

Case 2

Gastrostomy tube feeding in cystic fibrosis following lung transplantation

Clinical summary



Presentation/clinical history

Mr N, 19 years, student with cystic fibrosis admitted for a lung transplant 36 hours ago

- On transplant list for 7 months - virtually no oral intake due to shortness of breath. 15Fr Freka PEG in situ-feeding at home for 18 months.
- Previously maintaining weight with oral intake and Fresubin.
- Multiple hospital admissions over the past two years with respiratory exacerbatio.
- Oral intake poor following surgery and tube feeding to recommence to meet nutritional requirements.
- Past medical history: cystic fibrosis, previous PEG in childhood
- Medication: pancreatic enzymes, NaCl capsules, regular antibiotic therapy, steroid inhaler, O₂ therapy, saline nebulisers
- Biochemistry: Na 129 mmol/l, K 4.2 mmol/l, Ur 2.4 mmol/l, Cr 57 µmol/l, PO₄ 0.96 mmol/l, HbA1c 7.2 mmol/l



Early tube feeding helps meet nutritional requirements and reduce malnutrition risk in patients with poor oral intake following transplant surgery.



Weight history

Normal weight	57-62 kg (BMI: 18.6-20.2 kg/m ²)
Current weight	64.7 kg (BMI: 21.1 kg/m ²)

- Normal weight ranges depending on medical condition, however weight increased due to impending transplant. Weight stable for past 3-6 months

Nutritional assessment



Estimated nutritional requirements

- Energy: 2329-4658 kcal^{2,5,6}
(25 kcal x 64.7 kg + 1.2 stress factor and 1.2 physical activity factor - requirements for cystic fibrosis patients are individual and can be up to 200% of that of the healthy population)²
- Protein: 77.6-97 g (1.2-1.5 g/kg)^{2,3}
- Fluid: 2171 ml (using the 100/50/15 formula)⁷



Dietetic assessment

- Day 4 post-op - breathing independently with overnight BIPAP and O₂ therapy, looks very lethargic and short of breath.
- Current feeding regime: 1000 ml Fresubin Original at 50 ml/hr x 24 hr - to change from 24 hr feeding now on ward.
- Currently on 8-hourly IV fluids (1500 ml) - catheter draining good, volumes 1950 ml.
- Loose stools reported (4 times daily) possibly secondary to pancreatic insufficiency - pancreatic enzymes via feeding tube to be given orally as enteric coated.
- Weight 64.7 kg - stable over past 3-6 months therefore not a re-feeding risk.
- Biochemistry indicated slight overhydration. Chronic low Na due to cystic fibrosis.
- Oral fluid better than food intake - mostly managing water (approx. 500 ml daily), also enjoys ice pops.
- Recommence PEG-feeding as oral intake not likely to meet increased nutritional requirements in the short to medium term.



Aim

- Maintain nutritional status during surgery and aid rehabilitation (likely to be in hospital for 4-6 weeks).

Tube feeding with Fresubin



Nutrition therapy

- Energy-dense, high-protein feed needed to meet increased demands following lung transplantation.
- High vitamin D is required due to frequent vitamin D deficiency in cystic fibrosis patients with pancreatic insufficiency.²
- Reduce feeding rate with more concentrated feed - titrate slowly to ensure tolerance following surgery and due to pancreatic insufficiency.
- Reduce IV fluids to 12-hourly, can be discontinued once on full feed volume.
- Commence high protein fortified menu options.

Fresubin 2 kcal HP Fibre is an energy-dense, high-protein feed that meets increased demands following lung transplantation.

Day



Feeding regime

- 1000 ml Fresubin 2 kcal HP Fibre at 50 ml/hr x 16 hr approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.
- 1000 ml Fresubin 2 kcal HP Fibre at 75 ml/hr x 13.5 hr approx. 7 a.m.-11 p.m. with 100 ml water flushes pre- and post-feed.

Water flushes of 100 ml pre- and post-medication also required (approx. 4 times daily). Providing 2000 kcal, 100 g protein and 1710 ml fluid - monitor oral fluid intake and IV fluids.

Monitoring/follow-up

- 2 Feed tolerated very well at 50 ml/hr. Oral intake remains poor due mainly to shortness of breath and pain. Continues on oxygen therapy and analgesia. Fluid intake continues to improve (approx. 700 ml). Ur and Cr normalising, Na remains low - continues on NaCl. Bowels moved twice - remains loose but reduced volume. Urine output excellent via catheter. Increase feeding rate to 1000 ml Fresubin 2 kcal HP Fibre at 75 ml/hr x 13.5 hr.
- 4 Tolerating feed well at 75 ml/hr for 13.5 hr with 100 ml water flushes overnight. IV fluid to be discontinued. Lung function good, no signs of any transplant rejection. Bowels moving 2-3 x daily - loose, continues on pancreatic enzymes. Urine output good, catheter removed. Oral intake improving (approx. 450 kcal and 20 g protein). Weight 63.1 kg. Total intake 1950 kcal and 95 g protein. Increase feeding rate to 100 ml/hr x 10 hr on 1000 ml Fresubin 2 kcal HP Fibre. Review in 2-3 days.
- 7 Recovering well and mobile on ward with assistance. Oral intake improved - 750 kcal and 25 g protein. Biochemistry within reference ranges with exception of Na: 133 mmol/l (improving). Continue with feed on 1000 ml Fresubin 2 kcal HP Fibre at 100 ml/hr x 10 hr and monitor weight.
- 10 Oral intake improving - approx. 1250 kcal and 40 g protein. Weight 63.6 kg (10.5 kg). Bowels moving 1-2 x daily - soft/loose. Aim to keep weight stable. Reduce feed to 500 ml Fresubin 2 kcal HP Fibre in the evening (6 p.m.-11 p.m.) at 100 ml/hr with 100 ml water flushes pre- and post-feed. Commence Fresubin ONS 1-2 x per day to maximise oral intake. Review in 2-3 days, if oral intake stable - continue with regime until rehabilitation complete.
- 14 Rehabbing well, lung function continues to improve. Oral intake improved again, approx. 1200 kcal and 45 g protein - eating 1-2 courses at meal times plus 1 x Fresubin ONS daily. Urine output good, 1-2 soft/loose bowel movements daily (normal for him). Feed via PEG continues on Fresubin 2 kcal HP Fibre at 100 ml/hr x 5 hr from approx. 7 p.m.-11 p.m. Total intake approx. 2200 kcal and 95 g protein. Weight 63.7 kg - still meeting nutritional requirements. Continue with supplemental gastrostomy feeding on Fresubin 2 kcal HP Fibre and encouragement of fortified foods.

Enteral tube feeding in cystic fibrosis patients, like Mr N, may help to improve weight gain, nutritional status and lung function, and may improve quality of life.¹⁷

Therapeutic outcome



2 months later

- Outpatient, lung transplant has been a success. Rehabilitated well and due to go back to his studies in the next few weeks.
- Oral intake continues to improve and weight stable at 63.9 kg. Supplemental feeding via PEG continues - Fresubin 2 kcal HP Fibre 500 ml in evening at 100 ml/hr x 5 hr.
- MCT fats contained in Fresubin 2 kcal HP Fibre may help reduce steatorrhea secondary to pancreatic insufficiency.¹⁸
- Fresubin 2 kcal HP Fibre contains 15 g fibre in 1000 ml which may normalise bowel function, help to reduce abdominal pain and prevent distal intestinal obstruction syndrome in combination with pancreatic enzyme therapy.^{8-10,19}