DOI: 10.18044/MEDINFORM.2025122.2070 ISSUE 2, 2025

Dental Trauma and Soft Tissue Injuries Subject to Oral Surgery - Postoperative Care and Follow-up

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Abstract

Injuries to the maxillofacial area can cause damage to the hard dental tissues, the periodontium, the adjacent intraoral and extraoral soft tissues, and the facial bones. Dental trauma is more common in the permanent than the primary teeth, with the upper anterior teeth being the most frequently affected. Possible causes include transport trauma, sports, falls, fights, etc. This review aims to summarize and analyze the strategies for postoperative care in patients with traumatic injuries to the teeth and the surrounding soft tissues. An advanced electronic search was conducted using a combination of selected keywords and MeSH terms in Web of Science, Scopus, PubMed, and Google Scholar. The analysis of the obtained data demonstrated that postoperative care depends on the type of traumatic injury, tissues involved (primary or permanent dentition, soft tissue injuries), bacterial contamination, etc. Patients should be instructed to maintain good oral hygiene, avoid additional trauma to the area, and strictly adhere to follow-up appointments. The follow-up aims to re-evaluate the condition and take additional measures, if necessary, in order to avoid future complications.

Keywords: dental trauma, tooth injury, dentoalveolar injury, soft tissue injury, postoperative care

Introduction

Injuries to the maxillofacial area can cause damage to the hard dental tissues, the periodontium, the adjacent intraoral and extraoral soft tissues, and the facial bones. Injuries in the area can be divided into dentoalveolar injuries (affecting the teeth and the alveolar ridge), fractures of the jaws and other facial bones, and soft tissue injuries. The reported incidence of dental trauma is about 5% of all injuries and about 15-20% in children at the age of 0-6 years. Dental trauma is more common in the permanent (about 59%) than the primary teeth (37%), with the upper anterior teeth being the most frequently affected (1-3). Possible causes include transport trauma, sports, falls, fights, etc. (4) Gender distribution demonstrates that dental trauma is more common in men, with a male-female ratio of 1.4 (3). Some predisposing factors include anterior maxillary teeth protrusion and insufficient lip coverage (1).

Trauma to primary teeth can disturb the development of the permanent dentition (5, 6). On the other hand, trauma to the permanent teeth can lead to pulp necrosis and root resorption (7). At a young age, traumatic injuries in the maxillofacial area can interfere with bone and soft tissue

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growth and development (8). Usually, immediate dental treatment is necessary to improve the prognosis and prevent further complications.
Injuries to hard dental tissues are common, especially in childhood and adolescence. Fractures of the tooth crown and dislocations are prevalent. In 2020, the International Association of Dental Traumatology (IADT) developed recommendations for managing these injuries (9).

Aim

This review aims to summarize and analyze the strategies for postoperative care in patients with dental trauma and soft tissue injuries in oral surgery.
Some of the traumatic injuries, such as fractures of the tooth crown involving the hard dental tissues and the pulp to varying degrees (complicated fractures), are entirely subject to conservative dental treatment and are not the subject of this article.

Materials and Methods

An advanced electronic search was conducted using a combination of selected keywords and MeSH terms in Web of Science, Scopus, PubMed, and Google Scholar.

