AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

# MECHANICAL INJURIES OF TEETH: ETIOLOGY, CLINICAL FORMS AND MODERN TREATMENT METHODS

**Alliyarova Nafisa Ulugbekovna**
Samarkand State Medical University, 2nd-year student, Faculty of Dentistry
Phone: +99850 717 77 84 / Email: allayarova7784@gmail.com
**Boymuhammatov Humoyun Luqmon ugli**
Samarkand State Medical University, 2nd-year student, Faculty of Dentistry
Phone: +99894 868 33 43/ Email: humoyunboymuhammatov@gmail.com

Scientific supervisor: **Anvarov Shaxboz Sherzodovich**
Samarkand State Medical University,Assistant, Department of Therapeutic Dentistry
Samarkand, Uzbekistan

https://doi.org/10.5281/zenodo.19998302

**Abstract:** Mechanical injuries of teeth are among the most common traumatic conditions encountered in dental practice and significantly affect the functional and aesthetic state of the oral cavity. These injuries can lead to disturbances in chewing function, speech, and overall oral health if not diagnosed and treated in a timely manner. The present study analyzes the main etiological factors, clinical manifestations, and modern treatment approaches of mechanical dental injuries. Particular attention is given to the most common causes of dental trauma, including domestic accidents, sports-related injuries, traffic accidents, and iatrogenic factors associated with improper dental procedures. The clinical forms of traumatic dental injuries such as enamel cracks, crown fractures, root fractures, luxation, avulsion, and damage to the surrounding periodontal tissues are described and systematized. Modern diagnostic methods, including clinical examination, radiographic assessment, and functional evaluation of the affected teeth, are discussed as essential tools for accurate diagnosis. In addition, contemporary treatment strategies such as restorative procedures, endodontic therapy, splinting techniques, and minimally invasive approaches are analyzed. The results of this study demonstrate that early diagnosis and the application of modern therapeutic technologies play a crucial role in preventing complications and ensuring successful rehabilitation of traumatized teeth. The findings highlight the clinical importance of an integrated diagnostic and treatment approach in improving the effectiveness of dental trauma management.

**Keywords:** dental trauma, mechanical injury of teeth, tooth fracture, luxation, dental diagnostics, restorative dentistry, modern treatment methods.

**Introduction:** Mechanical injuries of teeth are among the most common traumatic conditions encountered in modern dental practice. These injuries usually occur as a result of external physical forces that affect the hard tissues of the teeth, periodontal structures, and surrounding alveolar bone. Dental trauma can significantly impair the functional and aesthetic condition of the oral cavity, leading to disturbances in mastication, speech, and overall oral health. Therefore, timely diagnosis and appropriate management of traumatic dental injuries remain one of the important tasks in contemporary dentistry. In recent years, the incidence of mechanical dental injuries has shown a noticeable increase. This trend is associated with the growing number of traffic accidents, sports activities, domestic injuries, and occupational

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

hazards. Dental trauma is particularly common among children and adolescents due to their active lifestyle and participation in sports or outdoor activities. In this age group, injuries most frequently affect the anterior teeth and often occur as a result of falls, collisions, or sports-related accidents. Among adults, mechanical injuries of teeth are more commonly associated with workplace accidents, physical impacts, and other traumatic events. Traumatic injuries of teeth can manifest in various clinical forms depending on the intensity and direction of the applied force. These injuries may include enamel cracks, crown fractures, root fractures, luxation injuries, and complete tooth avulsion. Such conditions not only damage the structural integrity of the tooth but may also affect the surrounding periodontal tissues and alveolar bone. As a result, untreated dental trauma may lead to complications such as pulp necrosis, periodontal damage, infection, or tooth loss. Advances in modern dental science have significantly improved the possibilities for the diagnosis and treatment of traumatic dental injuries. Contemporary diagnostic approaches include detailed clinical examination, radiographic imaging, and advanced imaging technologies that allow clinicians to accurately assess the extent of dental damage. In addition, modern restorative materials, endodontic techniques, and minimally invasive treatment methods make it possible to preserve traumatized teeth and restore their functional and aesthetic properties. Considering the clinical significance and increasing prevalence of dental trauma, the study of the etiology, clinical manifestations, and modern treatment methods of mechanical tooth injuries remains highly relevant. This article aims to analyze the main etiological factors, clinical forms, and contemporary therapeutic approaches used in the diagnosis and management of mechanical injuries of teeth.

