FISTULOCLYSIS OR DISTAL ENTERAL TUBE FEEDING

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The management of intestinal failure is complex and there are limited options for patients dependent on nutrient and fluid support. The emergence of fistuloclysis, or distal enteral tube feeding (DETF), is a relatively novel procedure involving a distal form of enteral nutrition (EN) that offers the appropriate patient an alternative feeding method over parenteral nutrition.

Several specialist intestinal units in the UK have successfully managed patients using DETF. The aim of this article is to relay the practical experience of using DETF in an intestinal failure patient in an attempt to wean parenteral nutrition (PN) with the added advantage of avoiding the complications associated with PN.

INTESTINAL FAILURE

A recent definition of intestinal failure (IF) involves reduced intestinal absorption so that macronutrient and/or water and electrolyte supplements are needed to maintain health and/or growth.[1] Intestinal failure is now categorised into three types and causes are varied incorporating a wide variety of medical and surgical conditions (refer to Table 1).

Enterocutaneous fistulae (ECF) are abnormal communications between the lumen of the gastrointestinal tract and the skin which may occur in various disease processes or iatrogenically. Approximately 20-30% of all ECFs arise secondary to Crohn's disease following bowel resection.[2,3] The majority of fistulae occur post-operatively as a result of bowel injury during surgery, an anastomotic leak, missed enterotomy or erosion of foreign material into adjacent bowel (e.g. mesh for hernia repair, vascular graft).[4] A number of pre-operative factors increasing the likelihood of developing a fistula include malnutrition, traumatic injury, infection, immunosuppression and emergency procedures.[5,6] Enteric fistulas are classified in relation to the effluent output of the fistula:

- a low output fistula drains less than 200mL/day
- a moderate output fistula drains between 200 and 500mL/day
- a high output fistula drains more than 500mL/day.

High output fistulas are associated with an increased risk of morbidity and mortality and greater macronutrient, fluid and electrolyte deficiencies.[7] Reportedly, up to 70% of patients with fis-

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Table 1: Categorisation of intestinal failure

Type 1	This type of IF is short-term, self-limiting and often peri-operative in nature. Type I IF is common and patients on high dependency units and intensive care units will also fall into this category.
Type 2	Occurs in metabolically unstable patients in hospital and requires prolonged PN over weeks or months. Often associated with sepsis and may be associated with renal impairment. These patients often need the facilities of an intensive care or high dependency unit for some or much of their stay in hospital. Poor management of Type 2 IF increases mortality and increases the likelihood of developing Type 3 IF
Type 3	A chronic condition requiring long-term PN. The patient is characteristically metabolically stable but cannot maintain their nutrition adequately by absorbing food or nutrients via the intestinal tract. These are, in the main, the group of patients for which HPN or Electrolytes (HPE) indicated.

Adapted from NHS England[23]

Table 2: Factors affecting liklihood of closure

Factor	*Likely to Close*	*Unlikely to Close*
Anatomic Location	Esophageal Duodenal Stump Pancreatobiliary	Gastric Small bowel
Sepsis	Absent	Present
Etiology	Appendicitis Diverticulitis Postoperative	IBD Cancer Radiation Foreign body (mesh, staple, or stent)
Condition of bowel	Healthy adjacent tissue Small leak No abscess Quiescent disease	Total disruption Distal disruption Abscess Active disease
Other	Tract >2 cm in length Low output	Tract <2 cm, epithelialized High output

Adapted from: Maykel J, Fischer J. (2)

tulas are malnourished[8] primarily due to postoperative ileus, sepsis, loss of bowel integrity and absorptive surface area, and the external loss of essential nutrients, electrolytes and fluid in the protein-rich enteric contents.[9] Ultimately, the goal is for the ECF to close spontaneously and if it occurs, it is usually within six to eight weeks of its first appearance.[10] Authors of case series recommend waiting between three and six months if the fistula warrants surgical repair[11,11a,12, 12a] to prevent further collateral damage at surgery.

