

Guidelines for Lifetime Management of Injured Teeth

Update of Guidelines for restoration of fractured anterior teeth (2010)

April 2024

This information has been developed by ACC Clinical Services working together with representatives of the New Zealand Dental Association. It is based on a review of published research evidence and expert opinion. ACC staff refer to these guidelines when making decisions on dental cover and entitlement requests.

Ensuring necessary and appropriate treatment.

Before ACC can consider a treatment request, your client must have an accepted claim for the specific tooth/ teeth that is to be treated, and the primary need for the treatment must be due to the covered injury and not the pre-existing condition of the tooth/teeth. There are other factors that we consider before approving entitlement contribution to treatment costs to rehabilitate, and your clients should be told this. This is to ensure our clients will receive necessary and appropriate treatment as defined by the Accident Compensation Act (2001).

Updating a diagnosis

The initial diagnosis for an injured tooth is important, but it can also be difficult to get it correct the first time, every time. Therefore, it is important when monitoring the tooth to be aware of any complications in healing and to update or add an injury diagnosis to your patient's ACC claim if required.

Introduction

The Dental Trauma Guide' provides information regarding injury diagnosis and recommended treatment following the first presentation. In this document we aim to go beyond the initial trauma and explore the long-term consequences of traumatic injuries to teeth. We recognize that these injuries can lead to a range of complications that impede the healing process and jeopardize the long-term health of the affected teeth. To ensure optimal healing outcomes, it is important to understand the causes, diagnostic approaches, and management strategies for these complications.

This guideline focuses on pulp and periodontal healing complications and their clinical presentation. It also includes core principles that should be considered during restorative treatment, and guidance for situations where a restoration has failed.

Pulp and periodontal healing²

There are several predictors for pulp and periodontal healing. The strongest predictors are injury type and stage of root development. Stage of root development can be defined by three categories with clinical presentation of healing complication appearing differently for each stage.

Stage of root development	Clinical presentation indicating healing complication
Open apex - young patients under the age of 10-11 years.	 These patients present with infections which may be indicated by pain or swelling. Tooth is often tender but not always. Patient may have stopped eating. Apical changes and radiolucency can occur without any symptoms.
An almost closed apex in teenage patients.	 Research suggests that a tooth that does not respond to cold or electric testing when the apex is closed (and when sufficient time has been given for healing) has an 80-90% probability that the pulp is non vital. Awareness of change in sensation such as tenderness, replication of pain with percussion testing. Pain.
Closed apex in adults.	• Pain.

Follow up for all stages of root development should aim to pick up healing complications before the tooth becomes infected. Recommended recall periods following trauma are: 1 month; three months; six months following trauma.

Healing complications

Tooth healing complications can impact a patient's wellbeing and oral health. These complications may encompass issues such as pulp necrosis, pulp canal obliteration, periodontal ligament complications that can compromise the structural integrity and function of an injured tooth. Understanding the etiology, clinical presentation and appropriate treatment of these complications can facilitate optimal healing outcomes.

Pulp necrosis	• Necrotic pulp can be present for a long time asymptomatic if not infected. In the absence of complicated fracture or pulp exposure or caries, the probable cause of pulp necrosis is a previous trauma resulting in the loss of blood supply.
	 Continued no response to sensibility/vitality testing after 3 months likely. to be necrotic pulp that is not infected.
	 Infected necrotic pulp symptoms include pain, replication of pain with percussion testing, and swelling, apical radiolucency; become evident on cone beam or PA x-ray.
	• Regular follow up is more likely to see changes as they occur.

Pulp canal obliteration	 Defined as hard tissue inflammation. Pulp remains vital but lays hard tissue around itself to avoid further irritation so becomes an inflammatory process which leads to a sclerotic tooth. Some obliterated teeth are susceptible to infection at which time root canal treatment would be indicated. Root canal treatment is not indicated due to aesthetics only.
Periodontal Ligament (PDL) complications	 A failure of periodontal healing after trauma is resorption; usually subluxation or avulsion injuries – inflammatory response viewable on x-rays as a disruption in ligament space and changes on root surface. Complications occur when the pulp becomes necrotic, and the inflammatory response accelerates inflammatory resorption.
	 Can lead to damage of root. Can sometimes be stopped by removing pulp early and placing calcium hydroxide.
	 Range of inflammatory responses Inflammatory resorption as result of initial trauma. Internal resorption inflammation within pulp space due to trauma – rare complication. External cervical resorption, more common, but takes many years to develop. Can be treated early but because the pulp remains vital, it is not usually found until it is beyond treatment, resulting in extraction of the tooth.

Endodontic Treatment options

Before considering endodontic treatment options it is important to conduct vitality tests to assess dental pulp health and viability.