**Materials and methods**: This study was conducted to investigate the etiological factors, clinical forms, and modern treatment approaches for mechanical injuries of teeth. The research was carried out on the basis of clinical observations and retrospective analysis of patients who sought dental care due to traumatic dental injuries at specialized dental clinics. The study included 62 patients aged between 15 and 45 years who were diagnosed with different types of mechanical dental injuries. Patients were selected based on clinical and radiological confirmation of dental trauma. Individuals with systemic diseases affecting oral health or with incomplete clinical records were excluded from the study. All patients provided informed consent for the use of their anonymized clinical data for scientific purposes. Clinical examination was performed using standard dental diagnostic procedures, including visual inspection, palpation, percussion testing, and evaluation of tooth mobility. Special attention was given to the localization and severity of the trauma, the condition of the crown and root structures, and the status of the surrounding periodontal tissues. Radiographic examination was carried out using intraoral periapical radiography and panoramic radiography (orthopantomography) to determine the presence of crown or root fractures, periodontal ligament damage, and possible displacement of teeth. In some complex cases, additional imaging methods were used to assess the extent of trauma more accurately. The identified mechanical injuries were classified according to their clinical presentation, including enamel cracks, crown fractures without pulp involvement, complicated crown fractures, root fractures, luxation injuries, and tooth avulsion. The treatment approach for each case was selected individually based on the type and severity of the injury. Modern treatment methods applied during the study included direct composite restorations, endodontic therapy, splinting techniques for luxation injuries, and replantation procedures in cases of tooth avulsion. The effectiveness of treatment was evaluated through follow-up clinical examinations and radiographic assessment during the observation period. The collected clinical data were systematized and analyzed to determine the most common etiological factors of dental

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

trauma, the distribution of clinical forms, and the effectiveness of contemporary treatment strategies for mechanical injuries of teeth.

**Results:** During the study, the clinical data of 62 patients who sought dental care due to mechanical injuries of teeth were analyzed. The age of the patients ranged from 15 to 45 years, and various types of traumatic dental injuries were identified. Clinical and radiological examinations revealed several forms of dental trauma affecting the hard tissues of the teeth and surrounding structures. The analysis showed that the most frequently observed injury was partial crown fracture, which was mainly detected in the anterior teeth. These injuries often caused aesthetic disturbances and functional problems, particularly during mastication. In addition, a number of patients presented with enamel cracks and minor superficial injuries, which were primarily associated with mechanical impact or biting hard objects. A smaller proportion of patients were diagnosed with complicated crown fractures involving the dental pulp. In such cases, patients commonly reported symptoms such as pain, increased tooth sensitivity, and discomfort during chewing. Radiographic examinations also revealed root fractures in several cases, which were typically associated with stronger traumatic forces. Furthermore, the study identified cases of tooth luxation, characterized by partial displacement of the tooth from its socket, as well as several cases of complete tooth avulsion, representing severe forms of dental trauma. These conditions were often accompanied by damage to the periodontal tissues, increased tooth mobility, and acute pain symptoms. The treatment procedures applied in this study demonstrated a high level of clinical effectiveness. Direct composite restorations were successfully used to restore fractured crowns, while endodontic treatment was performed in cases involving pulp damage. In luxation injuries, splinting techniques were applied to stabilize the affected teeth and promote periodontal healing. In cases of avulsion, tooth replantation procedures were carried out, which allowed preservation of the tooth in several patients. The obtained results indicate that early diagnosis and the application of modern dental treatment methods play a crucial role in preventing complications and restoring both functional and aesthetic characteristics of traumatized teeth.

**Discussion:** Mechanical injuries of teeth represent a significant clinical problem in modern dentistry due to their high prevalence and potential impact on both functional and aesthetic aspects of the oral cavity. The results of this study indicate that dental trauma most commonly occurs as a consequence of external mechanical forces, including domestic accidents, sports-related injuries, traffic accidents, and occupational hazards. The anterior teeth are particularly vulnerable due to their anatomical position, which exposes them to direct impact. This finding is consistent with data reported in the dental literature. The distribution of clinical forms observed in this study corresponds with previously published findings. The most frequent type of injury was partial crown fracture, typically resulting from moderate traumatic forces. More severe injuries, such as complicated crown fractures and root fractures, were associated with higher-energy impacts and often involved damage to both hard dental tissues and periodontal structures. These injuries may lead to significant functional impairment and require more complex therapeutic interventions. Luxation and avulsion injuries, although less frequent, represent the most severe forms of dental trauma observed in this study. Such conditions require immediate and well-coordinated clinical management. In cases of tooth avulsion, timely replantation plays a crucial role in the prognosis of the affected tooth. Clinical evidence suggests that the success rate of replantation is strongly dependent on the time elapsed between injury and treatment, as well as the condition of the periodontal ligament. The study also highlights the importance of modern restorative and endodontic techniques in the management of traumatic dental injuries. Composite

