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Case Report

Conservative management of lateral luxation in a 4-year-old: A pediatric case report with literature review

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Abstract

Lateral luxation is a common dental trauma in young children, often requiring immediate intervention to prevent complications. This case has been reported in line with the CARE guidelines. This case report describes the management of a 4-year-old female who reported to the department with an injury to the primary dentition with gingival bleeding due to a fall. On examination, lateral luxation of primary central incisors and right lateral incisor teeth were observed. Treatment involved repositioning, stabilization with splinting, and follow-up to ensure proper healing and long-term prognosis was conducted. Early intervention is essential in cases of lateral luxation to preserve vitality of teeth and ensure the proper development of permanent successors.

Keywords: Dental trauma, Lateral luxation, Primary teeth, Splinting, Pediatric dentistry, Case report

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1. Introduction

Traumatic dental injuries (TDI) are a significant public health concern affecting individuals of all age groups globally with 13% -17.5% prevalence as they have long-term consequences which affect both hard and soft tissues.[1] Epidemiological studies indicate that one-third of adults and one-fourth of school-aged children have experienced some form of dental trauma.[2] These injuries often result from falls, sports-related accidents, traffic incidents, and physical altercations. Males generally present with more severe dental injuries than females, largely due to their higher participation in physical activities and contact sports.[3] The most affected teeth in TDI cases are the maxillary central incisors, accounting for approximately 70% of injuries, followed by the mandibular central incisors (18%) and other mandibular teeth (12%).[4] Primary dentition is particularly vulnerable to trauma, with the highest incidence occurring between the ages of two and three when motor coordination is still developing.[5]

Among the various forms of TDI,(**Table 1**) intrusive luxation is considered the most severe, with an incidence ranging between 0.5% and 1.9%.[6] This type of injury involves displacement of the tooth into the alveolar bone, causing extensive damage to the periodontal ligament and pulp, leading to poor prognosis. Another common type of TDI, lateral luxation, involves displacement of the tooth with concomitant damage to one of the root surfaces, posing a risk of further complications.[7] Among primary teeth injuries, luxation (displacement) injuries are the most frequent, ranging from 21% to 81% of all cases.[8]

Timely intervention is crucial in minimizing the long-term consequences of TDI. Immediate management should ideally occur within the first hour post-injury to optimize treatment outcomes. It becomes extremely difficult to reposition laterally luxated teeth after 3-4 days. Urgent treatment protocols include repositioning and splinting of displaced teeth.[9] If pulpal damage is suspected, endodontic therapy should be initiated after two weeks to prevent progressive inflammatory root resorption.

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Table 1: Summary table of dental and oral Injuries (Based on ICD-1992 Classification): Here's a summary table categorizing the injuries based on the section (A–D), type of tissue involved, description, and ICD code:

Category	Type of Injury	Description	ICD Code
A. Injuries to Hard Dental Tissues and Pulp			
1	Enamel Infraction	Incomplete enamel crack without substance loss	N 502.50
2	Enamel Fracture	Loss of enamel only	N 502.50
3	Enamel-Dentin Fracture	Involves enamel and dentin, no pulp	N 502.51
4	Complicated Crown Fracture	Involves enamel, dentin, and exposes pulp	N 502.52
5	Uncomplicated Crown-Root Fracture	Enamel, dentin, cementum, no pulp exposure	N 502.54
6	Complicated Crown-Root Fracture	Enamel, dentin, cementum, with pulp exposure	N 502.54
7	Root Fracture	Involves dentin, cementum, and pulp	N 502.53
B. Injuries to Periodontal Tissues			
1	Concussion	No displacement, but reaction to percussion	N 503.20
2	Subluxation	Loosening without displacement	N 503.20
3	Extrusive Luxation	Partial tooth displacement from socket	N 503.20
4	Lateral Luxation	Displacement other than axial; socket fracture	N 503.20
5	Intrusive Luxation	Tooth driven into socket; socket fracture	N 503.21
6	Avulsion	Complete displacement from socket	N 503.22
C. Injuries to Supporting Bone			
1	Socket Communution (Mandibular/Maxillary)	Crushing of socket, often with luxation	N 502.60 / N 502.40
2	Socket Wall Fracture	Confined to socket wall	N 502.60 / N 502.40
3	Alveolar Process Fracture	May involve or spare socket	N 502.60 / N 502.40
4	Jaw Fracture	Involves jaw base, may include alveolar process/socket	N 502.60 / N 502.40
D. Injuries to Gingiva or Oral Mucosa			
1	Laceration	Tear or cut, often by sharp object	S 01.50
2	Contusion	Bruise, blunt trauma, submucosal bleeding	S 00.50
3	Abrasion	Superficial scrape or rub of mucosa	S 00.50

Early diagnosis and appropriate intervention are essential to preserving dental structures, maintaining function, and preventing long-term complications associated with TDI.[10] Every traumatic dental injury case is unique as it involves specific combination of history taking, treatment modes and post-operative sequelae. Documenting case reports can enrich databases of literature involving such cases.

