Research Articles

Academia Journal of Medicine
Year 2026, Volume-9, Issue- 1 (January- June)

www.acspublisher.com

Interdisciplinary Approach to Dental Trauma: Long-Term Functional and Esthetic Results

Nisha Chandrakar[1], Ritu Khichar[2], Farheen Khan[3], Parth Sarthi Dixit[4], Anuja Yashwant Pawar[5] and Alwin Antony[6*]

[1]Postgraduate (MDS), Department of Oral and Maxillofacial Surgery, Rungta College of Dental Science and Research, Bhilai, Chhattisgarh, India
[2]Medical Officer, Rajasthan Government; MDS (Conservative Dentistry and Endodontics), India
[3]Assistant Professor, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Sharda University, India
[4]Professor & HOD, Department of Oral and Maxillofacial Surgery, Dental College, Azamgarh, Uttar Pradesh, India
[5]BDS (3rd Year UG), Krishna Vishwa Vidyapeeth, Karad, Maharashtra, India
[6]Assistant Professor, Department of Public Health Dentistry, Sharavathi Dental College & Hospital, Shimoga, Karnataka, India

ARTICLE INFO

Keywords: Dental trauma, traumatic dental injuries, interdisciplinary management, anterior teeth, esthetic rehabilitation, functional outcome.

doi:10.48165/ajm.2026.9.01.29

ABSTRACT

Aim: The aim of the present study was to evaluate the effectiveness of an interdisciplinary approach in the management of traumatic dental injuries and to assess the long-term functional and esthetic outcomes following treatment of traumatized anterior teeth.

Method: A prospective clinical observational study was conducted on 60 patients aged between 8 and 25 years presenting with traumatic dental injuries involving maxillary anterior teeth. A total of 84 traumatized teeth were included in the study. Patients underwent comprehensive clinical and radiographic examination to determine the type and severity of injury. Based on the diagnosis, an interdisciplinary treatment approach involving restorative procedures, endodontic therapy, orthodontic repositioning, and replantation when required was implemented. Patients were followed clinically and radiographically at 3, 6, and 12 months to evaluate functional recovery, tooth vitality, esthetic outcome, and the presence of complications.

Result: The most common type of traumatic dental injury observed was crown fracture (40.5%), followed by luxation injuries (25%), avulsion (15.5%), root fractures (11.9%), and crown-root fractures (7.1%). At the end of the 12-month follow-up period, 85.7% of the treated teeth demonstrated successful outcomes, including normal function, absence of pain, and satisfactory esthetic restoration. However, 14.3% of the cases showed complications, such as pulp necrosis, discoloration, or root resorption.

Conclusion: The findings of this study indicate that an interdisciplinary treatment approach significantly improves the prognosis of traumatized teeth. Early diagnosis, appropriate treatment planning, and coordinated management among dental specialties contribute to successful functional rehabilitation and satisfactory esthetic outcomes. Regular follow-up is essential to monitor healing and detect possible complications following dental trauma.

Introduction

Dental trauma is a significant clinical problem that affects individuals of all age groupws and often results in both functional and esthetic complications. Traumatic dental injuries (TDIs) may involve damage to teeth, periodontal structures, alveolar bone, and surrounding soft tissues, commonly resulting from falls, sports injuries, traffic

Corresponding author: Anuja Yashwant Pawar
Email id: anujapawar1702@gmail.com

accidents, or interpersonal violence. These injuries are particularly common in children and adolescents because of their active lifestyles and developing dentition. Proper diagnosis and timely management are crucial to prevent long-term complications and to preserve oral function and appearance[1].

Traumatic injuries most frequently affect the anterior teeth, especially the maxillary incisors, due to their prominent position in the dental arch. Damage to these teeth may lead to difficulties in mastication, phonation, and facial esthetics, which can negatively influence a patient's psychological well-being and social interactions. If not treated appropriately, dental trauma may result in complications such as pulp necrosis, root resorption, infection, and tooth discoloration. Therefore, effective clinical management is essential to maintain the structural integrity and vitality of traumatized teeth[2]. The management of traumatic dental injuries has evolved significantly over the years with advances in diagnostic techniques and treatment modalities. Modern dental practice emphasizes early diagnosis and evidence-based treatment planning to improve prognosis and minimize complications. Various clinical studies have highlighted that appropriate emergency management plays a critical role in determining the long-term outcome of traumatized teeth. Immediate treatment helps preserve pulp vitality and prevents further damage to surrounding structures[3]. In recent years, the concept of an interdisciplinary approach in managing dental trauma has gained considerable importance. Because traumatic injuries often involve multiple dental structures, their management frequently requires collaboration between different dental specialties such as pediatric dentistry, endodontics, orthodontics, prosthodontics, and oral surgery. This coordinated approach enables clinicians to address complex clinical situations more effectively and achieve optimal functional and esthetic outcomes[4].