For the patient where spontaneous fistula closure is not possible, optimal management is paramount. The SNAP (sepsis, nutrition, anatomy and surgical procedure) protocol aids early detection and treatment of sepsis, optimising patient nutrition through oral, enteral and parenteral routes, identifying the fistula anatomy, optimising fistula management and proceeding to definitive surgery when appropriate.[13]

NUTRITION

The nutritional and metabolic needs of a patient with a high-output ECF during the period pending surgery has historically been met by the provision of PN, which is frequently provided at home. PN is complex, expensive and highly demanding requiring individualised management by an experienced multidisciplinary nutrition team. In addition, it may not be possible to train all patients such as the elderly and those with impaired vision or dexterity, to administer home PN, necessitating prolonged hospital admission or discharge with community nursing support.

In the selected patient, PN can be avoided with EN administered via a fistula. Several published studies have shown that EN can be safely implemented in patients with an ECF without complicating the treatment of the open abdomen and fistula itself.[14,15] Knowledge of the origin of the fistula is critical for the possibility of feeding via the gastrointestinal tract to succeed, and it is recommended that all patients with Type 2 intestinal failure undergo detailed anatomical assessment with oral and enema contrast studies, as well as fistulography.

DETF

DETF involves nutrition provision via an enteral feeding tube. A tube placed directly into the distal lumen of a fistula utilises the bowel distal to the fistula to absorb nutrients and fluid, thus offering the benefits of EN. Evidence suggests that EN has considerable advantages over PN in encouraging distal intestinal adaptation and reducing the risk of anastomotic dehissence.[16] Although DETF is not feasible for all patients with ECF, for those who are eligible, the method appears to be an acceptable and safe method of maintaining and improving nutritional status.

In order for this method to be successful, there must be enough unobstructed bowel distal to the fis-

tula in continuity for adequate nutrient absorption. The suggested length is at least 75cm and patients should also be without infection and hemodynamically stable.[17] Contrast radiology is the most reliable method to determine anatomy and clarify any drainage into the abdominal cavity, which would contraindicate the use of this feeding technique.

It is essential before commencing DETF that spontaneous closure of the ECF is ruled out. It is uncertain, in the absence of a randomised control trial, whether this method of feeding would hinder the closure of an ECF but, it has been suggested that evidence of mucocutaneous continuity at the site of an intestinal fistula is a clear indication that spontaneous closure will not occur.[17] Table 2 details factors that may predict spontaneous closure.

For those patients in whom spontaneous entercutaneous closure is unlikely, DETF may enable nutritional optimisation pending surgery. The following case study outlines the practical experience of DETF. It demonstrates the required perseverance by the patient and MDT for it to be successful.

Case study

Mrs X was referred for nutritional and surgical assessment following a large incisional hernia repair with mesh reconstruction. A burst periumbilical abscess resulted in a high output ECF.

An assessment using the SNAP tool identified:

Sepsis: None present

Nutrition: Weight 39.2kg, BMI: 18.6kg/m^2; Weight loss %: 52% over two years
MUAC: 20cm; MAMC: 17.87cm; Handgrip Strength: 15.3cm; TSF: 7mm
Mrs X drank ~1500mls daily, dietary intake on admission calculated to ~650kcals and ~30g protein.

Anatomy (radiology): A CT abdomen and pelvis with contrast and fistulogram were conducted to confirm the presence of an ECF, >75cm of small bowel below the fistula and no evidence of obstruction distal to the fistula.

Surgical assessment: Type 2 intestinal failure and required a surgical laparotomy for the removal of existing mesh, repair of fistula and reconstruction of the abdominal wall with a biological mesh.

NUTRITION PLAN

On admission, Mrs X was initially made NBM to assess her basal ECF output. She was then commenced on PN to meet her full estimated nutritional requirements pending planned surgery. Improving her nutritional status was imperative before any surgery intervention could be considered.

The patient wished to return home pending her surgical procedure to be near her family. Her limited dexterity deemed that she was not a candidate for home PN training. Subsequent discussions with the patient following review of her radiology indicated DETF feeding was a distinct possibility. Thus, it was agreed with the patient to commence nutritional support with PN followed by transition to enteral nutrition via DETF.

Radiology confirmed the length of the small intestine beyond the fistula opening, and the possibility of placing a feeding tube distal to the fistula, using a percutaneous gastrostomy. St Mark's and the Royal Salford Intestinal Failure Unit have produced handbooks and guidelines for healthcare professionals and include a step-by-step guide to equipment assembly.[18]

TECHNIQUE OF DETF

Under radiological guidance, the fistula tract was cannulated and dilated with a 5.0mm angioplasty balloon and then intubated with 12F gastrostomy. The catheter was advanced into the lumen of the distal intestine and 3.0ml water was placed in the catheter balloon. The fistula was enclosed within a stoma appliance linked to a universal catheter access port which allowed collection and measurement of proximal enteric content as enteral feed was infused via the fistula. The external flange was removed from the gastrostomy and a Hollister was punctured through the stoma bag window.

