Reminder of important clinical lesson

MARSIPAN and the deadly triad: management of malnourished patients

Hannah Mary Robinson, James Kinchen, Aminda De Silva

Department of Gastroenterology, Royal Berkshire Hospital, Reading, UK

Correspondence to Dr Aminda De Silva, Aminda.DeSilva@royalberkshire.nhs.uk**Summary**

A 44-year-old gentleman was admitted with a deliberate overdose of olanzapine, paracetamol and bisoprolol. On admission, he was hypothermic, bradycardic and hypotensive and his body mass index was 12 kg/m². Problems identified on admission included polypharmacy overdose, risk of refeeding syndrome and sepsis. Despite careful reintroduction of feeding and generous electrolyte replacement, he developed persistent hypophosphataemia, hypokalaemia and a marked transaminitis. Several days later, he was noted to be hypothermic and hypoglycaemic. No increase in white cell count or C reactive protein was noted and his clinical appearance was otherwise unremarkable. Nevertheless, given these signs he was started on broad spectrum antibiotics for possible sepsis, which was subsequently confirmed on chest radiograph in addition to a further finding of likely aspergilloma on a later chest CT. His metabolic function stabilised after 3 weeks of carefully titrated nutrition and the sepsis responded to antibiotics and antifungal therapy.

BACKGROUND

Refeeding syndrome and sepsis represent two commonly encountered, but often overlooked problems in malnourished patients. Both have potentially fatal consequences, which may be avoided by early recognition and action.

A relatively small proportion of patients in the developed world suffer from malnutrition and mental health issues such as eating disorders are often involved. These patients encounter additional challenges in management and it has been noted that they are not always optimally managed in acute hospital settings.¹

Despite recognition of the risk of both of these problems on admission, there was a significant delay before the recommended management was instigated and this patient developed both refeeding syndrome and severe sepsis.

CASE PRESENTATION

A 44-year-old gentleman was admitted following a deliberate overdose of olanzapine, paracetamol and bisoprolol. He had a significant psychiatric history including depression, schizotypal personality disorder and obsessive compulsive disorder. He was cachectic with a body mass index (BMI) of 12 kg/m² and was noted to be hypothermic (32°C), bradycardic (51 bpm), hypotensive (77/46 mm Hg), normoglycaemic (blood glucose level 7.5) and had a Glasgow Coma Score of 6/15. Problems identified included polypharmacy overdose, risk of refeeding syndrome and sepsis. He was referred to the intensive care unit (ICU) for ventilation, fluid resuscitation, inotropic support and treatment with Parvolex and glucagon infusions. He was prescribed pabrinex and antibiotics in the medical admission unit, but perhaps due to his rapid transfer to ICU, these were not administered and neither were they subsequently given in ICU.

After 24 h, he was transferred to the ward and reviewed by the mental health liaison team. His mood remained low and he was assessed as having a significantly high risk of further suicide attempts. In addition, considerable weight

loss (10 kg) was noted, since their last review 3 months ago. Inpatient therapy at a specialist eating disorders unit was recommended as soon as the patient became medically stable. In the interim, it was deemed that he should be held under section 5(2) of the Mental Health Act,² if attempting to self-discharge.

He consistently refused to eat and had multiple falls as a result of global weakness. He was referred to the nutrition support team on day 6 of his admission; nasogastric (NG) feeding was started at a rate of 10 kcal/kg/day, with aggressive electrolyte supplementation of potassium, phosphate and magnesium. Daily measurement of electrolytes (which had been omitted between days 3–6) and an incremental increase in feeding rates was advised, as directed by the patient's electrolytes and observations. Intravenous pabrinex was given prior to feeding.

On day 7, he was again noted to be hypothermic (35.6°C) and hypoglycaemic (BM 2.0) and desaturated to 92% on 35% oxygen. A septic screen identified a left sided pneumonia and a cavitating lesion in the right upper lobe (figure 1).

The patient received a 10-day course of Tazocin for hospital acquired pneumonia and following a chest CT scan, itraconazole was started for aspergilloma. This was followed up by bronchoscopy 2 weeks later. The patient declined HIV serology.

On day 10, the patient's liver function began to deteriorate with alanine transaminase peaking at 1024 u/l. The rate of NG feed was decreased and a parallel improvement of his liver function was seen. Hepatitis and autoimmune serology were negative and an abdominal ultrasound unremarkable.

OUTCOME AND FOLLOW-UP

His metabolic function stabilised following 3 weeks of NG feeding. His chest infection was successfully treated with antibiotics and he received a 4 week course of itraconazole

Figure 1 Chest radiograph on day 7 showing a right upper lobe cavitating lesion and left lower lobe pneumonia.

for the aspergilloma. At the time of writing, the patient was medically fit for discharge, but awaiting a psychiatric bed.

