

Introduction of Blended Diet for Enteral Tube Feeding in Paediatrics: A Clinical Observation

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Received date: February 17, 2021; **Accepted date:** September 8, 2021; **Published date:** September 18, 2021

Citation: Gemma P (2021) Introduction of blended diet for enteral tube feeding in paediatrics: A clinical observation. J Clin Nutr Diet Vol.7:7

Abstract

Advances in medical technology have given rise to many changes in enteral tube feeding over the years. Currently, standard practice in the UK is to use commercial formula for tube feeding via the stomach or small intestine; however, the use of blended diet is becoming more popular.

Emerging evidence shows multiple benefits to using blended diet although there is a lack of robust evidence to support clinical guidance. Consequently, there is disparity in practice and it remains unclear which patient groups may benefit most from using blended diet.

This case discussion presents details of a paediatric patient initiating blended diet and how this was managed. It provides an example of how blended diet can be implemented practically and how it was beneficial for this patient and their family.

This case suggests that there are benefits to blended diet but highlights that more research is needed to inform evidence based practice in this area.

Background

Enteral tube feeding is not a new phenomenon; it dates back thousands of years where nutrient rich solutions were given rectally to treat bowel disorders (1). This practice has evolved considerably into what we are familiar with today which is the "delivery of nutritionally complete feed via a tube into the stomach, duodenum or jejunum" (2). This has been facilitated by the development of enteral feeding tubes made from suitable materials that can remain in situ for extended periods of time (3). The development of commercial formula which is widely used today, accelerated during the 1950s and 60s. This was driven by the technological advances in medicine and associated emphasis on sterile techniques within the hospital environment at the time (4). Using commercial formula for enteral feeding remains standard practice in the UK (2).

However, there has been a recent increase in the use of blended diet for enteral feeding (5). Blended diet is the use of homemade foods pureed to a smooth consistency and delivered

via a feeding tube; blended diet can be used exclusively or in combination with commercial formula (6). There is a growing body of evidence reporting the benefits of blended diet including improved symptoms of reflux, vomiting and bowel function (5, 7, 8). In addition, families choosing to use blended diet also report an increased sense of control over the foods that they choose both for therapeutic effect or inclusion in family mealtimes and celebrations involving food (8).

There remain some concerns regarding the safety of blended diet such as nutritional inadequacy, tube blockage and risk of food borne infection (6). The frequency and extent of these complications remains unclear although some evidence suggests that perception of risk is greater than the incidence (9).

The aforementioned advances in science and technology which have expedited the development of enteral tube feeding equipment have also seen the need for enteral tube feeding at home. This is because those with complex medical conditions who require enteral tube feeding are living longer and therefore require previously acute medical interventions in a community setting (10). Given the evolution of enteral tube feeding in the acute hospital setting, it may be that standard practice no longer meets the needs of this group of individuals and is linked to the increase in popularity of blended diet. De-medicalization of enteral tube feeding and involvement in family mealtimes is valued by families using blended diet (8). These considerations may be of greater significance when considering long term home enteral feeding compared to short term enteral tube feeding during a period of acute illness.

Introduction

This case study is an example of the introduction of blended diet for a paediatric patient requiring home enteral tube feeding. It outlines the medical and feeding history, details of the dietetic assessment and how blended diet has worked for this individual. This highlights some considerations for dietetic practice.

Consent has been obtained from the patient's mother for this article.

Clinical presentation

K is a 2-year-old girl with a history of hypotonia, developmental delay and faltering growth. She was referred to the dietetic service and was first seen aged 8 months for faltering growth, evidenced by a drop of >2 centiles on her growth chart (11).

Despite food fortification and the introduction of oral nutritional supplements, her weight gain remained small and she had a nasogastric tube (NGT) placed aged 14 months to supplement her oral intake with commercial formula. After a period of 9 months (aged 23 months), she had a percutaneous endoscopic gastrostomy (PEG) placed given that she was expected to require enteral tube feeding in the longer term.

She was discharged home on her usual feeding plan which she was using with her NGT prior to PEG placement. See **Figure 1**.

Figure 1: Nutritional plan for NGT feeds.

