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Feeding Jejunostomy for the Treatment of Severe Hyperemesis Gravidarum: A Case Series

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Abstract

Background—Hyperemesis gravidarum is severe nausea and vomiting during pregnancy leading to dehydration, nutrition deficiency, and fetal morbidity and mortality. Treatment must maintain fluid and electrolyte balance and caloric intake. Parenteral nutrition is often attempted; however, complication rates are high. Nutrition via nasoenteric and percutaneous endoscopic gastrostomy tubes is limited by poor patient tolerance, tube dislodgement, and altered anatomy in pregnancy.

Methods—Women with hyperemesis gravidarum who failed standard therapy were offered jejunostomy. All patients underwent surgical jejunostomy in the second trimester. Isotonic tube feeds were administered to a goal caloric factor calculated by the Harris-Benedict equation with a correction added for pregnancy. Patients were monitored until delivery.

Results—Five women underwent jejunostomy placement at our institution between 1998 and 2005. One patient underwent jejunostomy placement twice for consecutive pregnancies. The mean body weight loss from prepregnancy was 7.9% (range, 4.0%–15.9%). Patients underwent jejunostomy placement between 12 and 26 weeks of gestation (median 14 weeks). Twelve to 16 Fr catheters were placed in the proximal jejunum. Maternal weight gain occurred in 5 of 6 pregnancies. The mean duration of tube placement was 19 weeks (range, 8–28 weeks). All pregnancies ended with term deliveries (range, 36–40 weeks of gestation). The mean infant birth weight was 2885 g (range, 2270–4000 g). Tube-related complications were limited to dislodgement in 2 patients in the third trimester. No cases of infection, bleeding, or preterm labor occurred.

Conclusions—Feeding via jejunostomy is a potentially safe, effective, and well-tolerated mode of nutrition support therapy in hyperemesis gravidarum.

Keywords

hyperemesis gravidarum; enteral nutrition; jejunostomy

Hyperemesis gravidarum (HG) is a condition of severe nausea and vomiting during pregnancy leading to dehydration, acid-base imbalance, nutrition deficiency, and weight loss.¹ It occurs in up to 2% of pregnancies and poses a substantial financial burden with an estimated \$200 million charged for inpatient management alone.² HG is distinguished from nausea and vomiting of pregnancy by ketonuria and weight loss of >5% of prepregnancy body weight.³ Although the prognosis is generally favorable, severe, untreated disease may be life-threatening to the mother and fetus.^{4,5}

Treatment of HG is aimed at maintaining fluid and electrolyte balance, maintaining adequate caloric intake, and controlling symptoms. Patients with HG require aggressive therapy to avoid maternal and fetal complications. Pharmacologic therapy with anti-emetics and antireflux medications in conjunction with intravenous (IV) hydration constitutes standard treatment for outpatients. However, severely affected patients may fail IV hydration and oral, rectal, and IV preparations of the medications commonly used to treat HG. In these patients, nutrition support therapy by parenteral or enteral means may be necessary to achieve maternal weight gain and appropriate fetal growth.

Because of the morbidity and inconvenience associated with parenteral nutrition (PN) via central catheters and enteral nutrition (EN) via nasoenteric tubes, we assessed the feasibility and efficacy of surgically placed feeding jejunostomy (J tube) in women with HG refractory to standard therapy. Patients were monitored for ongoing symptoms, weight gain, and tube-related complications. This report summarizes our preliminary experience.

Methods

Patients in this study were inpatients and outpatients at Women & Infants Hospital referred for gastroenterology consultation for HG. Women & Infants Hospital is a comprehensive women's health facility with a high-volume obstetric service. With 10,000 deliveries per year, the hospital has one of the largest cohorts of pregnant patients in the United States.

Between 1998 and 2005, 1323 women were treated at our hospital for HG. Patients were diagnosed with HG if they had persistent severe nausea and vomiting that could not be explained by other conditions and 1 or more of the following criteria: weight loss of >5% of prepregnancy body weight, ketonuria, multiple emergency room visits for dehydration, and/or inability to tolerate oral intake. All women were treated with the treatment algorithm for HG adopted by our center (Figure 1). Patients were offered J tube placement if they had persistent weight loss despite IV hydration, IV ondansetron, IV ranitidine or pantoprazole, and IV metoclopramide. Women in the third trimester of pregnancy and with contraindications to surgery (eg, anticoagulation that could not be discontinued) were excluded.

