Acute Kidney Injury in Trauma

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Acute Kidney Injury ≠
Acute Renal Failure

RIFLE & AKIN
RIFLE criteria

<table>
<thead>
<tr>
<th></th>
<th>Creatinine</th>
<th>Urine Output</th>
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<tbody>
<tr>
<td><strong>R</strong></td>
<td>&gt;1.5x baseline or GFR decrease &gt;25%</td>
<td>&lt;0.5ml/kg/hr x 6 hours</td>
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<td><strong>I</strong></td>
<td>&gt;2x baseline or GFR decrease &gt;50%</td>
<td>&lt;0.5ml/kg/hr x 12 hours</td>
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<td><strong>F</strong></td>
<td>&gt;3x baseline or GFR decrease &gt;75% or absolute of 4mg/dl (354 µmol/l)</td>
<td>&lt;0.3ml/kh/r x 24 or Anuria x 12hrs</td>
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<tr>
<td><strong>L</strong></td>
<td>Persistent ARF = loss of renal function &gt;4 weeks</td>
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<tr>
<td><strong>E</strong></td>
<td></td>
<td>End stage renal disease</td>
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Why redefine renal injury?

AKI is an independent risk factor for mortality in critical illness

Early identification of renal injury prior to tubular damage

Allows for interventions based at prevention of renal injury to be implemented early on
Pre-renal azotemia

New concept

Renal dysfunction with the absence of physical change in kidney

Why recognise this? – can intervene at this stage to prevent structural kidney damage
Trauma

Pro-inflammatory state

Crush
Rhabdomyolysis
Sjambok Injury
Trauma

Pro-inflammatory state

- Crush Rhabdomyolysis
- Hypovolaemia Hypotension
- Renal Injury / Nephrectomy
- Hypothermia
How do we prevent AKI in trauma?

Limit structural damage
  – Recognise and aggressively treat pre-renal azotaemia

How?
  – Maintenance of MAP in order to maintain renal perfusion pressure
    • Fluids
    • Inotrope/vasopressor support
  – Limit use of ionic contrast (low osmolar)
  – Limit nephrotoxic antimicrobials
How do we prevent AKI in trauma?

Recognition & treatment of sepsis

Early recognition & treatment of ACS

Renal salvage surgery – the two types of kidney

Renal biomarkers
Once AKI is established?

Continued resuscitation to limit damage to remaining nephrons

Renal replacement therapy
  – Must be early especially in crush / rhabdomyolysis injuries that don’t initially meet the “traditional” indications for dialysis

What is on the horizon for therapy?
Anti-apoptotic agents
  – Caspase inhibitors
  – Minocycline
Anti-sepsis
  – APC
Growth factors
  – Recombinant erythropoietin
Anti-inflammatory drugs
  – Fibrates
  – Adenosine analogues
Cell based therapy
  – M2 macrophages
  – Regulatory T-cells
Conclusion

Don’t get stabbed
Don’t get shot
Don’t get hit by a car
Conclusion

But if you do….

Early initiation of renal replacement injury in the crush / rhabdomyolysis patient

Early diagnosis and therapy for reversible causes such as early sepsis and ACS

Aggressive initial resuscitation with limitation of the administration of nephrotoxins
References


