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Case Report

Nutritional Intervention in Paediatric Gastroesophageal Reflux Disease: Clinical Case Reports

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Abstract

The nutritional management of the complex needs child with impaired gastrointestinal function can be challenging. Gastrointestinal intolerance is a common occurrence in these children, including frequent episodes of reflux that can progress to Gastroesophageal Reflux Disease (GORD). This publication discusses two separate clinical cases in children experiencing feeding intolerance. In particular, it describes the nutritional management of GI intolerance that includes the use of a high calorie (1.5kcal/ml) peptide-based Oral Nutritional Supplement (ONS).

Introduction

A dysfunction of one of the functions of the gut can lead to problems with other Gastrointestinal (GI) tract functions, as they often work sequentially. For example, if the food is not properly digested, it will not completely be absorbed. This will lead to malnutrition of the GI tract, decrease in GI tract integrity and finally breakdown of barrier function [1]. Several conditions can lead to an impaired GI function, including Gastroesophageal Reflux (GOR) which affects 15-75% of children and is characterised by the abnormal reflux of gastric content into the oesophagus, causing mucosal damage, regurgitation of food and vomiting [2].

The prevalence of feeding difficulties, including GOR, in children with Cerebral Palsy (CP) can be between 30-90% [3]. Children with CP who experienced GI reflux (N=16) exhibited a significantly greater height-for-age deficit than those who didn't experience GI reflux (N=24) (Z score: 4.9 ± 1.7 vs. 3.7 ± 1.5; P=0.033) [4]. Also, children with CP and swallowing difficulties exhibited lower daily energy intake (P=0.001) [4].

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Not all proteins are digested at the same rate; whey empties from the stomach more rapidly than casein because it remains liquid and does not form a curd in the acidic environment of the stomach. In the small intestine, whey is digested and absorbed faster than casein [5]. Gastric emptying times with 3 whey-based formulas were significantly shorter and episodes of vomiting significantly fewer than when fed with a casein-based formula (P<0.001) in gastrostomy-fed children with profound mental retardation, spastic quadriplegia, scoliosis, and developmental delay (N=9) [6].

The rate of gastric emptying associated with a food is affected by the type of proteins it contains, but not its caloric density [6,7]. In a cohort of gastrostomy-fed paediatric patients (N=10) with spastic quadriplegia unable to gain weight due to volume restriction, feeding with a high calorie 1.5 kcal/mL peptide formula resulted in significant weight gain from baseline, compared with feeding with a 1.0 kcal/mL peptide formula (1.2 vs. 0.0 kg/month; *P*<0.05) [7]. Gastric emptying was the same between the two formulas (*P*<0.05) [7]. Whey-based formulas can reduce the number of episodes and duration of GOR [8] and the ESPGHAN WG Guidelines recommend using a trial of whey-based formula in cases of GOR, gagging and retching in children with NI [9].

Disease-related malnutrition correlates with length of hospital stay in children who need sufficient caloric intake to promote normal growth, thus the most visible effect of malnutrition in children is faltering growth and weight loss [10]. Oral Nutritional Supplements (ONS) in the form of peptides and medium chain triglycerides may reduce the risk of malnutrition in children and provide a cost saving on further medical and nutritional management. Furthermore, peptide formulas may reduce the frequency of reflux, GORD and allowing better digestion and absorption of nutrients especially for those children with complex gastrointestinal problems.

Case Study 1

Nutritional management of GORD in a 23-month-old girl.

Clinical case study description

Neurodisability is an umbrella term used to describe conditions affecting the brain and central nervous system and includes muscular, developmental, motor, sensory, learning and neuropsychiatric disorders. Irrespective of the diagnosis, many children have eating and drinking difficulties; those with motor, physical or sensory impairments struggle the most. It is known that the more severe the disability, the more likely the child is to be at nutritional risk [11].