After informed consent was granted, a feeding jejunostomy was placed in the second trimester of pregnancy under general anesthesia by an experienced surgeon. The peritoneal cavity was opened through an epigastric midline incision. The proximal jejunum was identified by examining the small bowel and identifying the ligament of Treitz. A purse-string suture was placed, and an enterotomy was made with electrocautery in the proximal jejunum, approximately 10 cm distal to the ligament of Treitz. A 12–16 Fr catheter was inserted through a serosal tunnel on the antimesenteric border (Witzel procedure). The catheter was sutured into the jejunum and brought to the abdominal wall through an incision in the left upper quadrant. The feeding tube was then sutured and secured to the anterior abdominal wall and to the skin.

Enteral feedings were started within 24 hours of J tube placement. Caloric needs were calculated by a registered dietician using the Harris-Benedict equation plus 300 kcal added

for pregnancy. An isotonic complete, high-protein formula was administered in all patients. Feeding rates and times were adjusted according to patient tolerance and preference. Feeding times varied from 12 hours to 24 hours. Nutrition counseling continued after tube feeding initiation; patients were encouraged to eat and drink along with the tube feedings as tolerated. Patients were also offered psychological support to help cope with this lifestyle.

Patients were discharged from the hospital with the J tube in place when they could tolerate tube feedings at the goal rate.

Results

Five patients accepted J tube placement at our institution between 1998 and 2005 (Table 1). One patient underwent J tube placement twice for consecutive pregnancies. All patients had singleton pregnancies. Three patients had a history of HG during prior pregnancies, and 3 had a history of fetal losses as a result of HG. The mean body weight loss from prepregnancy was 7.9% (range, 4.0%–15.9%).

The J tubes were placed between 12 and 26 weeks gestation (median 14 weeks). Maternal weight gain was achieved in 5 of 6 pregnancies. The J tubes were in place for a mean duration of 19 weeks (range, 8–28 weeks). Four J tubes remained in place until delivery. One tube was removed at 34 weeks at the patient's request because of emotional distress (Patient 1), and 1 tube fell out at 30 weeks gestation and was not replaced (Patient 2). All pregnancies ended with term deliveries (range, 36–40 weeks of gestation) of healthy infants. The mean infant birth weight was 2995 g (range, 2270–4000 g; Table 2).

Tube-related complications were limited to late tube dislodgement requiring simple replacement via the established percutaneous tract in 2 patients (Table 3). There were no intra-operative or immediate postoperative complications. In addition, there were no cases of delayed infection, bleeding, preterm labor, or congenital abnormalities. However, all patients had continued nausea and vomiting, requiring continued standard therapy in addition to J tube feedings. In 5 of 6 pregnancies, the patient could be maintained on oral anti-emetics; in 1 patient, a midline catheter was placed for IV hydration and IV medications.

J tubes were removed by external traction after delivery in 4 pregnancies. In 1 pregnancy the tube was removed electively in the third trimester, and in 1 pregnancy the tube became dislodged and fell out spontaneously.

Discussion

HG is a severe condition in pregnancy that is associated with significant maternal and fetal morbidity. It is estimated that HG complicates 0.3%–2% of pregnancies.^{6–8} Symptoms usually begin at 4–5 weeks gestation and improve by the end of the first trimester. However, in up to 20% of patients, symptoms persist throughout pregnancy.⁹ The exact cause of HG is unknown. It may represent an extreme form of gestational vomiting or a distinct entity. Putative causes include physiologic hormonal changes of pregnancy,¹⁰ thyroid dysfunction,¹¹ gastrointestinal tract dysmotility, *Helicobacter pylori* infection,^{12,13} and psychological factors.¹⁴

Maternal complications range from weight loss, dehydration, and muscle weakness to Boerhave's syndrome¹⁵ and Wernicke's encephalopathy.¹⁶ Severe depression with elective termination of the pregnancy may also occur.¹⁷ Neonatal outcomes are adversely affected by HG. Compared with infants born to mothers without HG, infants born to mothers with HG

are more likely to have low birth weight, to be small for gestational age, to be preterm, and to have low 5-minute Apgar scores.¹⁸

Aggressive therapy is required to reduce maternal complications and improve pregnancy outcomes. Although evidence-based guidelines for the treatment of HG are limited, published algorithms recommend the use of antiemetics and IV hydration in a stepwise approach.¹⁹ Corticosteroids may be tried in refractory patients; however, randomized controlled trials have shown discordant results.^{20,21} Nutrition support therapy may also be required in the setting of ongoing weight loss or other evidence of malnutrition. Strategies for protein-calorie delivery include EN via nasoenteric tubes, percutaneous endoscopic gastrostomy (PEG), and gastrojejunostomy (PEG-J); and PN via central catheters or peripherally inserted central catheters (PICCs).

