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EDS-related Feeding Difficulties: Preventing the Placement of a Surgical Feeding Tube

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Abstract: Feeding difficulties due to functional gastrointestinal (GI) symptoms (i.e., nausea, pain, and bloating) are well described in patients with hypermobile-type Ehlers-Danlos Syndrome. These symptoms are particularly difficult to treat when there is comorbid dysautonomia, usually manifesting as postural orthostatic tachycardia syndrome. Here, we describe a successful trial of multidisciplinary rehabilitative interventions to avoid placement of a surgical feeding tube in such a patient. Main components of intervention were intensive pelvic floor physiotherapy and biofeedback, occupational therapy focused on coping with feeding-related symptoms, psychology support, and medications targeting histamine blockade and enhancing intestinal motility.

INTRODUCTION

We are observing an increase in the number of referred patients meeting criteria for hypermobile Ehlers-Danlos Syndrome (hEDS) per 2017 guidelines (1), at our urban, pediatric academic medical center. Digestive symptoms including nausea, early satiety, and constipation are common, often with hyper-adrenergic postural orthostatic tachycardia syndrome (POTS) (2). While studies suggest underlying GI motility issues in a subset of patients with hEDS (3), hEDS has a significant association with functional GI disorders (4). Currently, there are no validated guidelines for the evaluation and management of GI symptoms in hEDS. We have found that symptom management is difficult, and some patients regress rapidly from eating a regular diet to requiring nutritional supplements, feeding tubes, or parenteral fluids or nutrition. Initial POTS management includes adequate hydration, salt supplementation and physical therapy (PT) to promote conditioning. For patients with hEDS, POTS and concomitant GI symptoms, oral fluid and nutrition intolerance stymies the attempts to maintain hydration leading to worsened fatigue and malnutrition. The clinical team often finds itself forced to use IV fluids and tube feedings.

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CASE REPORT

A 14-year-old patient presented to the GI clinic with pain with eating, dysphagia, bloating, and weight loss. The patient had a history of hEDS, POTS, mast cell dysregulation, chronic pain syndrome (CPS), chronic headaches, and a concussion 1 year prior. Initial evaluation included an upper GI series with barium pill significant for a mild delay in distal esophageal emptying but with a normal timed barium swallow study (5), a visually normal upper intestinal endoscopy (UIE) with histologic evidence of chronic gastritis, and normal MRI brain and cervical spine. Three months after presenting to GI, the patient was admitted for dehydration, an 8-pound weight loss, and worsening dysphagia, nausea and abdominal pain. A normal repeat UIE and esophageal manometry study demonstrated normal esophageal motility (Chicago Classification). The patient was suspected to have esophageal hypersensitivity and was treated with a higher dose of amitriptyline (originally taken for CPS) and discharged with a nasogastric (NG) tube for supplemental enteral feeds. In a follow-up neurogastroenterology and motility (NGM) clinic appointment, the patient was diagnosed with rumination and started on a diaphragmatic breathing regimen, improving rumination symptoms. Additional symptom management included meloxicam for CPS, fludrocortisone and salt supplementation for POTS, and cromolyn for mast cell stabilization. Ondansetron, granisetron, omeprazole, prochlorperazine, and cyproheptadine were used for nausea and vomiting management, yet symptoms evolved over the next few months to vomiting bolus gastric feeds hours after administration. Erythromycin was trialed for presumed gastroparesis and stopped due to hypertension and lethargy with a QTc of 466. While undergoing a gastric emptying study, the patient had persistent vomiting leading to hospitalization. The patient was rehydrated and treated with pyloric dilation with Botox injection and advancement of the NG continuous transpyloric feeds. Metoclopramide and promethazine were avoided due to side effects. After discharge, abdominal pain and nausea persisted, and the patient was started on prucalopride for presumed gastroparesis.

The patient and family requested a surgical gastrojejunostomy tube due to bullying at school regarding the visible feeding tube. The care team felt strongly that all nonsurgical options should be pursued with a multidisciplinary approach before surgery. A care conference including general GI, NGM, chronic pain, complex care pediatrician, social work, patient representative, parents and the patient yielded a plan for admission to the GI service, feeding tube removal, IV fluids while advancing oral feeds, daily physical and feeding therapy, staged advancement of oral intake by volume and texture, intensive psychologic support, and a one-to-one sitter to document symptoms and refocus the patient on symptom coping. Psychologic support included increasing patient emotional awareness and identifying coping mechanisms for the patient to use during distress.

At the time of admission, the patient had lost greater than 10% of usual body weight, had inadequate nutrient intake of 25–50% of needs and BMI deceleration from z score –1 to –1.9, and was treated

with prucalopride for 3 weeks. The 10-day hospitalization of intensive multidisciplinary therapy support to introduce and advance oral feedings is described in Table 1. The patient was highly motivated throughout hospitalization.

Discharge criteria included oral tolerance of recommended daily caloric intake and small amounts of solid foods. Multidisciplinary outpatient management continued with pelvic floor PT (1-2 telehealth sessions/week and monthly biofeedback sessions), weekly feeding therapy and dietician appointments, cognitive behavioral therapy with the patient's counselor, and monthly visits in NGM or EDS clinic. All providers reinforced the goals of eating food by mouth, coping with orthostatic intolerance, core, pelvic, and hip stabilization, and breathing techniques.