Nutrition and growth in children with neurodisability still require further research and many children require artificial feeding. Enteral tube feeding can improve energy and protein intake, improve weight gain and nutritional status along with quality of life, although alone it will not solve all feeding related issues such as Gastro-oesophageal reflux [12]. Children with cerebral palsy who experienced GI reflux (N=16) exhibited a significantly greater height-for-age deficit

than those who didn't experience GI reflux (N=24) (Z score: 4.9 ± 1.7 vs. 3.7 ± 1.5; P=0.033) [12]. Switching to Peptamen® Junior (Nestlé Health Science) was associated with improved feeding tolerance in 92% of patients within 1 week of formula switch, in a retrospective chart review of children [N=13] with developmental delay who were failing to reach their nutritional goals using standard polymeric formulas [13].

Medical history

E is a 23-month-old girl who has been receiving Dietetic support since she was 17 months old due to increased swallowing difficulties; prior to this she was not known to the Dietetic team. E was born at 29 weeks gestation weighing 2.1kg (9th centile) with an Intraventricular haemorrhage (Grade 4).

E was admitted to the Paediatric ward at 17 months as an urgent elective admission due to concerns about aspiration pneumonia and weight plateau. Hydrocephalus, visual impairment, focal epilepsy, emerging cerebral palsy, developmental hip dysplasia, and development delay had already been identified. E had also recently commenced on Baclofen.

E was already known to Speech Therapy (SLT) and a feed thickener was already prescribed and she was on a modified diet (IDDSI level 5). It was evident food/fluids were collecting and pooling in her throat towards the end of every bottle feed or meal, so a Video Fluoroscopy (VF) was requested.

On admission she weighed 9.6kg (25th centile) and her parents commented over the last 2 months her oral feeding had deteriorated, Nasogastric Tube (NGT) feeding was commenced and oral intake was offered according to new SLT guidance (IDDSI level 4). The initial NGT feeding plan advised 3 x 100ml Paediasure Plus (Abbott Nutrition) bolus feeds + 5ml water flush and additional thickened water boluses to meet fluid requirements. E was discharged home once parents were competent with NGT feeding.

A week later E was readmitted with a probable aspiration and was placed Nil by mouth (NBM) as a precaution and commenced on antibiotics.The initial VF was cancelled as she became acutely unwell and was transferred to HDU.

A VF was arranged for the following week and it was agreed E would stay in hospital until the VF was performed and build up NG feeds to meet nutritional requirements based on her weight - 865kcals (95kcals/kg) and 14.5g protein and 1000mls fluid/day. The initial NGT plan was to feed 4 x 125ml Paediasure Plus + 25ml water pre and post feed, and 3 x 100ml thickened water boluses, providing 755kcals, 21g protein, 1000mls fluid/day. If this was tolerated well, NGT feeds would be increased as needed according to any oral intake allowed post VF.

E's feeds were swapped to pump feeds, each given over 1 hour due to episodes of increased vomiting after feeds, although it was unclear if the vomiting was related to the feeds, a productive cough or worsening GORD.

The VF demonstrated E was able to safely tolerate thick puree's and fluids but unsafe with thin fluids. It was agreed that her current NGT feeding plan would continue and oral tastes to be offered as advised by the SLT. E managed 5 tsp of IDSSI level 4 food but quickly became chesty and later vomited. The following day thick puree was tried again but again she vomited and became chesty. It was therefore agreed that E would be placed NBM due to the clinical picture each time food/fluid was presented orally. NGT feeds were increased to 5 x 125mls Paediasure Plus (Abbott Nutrition) providing 937kcals and 26g protein/day.

Numerous discussions took place regarding feeding options - bolus feeding, pump assisted bolus feeding, continuous feeding, peptide feeds and amino acid-based feed options. A subsequent VF two months later advised NBM due to an unsafe swallow. It remained unclear if there was a new medical cause for her feeding difficulties.

Over the next 4 months E had 3 admissions to the paediatric ward with possible aspiration and on her last admission she required oxygen therapy and required HDU support again. Discussions took place with the tertiary centre including the respiratory, neurology and gastroenterology teams due to ongoing feeding issues and aspiration concerns, as it was unclear what was causing the main issues with feeding and oxygen saturations. During an admission to a specialist children's hospital, the NGT was altered to a Gastrostomy tube and a fundoplication was performed.

Over the four month period since initiating enteral tube feeding, weight had increased by 4.3kg placing E on the 75th centile which fell in line with her height centile. Her feeds had been swapped to Paediasure Peptide to try and maximise tolerance due ongoing issues with vomiting, possible delayed gastric emptying and worsening reflux.

