Staged Acute Chest Wall Reconstruction for blunt traumatic chest wall injury

Bhavik Patel, FRACS
Martin Wullschleger, FRACS

1 Division of Trauma, Gold Coast University Hospital

E-mail addresses for all authors

drbhavikpatel@hotmail.com
martin.wullschleger@health.qld.gov.au

Name and address for correspondence, including fax number, telephone number, and e-mail address.

Dr Bhavik Patel,
Division of Trauma,
Gold Coast University Hospital
1, Hospital Boulevard
Southport 4215
Queensland, Australia
Email: drbhavikpatel@hotmail.com
Phone Number: 61 7 56875756
Conflict of interest statement - No conflicts are declared

Disclosures of funding received for this work from any of the following organizations: Nil
A 77-year-old man was air lifted into our emergency department following a road traffic accident. He was involved in a rollover accident down a 200-meter embankment ultimately colliding with a tree. He underwent intubation for drop in his levels of consciousness and bilateral finger thoracostomies for increasing surgical emphysema.

Following resuscitation and ionotropic support to correct Type I respiratory failure with acute kidney failure a multiphase Computed Tomography (CT) imaging for trauma was carried out. This was suggestive of a severe chest wall instability with bilateral 3, 4, 5 costochondral junction disruption, right clavicle fracture and herniation of the left lung into the subcutaneous tissue. Left chest wall 3-9 wedge rib fractures with series of anterior and posterolateral displacement (Figure 1). CT also suggested a complex fracture of the second cervical vertebra involving the body, spinous process, right and left pedicle without any cord compression. No intraabdominal or pelvic injury was identified.

What would you do?

1. Continue non operative management with respiratory and ionotropic support to improve physiology?
2. Theatre for one stage or two stage surgical stabilisation of rib fractures/reconstruction?
3. Transfer to centre with chest wall injury experts whilst resuscitation?

What did we do and why?
We proceeded to a staged acute surgical stabilisation of the unstable chest wall injury. During the first operation 10 hours from presentation, patient in supine position, we stabilised the anterior bilateral chest wall instability along with reduction of the subcutaneous lung herniation using a combination of Synthes® and Accumed® hardware (Figure 2).

Forty-eight hours later with minimal ionotropic and respiratory support the patient was taken back to theatre. During this procedure patient was placed in lateral position with stabilisation of left posterolateral chest wall instability with above-mentioned hardware (Figure 3).

In view of the slow neurological recovery patient underwent tracheostomy on Day 14 subsequent decannulation on day 50 of admission and discharged from hospital on day 72.

Chest wall injury society guidelines suggest early stabilisation of rib fractures for positive outcomes following blunt chest wall injuries. This is the first reported case in literature where a staged approach for early stabilisation of chest wall injury has been carried out. This was necessitated by the extent of injuries and poor patient physiology in terms of Type I respiratory failure and ongoing multi factorial shock.

Damage control strategies prioritize physiological and biochemical stabilization over the full anatomical repair of all injuries and are useful for a subset of trauma patients. Selection criteria for damage control management include the mechanism of injury and the degree of physiological derangement. We applied principles of damage control for chest wall reconstruction in an elderly
patient which has contributed to a positive outcome. Although, shock and ongoing resuscitation is relative contraindication to chest wall reconstruction a staged procedure might be an option.
DISCLOSURE

The authors declare no funding or conflicts of interest.
Figure Legends

1. Admission- 3-dimensional computed tomography reconstruction
2. Post first operation- 3-dimensional computed tomography reconstruction
3. Final- 3-dimensional computed tomography reconstruction
Figure 3