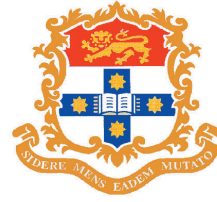


Australian Society
of Orthodontists



University of Sydney



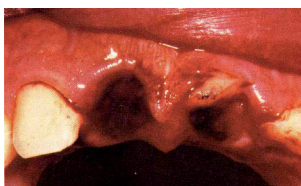
Orthodontics &
Dental Trauma

Creating Brighter Futures

Orthodontics & Dental Trauma

Dental trauma, typically involving permanent anterior teeth, can be one of the more stressful situations encountered in dental practice. The initial challenge is to manage the patient and often equally distressed parent. Complications persist with uncertainties in prognosis and treatment time, while long-term management can be complex. A co-ordinated interdisciplinary treatment plan will be required and may involve an oral surgeon, endodontist, paediatric dentist, periodontist, prosthodontist and orthodontist.

The three main roles where an orthodontist can help in the management of dental trauma are:



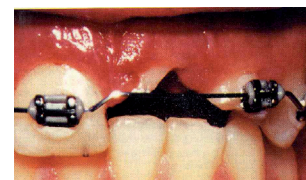
Initial Presentation

1. Repositioning and stabilisation
2. Assistance in the restoration of the compromised dentition
3. Prevention

Repositioning and Stabilisation

Dental injuries such as root fracture, intrusion, extrusion, lateral luxation and avulsion often require repositioning and/or stabilisation. Depending on the type of dental injury, following local anaesthesia, repositioning can be achieved by manual manipulation or surgical repositioning with forceps.¹ Splints using a variety of materials such as resin, composite and wire, orthodontic brackets or even titanium can be used to achieve stabilisation.²

Fixed orthodontic appliances can be an alternative to manual repositioning that allow for more gradual repositioning while accurately aligning the traumatised tooth. This orthodontic repositioning and stabilisation allows physiologic movement and helps reduce the incidence of ankylosis and replacement resorption.



11 repositioned and extrusion of 21 and 22 root fragments commenced.

Intrusion requires special consideration, with the type of treatment depending on the degree of root development and apexification. Extensive damage to the supporting structures and neurovascular bundle often occurs, resulting in compromised pulp vitality.

A recent study has shown that active repositioning, either manual or orthodontic, in individuals with incomplete root formation increases the incidence of pulp necrosis, root resorption and defects in the marginal periodontal bone when compared to healing via spontaneous eruption.³

Furthermore, for those with complete root formation aged between 12-17 years, the marginal periodontal bone healing was also better with spontaneous eruption.³ However, the latter group must be monitored very carefully as failure of eruption may signify ankylosis. In older patients with complete root formation, either manual or orthodontic eruption should be attempted rather than relying on spontaneous eruption.³

In most intrusion cases, especially for teeth with closed apices, endodontic therapy is indicated and endodontic access can be assisted by orthodontic extrusion of the tooth or tooth fragment.

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FLUORIDES IN AUSTRALIA

As a result of a workshop hosted by the Australian Research Centre for Population Oral Health (ARCPHO), guidelines for the use of fluorides in Australia have been published in the Australian Dental Journal (2006; 51(2): 195-199.) These guidelines, which will be reviewed as new evidence becomes available, were developed using existing Australian reports, research and scientific papers and where scientific evidence was unavailable – consensus of expert opinion.

The guidelines recognise that some fluoride use recommendations can be made for the population at large, while other recommendations are appropriate only for individuals or groups at increased risk of developing caries. Orthodontic patients often fall into the category of 'increased risk' during appliance therapy. In this and future issues of this Column we will look at the current Australian guidelines under the headings: Community water fluoridation, Self-use fluoride products and Professionally applied fluoride products.

Community water fluoridation in Australia provides protection against caries to individuals of all ages. It is estimated that there is a 20-40% reduction in caries in the permanent dentition for people with a lifetime exposure to fluoridation. The associated level of mild or very mild fluorosis in children is 22-29% with less than 2% exhibiting more severe fluorosis. The guidelines recommend continuing fluoridation of the community water supply at 0.6-1 mg/L and extending it to reach as many people as possible. Manufacturers of bottled water and water filters are encouraged to indicate the fluoride content of their water. Sodium fluoride should be marketed as a water supplement for addition to non-fluoridated home water sources at the level of approximately 1mg/L.

The issue of fluorosis risk for infants consuming infant formula has been addressed by Australian manufacturers and formulas no longer pose a risk when reconstituted with fluoridated or non-fluoridated water.

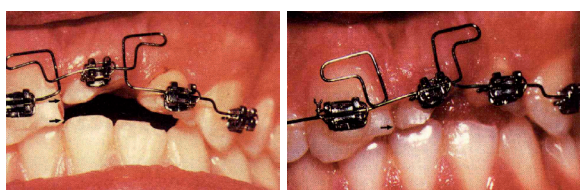


Assistance in the Restoration of the Compromised Dentition

Orthodontic Root Extrusion. When there is minimal supragingival tooth present, extrusion of the root can assist restoration of the damaged tooth. Extrusion can be slow or rapid. Slow extrusion facilitates growth of bone and soft tissue with the root or tooth fragment and can reduce crestal bony defects. However, periodontal surgery, such as crown lengthening, may later be required to establish a biological width and alveolar architecture that is consistent with adjacent teeth. Rapid extrusion, on the other hand, results in tooth extrusion that outpaces bone growth. This is used when bone height is satisfactory and only tooth extrusion is required. However, soft tissue surgery, such as a gingivectomy, may be required to improve aesthetics or the restorative outcome.