2. Case Presentation

The information presented here was collected and reported following the CARE guidelines. A 4-year-old female patient was brought to the Department of Pedodontics and Preventive Dentistry following a fall that resulted in traumatic injury and pain in her upper anterior teeth. Her guardian reported that she had bleeding from the gums and that three of her front teeth had been displaced inward. The child was visibly distressed but cooperative during the examination. Extraoral findings revealed mild swelling of the upper lip, though there were no soft tissue lacerations. Intraoral clinical examination confirmed the lateral luxation of the primary maxillary central incisors and primary right lateral incisor, with associated gingival bleeding. Clinically percussing the teeth revealed a high metallic sound. The tooth was displaced palatally but was firm, with no abnormal mobility. (**Figure 1,2**) An orthopantomography was taken, which showed that there was no root fracture, but the tooth had shifted within the socket.(**Figure 3**)

Figure 1: Preoperative extra oral clinical view

Figure 2: Preoperative intra oral clinical view showing laterally luxated 51,52 and 61 along with gingival laceration

2.1. Treatment and management

The treatment began with thorough cleansing of the lips and oral cavities using sterile saline to remove blood and debris. Local anesthesia was administered to ensure patient comfort. Lignocaine 2% was used to anesthetize the area. Using gentle digital pressure, the luxated tooth was carefully repositioned back into its original position. To stabilize the tooth and allow for proper healing, a flexible splint was placed, securing it to the adjacent teeth using wire with a diameter of 0.3-0.4 mm or 0.016 inches and composite using acid etch technique. (**Figure 4,5**) The gingival tissue was readjusted back to the cervical neck of the teeth, but no suture was done. Postoperative instructions were provided to the guardian, including maintaining good oral hygiene, avoiding hard or sticky foods, and using an age-appropriate chlorhexidine mouthwash to prevent infection. The patient was advised to take analgesics as needed for pain management and was scheduled for regular follow-up visits.

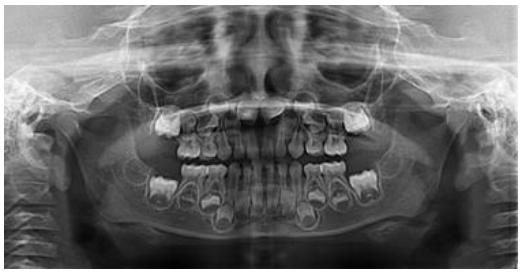

Figure 3: Preoperative orthopantomograph

Figure 4: Clinical view after

Figure 5: Radiographic view after splinting

Figure 6: Clinical view after 2 weeks (post removal of the splint)

Figure 7: Radiograph recorded after 4 weeks (post removal of the splint)

2.2. Follow-up and outcome

The patient was monitored at weekly intervals to assess healing, stability, and pulpal vitality. Throughout the follow-up period, the tooth remained stable, and there were no signs of infection, pulp necrosis, or ankylosis. After four weeks, the splint was removed, and the tooth demonstrated satisfactory stability within the arch. (**Figure 6**,**7**) The child was advised to continue periodic dental visits to monitor the long-term health of the tooth and ensure proper eruption of the permanent successor.

3. Discussion

Traumatic dental injuries (TDIs) in children are a common occurrence, with varying prevalence across different populations. A retrospective study conducted in New Delhi among children aged 1 to 14 years reported a TDI prevalence of 1.25%, with a higher incidence in males due to their greater participation in physical activities and contact sports.[11] However, in this case, the patient was a 4-year-old female, suggesting that while males may be at greater risk, females are also susceptible to TDIs, especially due to falls, which remain one of the most common etiological factors.[12] The current case supports these findings, as the injury resulted from a fall, which is a frequently reported cause of trauma in young children.