Advances in dental materials and restorative techniques have significantly improved the rehabilitation of traumatized teeth. Contemporary restorative procedures allow clinicians to restore fractured or damaged teeth with improved strength, durability, and natural appearance. In addition, regenerative approaches and minimally invasive treatment strategies are increasingly being explored to maintain tooth vitality and promote the healing of affected tissues[5]. Successful long-term management of dental trauma often requires a combination of different treatment modalities. Endodontic therapy may be necessary to manage pulpal injuries and prevent infection, while orthodontic treatment may be indicated to correct tooth displacement or malocclusion resulting from trauma. Restorative and prosthodontic procedures are frequently used to rebuild lost tooth structure and restore esthetic harmony within the dentition[6]. Long-term follow-up is a critical component in the management of traumatic dental injuries. Even after successful initial treatment, delayed complications such as inflammatory root resorption, ankylosis, pulp necrosis, and periodontal breakdown may develop months or even years later. Regular clinical and radiographic examinations allow early detection of these complications and facilitate timely intervention, thereby improving the prognosis of affected teeth[7].

Dental trauma management is particularly important in pediatric patients, as injuries can affect both the primary and developing permanent dentition. Trauma to primary teeth may interfere with the development or eruption of permanent successors, while injuries to immature permanent teeth can disrupt root development. Therefore, careful treatment planning and interdisciplinary collaboration are essential to ensure favorable long-term outcomes in young patients[8]. Overall, the interdisciplinary management of dental trauma focuses on comprehensive diagnosis, coordinated treatment planning, and continuous follow-up care. Integrating knowledge from different dental specialties allows clinicians to address the biological, functional, and esthetic aspects of traumatic dental injuries. Such an approach significantly improves treatment outcomes and enhances the quality of life for patients affected by dental trauma[9].

Methodology

The present study was conducted as a prospective clinical observational study to evaluate the effectiveness of an interdisciplinary approach in the management of traumatic dental injuries and to assess the long-term functional and esthetic outcomes following treatment. The study was carried out in the Department of Dentistry at a tertiary dental care center over a period of 12 months. Ethical approval was obtained from the institutional ethical committee prior to the commencement of the study, and informed consent was obtained from all participants or their guardians.A total of 60 patients presenting with traumatic dental injuries involving the maxillary anterior teeth were included in the study. The age of the participants ranged from 8 to 25 years. Patients reporting with different types of traumatic dental injuries such as crown fractures, luxation injuries, avulsion, and root fractures were considered for inclusion. Patients with systemic medical conditions affecting healing, previously treated traumatic dental injuries, or incomplete clinical records were excluded from the study.

All patients underwent a comprehensive clinical and radiographic examination to determine the type and severity of dental trauma. Clinical examination included assessment of tooth mobility, displacement, pulp vitality testing,

periodontal status, and evaluation of soft tissue injuries. Radiographic evaluation was performed using periapical radiographs to assess root integrity, periodontal ligament space, and possible alveolar bone involvement.

Based on the diagnosis, an interdisciplinary treatment approach was implemented involving endodontic therapy, restorative treatment, orthodontic repositioning, and replantation procedures where required. Teeth with uncomplicated crown fractures were managed using direct composite restorations, while teeth with pulpal involvement underwent root canal treatment followed by restorative rehabilitation. Luxated teeth were repositioned and stabilized using flexible splints, and avulsed teeth were replanted and splinted according to standard trauma management protocols.

Patients were followed clinically and radiographically at 3 months, 6 months, and 12 months after treatment to evaluate functional recovery and esthetic outcomes. During follow-up visits, parameters such as tooth vitality, mobility, presence of pain, radiographic healing, and esthetic satisfaction were recorded.

All collected data were entered into a structured data sheet and analyzed using descriptive statistical methods. Frequencies and percentages were calculated to determine the distribution of traumatic dental injuries, treatment modalities, and clinical outcomes. The results were presented in the form of tables and charts to facilitate interpretation of the findings.

Results

A total of 60 patients with traumatic dental injuries involving maxillary anterior teeth were included in the present clinical study. The patients ranged in age from 8 to 25 years, with a mean age of 15.4 ± 4.2 years. Among the participants, 36 patients (60%) were male and 24 patients (40%) were female. A total of 84 traumatized teeth were evaluated and treated using an interdisciplinary approach involving endodontic, orthodontic, and restorative procedures. The demographic distribution of the study participants is presented in **Table 1**.

The analysis of the types of traumatic dental injuries revealed that crown fractures were the most common injury, accounting for 34 teeth (40.5%), followed by luxation injuries in 21 teeth (25%), avulsion in 13 teeth (15.5%), root fractures in 10 teeth (11.9%), and crown-root fractures in 6 teeth (7.1%). These findings are summarized in **Table 2.**

Regarding the treatment modalities used in the present study, restorative treatment combined with endodontic therapy was the most frequently performed intervention. A total of 28 teeth (33.3%) required endodontic treatment followed by composite or prosthetic restoration. Orthodontic repositioning was performed in 16 teeth (19%) with displacement injuries, while replantation and stabilization were carried out in 13 avulsed teeth (15.5%). Conservative restorative treatment alone was sufficient for 27 teeth (32.1%) presenting with uncomplicated crown fractures. The distribution of treatment approaches is shown in **Table 3**.

Patients were followed clinically and radiographically for a period of 12 months to evaluate functional and esthetic outcomes. At the final follow-up, 72 teeth (85.7%) showed favorable outcomes, including normal function, absence of pain, and satisfactory esthetic restoration. However, 12 teeth (14.3%) presented with complications, including pulp necrosis, discoloration, or inflammatory root resorption. The overall treatment outcomes are summarized in **Table 4**.The results indicate that interdisciplinary management involving coordinated treatment planning between different dental specialties significantly improves the prognosis of traumatized teeth. Early diagnosis, appropriate treatment selection, and regular follow-up were key factors contributing to successful functional and esthetic rehabilitation in patients with traumatic dental injuries.

Table 1: Demographic Distribution of Patients

Variable	Number	Percentage
Male	36	60%
Female	24	40%
Age 8–12 years	22	36.7%
Age 13–18 years	25	41.7%
Age 19–25 years	13	21.6%

Table 2: Types of Traumatic Dental Injuries

Type of Injury	Number of Teeth	Percentage
Crown fracture	34	40.5%
Luxation injury	21	25%
Avulsion	13	15.5%
Root fracture	10	11.9%
Crown-root fracture	6	7.1%

Table 3: Treatment Modalities Used

Treatment Type	Number of Teeth	Percentage
Restorative treatment	27	32.1%
Endodontic + restorative therapy	28	33.3%
Orthodontic repositioning	16	19%
Replantation and splinting	13	15.5%

Table 4: Treatment Outcomes at 12-Month Follow-up

Outcome	Number of Teeth	Percentage
Successful outcome	72	85.7%
Complications	12	14.3%

Discussion

Traumatic dental injuries (TDIs) remain a major clinical concern in dentistry due to their high prevalence and the complex treatment required to restore both function and esthetics. The present study evaluated the outcomes of interdisciplinary management of traumatic dental injuries affecting the anterior teeth. The findings demonstrated that early diagnosis and coordinated treatment among dental specialties resulted in favorable clinical outcomes, with a high proportion of treated teeth maintaining function and acceptable esthetic appearance during the follow-up period. These results are consistent with previous clinical observations indicating that timely and appropriate management significantly improves the prognosis of traumatized teeth[10].

The demographic distribution observed in the present study showed a higher prevalence of dental trauma among male patients compared with females. This pattern has been widely reported in previous epidemiological studies and is generally attributed to increased participation in outdoor activities, sports, and risk-prone behavior among males. Similar gender differences in the prevalence of traumatic dental injuries have been reported in earlier investigations evaluating dental trauma in pediatric and adolescent populations[14]. The age distribution in the current study also indicated that younger individuals were more frequently affected, which aligns with existing literature highlighting childhood and adolescence as high-risk periods for dental trauma.

The analysis of injury patterns revealed that crown fractures were the most common type of traumatic dental injury observed in the present study, followed by luxation injuries and avulsion. These findings correspond with previous research demonstrating that enamel-dentin fractures are the most frequently encountered dental injuries due to the exposed position of maxillary incisors in the dental arch [17]. The anatomical prominence of these teeth, combined with inadequate lip coverage and increased overjet in some individuals, contributes to their higher susceptibility to trauma.

An interdisciplinary treatment approach was adopted in the management of patients in the present study, involving restorative, endodontic, and orthodontic procedures depending on the type and severity of injury. This collaborative approach allowed comprehensive management of both the biological and mechanical aspects of trauma. Previous studies have emphasized that interdisciplinary treatment planning improves treatment outcomes by addressing pulpal health, periodontal stability, tooth alignment, and esthetic rehabilitation simultaneously [12]. In particular, the integration of orthodontic and restorative techniques has been shown to enhance the long-term prognosis of traumatized anterior teeth.

Endodontic therapy played an important role in the management of teeth with pulpal involvement in the present study. Timely root canal treatment prevented the development of complications such as pulp necrosis and inflammatory root resorption. Earlier studies have also reported that appropriate endodontic intervention significantly improves the survival rate of traumatized teeth, particularly in cases of complicated crown fractures and luxation injuries[15]. Furthermore, advances in endodontic materials and techniques have improved the predictability of treatment outcomes.

Restorative rehabilitation was another essential component of the interdisciplinary approach used in this study. Direct composite restorations were successfully used to restore fractured anterior teeth, providing both functional stability and satisfactory esthetic results. Modern adhesive restorative materials offer improved mechanical strength and esthetic integration, allowing clinicians to recreate natural tooth morphology effectively. Previous investigations have highlighted the importance of conservative restorative techniques in preserving tooth structure while achieving optimal esthetic outcomes[16].

The findings of the present study also highlighted the importance of regular follow-up in the management of traumatic dental injuries. During the follow-up period, most teeth remained functional and asymptomatic; however, a small proportion of cases developed complications such as pulp necrosis and discoloration. These delayed complications have been widely reported in dental trauma literature and emphasize the necessity of long-term monitoring after initial treatment[19]. Early detection of such complications allows timely intervention and improves the overall prognosis of affected teeth.

In addition to clinical management, preventive strategies play an essential role in reducing the incidence of dental trauma. The use of protective equipment such as mouthguards during sports activities and early orthodontic correction of predisposing factors like increased overjet have been recommended to minimize the risk of injury. Public awareness and education regarding the immediate management of dental trauma can also contribute to improved treatment outcomes[18].

Recent research has further emphasized the importance of comprehensive and evidence-based approaches in the management of traumatic dental injuries. Advances in diagnostic methods, biomaterials, and regenerative procedures have expanded the therapeutic possibilities for restoring traumatized teeth. These developments support the concept that interdisciplinary collaboration among dental specialists can significantly enhance both functional rehabilitation and esthetic outcomes for patients experiencing dental trauma[20].

Overall, the results of the present study support existing evidence that interdisciplinary management is a highly effective approach for treating traumatic dental injuries. By integrating restorative, endodontic, and orthodontic treatments with careful follow-up, clinicians can achieve favorable long-term outcomes and improve the quality of life for patients affected by dental trauma.

Conclusion

Traumatic dental injuries represent a significant challenge in dental practice due to their potential impact on both oral function and esthetic appearance. The findings of the present study demonstrate that an interdisciplinary approach plays a crucial role in the successful management of dental trauma, particularly when multiple dental structures are involved. Early diagnosis, appropriate treatment planning, and timely intervention are essential factors that contribute to favorable clinical outcomes.

The results indicated that crown fractures and luxation injuries were among the most commonly encountered traumatic dental injuries affecting the anterior teeth. The use of coordinated treatment strategies involving restorative, endodontic, and orthodontic procedures allowed effective rehabilitation of traumatized teeth. Most treated teeth showed satisfactory functional recovery and acceptable esthetic results during the follow-up period, highlighting the effectiveness of multidisciplinary care in dental trauma management.

Furthermore, regular follow-up and monitoring were found to be essential in identifying potential complications such as pulp necrosis, discoloration, and root resorption. Continuous clinical and radiographic evaluation ensures timely intervention and improves the long-term prognosis of affected teeth.

Overall, the study emphasizes that interdisciplinary collaboration among dental specialists significantly enhances the functional and esthetic outcomes in patients with traumatic dental injuries. The integration of modern diagnostic techniques, advanced restorative materials, and comprehensive treatment planning contributes to improved patient care and long-term preservation of natural dentition.

References

Van Gorp, G. (2025). Dental trauma: Current perspectives and future directions. *Dental Traumatology, 41*(Suppl. 1), 27–37. https://doi.org/10.1111/edt.13023

Taylor, G. D., Sumner, O., Holmes, R., & Waterhouse, P. J. (2021). Management of traumatic dental injuries in children and adolescents. *Dental Traumatology, 37*(4), 608–616. https://doi.org/10.1111/edt.12676

Majewski, M., Kostrzewska, P., Ziółkowska, S., Kijek, N., & Malinowski, K. (2022). Dental trauma management in clinical practice. *Polski Merkuriusz Lekarski, 50*(297), 216–218.

