**GERIATRIC TRAUMA MODULE**

**Introduction**
With an aging population the incidence of significant trauma in the elderly population is rising.

The exact age when we should consider the trauma patient as elderly is unclear. Most consider it to be people older than 65 years old given the mortality from minor injuries (ISS < 9) increases beyond the age of 65.

Advanced age clearly correlates with elevated mortality. The hypotensive elderly trauma patient has a mortality greater than 82% once their SBP falls below 90mmHg. \(^1\) Dedicated trauma centres have significantly improved outcomes in elderly trauma with lower mortality rates and fewer complications. \(^2\) Some argue age alone to be a sufficient indicator to prompt pre-hospital bypass of non-trauma centres in light of this. \(^2\)

In a cohort of 98 elderly patients with major trauma (ISS ≥ 16) who survived to hospital discharge only 17% regained their pre-injury function. 67% did however return to independent living. Factors associated with a poor outcome were; GCS < 8, age > 75, shock or sepsis during admission. \(^3\)

**Unique considerations in the geriatric patient**
Age related physiological and degenerative changes need to be considered in the management of the elderly trauma patient\(^1\):

<table>
<thead>
<tr>
<th>Airway</th>
<th>Take care placing airway adjuncts</th>
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<tbody>
<tr>
<td>• Friable nasopharyngeal mucosa</td>
<td>Best to leave dentures in for BVM and remove for ETI</td>
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<tr>
<td>• Edentulous</td>
<td>Decreased cervical mobility can impede laryngoscopy</td>
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<tr>
<td>• Spondyloysis, arthritis and spinal canal stenosis</td>
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<table>
<thead>
<tr>
<th>Breathing</th>
<th>Reduced respiratory reserve</th>
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<td>• Decreased chest wall compliance</td>
<td>Reduced respiratory reserve</td>
</tr>
<tr>
<td>• Reduced VC, FRC, FEV</td>
<td>More likely to sustain rib &amp; sternal #s with lower mechanism of injury</td>
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<tr>
<td>• Osteoporosis</td>
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<tr>
<th>Circulation</th>
<th>May not mount a tachycardic response to hypovolaemia, limited ability for cardiovascular compensation</th>
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<tbody>
<tr>
<td>• Catecholamine insensitivity, atherosclerosis, conduction abnormalities, B blocker &amp; CCB use</td>
<td>Relative hypotension with normal blood pressure values</td>
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<tr>
<td>• Baseline HTN</td>
<td>Risk for major haemorrhage</td>
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<tr>
<td>• Anticoagulant use</td>
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**Co-morbidities**
Elderly patients often have significant co-morbidities which impact on their trauma management. Patients with underlying heart, renal or liver failure need careful assessment and management of their fluid status. The presence of COPD with chronic CO\textsubscript{2} retention has implications for oxygen therapy. Similarly, many medications – including opioid analgesia, most induction agents and certain antibiotics – require dose reduction in the elderly.

<table>
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<th>Disability</th>
<th>Exposure</th>
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<td>- Brain weight decreases 10% between 30 to 70yo increasing the distance bridging veins need to traverse</td>
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<tr>
<td>- Anticoagulant use</td>
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<tr>
<td>Bridging veins are more susceptible to shearing forces and subsequent SDH</td>
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<tr>
<td>Worsens intracranial bleeds</td>
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<tr>
<td>Poor nutrition, decreased lean muscle mass, blunted hypothalamic function</td>
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<tr>
<td>At higher risk for hypothermia and the development of pressure sores</td>
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**Futility**
Considerations regarding futility are important to consider early. The most consistent predictors of mortality in geriatric trauma literature are increasing age, low GCS and the presence of significant co-morbidity, particularly previous MI.

It is clear that severe head injury is associated with a grim outcome and the presence of the same should prompt consultation with the neurosurgical team about possible limitation of therapy. Mortality rates approach 90% in elderly patients with an admission GCS < 8.\textsuperscript{2} A European series of 136 patients with head injuries found the mortality rate for those with a GCS < 9 requiring craniotomy was 90%, recommending against active therapy in this age group.\textsuperscript{2}

However in the non-head injured patient, the outlook can look more promising. In fact, with aggressive resuscitation, some studies suggest that up to 85% of elderly blunt trauma patients (ISS > 15) return to independent living.\textsuperscript{3}

Ultimately decision making with respect to futility is difficult, particularly in the early phase of management. Often patients are managed aggressively for the first 24-48 hours before readdressing the question of futility.

**Assessment**
Primary and secondary survey should be performed along standard lines with consideration of factors specific to the elderly patient.

Factors on history to consider include:
- Co-morbidities
- Medications
  - particularly cardiovascular medications, anticoagulants, benzodiazepines
- Social history
  - functional assessment; mobility, ADLs, level of care
  - home circumstance
On examination:
  • Normal vital signs can occur even in significant compromise
  • Pre-existing cognitive impairment can make examination, particularly neurological assessment difficult

Investigation considerations:
  • Plain X-ray is often difficult to interpret in light of degenerative change – in particular C spine views.
  • The threshold to use CT in elderly victims of blunt trauma should be low given they are more likely to have significant injury with relatively minor mechanisms.
  • Care needs to be taken in administering IV contrast – as the elderly are more at risk of acute kidney injury.

Management
With early aggressive resuscitation, a high proportion of elderly trauma patients can return to independent living.³

Resuscitation
  • The usual clinical parameters used to guide fluid resuscitation (HR, BP, urine output) need to be interpreted with caution given the potential for underlying co-morbidites and medications affecting the cardiovascular response
    - some suggest using base deficit & lactate clearance as a more accurate guide
    - a base deficit greater than -6 is associated with increased mortality⁴

Specific therapy
  • All efforts should be made to remove from spinal board/rigid immobilisation ASAP to prevent pressure ulcer formation
  • Consider anticoagulant reversal if applicable

Supportive therapy
  • Keep warm
  • Ensure adequate analgesia, particularly in chest injuries with multiple rib #
    - Consider PCA/regional block
  • Allied health referral where appropriate for OT, CHIP, physiotherapy
  • Early involvement of family – particularly if medical futility is an issue

Disposition considerations are based on early aggressive intervention where appropriate can lead to good functional outcomes. HDU or ICU admission for the major geriatric trauma patient is usually required to enable appropriate management.

Additional information
  • For every fractured rib, the risk of pneumonia increases by 27% and mortality increases by 19%.⁵

There has been many papers describing the use of using pulmonary artery catheters (PAC) to guide fluid resuscitation to a cardiac index of 4L/min/m² or O₂ consumption index of 170 mL/min/m² to a significant mortality benefit.¹³ Many authorities recommend their routine use in the hypoperfused geriatric trauma patient. The use of PAC is unusual in our institution – however more modern less invasive bioelectrical impedance devices that can estimate cardiac index and may be similarly effective are available in the Intensive Care Unit.

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Further reading


References


3. Van Aalst et al. ‘Severely injured geriatric patients return to independent living: a study of factors influencing function and independence.’ *J Trauma* 1991; 31:1096-1101