DISCUSSION

Refeeding syndrome occurs in malnourished or starved patients when feeding is reintroduced. It is characterised by rapid fluid and electrolyte shifts causing pathophysiological consequences in multi-organ systems.^{3 4} Hypophosphataemia is the classic hallmark of refeeding syndrome but hypokalaemia, hypomagnesaemia and hyponatraemia are also common.^{3 4} Complications include cardiac arrhythmias and heart failure, seizures, neuromuscular, liver, renal, gastrointestinal and haematological disorders.^{3 4} Hepatitis is frequently seen and is usually reversible.⁵

In very high risk patients, nutritional support should be introduced at a maximum of 10 kcal/kg/day, then increased gradually to meet energy requirements.⁶ The rate of feeding may need to be reduced if complications occur.

Thiamine should be given prior to feeding to prevent Wernicke's encephalopathy being precipitated and electrolyte replacement should continue as needed throughout the refeeding period. One important change from previous guidelines is that, it is now recognised that nutrition support should be started at the same time as correcting electrolyte and fluid imbalances, as opposed to the potentially futile practice of electrolyte replacement prior to feeding.³

The combination of hypoglycaemia, hypothermia and a low BMI is well recognised in developing countries as the 'deadly triad' and should alert clinicians to the possibility of sepsis and the need for broad spectrum antibiotics.^{7 8} It is well established that malnourished patients are at greater risk of infection including opportunistic pathogens^{9 10} and that they may deteriorate very rapidly without showing the conventional clinical hallmarks of sepsis, such as pyrexia or raised inflammatory markers.¹⁰

In the above case, several preventable management errors were recognised (a significant delay before the

patient received antibiotics, thiamine or nutritional support and absence of electrolyte monitoring between days 3–6). Possible reasons for this are that seemingly more acute issues diverted clinical attention or that sufficient handover or explanation of why treatment was to be instigated, was either not given, or not acted upon. It should be noted that the patient was transferred between three different clinical areas during the first 48 h of admission and that the admission occurred prior to a bank holiday weekend (when staffing levels are acknowledged to be under pressure).

Management of really sick patients with anorexia nervosa (MARSIPAN)¹ is a clinical guideline produced in response to the concern that patients of this type were deteriorating unnecessarily, when admitted to general medical units for precisely reasons of this nature. Problems encountered with transfers between clinical settings are addressed and as always clear communication is paramount. It advocates heightened awareness across the multidisciplinary team to the high risk associated with these patients and routine involvement at initial assessment of both the nutritional support team and the psychiatry team. It provides instructions to ensure safe refeeding, as discussed above and addresses when treatment under the Mental Health Act may be appropriate.

Learning points

- ▶ Awareness of refeeding syndrome and patients at risk of developing it is crucial, as the potentially fatal complications are preventable.
- ▶ Refeeding syndrome should be treated by a gradual reintroduction of nutrition (5–10 kcal/kg/day) and electrolyte replacement, both titrated to clinical response.
- ▶ Recognising the simple clinical signs of the 'deadly triad' (hypothermia, hypoglycaemia and low BMI) should alert clinicians to the possibility of sepsis.
- ▶ Malnutrition in the context of eating disorders presents a unique medical and ethical challenge and specialist advice should be sought early, in order to prevent significant morbidity and mortality.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. Royal College of Psychiatrists and Royal College of Physicians. MARSIPAN: Management of Really Sick Patients with Anorexia Nervosa. College report CR162, 2010. <http://www.rcpsych.ac.uk/files/pdfversion/CR162.pdf> (accessed 7 April 2011)
2. Mental Health Act 1983 (2007). http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_084597 (accessed 7 April 2011)
3. Mehanna HM, Moledina J, Travis J. Refeeding syndrome: what it is, and how to prevent and treat it. *BMJ* 2008;**336**:1495–8.
4. Machado JDC, Suen VMM, Chueire FB, et al. Refeeding syndrome, an undiagnosed and forgotten potentially fatal condition. *BMJ Case reports* 2009;doi:10.1136/bcr.07.2008.0521.
5. Tsukamoto M, Tanaka A, Arai M, et al. Hepatocellular injuries observed in patients with an eating disorder prior to nutritional treatment. *Intern Med* 2008;**47**:1447–50.
6. NICE guidelines. Nutrition Support in Adults CG32, 2006. <http://guidance.nice.org.uk/CG32/Guidance/pdf/English> (accessed 10 April 2011)
7. World Health Organization. *Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers*. Geneva: World Health Organization 1999:7–12, 37–9.
8. Warrell DA, Cox TM, Firth JD. *Oxford Textbook of Medicine*. Oxford: Oxford University Press 2003.
9. Scrimshaw NS, SanGiovanni JP. Synergism of nutrition, infection, and immunity: an overview. *Am J Clin Nutr* 1997;**66**:464S–77S.
10. Schneider SM, Veyres P, Pivot X, et al. Malnutrition is an independent factor associated with nosocomial infections. *Br J Nutr* 2004;**92**:105–11.

This pdf has been created automatically from the final edited text and images.

Copyright 2011 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Robinson HM, Kinchen J, De Silva A. MARSIPAN and the deadly triad: management of malnourished patients. *BMJ Case Reports* 2011; 10.1136/bcr.05.2011.4205, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow