26. Burn injury

Case study 1 Non-ventilated scald injury in an elderly patient

Mark Windle

Mrs Brock, aged 70 years, was admitted to the burns unit with a 16% total body surface area (TBSA) kettle scald. The nature of the injury was mostly partial thickness and her forearms, hands and lower abdomen were affected. Preadmission history showed confusion and memory loss for which she was awaiting investigation, diabetes and ischaemic heart disease. Mrs Brock required formal intravenous fluid resuscitation on admission and for the first 24 hours. Her case was discussed on the multidisciplinary team (MDT) ward round. It was decided that surgical intervention would not be appropriate and instead she would be managed conservatively with dressings, and full nursing and medical care. Mrs Brock lives alone in an upstairs flat. She relies on her son who lives 20 miles away to provide occasional food shopping. She is a non-smoker and does not drink alcohol. On admission her weight was 65 kg and her height was 1.50 m. Mrs Brock has a catabolic index of 3 and is pyrexial. Biochemistry results (reference range) are:

- Haemoglobin 9.0 g/100 mL (11.5–16.5)
- Mean corpuscular volume 115 fL (80–90)
- White blood count 14.6 × 10⁹/L (4–13)
- Sodium 138 mmol/L (136–145)
- Potassium 4.2 mmol/L (3.5–5.1)
- Urea 14.9 mmol/L (2.2–7.7)
- Creatinine 115 µmol/L (60–120)
- Albumin 14 g/L (35–50)
- C-reactive protein 125 mg/L (0–9)

- What are the possible reasons for the surgical team decision not to operate?
- What are the short and long term goals of nutritional care? Are they SMART? How can you evaluate whether these goals have been achieved?
- What vitamin deficiency does the haematological profile suggest and what impact may this have on recovery from her burn wound? How would you follow-up this biochemical finding?
- What metabolic barriers does Mrs Brock’s burn injury present to maximizing her nutritional status?
- What physical barriers does her burn injury present to optimising nutritional status, and how could these be overcome?
• Calculate energy requirements using the Ireton-Jones & Jones (2002) equation? Calculate the protein requirements for this patient?
• What would be the nutritional issues for when she goes home? How can you work with the multidisciplinary team to facilitate successful community care?

Reference

Case study 2 Mechanical ventilated patient with major burn injury
Mark Windle

Mr Bignell is a 55-year-old with a history of schizophrenia. He is non-compliant with medication and has an excessive alcohol intake. He sustained a severe flame injury caused by self immolation using petrol as an accelerant. He has 80% TBSA burns, including 55% full thickness burns, and smoke inhalation injury. The burn distribution is generalised, with anterior and posterior aspects of the head, torso and limbs being affected. Mr Bignell was admitted to the burn unit within 24 hours of injury. He was sedated, mechanically ventilated, commenced on formal intravenous fluid resuscitation and went to theatre for wound debridement and skin grafting. Mr Bignell was extubated from the ventilator on day 21. Eleven theatre trips were required for further debridement and grafting. He underwent intensive physical rehabilitation and was eventually transferred from the unit on day 85 to a long term facility for further rehabilitation and psychiatric support. Mr Bignell’s admission weight was 65.5 kg and on day 21 it had fallen to 59.5 kg; his height is 1.75 m. His temperature was 37.2°C (at point of assessment); maximum temperature in the past 24 hours was 38.5°C. His expired minute volume is 10.0 L/m. The biochemistry results were:

<table>
<thead>
<tr>
<th></th>
<th>Day 1 (20 hours post injury)</th>
<th>Day 21</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na (mmol/L)</td>
<td>145</td>
<td>139</td>
<td>136–145</td>
</tr>
<tr>
<td>K (mmol/L)</td>
<td>4.2</td>
<td>4.7</td>
<td>3.5–5.1</td>
</tr>
<tr>
<td>U (mmol/L)</td>
<td>12.1</td>
<td>7.0</td>
<td>2.2–7.7</td>
</tr>
<tr>
<td>Cr (µmol/L)</td>
<td>118</td>
<td>110</td>
<td>60–120</td>
</tr>
<tr>
<td>WBC (× 10⁹/L)</td>
<td>24</td>
<td>13</td>
<td>4–13</td>
</tr>
<tr>
<td>CRP (mg/L)</td>
<td>350</td>
<td>140</td>
<td>0–9</td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>11</td>
<td>21</td>
<td>35–50</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td>152</td>
<td>140</td>
<td>25–130</td>
</tr>
</tbody>
</table>
Alanine transaminase (IU/L) 26 28 0–56
Bilirubin (µmol/L) 45 40 0–22
Zinc (mmol/L) 0.37 0.82 0.7–1.0
Copper (µmol/L) 4.6 11.0 11–32
Caeruloplasmin (mg/L) 750 200 200–600

- What potential preinjury factors may contribute to suboptimal wound healing?
- How soon should nutrition support start? Suggest an appropriate protein prescription. Use (a) the Ireton-Jones & Jones (2002) and (b) Modified Penn State (Frankenfield et al., 2009; Frankenfield, 2011) energy prediction formulae to estimate requirements at admission. Discuss the pros and cons of using these equations.
- Mr Bignell is commenced on enteral vitamin C supplementation alongside his enteral tube feed. What is the potential benefit of this?
- What are the likely causes of hypoalbuminaemia? Support your statement.
- Calculate an appropriate glutamine dose for this patient. How long would you administer this for?
- What is a possible cause of zinc and copper loss in this patient? Why is caution required in interpreting biochemical levels of micronutrients?
- On entering the rehabilitation phase on day 21, Mr Bignall is commenced on oxandrolone therapy and this is continued until discharge. What are the potential benefits of this drug on outcome and what is an appropriate target for protein intake during treatment?
- What are your SMART goals for the rehabilitation phase?

**References**