Currently, the patient is 14 months remote from hospitalization and continues to take all nutrition and hydration orally without formula. The patient's BMI has improved from 19 to 22 with a 19-pound weight gain since discharge. Daily medications include prucalopride for motility, famotidine and loratadine for histamine blockade, meloxicam and tizanidine for CPS, salt supplementation for POTS, and cromolyn and hydroxyzine for breakthrough urticaria.

DISCUSSION

EDS is a connective tissue abnormality impairing tissue structure and function. There is no standardized approach to management and evaluation of GI symptoms in this patient population; therefore, we recommend a symptom-based approach. Due to functional GI disorders being the most commonly associated cause of symptoms, we find that encouraging gut motility and altering sensory processing can clinically counteract these effects and recommend avoiding the placement of surgical feeding tubes or central lines for long-term nutrition if possible. We believe that the combination of patient motivation, multidisciplinary intervention, and medication optimization led to successful feeding in this patient. Systemic desensitization was used by slowly reintroducing the anxiety-provoking subject (oral nutrition) while using biofeedback relaxation techniques (6). During and after hospitalization, the team of feeding and physical therapists, psychologist, and physicians reinforced systemic desensitization and the use of coping mechanisms and emotional awareness. After multiple medications and procedural intervention failures, prucalopride was used to treat presumed gastroparesis. A recent study demonstrated improved gastroparesis cardinal symptom index and quality-of-life after 4 weeks of prucalopride 2 mg daily compared to placebo (7) suggesting hospitalization 3 weeks after prucalopride initiation may have optimized treatment success. Opiates, antihistamines, and anticholinergics may slow GI motility while antiserotonergics such as ondansetron and granisetron theoretically negate the proserotonergic effects of prucalopride. These medications were weaned at prucalopride initiation. We propose that medications

TABLE 1. Multidisciplinary approach during the patient's hospitalization

Consultants	Multidisciplinary team during hospitalization: Occupational therapy—feeding Daily in-room visits Monday to Friday Provided a daily schedule that structured feeding and therapy goals Physical Therapy—Pelvic floor focus Daily in-room visits Monday to Friday Biofeedback used for timed breathing and movement of diaphragm Physical Therapy—General (for ongoing POTS rehabilitation) Dietician Provided guidance on goal caloric intake and fluid intake Psychiatry Psychology Focused on symptom-specific coping skills Special care clinic (pediatrician with EDS-expertise, provided support) Medical palliative care Patient/family values-based goals of care Child life
Medications	Continuous IVF at maintenance rate IV adjusted to IV + PO total goal as PO intake improved Prucalopride 2 mg daily Lansoprazole 30 mg daily Cromolyn QID Fludrocortisone Meloxicam Melatonin qHS Hydroxyzine qHS, and q6 hours prn nausea Milk of magnesia BID prn constipation Vitamin D supplement Vitamin B12 supplement
Nutrition goals	Advance from liquids to purees to soft foods, advance liquid intake to meet hydration needs Day 1: Drink 1/2 carton supplement for snack, 1/2 carton for dinner Day 2: Drink 1/2 carton supplement for all 3 meals and 2 snacks Day 3: Drink 1/2 carton supplement for all 3 meals and 2 snacks and trial purees at meals. Day 4: Drink 1/2 carton supplement for all 3 meals and 2 snacks, and eat at least part of a puree with every meal
Other interventions	NJ tube removed day 1 One-to-one sitter, daily Diaphragmatic breathing 15 minutes before and after PO intake

and intensive multimodal therapies in the inpatient setting should be attempted before surgical intervention in EDS patients with oral feeding difficulty.

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REFERENCES

1. Tinkle B, Castori M, Berglund B, et al. Hypermobile Ehlers–Danlos syndrome (a.k.a. Ehlers–Danlos syndrome Type III and Ehlers–Danlos syndrome hypermobility type): clinical description and natural history. *Am J Med Genet Part C Semin Med Genet*. 2017;175C:48–69.
2. Mathias CJ, Low DA, Iodice V, et al. Postural tachycardia syndrome–current experience and concepts. *Nat Rev Neurol*. 2011;8:22–34.
3. Zarate N, Farmer AD, Grahame R, et al. Unexplained gastrointestinal symptoms and joint hypermobility: is connective tissue the missing link? *Neurogastroenterol Motil*. 2010;22:252–e78.
4. Fikree A, Aktar R, Grahame R, et al. Functional gastrointestinal disorders are associated with the joint hypermobility syndrome in secondary care: a case-control study. *Neurogastroenterol Motil*. 2015;27:569–579.
5. Rosenwald KD, Hayes K, Menard-Katcher C, et al. Implementation of a timed Barium Esophagram protocol for assessment of esophageal function in children. *J Pediatr Gastroenterol Nutr*. 2020;71:470–475.
6. Burns RB. Systematic desensitization. In: *Counselling and Therapy*. Springer; 1983:95-106.
7. Carbone F, Van den Houte K, Clevers E, et al. Prucalopride in gastroparesis: A Randomized Placebo-Controlled Crossover Study. *Am J Gastroenterol*. 2019;114:1265–1274.