Results

Permanent teeth injuries

The most common complications after such injuries are pulp necrosis and infection, obliteration, root resorption, and dehiscence of the marginal gingiva and bone. Early detection of these complications improves the prognosis (10, 11).
Antibiotic prophylaxis is not widely used for dental trauma except in cases of some soft tissue injuries. The postoperative instructions may include regular follow-up examinations, a soft diet, and strict oral hygiene with the use of antibacterial solutions or gels with 0.12% CHX, avoiding group sports, etc. (12)
Follow-up includes control examinations, assessment of the clinical condition, imaging and photographic documentation, and tests for tooth sensitivity and vitality, including the cold test, electric pulp testing (EPT), pulse oximetry, laser Doppler flowmetry, and ultrasound Doppler flowmetry. Imaging methods include two-dimensional radiographs and cone-beam computed tomography, which is the gold standard in evaluating dentoalveolar structures (13-16).
The frequency of follow-up examinations is determined by the type of trauma. For root fractures – after 4 weeks (removal of the splint for fractures in the middle and apical third), 6-8 weeks, 4 months (removal of the splint for fractures in the cervical third), 6 months, 1 year, and then annually for at least the first 5 years. For alveolar crest fractures, follow-up is at the same interval, with the splint removed at the fourth week. For contusions, follow-up is at the fourth week and after 1 year. In cases of subluxations – at 2 weeks (splint removal), 12 weeks, 6 months, 1 year. In case of extrusion, the follow-up examinations are as follows: 2 weeks (splint removal), 4 weeks, 8 weeks, 12 weeks, 6 months, 1 year, and annually for at least 5 years. In case of luxation or intrusion,

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the follow-up is the same as in cases of extrusion, but this time the splint removal is after 1 month (17, 18).

Expulsion of permanent teeth is among the most severe traumatic injuries to the teeth and occurs with a frequency of up to 15-16% of these conditions. The prognosis depends on the measures taken immediately after the incident (19).

The periodontal ligament of avulsed teeth is often contaminated by oral microflora. Therefore, antibiotic prescription is recommended to prevent infection and reduce the risk of inflammatory root resorption (20, 21). Penicillins, and amoxicillin in particular, are the agents of choice due to their effectiveness against oral microorganisms and relatively rare side effects. Tetracyclines are also effective, but their use should be avoided in children under 12 years of age due to the risk of teeth discolorations (21, 22). The effectiveness of topical antibacterial agents placed on the root surface before reimplantation is controversial. Contrary to some successful preclinical studies, human studies have not demonstrated improved pulp revascularization after the immersion of the avulsed teeth in topical antibiotic solutions (19, 23).

The need for a booster tetanus vaccine should be assessed in consultation with the patient's general practitioner, as most of the population is immunized (19).

Splinting of reimplanted teeth is performed with a short-term, passive, and flexible splint, as scientific evidence suggests that healing processes in the pulp and periodontium are stimulated by mild functional mobility of the teeth. For this purpose, a 0.016" or 0.4 mm wire or cord (0.13–0.25 mm) is used, connected to the adjacent teeth by composite. The splint is removed after 2 weeks, however, this period may vary according to the degree of root development (19, 24).

Instructions to the patient (and their parents) include: avoiding group sports, a soft food diet for 2 weeks, brushing with a soft toothbrush after each meal, and rinsing with 0.12% chlorhexidine solution twice daily for 2 weeks. If endodontic treatment is necessary, it should be started within 2 weeks of the reimplantation (19).

Follow-up (clinical and radiographic) of reimplanted teeth is performed after 2 weeks (splint removal), 4 weeks, 3 months, 6 months, 1 year, and annually for at least 5 years. In teeth with incomplete root development, follow-up is more frequent due to the risk of infectious (inflammatory) resorption and subsequent loss of the tooth and supporting bone, as well as the risk of ankylosis. Both complications can occur simultaneously. Follow-up in these cases is after 2 weeks, 1 month, 2 months, 3 months, 6 months, 1 year, and annually for at least 5 years. Treatment and follow-up in these patients require an interdisciplinary approach between an orthodontist and a pediatric dentist and/or endodontist (19, 24).

The patient (and their parents) must be fully informed about the prognosis and risks of complications, as well as the financial aspect, due to the unpredictability and the likely need for additional manipulations. Their consent and cooperation are prerequisites for successful treatment.

Primary teeth injuries

In children aged 0 to 6 years, injuries to the oral cavity account for 18% of all physical disabilities. According to a 2018 meta-analysis, dental trauma affects the primary dentition in up to 23% of the cases (24).

