Fire eater’s lung: analysis of 123 cases reported to a national poison centre

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Introduction

Fire eater’s lung (FEL) is a distinct form of acute chemical toxic pneumonitis, which is caused by aspiration of flammable petrochemical derivatives, like petroleum or its distillate, used by street performers for “fire eating”. To date, the largest case series evaluating patients with FEL includes 17 cases, and the optimal management of this condition has not yet been determined. The aim of this study was to investigate patient characteristics, circumstances, clinical features, treatment, and outcome of FEL.

Materials and Methods

Single-centre retrospective review of consecutive cases of FEL in children and adults reported to a national poison centre (STIC) between 1995 and 2012. Data were analysed by unpaired Student’s t test and chi-square test or Fisher’s exact test.

Results

123 cases (83.7% males, mean age 21.9 y) were included. Most frequently reported offending fuel was petroleum or an unspecified petroleum distillate (95%). Among 36 cases in which detailed information on clinical features and follow-up data was available, 19.4% showed mild, 69.4% moderate, and 11.1% severe symptoms (PSS). Most frequently reported symptom was cough (50.4%), followed by chest pain (45.5%), and fever (35.8%). Dyspnea was reported by 23.6%. Cough (p=0.002) and chest pain (p=0.026) were significantly more prevalent in subjects reporting to have aspirated the fuel compared to those who had swallowed it or who did not perceive poison exposure. A pulmonary infiltrate was detected in 83% of the cases in which chest x-ray was performed. Overall, 22% were treated with an antibiotic (71% amoxicillin/clavulanic acid, 29% new generation quinolone) for a mean duration of 10.4 d. The decision to administer antibiotics was not based on the presence of any symptom or the severity of symptoms. Corticosteroids were administered in 4.9%, and in most cases they were combined with antibiotics. Of the 24 patients in whom information on hospitalization was available, 75% were hospitalized due to FEL for a mean duration of 5.1 d. All had complete recovery irrespective of treatment.

Conclusions

FEL is mainly observed in young adults with a clear male predominance. The combination of intense pleuritic chest pain, cough, dyspnea, and fever, or any of these symptoms after “fire eating” or erroneous swallowing of petroleum should alert the clinician to the diagnosis of FEL. Early antibiotic treatment of severe cases seems justified, considered that clinical, laboratory, and radiologic findings of FEL are overlapping with bacterial superinfection.

References


Table 1: Demographic characteristics of the patients, involved agents, circumstances and mechanisms

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All reported subjects (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender, n (%)</td>
<td>103 (83.7)</td>
</tr>
<tr>
<td>Age (years), mean</td>
<td>21.9 (11.1)</td>
</tr>
<tr>
<td>Adults ≥16 years, n (%)</td>
<td>105 (85.2)</td>
</tr>
<tr>
<td>Time first exposure to reporting (hours)</td>
<td>151 (125.1)</td>
</tr>
<tr>
<td>Offending agent, Petroleum or unspecified petroleum distillate, n (%)</td>
<td>115 (93.5)</td>
</tr>
</tbody>
</table>

Circumstance:
- "Fire breathing," n (%) | 117 (95.0)
- "Intentional swallowing," n (%) | 5 (4.1)

Medication:
- Aspiration, n (%) | 40 (32.8) |
- Swallowing, n (%) | 8 (6.6) |
- Both Aspiration and Swallowing, n (%) | 34 (27.5) |
- Neither aspiration nor swallowing (unspecified exposure), n (%) | 10 (8.1)

Values are means (SD) unless otherwise stated.

*All Satisfaction indicates for a development.
**Available data in only 30 patients with combined treatment (both aspiration and swallowing).

Table 2: Clinical findings

<table>
<thead>
<tr>
<th>Clinical findings</th>
<th>All reported subjects (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure on presentation (systolic/diastolic) (mm Hg)</td>
<td>108 (124/70 Hg) (10/6.5 Hg)</td>
</tr>
<tr>
<td>Temporal temperature</td>
<td>38.5 (10.8)</td>
</tr>
<tr>
<td>Physical findings</td>
<td>40 (32.8)</td>
</tr>
</tbody>
</table>
- Pleural signs (tenderness, n (%) | 36 (29.3) |
- Right lower zone consolidation, n (%) | 9 (7.3) |
- Bilateral lower zone consolidation, n (%) | 26 (20.9) |
- Laboratory examination (performed) | 20 (16.1) |
- Elevated inflammatory parameters (WBC +10 mg/uL and CRP) (n=78) | 29 (38.7) |
| CRP (mg/L) | 14.8 (7.5) |
| Lactate dehydrogenase (IU/L) | 14.8 (7.5) |

Table 3: Signs and symptoms of fire eater’s lung among different subgroups according to the most common poisoning mechanisms

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All reported subjects (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS (n=52)</td>
<td>21 (3.8)</td>
</tr>
</tbody>
</table>
- Cough (n=52) | 34 (65.3) |
- Fever (n=52) | 12 (23.1) |
- Dyspnea (n=52) | 14 (27.0) |
| Hemoptysis | 7 (13.5) |
- Nausea | 10 (19.2) |
- Dizziness | 5 (9.6) |
- Palpitations | 2 (3.8) |
| Hospitalized (n=98) | 24 (24.4) |
- Combined treatment (both aspiration and swallowing) | 1 (1.0) |

Values are means (SD) where appropriate.

*Overall, 40.6% had aspiration (either alone or in combination with swallowing).
**Exclude cases where poisoning occurred in the absence of aspiration or swallowing.

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