls with a ratio of 1.68:1.⁷ Meanwhile, The most frequent issue among young children is trauma to the anterior teeth. The maxillary central incisors are the teeth that are most commonly impacted.⁸

Sports are one of the main causes of tooth fractures. Children between the ages of 9 and 10 are also active and effective, but because they are still growing and developing, they lose their kinetic coordination and are unable to accurately judge speed and danger. Tooth fracture can occur directly or indirectly. Direct tooth fracture occurs when a hard object directly contacts the tooth, while indirect fracture occurs when there is an impact to the chin, which causes the mandibular tooth to bump into the maxilla with a sudden large force.^{4,6,7}

To ensure a positive outcome, proper diagnosis, treatment planning, and follow-up are crucial. Management of tooth fracture should be done promptly because time is an important

factor in maintaining the vitality of injured tissues. Furthermore, first aid highly determines the treatment outcome, especially related to the prognosis of a tooth, pulp tissue, and periapical tissue. It consists of diagnosing, managing, and choosing the correct materials. Dental trauma management is complicated, and it can get more complicated for patients who are growing.^{2,6,9}

This case report discussed Ellis class II fracture on an immature permanent tooth of a patient who reported to Jenderal Achmad Yani University (Unjani) Dental Hospital. Hopefully, this case report will shed new enlightenment regarding Ellis class II fracture in young permanent maxillary central incisor which often occurs and is found in clinics. However, if it is not handled properly it will affect the vitality of the teeth which in turn can affect the stomatognathic system.

CASE AND CASE MANAGEMENT

First Visit

An 11-year-old girl reported to Unjani Dental Hospital with a complaint of a broken upper left front tooth, sensitive to cold drinks, and interfered with her appearance since a year ago. The tooth fractured when she fell during bicycling and landed on the asphalt when she was 8 years old. During that time, she received a wound in the oral region. However, the tooth was not mobile and not sensitive. Therefore, she did not visit the dentist. However, the patient felt that the tooth affected her appearance after a year and caused sensitivity, thus she wanted her tooth to be restored with a tooth-colored restoration. During the first visit, subjective and objective examination was conducted and found that the patient was in a mixed dentition period, normal occlusion, Ellis class II fracture on tooth number 21, tooth 75 was persistent, and caries on tooth 55, 12, 24, 36, 44, and 46. The extraoral examination was uneventful and the patient had a good general condition. She was given prophylaxis and an adjunctive examination of a panoramic radiograph (Figure 1). The overall

diagnosis result from the examination is presented in Table 1.

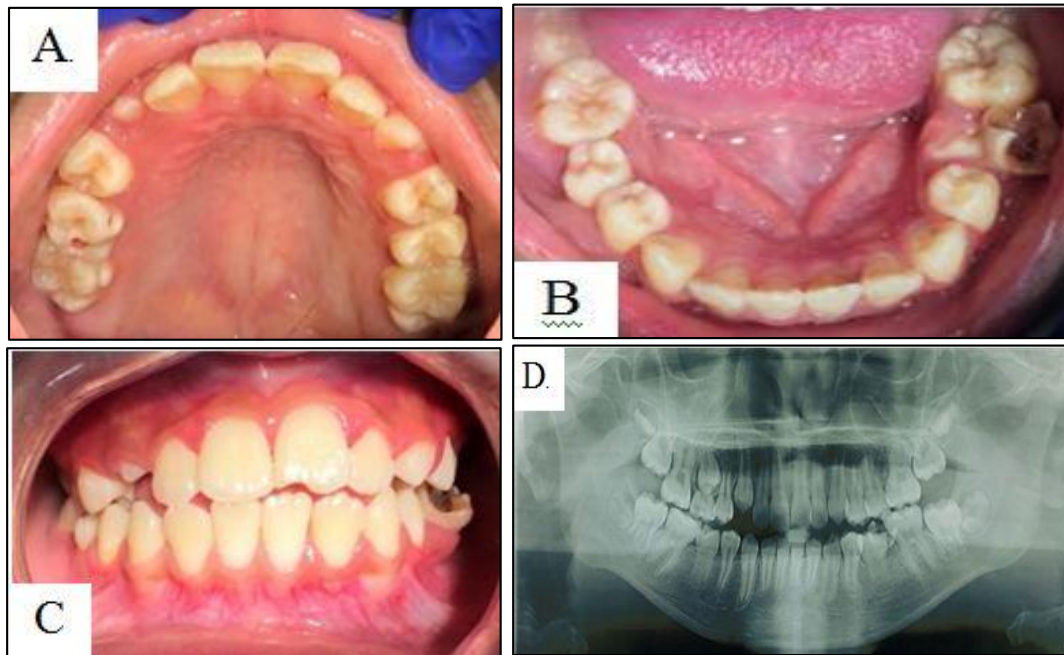


Figure 1. A Maxilla B. Mandibula C. Occlusion D. Panoramic radiograph (Before Treatment).