Maxillary central incisors are the most affected teeth in dental trauma.[12] This is consistent with the present case, where the maxillary primary central incisors and the right lateral incisors suffered a lateral luxation injury. Luxation injuries are more prevalent in the primary dentition, primarily due to the increased resilience and anatomical differences of the alveolar bone in young children.[13,14] The flexibility of the alveolar bone in primary dentition allows for displacement injuries, such as lateral luxation, rather than fractures.[15]

One of the key risk factors for TDIs is an increased overjet greater than 3 mm, along with inadequate lip coverage, with odds ratios of 3.53 and 3.35, respectively.[16] While overjet and lip coverage were not specifically assessed in the present case, it was clinically observed to be 1.5 to 2 mm, this is a critical consideration in pediatric dental trauma cases. The presence of these predisposing factors could necessitate early orthodontic intervention to reduce the risk of future injuries.[17]

Management of lateral luxation injuries requires immediate attention to reposition the displaced tooth and ensure long-term stability. The International Association of Dental Traumatology (IADT) recommends careful repositioning and stabilization of laterally luxated teeth, followed by splinting for approximately four weeks.[18] In the present case, the maxillary central incisor was repositioned under local anesthesia and stabilized using a flexible splint, following the IADT guidelines. The importance of splinting in maintaining stability and promoting periodontal ligament healing has been well-documented. This case further supports the evidence that splinting, when applied appropriately, allows for proper healing and minimizes the risk of long-term sequelae such as ankylosis, pulp canal obliteration, external root resorption, marginal bone loss or pulp necrosis.[19]

Splints are devices used to support, stabilize, or immobilize teeth that have been loosened, replanted, fractured, or treated surgically. Traditionally, rigid splints were employed following principles similar to bone fracture management, requiring prolonged immobilization. However, this approach often led to complications such as pulp necrosis and external root resorption. Over time, flexible splints gained preference due to their reduced risk of ankylosis, as they allow limited functional movement—considered beneficial for healing.

Studies have shown higher ankylosis rates with rigid wire-composite splints compared to more flexible options like suture splinting, emphasizing the importance of physiological mobility. Accordingly, the International Association of Dental Traumatology (IADT) recommends the use of flexible splints for shorter durations.

Key Features of an Ideal Splint (adapted from Andreasen's guidelines):

1. Promotes reattachment of periodontal ligament fibers.
2. Minimizes further trauma and prevents aspiration or swallowing of loose teeth.
3. Easily applied and removed without injuring soft tissues.
4. Maintains correct positioning of the affected tooth or teeth.
5. Allows normal physiological tooth mobility.
6. Non-irritating to surrounding tissues.
7. Permits pulp testing and endodontic procedures.
8. Enables proper oral hygiene maintenance.
9. Does not interfere with normal occlusal function.
10. It should be comfortable and esthetically acceptable.

Types of Splints:

1. Fiber Splints: Made with materials like polyethylene or Kevlar mesh and unfilled resin (e.g., Optibond™ FL). Examples include Ribbond™, Fiber-Splint, and EverStick. These offer good stability and aesthetics, particularly in children.
2. Wire and Composite Splints: Most used; wires under 0.3–0.4 mm in diameter qualify as flexible. These are preferred for luxation injuries and avulsed teeth due to better gingival tolerance.
3. Arch Bar Splints: Metal bars shaped to fit the contours of the dental arch and fixed with ligature wires; usually rigid and used in dentoalveolar trauma.
4. Acrylic Splints: Utilized in complex cases involving both dental and bony fractures (e.g., para symphyseal fractures), especially when fracture segments can be aligned manually to avoid surgery. This method is relatively straightforward and suitable for young patients. [11]

The prognosis of luxation injuries depends on the severity of trauma and the timeliness of intervention. The IADT guidelines emphasize close monitoring for signs of pulp necrosis, which, if suspected, should be managed promptly to prevent complications such as inflammatory root resorption.[20] In this case, the patient was followed up weekly, and no signs of necrosis or infection were observed. This outcome aligns with previous studies that suggest early

intervention and careful monitoring results in favorable prognoses for lateral luxation injuries.[21]

4. Conclusion

Early intervention and appropriate management are critical in cases of lateral luxation to preserve primary teeth and ensure the proper development of permanent successors. This case reinforces the existing literature on pediatric dental trauma, demonstrating that repositioning and splinting are effective treatment modalities for lateral luxation injuries. The positive outcome observed in this case highlights the importance of timely intervention, adherence to IADT guidelines, and regular follow-ups to monitor pulp vitality and healing. Given that risk factors such as increased overjet and inadequate lip coverage contribute to TDIs, preventive orthodontic care and patient education should be emphasized in pediatric dental practice. Future studies should further explore long-term outcomes in such cases to refine treatment protocols and improve patient care.

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None.

6. Conflict of Interest

None.

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