E at the point of trialling Peptamen junior 1.5 (Nestlé Health Science), was tolerating the Paediasure Peptide but was struggling with feed volumes to meet her nutritional requirements. She was tolerating a much lower calorie intake of 540kcals and 13.5g protein/day due to ongoing issues with GORD. The aim of the Peptamen junior 1.5 trial would be to increase overall nutritional intake.

Nutritional intervention

The nutritional aim was to move back towards meeting nutritional requirements based on age and low physical activity levels (85% of normal) while also preventing excessive weight gain as E achieved catch up growth. The new feeding plan consisted of 4 feeds of 135ml Peptamen Junior 1.5 thickened via pump over 1 hour with additional thickened water boluses between enteral feeds to meet fluid requirements. This provided 810kcals and 22.6g protein/day.

Weight was recorded at 13.4kg (75th centile), Length - 88cm (75th centile), BMI - 17.4 (75th centile).

Outcome

E was reviewed via telephone after 2 days of swapping over to the 1.5kcal/ml peptide feed to assess tolerance; E was tolerating the feed at the normal rate and volumes as agreed. E was reviewed again at the end of the 7 day trial and parents reported she had tolerated the feed well, she was settled after every feed and they commented that reflux seemed to be less of a problem and there was less wind when they vented the feeding tube. Parents also noted that she was sleeping better, and this may be attributed to the increased calorie intake she was now receiving.

Discussion

E had exceeded expectations in tolerating the Peptamen Junior 1.5 bottles at the same rate and volume as her usual lower calorie feed. The family expressed their wish to continue with the new trial

feed. E was settled overnight and parents liked the convenience of the 200ml bottle presentation as this suited the clinical decision to feed with pump assisted bolus feeds, as this appeared to be the safest option for her.

Conclusion

E was able to tolerate the same volume of feed as the previously lower calorie feed, therefore improving her overall nutritional intake. This feed helped to optimise her feeding plan without the need to increase overall feed volumes and avoided prolonged feeding times, allowing more time for other aspects of her care such as physio and developmental play.

Feeding and nutritional status remains a significant area of concern in neurodisability and can have severe consequences for their quality of life and general health. The change to an energy dense peptide feed has the added benefit of reducing anxiety in the parents that feed volumes didn't need increasing as much as they expected, which may have led to tolerance issues.

Case study 2

Nutritional management of GORD in a 14-year-old boy.

Clinical case study description

Eosinophillic Oesophagitis (EoE) is a chronic immune-mediated/allergen-mediated condition, defined clinically by symptoms of oesophageal dysfunction including dysphagia and food impaction, vomiting, regurgitation, heartburn, abdominal pain, failure to thrive and/or feeding intolerance. Histologically it is diagnosed by the eosinophilia infiltration of the oesophageal epithelium of > 15 eosinophilis per high-power microscopy in the absence of other causes of local or systemic eoesinophillia [14].

In young children symptoms are variable and include faltering growth, food refusal, Gastro-Oesophageal Reflux (GORD), vomiting and abdominal pain. In older children solid food dysphagia, GORD, vomiting, abdominal pain, dysphagia, over-chewing and over-cutting food are common [15].

Treatment of EoE involves medical management using corticosteroids and/or food avoidance. Evidence is currently lacking as to which of these approaches is the most effective. The ultimate aim of any therapy should be improvement in clinical symptoms and reduction in oesophageal inflammation.

Medical history

A is a 14-year-old boy diagnosed with EoE aged 4; symptoms included food refusal, GORD, vomiting, abdominal pain and faltering growth. A already received nutritional support from an NGT inserted at 3 years of age. He weighed 13kg (25th centile). The route of feeding was later changed to a PEG. He was unable to tolerate whole protein feeds. A's medical diagnosis included Bronchial asthma, migraine, hypermobility, adrenal suppression, ASD and family history of polycystic kidney disease.