Enteral feeding by nasogastric tube (NG)²² or PEG²³ has been used successfully to maintain nutrition in women with HG. This mode of feeding is limited, however, by the risk of increased nausea and vomiting caused by intragastric feeding. Percutaneously inserted tubes in pregnancy also carry additional risks attributable to changing anatomy.

Postpyloric feeding tubes, both nasojejunal (NJ)^{24,25} and PEG-J,²⁶ have been used in attempts to reduce this risk; however, dislodgement of the tubes²⁷ caused by ongoing vomiting and retching and gastric coiling is a common complication. A single case report in the literature describes feeding jejunostomy and open gastrostomy (for drainage and decompression) for HG. This patient achieved weight gain but had persistent nausea and vomiting throughout pregnancy.²⁸ She also tolerated the tube poorly, having both psychological distress and physical discomfort.

Nutrition support therapy by PN has been described in pregnancy for the treatment of HG.¹¹ PN is costly and associated with significant maternal medical complications. Infection and thrombosis, the 2 most frequently occurring complications, are postulated to be inherently higher in pregnancy because of the hypercoagulable state and immunologic suppression in pregnancy, and may account for the higher rate of catheter-related complications. Notably, these complications appear to be independent of PN infusion. A recent study reported an adjusted odds ratio of 34.5 for complications in women with HG managed with PICCs compared with women managed with short catheters or nasoenteric tubes, although only a small minority had received PN via their PICCs.²⁹

Given the serious complications associated with PN that are not only catheter-related but also attributable to gallbladder dysmotility, intrahepatic cholestasis, and inappropriate nutrient administration causing metabolic abnormalities,³⁰ our approach has been to provide EN to women with refractory HG. EN is also preferred to prevent the deterioration in intestinal integrity associated with PN.³¹ Jejunostomy was performed rather than nasoenteric tube placement to minimize the risk of early dislodgement and the need for multiple tube replacements with radiographic confirmation. We also find small-caliber NG and NJ tubes to be inadequate forms of long-term enteral access because of clogging and interference with oral intake. In our experience, women with HG tolerate nasoenteric tubes in the short-term but do not tolerate them for the protracted duration that nutrition support therapy is required. Our population of young, otherwise healthy pregnant women reported nasoenteric tubes to be aesthetically unappealing and psychologically distressing because the tubes are constant visual reminders of the women's condition. Because J tubes can be safely guarded underneath clothing, they are better tolerated from this standpoint.

Our series demonstrates the relative safety and efficacy of feeding jejunostomy in pregnancy. Although our experience is limited to a relatively small number of cases, all of our pregnancies ended with full-term deliveries. Five of 6 cases resulted in maternal weight

gain. There were no infants who were small for gestational age and no cases of intrauterine growth retardation. The feeding tubes remained in place for a mean duration of 19 weeks, which is significantly longer than what has been reported in the literature for NG and NJ feeding tubes placed for HG. This form of feeding was also generally well tolerated and required minimal local care.

Two cases in our series were complicated by early tube removal attributable to dislodgement. Both of these cases occurred after prolonged use of the feeding tube (8 weeks and 18 weeks) for an overall percentage of tube dislodgement per patient days of 0.25. Patients in whom tube dislodgement occurred either had achieved weight gain or had weight loss stabilization before loss of the tube. In the case of patient #1, it was suspected that dislodgement may have been caused by self-induced tampering, because the patient was known to have anorexia nervosa. HG likely prevented initial weight gain, but once enteral access was established, the patient was suspected of tampering with her tube feeds (ie, disabling the pump, dumping feeds) to restrict weight gain.

Feeding via jejunostomy did not affect the nausea and vomiting experienced by our patients. All patients in this series continued to have significant symptoms that required anti-emetics for the duration of the pregnancy, and 1 patient required IV hydration via a midline catheter. When tolerated, fluid boluses were given through the J tubes to reduce the risk of dehydration from ongoing vomiting.