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Luxations, intrusions, and root fractures can cause severe pain, requiring the use of analgesics – ibuprofen or paracetamol.
Trauma to primary teeth and their treatment can cause post-traumatic stress disorder, anxiety, and fear of dental procedures in young children. It has been established that tooth extraction can aggravate these conditions and, when possible, should be avoided or postponed during the first visit (25-27).
Avulsed primary teeth should not be reimplanted for several reasons: difficulty in treatment, risk of damage to the permanent teeth germs, disruption of their eruption, risk of tooth aspiration, etc. (28)
Antibiotic prophylaxis can be prescribed in cases of traumatic damage to the soft tissues. In case of heavily contaminated wounds, the need for a booster tetanus vaccine should be considered after consulting the patient's general practitioner (29).
Oral hygiene in the postoperative period consists of cleaning the affected area with a soft brush or gauze pad. It is possible to use an alcohol-free mouthwash twice a day for a week (usually in children over 6 years of age) to reduce plaque accumulation and the bacterial count. The patient should be instructed to eat carefully, avoiding further trauma to the affected teeth.
Parents should monitor the child for complications such as swelling, increased tooth mobility, or fistula formation. The absence of pain complaints does not exclude the presence of inflammatory complications (30).
In cases of root fractures without displacement of the coronary fragment the follow-up is after 1 week, 6-8 weeks, and 1 year; in cases of reduction and splinting of the coronary fragment – after 1 week, 4 weeks (splint removal), 8 weeks, and 1 year; in cases of removal of the coronary fragment – after 1 year. For an alveolar crest fracture, the clinical follow-up is after 1 week, 4 weeks (to remove the splint), 8 weeks, and 1 year. Radiographic examination is necessary at 4 weeks and after 1 year. In cases of contusion or subluxation, follow-up visits are after 1 week and 6-8 weeks. For extrusions, clinical examinations are after 1 week, 6-8 weeks, and 1 year. If a complication is suspected, follow-up continues every year until the eruption of the permanent tooth. In cases of luxation, the clinical examinations are after 1 week, 6-8 weeks, 6 months, and 1 year. In case of repositioning and splinting – after 1 week, 4 weeks (splint removal), 8 weeks, 6 months, and 1 year. If a complication is suspected, follow-up continues every year until the eruption of the permanent tooth. In cases of intrusion, the follow-up is after 1 week, 6-8 weeks, 6 months, and 1 year. In cases of severe intrusion, the follow-up is at the age of 6 to monitor the eruption of the permanent tooth. In cases of expulsion, the clinical examinations are performed after 6–8 weeks and at 6 years of age to monitor the eruption of the permanent tooth (19, 24).

Soft tissue injuries

Postoperative care after soft tissue injuries in the oral cavity includes controlling bleeding, pain, edema, and infection (31).
More severe bleeding is observed in cuts and lacerations without tissue contusion. Injuries to the tongue and floor of the mouth can cause severe, life-threatening hemorrhages. This requires careful hemostasis intraoperatively and adequate postoperative control of bleeding using hemostatic

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agents. Swelling of the tongue can cause asphyxia due to obstruction of the oropharynx (32). This should be taken into account, and excessive tightening of the sutures should be avoided.

The most effective method of preventing infection is thorough curettage and wound debridement to ensure a wound bed free of necrotic tissue and foreign bodies Antibiotic prophylaxis is recommended in the following situations: in heavily contaminated wounds, when the wound treatment is delayed for more than 24 hours, in bite wounds, infected wounds, and in patients with immunocompromised status (33). Tetanus vaccination should be considered in acute contaminated wounds, puncture wounds, and bite wounds (34).

Postoperative care includes guidelines for maintaining oral hygiene, following a soft diet, controlling bleeding, edema, and infection, as well as administering pain relief therapy. Some local remedies can be prescribed, such as local antiseptics, antibiotics, barrier gels, etc. Intraoral sutures should be removed in 7-10 days, while extraoral sutures should be removed in 4-5 days to avoid scarring.

If violent injuries are suspected, it is necessary to notify the relevant authorities. Patients who have experienced severe trauma and are at risk for developing post-traumatic stress disorder should be referred for psychotherapy (35).

