Case Study

Enteral feeding on ICU with a neurological compromised patient

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Introduction/overview:

Present on ICU – day 50 of critical care at the time of completing case study

A 65 year old male was admitted to the Intensive Therapy Unit (ITU) in August 2014 with a history of pain in his ankles and unsteadiness on feet. He was initially admitted to the cardiology unit with respiratory problems, pneumonia and ascending bilateral systematical weakness but his condition deteriorated and he was transferred to ITU for intubation and ventilatory support.

His medical history included:

- prostatectomy
- high blood pressure
- previous supraventricular tachycardia
- short history of renal impairment

After various investigations the patient was diagnosed with Guillain-Barré syndrome however this was not confirmed until some way down the admission line.

Guillain-Barré syndrome is a rare, potentially very serious condition that can occur shortly after a bacterial or viral infection. The immune system can attack the peripheral nervous system causing immobility, altered or limited communication, temporary paralysis of legs, arms and face coupled with temporary paralysis of the respiratory muscles - hence why many patients need to be ventilated. Fluctuations in heart rate can also be an issue and this patient was closely monitored due to a history of heart disease.

Many patients often have difficulty with chewing and swallowing and so tube feeding is frequently initiated.

Case Study, cont.

Nutritional Assessment:

Weight history:

- His initial weight was estimated at 91 kg, height: 1.8 m, BMI 28.1 kg/m^2.
- Over the course of his admission, further weights were recorded for this patient.
  - Around week 5 of admission, the patient's weight was subjectively reassessed re-estimated at 84 kg, giving BMI of 26 kg/m^2 (this large weight loss may be partly associated to previous fluid overload).
  - On week 6 the patient was hoisted on weighing scales and it was found his weight to be 81.3 kg giving a BMI 25 kg/m^2.

Throughout this time, he was sedated and ventilated (BIPAP ventilation) and had a tracheostomy placed very early into admission to aid airway management. An NGT was placed as soon as he was admitted on to the ITU. The unit started the emergency out of hours feeding regimen.

Due to his complex medical history the medical team felt he may benefit from being transferred to James Cook University Hospital for specialist support on their neuro unit. However around week 4 he made small improvements and so remained on the ITU in Darlington.

Initially the out of hours protocol was commenced. Upon first assessment by the dietitians it was noted that biochemical markers were within range, apart from phosphate, CRP and white cell count which were all high. This gave a likely indication that there was a source of infection in the body, and requirements were calculated as:

- 2187 kcals (using Henry equation) range of 96-113 g protein, 2750 mls.
- A stress factor of 25% was added due to his chest infection and 0% activity due to ventilation.
- I.V fluids and propofol were also administered which were taken into account when calculating regimens.

The feed was then increased to 1,488mls of Nutrison Energy @ 62 mls over 24 hours to help meet his nutritional requirements. This provided the patient with 2250 kcals, 90g protein and 1500mls fluid. Initially his bowels did not open and so low profile laxatives were commenced to help promote this.

As the patient continued through treatment, his urea level rose and sodium became borderline which showed he was becoming dehydrated. Extra water was commenced via the NGT of 30mls/hr x 24hrs.

His bowels started to open and were functioning well. He continued to spike a temperature and so cultures were taken to rule out possible infection. His bowels habits then changed again - they became very loose (type 6 BSC) and were opening up to 5 times per day. It was difficult to ascertain if the feed was causing the loose stools or if the antibiotics which he had been prescribed the previous week for his chest infection may have triggered it.

As the patient was being weaned off propofol (a lipid based sedative that provides 1kcal per ml) a titration guide was provided to enable nutritional requirements to be best met. On his next review it was noted that the medical team had changed his current feed to a low sodium @ 80mls / hour (1,920 mls) due to high sodium level (despite additional fluids).

Investigations then showed that it appeared this patient may have developed a pseudo obstruction (possibly aydynamic ileus) which was likely to be connected to the neural paralysis the syndrome can cause. The ITU team decided to start PN. His abdomen was very distended and large gastric residual volumes were pulled back. It has been shown that large gastric residual volumes in critical care are not always representative of absorption;[1] however these readings were so high in comparison to his 'norm' in addition to his bowels not opening, which meant we had to look to parenteral feeding.

After a week on full PN feeding, his sodium levels improved, bowel sounds were noted with small movements, so PN was stopped as the obstruction seemed to have resolved itself and enteral feed was restarted.

Commonly when seeing patients on critical care with Guillain-Barré syndrome, they can be hypermetabolic and hypercatabolic, due to the endocrine effect, inflammatory responses and infectious reactions of the disease. For this reason his nutritional requirements were recalculated as with best practice. Previously we had been meeting the lower end of his protein and energy requirements due to the risks associated with overfeeding[2,3]. At around week 7 he was commenced on 1632mls of Peptamen HN @ 68 mls over 24 hours which provided an extra 17g protein. It was then further increased to goal rate of 80mls/hr over 24hrs to help enhance recovery and rehabilitation. Once Peptamen HN started there was a noticeable improvement in his bowel motions.

PeptamenHN was used to better meet his protein requirements; however it is very difficult to achieve a positive nitrogen balance whilst critically ill [4]. The other significant benefit to this feed is its higher MCT content and whey based protein formula which is easily digested and well absorbed for a patient who has significant neurological related gastric dismotility[5].

The initial dietetic aim was to provide 100% of his estimated nutritional requirements via enteral feeding route. Inevitably his long term goal was to help promote rehabilitation and support transition to oral feeding as soon as possible.

The patient progressed, he regained strength and with substantial phyiso input was able to transfer out and sit in his chair. But this syndrome can be very debilitating and so our main role was to support his progress to regaining strength and muscle mass.

In retrospect it may have been beneficial to feed the patient at a higher rate of protein from the outset; however, realistically it is difficult to achieve this and many feeds cannot support lower calories with higher protein content.

Since completing this case study, the department has changed to The Penn State University equation for calculating energy requirements. In using this, energy requirements would have been more accurate to those using the Henry equation for ventilator dependent patients.

References:

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2. Loh NHW, Griffiths RD The curse of overfeeding and the blight of underfeeding. Intensive Care Medicine 2009: 675-682.
3. Krishnan J.A., Parce P.B., Martinez A., Diette G.B. and Brower R.G. Calorie Intake in Medical ICU Patients-: Consistency of Care with Guideline and Relationship to Clinical Outcomes. Chest 2008; 124 (1): 297-305.
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5. Khoshoo and Brown. Gastric emptying of two whey-based formulas of different energy density and its clinical implication in children with volume intolerance. European Journal of Clinical Nutrition 56 2002: 656-658.