Nutrition support by jejunostomy requires general anesthesia and surgery in pregnancy, which pose risks to the mother and fetus.³² However, up to 75,000 pregnant women in the United States undergo surgery each year for nonobstetrical reasons with generally favorable outcomes.³³ Specific surgical risks to be considered regarding J tube placement include tube dislocation, obstruction or migration of the tube, cutaneous or intra-abdominal abscesses, enterocutaneous fistulas, pneumatosis, occlusion, and intestinal ischemia.³⁴ A recent retrospective study found the rate of surgical complications following Witzel catheter feeding jejunostomy to be 1.5% in patients undergoing the procedure after upper digestive tract surgery³⁵; however, it is unknown whether this complication rate holds during pregnancy. Our strategy has been to minimize surgical risks by performing the procedure after fetal organogenesis has been completed and before the risk of preterm labor and the difficulty posed by changing anatomy increase.

Cost is a factor in prolonged nutrition support therapy for HG. It is well established that HG poses a costly burden to society in terms of days lost from work,³⁶ repeated hospitalizations, and visits to healthcare professionals.³⁷ Prolonged PN significantly increases the cost of HG not only via the direct cost of the nutrient solution, administration sets, and infusion pumps but also via the associated medical visits, laboratory monitoring, home nursing support, and hospitalizations for complication.³⁸ In general, EN is considered to be cost-saving compared with PN with fewer inherent complications; however, future research should include the cost-effectiveness of EN via jejunostomy compared with PN and other enteral strategies for pregnant women with HG. Novel techniques to treat refractory HG are also needed because nutrition support therapy addresses the weight loss complication of HG but does not treat its underlying cause or persistent symptoms.

Our study is limited by the small sample size and retrospective nature. It is also a single-center experience and therefore may not be easily generalized. Our center is unique in that it is a high-volume obstetric hospital with a gastroenterology division that focuses on gastrointestinal disorders in pregnancy. Institutions that treat HG infrequently may consider referral to a larger center before offering J tube placement.

Conclusions

This series provides preliminary evidence of the safety and efficacy of feeding jejunostomy for the treatment of HG. EN avoids the catheter-related complications associated with PN. Surgical placement of the feeding tube into the jejunum minimizes the risk of increased nausea and vomiting that accompanies prepyloric feeding as well as the risk of early tube dislodgement. However, controlled studies of jejunostomy vs other forms of enteral access are needed before this form of nutrition support therapy can be routinely recommended in women with refractory HG.

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Figure 1.

Treatment algorithm for hyperemesis gravidarum. Persistent symptoms $\pm$ ongoing weight loss $\pm$ signs and symptoms of dehydration (orthostatic hypotension, ketonuria, oliguria) prompt step-wise progression down the algorithm. Patients are assessed every 1–2 weeks until symptomatically improved and weight loss is stabilized. Treatment escalation occurs every 1–2 weeks, as needed. Medication doses are fixed unless side effects occur, requiring dose reduction or medication discontinuation.

***Dietary modification consists of one-on-one counseling with a registered dietician with recommendations to eat bland foods, avoid high fat foods and strong aromas and tastes, separate intake of solids and liquids, and eat small, frequent meals throughout the day. **Consider nasoenteric access if patient is not candidate for J tube.**

Table 1

Patient Characteristics

Patient	Age	Gravida	Parity	History of Hyperemesis	Weeks Gestation	Prepregnancy Weight, lb	Pre-intervention Weight, lb	% Weight Loss
1	31	11	0	No	26	180	152	15.6
2	19	6	0	Yes	12	175	168	4
3	37	3	2	Yes	20	190	172	9.5
4	28	1	0	NA	14	112	104	7.2
5	35	9	2	Yes	12	129	125	3.1
6	37	10	3	Yes	14	126	116	7.9

NA, not applicable

Table 2

Pregnancy Outcomes

Patient	Duration of Jejunostomy, wk	Maternal Weight Change, lb	Gestational Age at Delivery, wk	Mode of Delivery	Infant Birth Weight, g
1	8	-2	38	Vaginal	2270
2	18	+28	36	Vaginal	2300
3	16	+31	39	Vaginal	4000
4	20	+32	37	Cesarean section	2995
5	28	+11	40	Vaginal	2970
6	25	+13	39	Vaginal	2775

Table 3

Pregnancy Course

Patient	Persistent Symptoms	Complication
1	Yes	Tube dislodgement
2	Yes	Tube dislodgement
3	Yes	None
4	Yes	None
5	Yes	None
6	Yes	None