Figure 1 presents the traumatic dental injury classification proposed by Andersen (36) and implemented by the World Health Organization (37).

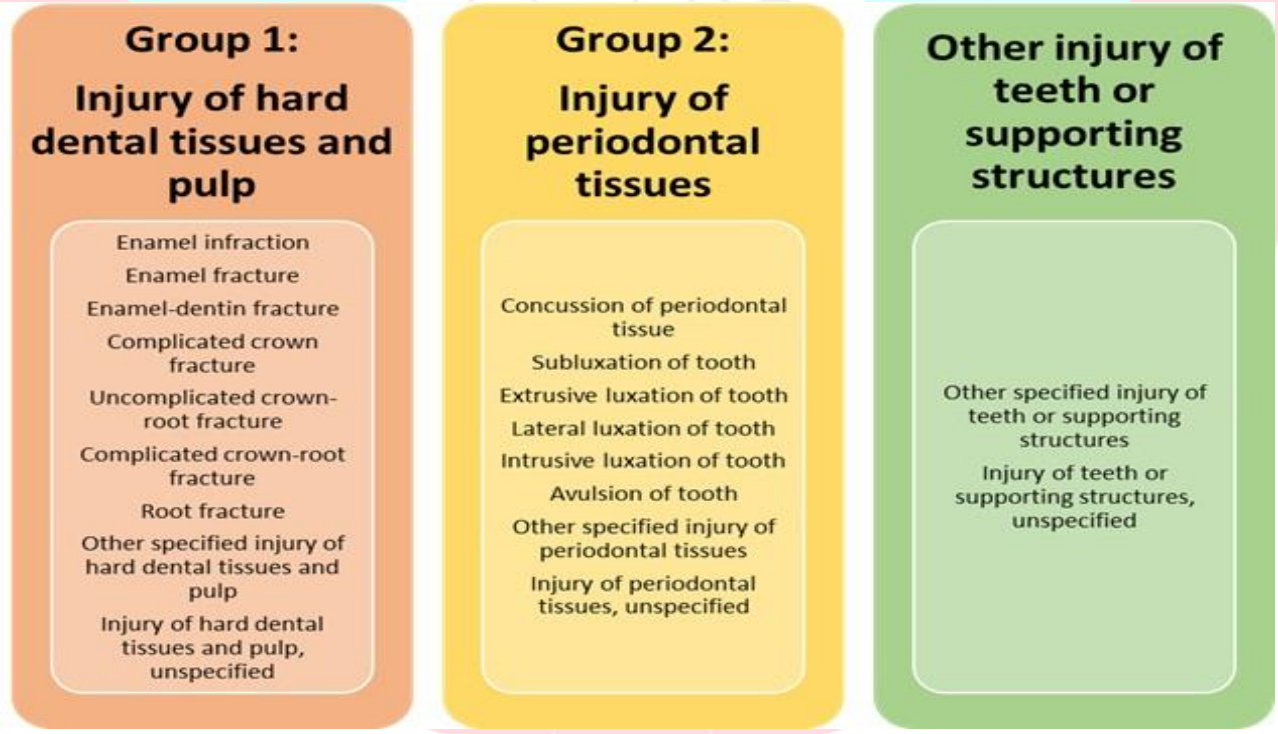

Figure 1. Classification of Traumatic Dental Injuries (37)

DOI: 10.18044/MEDINFORM.2025122.2070 ISSUE 2, 2025

Conclusion

Postoperative care depends on the type of traumatic injury, tissues involved (primary or permanent dentition, soft tissue injuries), bacterial contamination, etc. The patients should be instructed to maintain good oral hygiene, avoid additional trauma to the area, and be strict about the follow-up appointments. The follow-up aims to re-evaluate the condition and take additional measures, if necessary, in order to avoid future complications.

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Yotsova R, Dental Trauma and Soft Tissue Injuries Subject to Oral Surgery - Postoperative Care and Follow-up, J. Med. Dent. Pract., 2025; 12(2):2070-2077.