When children are learning to walk and then to run around and exercise their newly discovered mobility they are particularly prone to falls which frequently cause oro-facial injuries. These injuries, most of which occur in or near the home to a child’s primary teeth are not only traumatic in a physical sense, but also in an emotional and psychological sense. Before the damaged teeth can be treated the distress suffered by the parents needs to be managed; also any more significant injuries need to be ruled out. To ensure that the appropriate treatment is eventually provided and that medico-legal issues are correctly managed it is essential that a detailed history of the accident as well as the medical history are taken in concert with an evaluation of the child’s physical status and level of co-operation.

The treatment that is subsequently offered should carry the best prognosis and not be risky procedures. Furthermore, the long-term effects on the permanent successor tooth must be considered although they will not be evident for several years. Nevertheless, the treatment of one child may be different to that of another child even if the actual injuries may be similar. This is because a more complex and different approach may not be appropriate for the less cooperative child.

It is proposed to outline the management of some of the more commonly encountered injuries to the supporting structures of the primary teeth that might present in a medical practitioner’s office.

Injuries to the primary teeth

It must be remembered that the bone of a child under 6 years of age is more elastic than that of a teenager; thus it is able to absorb the energy of a blow to the teeth. The result is that the socket expands and the tooth remains intact while the surrounding bone is distorted; consequently, the tooth may be subluxed (loosed but still in the original position), intruded into the bone, moved laterally and to some extent extruded, or the tooth may be avulsed from the socket.

Less commonly the tooth can be fractured resulting in chipping of the enamel and may be dentine; or the fracture of the crown of the tooth can expose the neuro-vascular tissues of the pulp. This latter type of injury requires prompt referral for extraction of the fractured tooth.

(i) **Subluxation of the tooth:**

In this type of injury the periodontal ligament, which is the supporting structure of the tooth within the socket, is damaged and the socket is slightly expanded. However, the tooth remains in the socket albeit loose to varying degrees depending on the force and direction of the blow.

The consequent injuries can be treated with a soft diet, analgesics and topical chlorhexidine gel application if there is extensive soft tissue damage.

(ii) **Intrusion of the tooth:**

In most cases when a primary incisor has been intruded; this may be by only a few millimetres or the tooth may be totally covered by the surrounding gingival tissue and bone in which case it may be difficult to be sure without the benefit of radiographs, if the tooth has not been lost or intruded (Figure 1). This causes crushing of the supporting tissues and cells.

Local treatment of the soft tissues and pain management are required in all cases. When systemic infection is a possibility, which may be in as many as 41% of cases, then antibiotics should be prescribed. However, it is essential that the parents are counselled about the possibility of damage to the permanent successor tooth which will be developing on the posterior aspect of the root of the primary tooth.

Regular reviews over the subsequent few months will usually be rewarded by the re-eruption of the intruded primary tooth. Subsequently, there may be evidence of structural damage to the permanent successor tooth.

\[\text{Figure 1. The maxillary left primary incisor has been intruded by approximately half of the length of the crown of the tooth.}\]
(iii) Extrusion/laterally displaced tooth:

When the tooth is displaced it may be in a palatal or lateral direction which inevitably results in the tooth being extruded partially from the socket (Figure 2). In this type of injury the traumatized tooth commonly causes discomfort when the child eats and talks because it interferes with the occlusion of the maxillary and mandibular teeth. If this is the case then extraction of the displaced tooth is the treatment of choice. However, in some instances it may be that after a period of taking a soft diet the supporting structures of the tooth may heal and the minor degree of displacement may be self-correcting due to the forces delivered by the muscles of the cheeks and tongue.

![Figure 2](image)

In addition to intra- and extra-oral lacerations the right maxillary primary central incisor tooth is displaced, palatally while the left central incisor is intruded.

(iv) Avulsion:

This is arguably the most severe consequence of trauma because the fibres of the periodontal ligament have been torn and the bone distorted. Furthermore, there may be subsequent damage to the permanent successor tooth.

Management of this type of injury involves arresting the haemorrhage and possibly suturing of any soft tissue lacerations, and/or of the tooth socket in addition to managing the soft tissue injuries and the pain. The reimplantation of the avulsed primary tooth is inadvisable because of the possibility of causing further damage to the permanent successor tooth.

Damage to the Permanent teeth:

At the time of the injury to a primary tooth its permanent successor will be in a developmental stage so physical contact between the root of the primary tooth and the developing crown of the permanent tooth, which is incompletely calcified, can cause developmental defects in the enamel or even the entire crown.

The mildest form of developmental defects may present as white, pale yellow or even brown opaque subsurface defects in the enamel of the permanent tooth. A more severe developmental defect is a hypoplastic region within the enamel, while the most severe form can be distortion of the tooth or root so that the tooth has an acute angle in it. This is known as a dilacerations of the root and/or crown.

Both the nature of the injury to the primary tooth and the age of the child influence the type and severity of the damage to the permanent tooth. The more severe damage to the permanent tooth can be expected to occur before four years of age.

While the opacity and hypoplastic types of defects have only aesthetic consequence and can usually be relatively easily treated, the dilacerations injury can mean that the permanent tooth will not erupt and ultimately needs to be extracted, resulting in the need for a prosthetic replacement or an implant when the child has reached maturity.

Summary:

In all types of traumatic injuries the child should be placed on a soft diet and given an appropriate dose of paracetamol for one to two days. Thrice daily topical applications of the anti-microbial agent chlorhexidine gluconae gel is beneficial for enhancing soft tissue healing and is more effective than use of the solution version.

Thus, it can be appreciated that children who have the misfortune to sustain traumatic injuries to their primary teeth must, after emergency treatment, which if possible should be based on a careful clinical examination supported by intra-oral radiographs, be subjected to long-term reviews so as to ensure that if the damaged tooth becomes non-vital it can be treated quickly to prevent an apical infection which may in turn damage the developing permanent successor.

No matter what type of injury is sustained by the child there are possibilities that there may be damage to the permanent successor teeth. Therefore, accurate counselling is essential so that the parents are aware of the possible long-term consequence of the injuries. Referral of the child to a dentist, familiar with managing traumatic injuries to the teeth is advantageous because long-term monitoring can be implemented and any appropriate treatment can be quickly delivered.

References