Daily Requirements:	
Food and drink as per speech and language therapy recommendations	
450ml 1.5kcal/ml whole protein feed with fibre	
Nutritional Plan:	
Morning: 150ml 1.5kcal/ml whole protein feed with fibre + 5ml water flush	
After lunch: 150ml 1.5kcal/ml whole protein feed with fibre + 5ml water flush	
After tea: 150ml 1.5kcal/ml whole protein feed with fibre + 5ml flush	

Dietetic assessment following PEG placement

K had a dietetic review 1 month after discharge from hospital following her PEG placement. Parents wanted to discuss the use of blended diet via the PEG as an option having used commercial formula exclusively via the NGT.

Table 1, outlines the dietetic assessment completed at the time of review in the format of the British Dietetic Association (BDA) Model and Process for Dietetic Practice (12).

Table 1: Dietetic assessment.

Anthropometry	8.6kg (2nd centile). Increased from <0.4th centile prior to NGT placement. Birth weight 25th-50th centile.
Biochemistry	NA
Clinical condition	Hypotonia, developmental delay
Dietary intake	H continued to be offered family meals by mouth. She manages soft, lumpy textures and was offered a portion of a family meal mashed to a suitable consistency. Some examples of foods given were cauliflower cheese or lentil dhal or fruit, oats and yogurt. She was managing approximately 3-4 spoons at each mealtime. H was managing all fluid orally to meet her requirements

Estimated requirements	Energy: 81kcal/kg = 696kcal Protein: 8.3-14.5g (Safe minimum - Reference Nutrient Intake) 850ml fluid
Family and social	H lives at home with her parents and 2 brothers. She is looked after by her grandparents on some days when her parents are both at work.
Nutrition and dietetic diagnosis	
Ongoing need for enteral feeding related to complex medical history evidenced by inadequate oral intake.	
Aim of intervention	
To meet nutritional requirements via oral and enteral feeds to support proportional growth.	

During the discussion, parents enquired about using blended diet via the PEG. Parents were keen for K to receive a more varied diet including more homemade foods as she was only managing small amounts by mouth.

The implications and practicalities of giving blended diet were discussed and the risk assessment was completed in line with local guidelines. The risk assessment contains some potential risks of using blended diet and provides an opportunity to discuss ways to mitigate them.

Table 2 summarises the discussion and mitigations for K's introduction of blended diet.

Table 2: Potential risks and mitigation for K's introduction to blended diet.

Risk	Mitigations
Nutritional risk This relates to the nutritional content of blended foods being lower than commercial formula. Blended foods will need to be diluted to achieve a suitable consistency and therefore a larger volume will be needed to provide adequate nutrition.	A combination of commercial formula and blended foods was used similar to how an oral nutritional supplement is used alongside food and drinks K's weight continued to be monitored to ensure continued growth K's intake was reviewed through dietetic assessment which showed food variety resembling balanced family meals pureed to suitable consistency to administer via her PEG
Infection This could arise from inappropriately prepared or stored foods, poor hand hygiene or inadequate cleanliness of equipment used, including residual particles of food in the tube.	In this instance, all foods given as blended diet were also offered orally. Therefore, foods which are safe to be given orally in terms of microbial content are safe for administration via PEG. K's PEG tube is flushed after all foods to minimise food residue in the tube.
Feed administration This relates to the consistency of blended foods being thicker than commercial formula and the need for bolus feeding as blended diet cannot be given using a pump due to calibration and prolonged hanging time.	K's Mum planned to use 1.5kcal/ml whole protein feed with fibre to dilute any foods to a suitable consistency Foods were prepared ahead of each mealtime therefore no concerns regarding foods being out at room temperature for an extended period
Tube blockage This could occur if foods are incompletely blended leaving lumps being too thick	We discussed blending foods until they are completely smooth and adding 1.5kcal/ml whole protein feed with fibre until a suitable consistency is reached

	The PEG is flushed with water to make sure no residual food is remaining to cause a blockage
Tube condition Some devices are not recommended for use with blended foods and therefore may deteriorate sooner.	The manufacturers of the tube that H has (Avanos – Corflo PEG) acknowledge the use of blended diet in their product information.