Considerations when planning Orthodontic Root Extrusion⁴

1. **Root Form.** The level and extent of root fracture dictates the success of root extrusion. The remaining root must be wide enough to accommodate a restoration and provide an adequate emergence profile. If the emergence profile is too divergent a black triangular space may result.
2. **Root Length.** Remaining root length should at least have a 1:1 crown/root ratio following extrusion.
3. **Internal Pulp Form.** A large pulp canal can leave weakened tooth structure on the periphery, and the root can be further compromised by the post and core.
4. **Root Health.** The root must be free from periapical pathology and should not have a calcified canal. Endodontic treatment may be required prior to root extrusion.
5. **Occlusion.** Overjet, overbite and lateral excursion should be assessed for adequate clearance from interference from orthodontic appliances and future prosthetic restoration.
6. **Tooth Value.** Assess the value of retaining the tooth by considering the condition of the remaining dentition, e.g. oral hygiene, existing periodontal disease and caries, cost factors, the age of the patient and previous dental care.



Extrusion and alignment of 21 and 22 roots proceeding.

Loss of a Tooth. Space closure, space maintenance or regaining for prosthetic replacement are the orthodontic treatment options when dental trauma results in the loss of a tooth. Information about these options was covered in the two previous issues of Brighter Futures dealing with Implants and Missing Maxillary Lateral Incisors.

Retaining a Traumatized Tooth is generally preferable; however, in some cases it may not be practical. In growing patients ankylosis will usually retard alveolar bone development, thereby compromising aesthetics, bone support and potentially

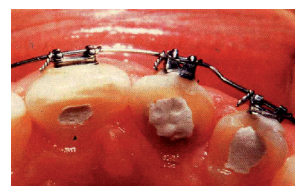
leading to tipping of adjacent teeth. However removal of an ankylosed tooth can also result in bone loss. Malmgren et al suggested that loss of alveolar bone and buccal cortical plate may be minimised by decoronating the tooth and retaining the ankylosed root in the alveolar bone, similar to root burial options for cases of subalveolar root fracture.⁵ Experimental studies have shown new marginal bone can develop over the submerged root that has been covered by a mucoperiosteal flap.^{6,7}

Observation Periods Prior to Orthodontic Treatment.¹ Following a traumatic incident, orthodontic movement should be delayed or suspended to allow healing. For crown fractures, mild subluxations and other mild injuries a period of approximately three months is suggested. However for more significant injuries involving intrusion, extrusion, significant lateral displacement and of course avulsion and reimplantation, this period may need to be as much as a year.

Where there has been a crown-root fracture of immature teeth, orthodontic movement should be delayed until root development is seen to resume. Clinical and radiographic observations should be carried out after 6 months, 1 year and 2 years.

Endodontic Therapy and Tooth Movement.

Endodontics is unavoidable in some cases, particularly following intrusion injuries of mature teeth. Endodontically treated teeth generally respond normally to orthodontic treatment although orthodontic tooth movement should be deferred for at least three months after trauma, or until the tooth is free from pathology, to avoid or minimise external root resorption. Minor orthodontic movement of teeth undergoing endodontic treatment is possible, and calcium hydroxide is recommended as the interim therapeutic dressing. Final obturation of endodontically treated teeth should be delayed until after the orthodontic treatment is completed.⁸ Studies have shown that the apical barrier formed by apexification is not disturbed by orthodontic tooth movement.^{9,10}



Initial Endodontic therapy complete.

Prevention

There are many dento-facial factors that can predispose an individual to traumatic dental injuries. These include increased overjet, lip incompetence, high lip line and proclined upper anterior teeth, with inadequate lip coverage being the most important factor¹¹⁻¹⁴. An overjet of more than 6 mm increases the incidence of damage fourfold.¹⁴ Early identification of "at risk" individuals followed by early orthodontic treatment should reduce the incidence of dental trauma.



Inadequate lip coverage.



A removable orthodontic appliance retracting protruded upper incisors.



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The newsletter is intended to help keep the dental profession updated about contemporary orthodontics, and also to help foster co-operation within the dental team.

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Conclusion

Management of dental trauma involves a multi-disciplinary team. Orthodontic treatment can assist in the repositioning of displaced teeth and provide physiological stabilisation to facilitate optimal healing and improved prognosis. Orthodontic treatment can also assist in the restoration of a fractured tooth, as well as provide improved access for endodontic treatment.

Interceptive or early orthodontic treatment to reduce upper incisor protrusion in those prone to traumatic injuries should be beneficial in preventing or reducing these injuries.



Completed case - 11, 21
and 22 restored

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