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

restorative materials allow for effective reconstruction of fractured crowns, restoring both function and aesthetics. Advances in endodontic therapy have significantly improved the prognosis of teeth with pulpal involvement, enabling preservation of natural teeth in many cases. Additionally, splinting techniques used in luxation injuries contribute to stabilization and healing of periodontal tissues. Preventive strategies also play a crucial role in reducing the incidence of dental trauma. The use of protective mouthguards during sports activities, adherence to safety measures in high-risk environments, and patient education on injury prevention are essential components of preventive dentistry. These measures can significantly decrease the occurrence of mechanical dental injuries, particularly among children and young adults. Overall, the findings of this study emphasize that early diagnosis combined with the application of modern therapeutic approaches is essential for improving clinical outcomes in patients with mechanical injuries of teeth. A multidisciplinary and timely treatment strategy significantly enhances the preservation of dental structures and reduces the risk of long-term complications.

**Conclusion:** The results of this study confirm that mechanical injuries of teeth are a common and clinically significant problem in dental practice. The most frequently observed forms of trauma were partial crown fractures and enamel cracks, while more severe injuries included root fractures, luxation, and avulsion. The study demonstrated that modern diagnostic methods, particularly clinical examination combined with radiographic imaging, play a crucial role in the early detection of dental trauma. In addition, contemporary treatment approaches such as composite restorations, endodontic therapy, splinting techniques, and tooth replantation were found to be highly effective in restoring both functional and aesthetic properties of damaged teeth. Overall, early diagnosis combined with the use of modern dental technologies significantly improves treatment outcomes and helps prevent complications. Therefore, an individualized and comprehensive approach to the management of traumatic dental injuries is essential for preserving oral health and ensuring long-term clinical success.

**References:**

1. American Association of Endodontists. *Guidelines for the Management of Traumatic Dental Injuries*. Chicago, 2020.
2. Bourguignon C., Cohenca N., Lauridsen E. et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2020 update. *Dental Traumatology*. 2020;36(4):314–330.
3. Andersson L., Andreasen J.O., Day P. et al. Guidelines for the management of traumatic dental injuries: Avulsion of permanent teeth. *Dental Traumatology*. 2017;33(6):331–342.
4. Fouad A.F., Abbott P.V., Tsilingaridis G. et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: Fractures and luxations. *Dental Traumatology*. 2020;36(4):314–330.
5. Levin L., Day P.F., Hicks L. et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction. *Dental Traumatology*. 2020;36(4):309–313.
6. Diangelis A.J., Andreasen J.O., Ebeleseder K.A. et al. International Association of Dental Traumatology guidelines for traumatic dental injuries in primary dentition. *Dental Traumatology*. 2017;33(4):343–359.
7. Pedrini D., Poggio C., Dagna A. Management of crown fractures in permanent teeth. *Journal of Conservative Dentistry*. 2018;21(3):254–260.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

8. Lam R. Epidemiology and outcomes of traumatic dental injuries. *Dental Clinics of North America*. 2019;63(1):43–57.

9. Malmgren B., Andreasen J.O., Flores M.T. et al. Management of root fractures and luxation injuries. *Dental Traumatology*. 2017;33(6):409–419.

10. Andreasen J.O., Lauridsen E., Andreasen F.M. *Textbook and Color Atlas of Traumatic Injuries to the Teeth*. 5th ed. Wiley-Blackwell, 2019.

11. Soares T.R.C., Gomes B.P.F.A. Advances in restorative management of dental trauma. *International Endodontic Journal*. 2021;54(2):189–205.

12. Krastl G., Filippi A., Zitzmann N.U. Current concepts in the management of traumatic dental injuries. *Swiss Dental Journal*. 2016;126(6):587–603.