



Clinical Practice Guidelines: Trauma/Crush injury

Policy code	CPG_TR_CRI_0215
Date	February, 2015
Purpose	To ensure a consistent approach to the management of patients with crush injury.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
Source of funding	Internal – 100%
Author	Clinical Quality & Patient Safety Unit, QAS
Review date	February, 2018
Information security	UNCLASSIFIED – Queensland Government Information Security Classification Framework.
URL	https://ambulance.qld.gov.au/clinical.html

While the QAS has attempted to contact all copyright owners, this has not always been possible. The QAS would welcome notification from any copyright holder who has been omitted or incorrectly acknowledged.

All feedback and suggestions are welcome. Please forward to: Clinical.Guidelines@ambulance.qld.gov.au

Disclaimer

The Digital Clinical Practice Manual is expressly intended for use by QAS paramedics when performing duties and delivering ambulance services for, and on behalf of, the QAS.

The QAS disclaims, to the maximum extent permitted by law, all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs incurred for any reason associated with the use of this manual, including the materials within or referred to throughout this document being in any way inaccurate, out of context, incomplete or unavailable.

© State of Queensland (Queensland Ambulance Service) 2020.



This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives V4.0 International License

You are free to copy and communicate the work in its current form for non-commercial purposes, as long as you attribute the State of Queensland, Queensland Ambulance Service and comply with the licence terms. If you alter the work, you may not share or distribute the modified work. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

For copyright permissions beyond the scope of this license please contact: Clinical.Guidelines@ambulance.qld.gov.au

Crush injuries include simple mechanical crush injury, compartment syndrome and crush syndrome. There are many causes ranging from isolated limb injuries, multisystem trauma, envenomation, drug and toxin exposure, heat stroke, burns and some bacterial/viral infections.^[1]

Crush injury – localised tissue injury that occurs when a compressive force is applied.^[2]

Compartment syndrome – compromised perfusion to tissues within an anatomical compartment due to increased pressure within that compartment. Left untreated, this can lead to tissue necrosis, permanent impairment and crush syndrome.^[3]

Crush syndrome – is a systemic condition that results from injuries sustained by compressive forces sufficient in duration and pressure to cause widespread ischemia and necrosis to soft tissue.^[1] Ischaemia of the muscle leads to increased permeability of cell membranes and the release of potassium, enzymes, and myoglobin into the systemic circulation. Crush syndrome is characterised by rhabdomyolysis, lactic acidosis, hyperkalaemia, renal failure, shock, dysrhythmias and death.^[4]

The development of crush syndrome is TIME and PRESSURE dependent. Crush syndrome can develop over a short time period where the compressive force and muscle mass is large and, conversely, over long periods where compressive forces are relatively small.^[1]



Clinical features

Common histories associated with compartment and crush syndrome:

- Fracture (especially tibial),^[5] severe soft-tissue injury, prolonged limb compression
- Fluid infusion, arterial puncture and haemorrhage
- Envenomation
- Electric shock/burns
- Surgical repair of muscle hernia
- Constriction by casts, circumferential dressings, clothing
- Prolonged immobility (e.g. the unconscious patient not discovered for many hours).

Co-morbidities associated with increased risk:

- Diabetes
- Hypothyroidism
- Bleeding disorders/anticoagulation

Clinical features (cont.)



Compartment syndrome is characterised by:^[6]

- Palpable tension or swelling of an anatomical compartment
- Pain disproportionate to the injury
- Pain on passive stretching of muscles within the anatomical compartment
- Paraesthesia of skin and paresis of muscles supplied by nerves traversing the compartment
- Pallor of skin over the compartment
- Pulses diminishing as the condition develops is common, but normal peripheral pulses and capillary filling is not uncommon.^[1]

Crush syndrome is characterised by:

- Compartment syndrome
- Haemodynamic instability
- Reperfusion injuries leading to:
 - lactic acidosis and hyperkalaemia
 - dysrhythmias
 - myoglobinaemia leading to renal failure
- Shock
- Hypothermia

Risk assessment



- Compressive force removal^[1]
- Anticipate the development of crush syndrome following removal of compressive force.
- Anticipate hypovolaemic shock post removal of compressive force.
- Chest involvement requires immediate release of compressive force.
- Hypothermia is a potential risk for patients suffering crush injuries.^[1]



Additional information

- Compartment syndrome is a surgical emergency. If not diagnosed quickly and treated appropriately it is associated with a high morbidity. Management includes surgical decompression of the affected muscle compartment by fasciotomy and, in the case of circumferential burns, escharotomy.^[5]