Tabel 1. Examination Result, Diagnosis and Treatment Plans

Tooth	Examination Result	Diagnosis	Treatment Plans
Tooth 55	Caries occlusal dentin V : +, P/t : -, M: -	- Pulpitis Reversible	- Extraction infiltration
Tooth 12	Caries proximal email V : +, P/t : -, M: -	- Caries media	- Observasion
Tooth 21	Ellis Class II Incisal Mesial fracture V : +, P/t : -, M: -	- Pulpitis Reversible	- Restorasion class IV resin composite
Tooth 24	Caries occlusal dentin V : +, P/t : -, M: -	- Ellis Class II fracture	-
Tooth 36	Caries occlusal dentin V : +, P/t : -, M: -	- Pulpitis Reversible	- Restorasion class I resin composite
Tooth 75	Persistence V : -, P/t : -, M: grade 2	- Caries media	-
Tooth 44	Caries occlusal dentin V : +, P/t : -, M: -	- Pulp necrosis Physiological root resorption	- Extraction infiltration
Tooth 46	Caries occlusal dentin buccal V : +, P/t : -, M: -	- Pulpitis Reversible	- Restorasion class I resin composite
		- Caries media	-

Second Visit

On the second visit, extraction was performed on tooth 75 with II degree of mobility. Afterward, an X-ray was performed on tooth 21 with Ellis class II fracture. OHI was always given to the patient regarding how to perform oral hygiene. The result of the periapical radiograph revealed a partial loss of the mesial side of tooth 21 which involved the enamel and dentin resembling a fracture. The periapical and lamina dura was within normal limits (Figure 2).



Figure 2. Periapical Dental

Third Visit

On the third visit, a composite resin class IV restoration was given to tooth 21 using the following materials and equipment, i.e. ash 49, etch, bonding, light cure, cotton roll, celluloid strips, polishing strips, enhance, and silicon rubber burs. The first step performed was shade determination, which includes A3 for dentin and A2 for enamel with a composite (Beautifill II dental hybrid composite). Afterward, the fractured area was smoothened using a diamond fissure bur and a long bevel was placed on the labial side and a short bevel on the palatal side. Then, the cavity was cleaned, and the working area was isolated using a cotton roll. The enamel was etched using a micro brush for 15 seconds and rinsed with water and dried

under moist condition. Then, the enamel-dentin area was bonded with a micro brush and light-cured for 10 seconds. A celluloid matrix and palatal matrix were placed to prevent restoration material from touching the adjacent tooth. Then, the composite was inserted into the cavity using an incremental method with 2 mm thickness layered with enamel-dentin-enamel shade and was shaped according to tooth anatomy and light-cured for 20 seconds. The proximal side was polished with a polishing strip and the labial side was polished with an enhanced bur and finished with a silicone rubber bur. The occlusion was checked using articulating paper (Figure 3).

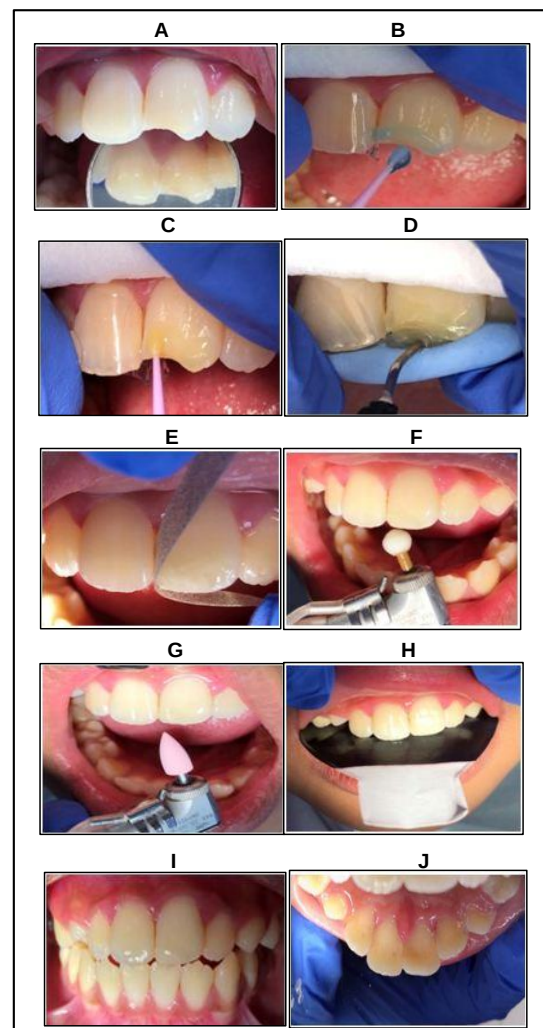


Figure 3. A. Long bevel in labial incisal and short bevel in palatal incisal. B. Etching application. C. Bonding Application. D. Incremental composite application. E. Polishing with polishing strips. F. Polishing with Enhance. G. Polishing with silicone rubber. H. Check the occlusion with articulating paper. I. Final restoration. J. Final restoration.

paper. I. Post restoration during occlusion. J. Palatal post-restoration.

Fourth Visit

The patient was recalled a week after the restoration procedure. There was no complaint, and an objective examination of percussion, mobility, and vitality test did not show any abnormalities. The restoration was in good condition with no erosion or damage. The patient was always given OHI to maintain oral hygiene. The restoration was evaluated a month later (Figure 4).