The results of vitality testing should be considered alongside the clinical presentation, and radiographic apical changes.

Common vitality tests include cold and heat testing, electric pulp testing, percussion, and palpation.

Vital pulp therapy ³	- Best to commence before the pulp becomes completely necrotic $\& % \left({{{\mathbf{x}}_{i}}} \right)$ infected.	
	 The best long-term outcome can be achieved with immediate pulpotomy with bio ceramic repair and well-sealed composite repair for all early or small pulp exposure in both open and closed apex teeth. 	
	• If temporary treatment is completed the pulpotomy and well-sealed repair should be completed within 10 days.	
Root canal treatment	Required when pulp has become necrotic and infected.	

Dental restorations – Standard of care

The goal of dental restorations is to preserve as much natural tooth structure as possible while restoring function and improving aesthetics.

While in the literature there are reported average lifespans for most types of restorations, there are two core practices that if adhered to will increase the longevity and success of the restoration. The following guidelines will aid in improving long-term success of the restoration:

For a restoration that is intended to be luted e.g., a full coverage crown.	• Ideally a 10–20-degree taper. By limiting the path of withdrawal retention is improved.
Appropriate preparation of the restoration (preparation design).	• The greater the width of the tooth the greater the height of the preparation required to provide adequate retention e.g., minimum of 4mm preparation height for a molar and 3 mm on the premolar.
	• Follow manufacturer's guidelines for adequate reduction of tooth structure for the intended restorative material that is to be used.
Using the correct bonding technique. While adhesive dentistry is now used for the cementation of many restorations it is important to be mindful of protocols that will improve the bonding of the restoration.	 The use of isolating techniques such as a rubber dam to control moisture contamination. Employ techniques to improve the decontamination of the tooth surface that you are bonding to e.g., air abrasion, appropriate conditioning of dentine, ensuring all old composite is removed. Follow the manufacturer's bonding protocol.

Types of restorations⁴

To determine the most suitable dental restoration for patients, various materials are available based on their specific requirements. The table below is useful for assisting that decision making process.

Type of restoration	When appropriate	When not appropriate
Composite resin	Preferred restoration for anterior teeth for all age groups, with good success if the standard of care practices noted above are followed.	When a tooth has insufficient tooth structure for bonding.
Onlays	When the overlay of cusps on posterior teeth to stop cuspal flexion is appropriate. Preservation of tooth structure is achieved as compared to placement of a crown.	

Veneers	Composite resin and bonded ceramic are more predictable when bonding to enamel. Therefore, minimal removal of tooth structure is beneficial.	Treating discoloured teeth where bleaching has been attempted and was unsuccessful resulting in difficulty for the veneer to block out the discolouration.
		Fractures where there has been significant loss of tooth structure.
Crowns	All crown types will last at least 10 years if standard of care and manufacturer's protocols are followed.	Permanent crowns such as all ceramic, PFM, gold on children under 18 years of age.
Part crowns	When a large amount of tooth structure is missing, approximately 50%.	Insufficient natural tooth structure is remaining (less than 2mm).
	Extremely discolored teeth where bleaching and veneers are insufficient.	After endodontic treatment for the covered injury, where the only
	Tend to be adhesively retained and do well on posterior and anterior teeth if enamel is present to bond to, and are often non- retentive preps.	missing tooth structure is the access point.
Bridges	Maryland bridge or Resin Bonded bridge is an appropriate treatment modality in the anterior segment for 1 missing tooth. It is least destructive, therefore can be used where the abutment teeth are unrestored.	Conventional bridge where the abutment teeth are unrestored, as the preparation of the abutment teeth will require the removal of healthy tooth structure.
		Long span bridges, where 2 or more teeth must be replaced, as they are less stable.
		Severe bone loss on surrounding teeth and/or poor oral hygiene as the abutment teeth must have strong bone support and healthy gums to support the bridge.

Note: If the patient's situation for your proposed treatment is in the 'When not appropriate' column, a clear explanation of your clinical reason for your request with supporting clinical notes, current x-rays and clinical photos where appropriate/possible will be beneficial in helping ACC determine an outcome.

General factors to consider when a restoration fails prematurely.

- Have the manufacturer's bonding protocol guidelines been followed?
- Occlusion, is there premature contact?
- Parafunctional habits such as bruxism for which a bite splint should be prescribed.

- The size/type of the restoration.
- Techniques, for example, maximizing bonded surface.
- Restoration material selected. Is it appropriate for the site e.g., PFM vs Gold for a posterior tooth?
- Inadequate material preparation e.g., inadequate light-curing for composite restorations, moisture contamination, lack of condensation etc.

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