Dietetic plan

Table 3 shows the nutritional plan agreed following dietetic assessment and discussion with parents around the introduction of blended diet.

Table 3: Nutritional plan for PEG feeds.

<p>Daily Requirements:</p> <p>Food and drink as per speech and language therapy recommendations</p> <p>Blended diet via PEG</p> <p>250ml 1.5kcal/ml whole protein feed with fibre + approx. 250-300ml extra in food blends</p> <p>940ml total fluids (includes drinks, milk feeds and water flushes)</p>
<p>Nutritional Plan:</p> <p>Morning: 50-60ml 1.5kcal/ml whole protein feed with fibre by mouth</p> <p>Breakfast: Foods offered by mouth and remainder blended and given via PEG using 1.5kcal/ml whole protein feed with fibre to achieve suitable consistency.</p> <p>Lunch: Foods offered by mouth and remainder blended and given via PEG using 1.5kcal/ml whole protein feed with fibre to achieve suitable consistency.</p> <p>Teatime: Foods offered by mouth and remainder blended and given via PEG using 1.5kcal/ml whole protein feed with fibre to achieve suitable consistency.</p> <p>Overnight: 200ml 1.5kcal/ml whole protein feed with fibre + water flush</p>

Management and outcome

K was reviewed again after 6 weeks; her weight had continued to increase to 9.36kg now plotting 2nd-9th centile. This suggested adequate energy intake evidenced by catch up growth towards K's birth weight centile. Parents reported that K had been much more settled in terms of reduced reflux since starting the blended diet and her bowels were much improved, opening regularly twice daily passing soft stools. K no longer requires medication for her reflux having previously required lansoprazole.

Parents described their enjoyment in being able to cook for K and increased satisfaction with the variety of foods that they include in K's diet. Parents observed that K had much more energy which they felt enabled her to engage with other activities including physiotherapy, this has allowed K to progress developmentally as a result.

K's nutritional plan was later changed to prioritise mealtimes during the day with a top-up feed given overnight. K will continue to be reviewed to ensure that she continues to grow and her nutritional requirements are met through a combination of her oral and enteral tube feeds. Figure 5 shows the revised nutritional plan following dietetic review.

Discussion

This case study demonstrates similar effects of blended diet on physical symptoms as described in the literature. Batsis et al.

(13) showed that blended diet improved gastrointestinal (GI) symptoms in 95% of participants within 3 weeks of starting blended diet. These findings are in line with research by Hron et al. (7) who reported a reduction in gagging, retching and diarrhoea following the initiation of blended diet. Similarly, a review by Breaks et al. (5) reported that a number of studies have demonstrated a positive effect of blended diet on symptoms of reflux and constipation. As well as objective changes in occurrence of GI symptoms, more subjective reports of improved health and wellbeing are evident in the literature. Some parents commented on their child's "beautiful skin, shiny hair" (14) whilst others explained that their child "just seemed healthier" (14). Children starting on blended diet have been reported to look "brighter" (8) and have "more energy" (8).

In addition to the changes in physical symptoms, parents referred to being able to cook for their daughter which is particularly important to them. There are several studies which have drawn conclusions on the social implications of blended diet; several studies have acknowledged inclusion at mealtimes and the value of this for the child as well as the wider family (5, 15, 16). A review by Coad et al. (17) refers to the "feeding relationship" valued by families and the role of blended diet in allowing families to nurture their children with food that they would otherwise have given orally. In addition, people also value freedom of choice regarding specific foods; several studies refer to the selection of 'natural' or 'real' foods in preference to commercial formula (14-16); Weeks et al. (18) recognise a "cultural shift towards unprocessed foods" which is associated with families' choice to use blended diet.

Tube blockage, microbial contamination and inadequate nutritional intake are reported as potential risks associated with blended diet (6). In this case, K's parents reported that they have not had any incidence of tube blockage or food borne infection since starting blended diet; K's weight has increased suggesting adequate energy intake. A laboratory study by Madden et al. (9) showed that tube blockage with blended diet was uncommon whilst Armstrong et al. (19) reported results of surveys completed by dietitians highlighting that such complications were less prevalent in practice than anticipated.