Figure 4. A. Labial surface post restoration class IV teeth 21 after 1 week. B. Palatal surface post restoration grade IV teeth 21 after 1 week

Fifth Visit

The patient came for a 6-month follow-up. There was no complaint and an objective examination on the tooth, which include percussion, mobility, and vitality test, showed no abnormalities. The restoration was still in good condition without any erosion or damage. The patient was always given OHI to maintain oral hygiene. A periapical radiograph on tooth 21 was performed to evaluate the restoration. The result was uneventful (Figure 5).

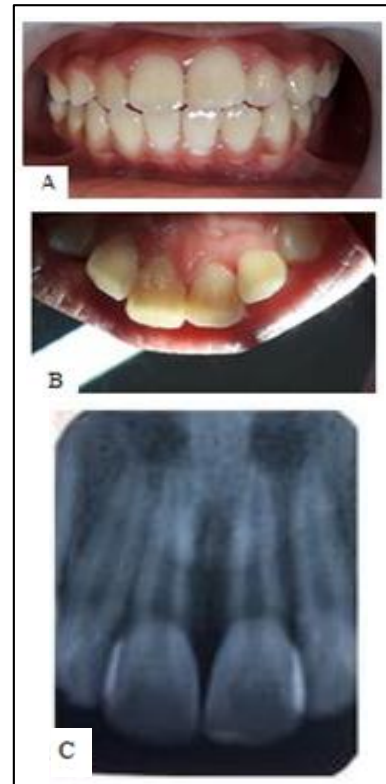


Figure 5. A. Labial surface post restoration Class IV teeth 21 after 6 months. B. Palatal surface post restoration Class IV teeth 21 after 6 months. C. Periapical radiograph after 6 months.

DISCUSSION

The patient was an 11-year-old girl with a crown fracture on tooth 21 due to falling when bicycling. Her mouth bumped onto the asphalt when she was 8 years old. The younger age group of eight to ten years (8-10 years) sustained much fewer injuries (25.4%), whereas eleven and twelve years (11-12 years) accounted for 74.6% of the children who suffered dental injuries in the current study. The most commonly affected tooth is the maxillary central incisor because it is the most prominent tooth vulnerable to direct blow.^{1,2,5,10,11} Zainal (2021) reports that the teeth most frequently involved are the maxillary central incisors and the most common causes are falls, fights, sports, traffic accidents, and domestic violence.¹²

When treating traumatic oral injuries, incorrect initial assessment frequently leads to

treatment errors. In-depth yet speedy and effective clinical and radiographic evaluations, as well as diagnostic testing, must be performed.¹³ The first step in this diagnostic process is to determine whether dental luxations are present. Next, we will attempt to determine whether a crown or coronoradicular fracture is present, and using this decision-making tree, we will determine the accurate diagnosis that will enable the creation of the most suitable treatment plan.¹⁴

A clinical examination of the case showed that the tooth was sensitive to cold foods. A radiograph of tooth 21 showed lost incisal mesial part of the enamel to dentin. The periapical region was normal and the vitality test showed positive. This stated that exposed dentin could irritate the pulp, thus causing free movement of the dentin tubules in reaction to temperature, pressure, and tactile stimuli to compress odontoblasts, nerve endings, fibroblasts, and blood vessels. This condition can be diagnosed as reversible pulpitis caused by Ellis class II fracture on tooth 21.¹⁵

The tooth was restored using composite resin without pulp capping because the fracture did not expose the pulp or near the pulp. In this case, a material with satisfactory esthetic quality, good color stability, and polish ability was chosen. Composite resin is a plastic material, durable to masticatory force, and can attach well to tooth tissue. However, it has several drawbacks, which were sensitive technique and requires good isolation.¹⁶⁻¹⁸ This is in accordance with research by Lakshmi (2022) which states that about 61.54% of them had restoration as the choice of treatment for Ellis Class 2 fracture.¹⁹

Evaluation of tooth with Ellis class II fracture was conducted after a week, a month, and 6 months post-procedure. A radiograph evaluation revealed a radiopaque image resembling the restoration material on the mesial side of tooth 21 that was still complete. This means that the restoration was in good condition. Furthermore, there was no complaint during objective and subjective examinations.

According to APPD, evaluation of Ellis class II fracture should be conducted after 6-8 weeks and a year after trauma. An evaluation of fractured teeth includes any complaints, response to pulp vitality test, any apical periodontitis, and the continuity of physiological root development.²⁰ Most medical professionals use electrical stimulation and heat during a post-trauma evaluation to determine the pulp's state of health.¹⁹ These tests can be performed using a variety of methodologies and have varying indications (with different materials). It is therefore easier to select the appropriate test for each individual if one understands the concepts underlying tests, their varieties, and their clinical variations.²¹

CONCLUSION

Management of Ellis class II fracture should be conducted holistically and systematically by considering intraoral and extraoral examinations, adjunctive examination, and child's psychology. These are all related to the prognosis of tooth trauma management.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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