SELECTION OF ENTERAL FEED

The nutritional goal for Mrs X was to improve and then maintain her nutritional status to allow for the best surgical outcome by maximising macro- and micronutrient and electrolyte provision. She had been on PN for several weeks prior to commencing DETF. Initially, a standard polymeric feed 1.0kcal/ml (288mOsm/kg) was commenced at 25mls/hr over 20 hours to provide 500kcal energy and 20g protein. Studies have

shown in patients with residual bowel length of 60-150cm that macronutrient, micronutrient, electrolyte and fluid absorption were unaffected by the type of feed administered.[19] These findings have also been supported by larger studies.[20] Joly et al[21] in a randomised crossover study found that using continuous feeding improved lipid and protein absorption, but this needs to be tempered with the impact that carrying feed around for 24 hours has on an individual, in particular, in someone who is elderly and frail.

An important factor when deciding upon an enteral feed, is the osmolality. The osmolality of bowel contents effects secretion and absorption of fluid and sodium and may be fundamental in the fluid management of the patient. Teubner[15] suggested commencing patients on a polymeric feed and in the event of intolerance, change to a peptide feed taking into account feed osmolality. A polymeric feed offers the advantage of a higher macronutrient content to offset any increased nutritional requirements.

PROGRESS

Day 1: Mrs X continued on PN throughout the trial of DETF. EN was commenced at 25mls/hr for ~10 hours, but following the development of nausea, overnight nursing staff stopped the feed.

Day 2: The feed was recommenced but stopped again due to ongoing nausea. A tubogram confirmed the position of the gastrostomy had moved and required re-insertion.

Day 3: Interventional radiology inserted a second 12F gastrostomy and feeding recommenced at 25mls/hr with Osmolite 1.0kcal. Mrs X developed diarrhoea and vomiting and the tube dislodged and fell out. The patient was reluctant for a further tube replacement.

Day 7: Mrs X agreed to re-attempt fistuloclysis and, following a very difficult and painful procedure using fluoroscopy, a third 12F gastrostomy was placed.

Day 8: EN was recommenced at 25mls/hr and tolerated. The feed was increased to 40mls/hr but Mrs X quickly developed nausea and reported abdominal discomfort. There was no evidence of diarrhoea and no increase in fistula output. Feeding was discontinued and the tube then fell out for a second time. A decision was then made with the patient and multidisciplinary team not for further insertion.

MONITORING

The key to successful DETF is close monitoring of hydration, nutritional status and biochemistry. In this instance, Mrs X was continued on PN during the DETF trial so hydration, nutritional and electrolyte status were maintained. However, should DETF have succeeded and Mrs X weaned off PN, continuous monitoring is fundamental.

ORAL DIETARY AND FLUID INTAKE

As spontaneous healing of Mrs X's ECF was unlikely, there was no reason to restrict oral dietary intake. A high energy, high protein and low fibre diet was advocated. It is beneficial for patients with reduced bowel length to consume a low fibre diet to prevent the occlusion of the proximal fistula.[22] There is little evidence supporting the practise of advising patients to avoid fluid intake at mealtimes to aid absorption. However, balancing against the impact of the fluid and electrolyte losses that Mrs X experienced, this recommendation was discussed with the patient along with the consumption of an isotonic fluid.

Despite daily counselling and education with the patient discussing the effects of fluid intake on fistula output, Mrs X refused to limit her intake of oral hypotonic fluids (tea, coffee, water) to 500mls and consumption of an isotonic solution resulting in a high output fistula. If our recommendations were followed, we may have achieved a lower output.

CONCLUSION

In this example, DETF feeding was unsuccessful on account of the difficulties in successfully placing a tube and patient tolerance. I wanted to use this particular example to demonstrate the potential pitfalls that may be encountered, but not to be deterred by some failures. Even in the intestinal failure centres that have high usage of DETF, not every case is a success. It requires an experienced MDT and a motivated patient who has been appropriately counselled and educated; it can be successful and offers an alternative for the appropriate patient.

For article references please email:
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