The Outcomes of Pediatric Inhalation Injuries in Lesser Burns – Still a Deadly Injury

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Conflicts of Interest

- Nothing to disclose
Background

• Burns are a global public health problem, accounting for an estimated 180,000 deaths annually.

• In the USA more than 350,000 fires in urban areas resulting in more than 2000 deaths and 13,000 injuries.

• The development of effective fluid resuscitation management and early surgical excision of burned tissue has improved the survival from burn injuries, however mortality is still significant.

• Inhalation injury still is an important determinant of morbidity and mortality in pediatric patients.
Background

- Mortality related to inhalation injury in this population is dependent on age and extension of the burn injury measured by percentage of total body surface area (TBSA).

- It has widely been proposed that inhalation injury worsens outcomes, yet no national large-scale study has shown the exact relationship between inhalation injury and burn outcomes.

- Even in isolation, inhalation injury can be associated with longstanding pulmonary dysfunction.

- Our study aim was to evaluate inhalation injuries as a risk factor in patients with limited burn injury, defined as ≤ 15% total body surface area (TBSA).
Study Goals/ Objectives

• Our study proposes that inhalation injury is associated with worse burn outcomes, even with limited burn injury.
Methodology

• A retrospective review of the American Burn Association Registry from 2002-2011

• We compared the outcomes of all the pediatric burn patients that meet our inclusion criteria which included:
  – TBSA <15%
  – Adequate data recording inhalation injury

• We stratified the patients into two groups:
  – Inhalation injury (group 1)
  – Non-inhalation injuries (group 2)
Methodology

• Data points included in our study:
  – Demographic characteristics
  – Outcome variables:
    • In-hospital mortality rate
    • Hospital length of stay
    • ICU length of stay
    • Ventilator days

• Chi-Squared and t-test analyses were used with significance defined as p<0.05
## Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (Inhalation)</th>
<th>Group 2 (Non-Inhalation)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Patients</td>
<td>434</td>
<td>29,005</td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>9.34</td>
<td>6.05</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Average Total TBSA</td>
<td>4.16</td>
<td>4.15</td>
<td>0.94</td>
</tr>
<tr>
<td>Average Partial TBSA</td>
<td>3.34</td>
<td>3.59</td>
<td>0.21</td>
</tr>
<tr>
<td>Hospital LOS (days)</td>
<td>9.38</td>
<td>4.47</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ICU- LOS (days)</td>
<td>5.58</td>
<td>0.95</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Average Vent (days)</td>
<td>3.74</td>
<td>0.18</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>In-hospital Mortality (%)</td>
<td>3.92% (17)</td>
<td>0.26% (77)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
Outcomes

<table>
<thead>
<tr>
<th>Hospital Days</th>
<th>ICU Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>9.38</td>
</tr>
<tr>
<td>Non-Inhalation</td>
<td>4.47</td>
</tr>
</tbody>
</table>

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Outcomes

Ventilator Days

- Inhalation: 3.74
- Non-Inhalation: 0.18

Mortality In-Hospital (%)

- Inhalation: 3.92
- Non-Inhalation: 0.26
Conclusion

• The presence of inhalation injury in pediatric patients was associated with an increased ICU LOS, in-hospital LOS and ventilator days and in-hospital mortality.

• The presence of inhalation injury may be a predictor of increased mortality and poor long-term pulmonary outcome in patients with limited size burns

• Study suggests patients with inhalation injuries need increased use of resources for patient management
References

- Toon, Michael H; Maybauer, Marc O; Greenwood, John E; Maybauer, Dirk M and Fraser, John F. Management of Acute Smoke Inhalation Injury. Critical Care and Resuscitation, Vol. 12, No. 1, Mar 2010: 53-61. ISSN: 1441-2772
Thank you

- Pediatric Trauma Society
- Team members