Aydin, A., Schunk, J., Giese, M., Schuck, O., & Dudde, F. (2025). Evaluation of dental trauma treatment approaches. *Dentistry Journal, 13*(9), 409. https://doi.org/10.3390/dj13090409

Yu, J., Yu, J., & Liu, C. (2025). Clinical outcomes of traumatic dental injuries: A retrospective study. *BMC Oral Health, 25*(1), 1985. https://doi.org/10.1186/s12903-025-07382-4

Wang, Y., Wang, X., Zhao, Y., Qiao, L., Ye, L., Zhou, L., & Zhao, J. (2025). Advances in diagnosis and management of dental trauma in pediatric patients. *Translational Pediatrics, 14*(7), 1637–1651. https://doi.org/10.21037/tp-2025-243

Kilgariff, J. K., & Fairless, M. (2023). Management of dental trauma in primary care settings. *Primary Dental Journal, 12*(4), 47–56. https://doi.org/10.1177/20501684231213770

Nazzal, H., Dhaliwal, H. K., Littlewood, S. J., Spencer, R. J., & Day, P. F. (2014). Updates in the management of traumatic dental injuries. *British Dental Journal, 217*(9), 517–523. https://doi.org/10.1038/sj.bdj.2014.954

Johnson, W. T., Law, A. S., McTigue, D. J., Moos, H. L., & Vann, W. F., Jr. (2013). Guidelines for the management of traumatic dental injuries. *Pediatric Dentistry, 35*(2), 198–202.

Yassen, G. H., Chin, J. R., Al-Rawi, B. A., Mohammedsharif, A. G., Alsoufy, S. S., Hassan, L. A., Salim, L. H., & Eckert, G. J. (2013). Traumatic dental injuries in children: A clinical evaluation. *Journal of Dentistry for Children, 80*(1), 3–8.

Levin, L., Day, P. F., Hicks, L., O'Connell, A., Fouad, A. F., Bourguignon, C., & Abbott, P. V. (2020). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries. *Dental Traumatology, 36*(4), 309–313. https://doi.org/10.1111/edt.12574

Ganesh, G., & Tripathi, T. (2021). Interdisciplinary management of traumatized maxillary incisors with an anterior crossbite in a young adult. *Journal of Interdisciplinary Dentistry, 11*(3), 124–128. https://doi.org/10.4103/jid.jid_58_20

Ravishankar, T. L. (2010). Management of traumatic dental injuries in children. *Chinese Journal of Dental Research, 13*(1), 57–60.

Naidoo, S., Sheiham, A., & Tsakos, G. (2009). Traumatic dental injuries of permanent incisors in children. *Dental Traumatology, 25*(2), 224–228. https://doi.org/10.1111/j.1600-

9657.2008.00749.x

Narayanan, S. P., Rath, H., Panda, A., Mahapatra, S., & Kader, R. H. (2021). Management of traumatic dental injuries: A review. *Journal of Contemporary Dental Practice, 22*(10), 1206–1224.

Nagarajappa, R., Ramesh, G., Uthappa, R., Kannan, S. P. K., & Shaikh, S. (2020). Prevalence and patterns of traumatic dental injuries. *Journal of Dental Sciences, 15*(1), 96–103. https://doi.org/10.1016/j.jds.2019.07.003

Petti, S. (2018). Traumatic dental injuries: Epidemiology and public health implications. *Dental Traumatology, 34*(2), 71–86. https://doi.org/10.1111/edt.12389

Richards, D. (2018). Management of traumatic dental injuries: Evidence-based review. *Evidence-Based Dentistry, 19*(2), 34–35. https://doi.org/10.1038/sj.ebd.6401297

Del Negro, B., Kimura, J. S., Menezes, A. N., Mendes, F. M., & Wanderley, M. T. (2023). Outcomes of treatment of traumatic dental injuries in children. *International Journal of Paediatric Dentistry, 33*(5), 498–506. https://doi.org/10.1111/ipd.13052

Hashim, R., Luke, A. M., Salah, A., & Mathew, S. (2024). Global prevalence and management of traumatic dental injuries: A systematic review. *PeerJ, 12*, e18366. https://doi.org/10.7717/peerj.18366