In this case, K was receiving a combination of blended diet and commercial formula. Due to her underlying medical condition and hypotonia, it is likely that her energy requirement is less than the estimated average requirement (EAR) for a child of the same age. As with every child requiring enteral tube feeding, it is necessary that they have a dietetic assessment to inform their nutritional plan. This is prudent for those using blended diet due to the additional considerations discussed above. As in this case, care must be taken to ensure adequate protein and micronutrient intake from a diet low in energy. Some research has highlighted the need for oversight from healthcare professionals which is reflected in the current British Dietetic Association policy statement (6, 20). There is disparity within the profession regarding confidence in supporting blended diet. A study by Kariya et al. (21) showed that only 25% of dietitians felt confident to support families to use blended diet. However, research by Armstrong et al. (19) reported that

over half of survey respondents who were dietitians felt 'very' or 'quite' confident to support a patient using blended diet.

Summary

This case demonstrates how blended diet can be introduced safely whilst mitigating the potential risks associated with its use to achieve a positive outcome for this individual. Whilst blended diet may not be suitable for everyone, it is necessary to review suitability on an individualised basis. It is pertinent to consider blended diet given the evidence to support improvement in GI dysfunction which is prominent for a number of individuals requiring enteral tube feeding. It is necessary to maintain open discussions with families to ensure best care for patients. Core dietetic skills of nutritional assessment and individualised dietary advice are necessary to support the safe and effective use of blended diet; similar to oral nutritional support. More research is necessary to evidence best practice around the use of blended diet and to facilitate safe and effective delivery of services to support individuals using it.

References

1. Chernoff R (2006) An Overview of Tube Feeding: From Ancient Times to the Future. *Nutrition in Clinical Practice*. 21(4):408-10.
2. National Institute for Health and Care Excellence. Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition. 2006. <https://www.nice.org.uk/guidance/cg32>
3. Barron J (1953) Tube Feeding With Liquefied Natural Foods. *Henry Ford Hospital Medical Journal*. 1:13-7.
4. Harkness L (2002) The History of Enteral Nutrition Therapy: From Raw Eggs and Nasal Tubes to Purified Amino Acids and Early Postoperative Jejunal Delivery. *Journal of the American Dietetic Association*. 102(3):399-404.
5. Breaks A, Smith C, Bloch S, Morgan S (2018) Blended diets for gastrostomy fed children and young people: a scoping review. *Journal of Human Nutrition and Dietetics*. 31(5):634-46.
6. British Dietetic Association. Policy Statement: The Use of Blended Diet with Enteral Feeding Tubes. British Dietetic Association; 2019. <https://www.bda.uk.com/resource/the-use-of-blended-diet-with-enteral-feeding-tubes.html>
7. Hron B, Fishman E, Lurie M, Clarke T, Chin Z, Hester L, et al. (2019) Health Outcomes and Quality of Life Indices of Children Receiving Blenderized Feeds via Enteral Tube. *Journal of Pediatrics*. 211:139.
8. Durnan S (2018) 'It's Just Food, Blended': Exploring Parents' Experiences of Choosing Blended Diet for Their Tube-fed Child.
9. Madden AM, Baines S, Bothwell S, Chen E, Goh S, Jerome L, et al. (2019) A laboratory-based evaluation of tube blocking and microbial risks associated with one blended enteral feed recipe. *Journal of Human Nutrition and Dietetics*. 32(5):667-75.
10. Ojo O (2012) The Impact of Changes in Health and Social Care on Enteral Feeding in the Community. *Nutrients*. 4(11):1709.
11. National Institute for Health and Care Excellence. Faltering growth: recognition and management of faltering growth in children. 2017. <https://www.nice.org.uk/guidance/ng75>
12. British Dietetic Association. Model and Process for Nutrition and Dietetic Practice 2020 [Available from: <https://www.bda.uk.com/uploads/assets/1aa9b067-a1c1-4eec-a1318fdc258e0ebb/2020-Model-and-Process-for-Nutrition-and-Dietetic-Practice.pdf>].