Aged 8 under the support of the Paediatric Gastroenterology team, A was commenced on an 8-week elimination diet via his PEG due to worsening eosinophilic infiltration levels. A was fed an exclusive Elemental feed via his PEG. After 4 weeks and symptom resolution was apparent, it was agreed to continue for a total of 12 weeks to allow A to enjoy the first few weeks back at school symptom-free. After this he commenced an empirical elimination diet, excluding cow's milk/dairy, soya, eggs, wheat, peanuts/tree nuts and fish/shellfish (the six food elimination diet). A's PEG feeds were gradually reduced and safe foods were introduced based on A's requests and dietary value.

After 6 months of food reintroduction, foods from the exclusion list were reintroduced gradually for a minimum of 4 weeks. A reported symptoms of EoE with each food group within a week of each food being introduced back into the diet. After Medical, Dietetic and family discussions it was agreed that A would maintain his nutrition via his PEG but have 1 meal a day from his safe foods/food that he wanted to eat to allow social interaction and symptom minimisation, A decided on just 1 meal per day.

At 12 years of age a PEG was altered to a Mic- jejunostomy tube due to continued issues with GORD and raised eosinophils, despite only taking 1 meal per day. A required 2220kcals and 42g protein to meet his nutritional needs. He was taking approximately 400kcals from food; the remaining calories were met by his Elemental feed - he required 2000ml/day which presented difficulties with the feed times, school day and support for feeding in school. Weight was 48kg (75th centile) following corticosteroid treatment. Height 159cm (75th centile).

A's feeding plan was altered to provide 1250mls elemental feed overnight (4pm - 7am) and 2 peptide feeds (using an adult feed preparation) given during the day. This was given as a pump assisted bolus in school due to lack of staff to support his medical needs and the need to minimise feeding time in school. A complained of increased symptoms with the peptide daytime feeds but didn't want to alter back to daytime Elemental feeds due to the volume needed and the increased disruption to his school day. This new feeding plan provided 1712kcals and 58g protein excluding oral intake.

Nutritional intervention

It is worth noting that child A did not have cow's milk allergy and the nutritional aim following the introduction Peptamen Junior 1.5 (Nestlé Health Science) ONS was to meet nutritional requirements and minimise any gastrointestinal intolerance issues such as GORD. A had previously struggled to tolerate peptide daytime feeds but in view of changes to school support and increased EoE symptoms A was keen to try anything he had not tried before. A would continue with the Elemental feed overnight and replace his daytime pump assisted bolus feeds with the Peptamen Junior 1.5 ONS; two feeds of 200ml would be given via pump over 1 hour. This plan would provide 1712kcals and 49g Protein/day excluding oral intake.

Weight was recorded at 49.6kg (50th centile), Height - 163cm (75th centile).

Outcome

A was reviewed via telephone 2 days after swapping his daytime enteral feeds to Peptamen junior 1.5 to assess tolerance. A was tolerating the full 2 x 200ml volume and reported less GORD and abdominal discomfort than previously experienced. A was reviewed again at the end of the 7- day trial and it was noted that the family had also tried to give as a bolus but the feed was too thick to give without using a feeding pump. A had tolerated the change in his daytime feed well, symptoms appeared to be resolving and A had no change in bowel habits or discomfort.

Discussion

A tolerated the change in feed with a reduction in symptoms, and he expressed a wish to continue with this feed as he noted less GORD during the day and no abdominal discomfort during feeds. A also expressed a wish to at some point try this feed overnight to see if he could reduce the feed volume needed per day and to assist with nocturnal incontinence.

Conclusion

A was able to tolerate the feed and noticed a reduction in symptoms. His nutritional intake was maintained, meeting his daily nutritional requirements and this feed provided a better protein profile.

A is expected to continue to require both dietary and medical management for his EoE and the balance of these is needed to optimise normal growth and development. Complete resolution of symptoms and pathology is the ideal endpoint, but a reduction in symptoms and histology remains a more realistic and practical goal in clinical practice. The introduction of a high energy whey-based peptide nutritional supplement which can be used orally or enterally is a welcome addition.

Overall Conclusion

These two clinical case reports illustrate the difficulties of managing feeding intolerances in children with complex needs in the presence of GOR symptoms and GORD. Such cases highlight the merits of an earlier trial of a whey-based peptide formula in reducing the occurrence and symptoms of reflux. This should include consideration of use of higher calorie peptide formulas to also help promote normal growth in these children.

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