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Management of Hyperemesis Gravidarum with Enteral Nutrition

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Hyperemesis gravidarum, the most severe form of nausea and emesis during pregnancy, can seriously affect the health and well-being of the pregnant woman and her unborn fetus. Intravenous fluids, antiemetic medications and dietary manipulation can be tried initially. If these interventions are not effective, several investigations have shown rapid relief of nausea and vomiting, achievement of nutrition goals and successful pregnancy outcomes after the initiation of gastric enteral feeding. This article will review diet, medications and the use of enteral feeding in patients with hyperemesis gravidarum.

CASE STUDY

A 28-year-old woman with a diagnosis of hyperemesis gravidarum, presents to a nutrition support clinic for an initial nutrition assessment. She is 15 weeks pregnant, 5′1″ and weighs 88 kg with a pre-pregnancy weight of 91 kg. The patient has unremitting nausea and emesis. She had been managed at home with intravenous fluids (IV) containing ondansetron and multivitamins. She developed cellulitis at her intravenous site and is unable to maintain IV access; she does not make eye contact. Per 24 hour recall, the patient is consuming approximately 400 calories, 15 grams of protein and 360 mL of fluid per day. Where do we go from here?

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INTRODUCTION

Mild to moderate nausea and emesis are common in early pregnancy, but the most severe form, hyperemesis gravidarum (HEG), can seriously affect the health and well-being of the pregnant woman and her unborn fetus. HEG is a diagnosis of exclusion that has no single accepted definition. It is a condition in pregnancy characterized by intractable nausea and emesis that can lead to dehydration, metabolic disarray, nutritional

compromise, psychological disturbances and termination of the pregnancy. Key to the diagnosis of HEG is the patient's presentation and onset of symptoms that are consistent with this condition. The nausea and emesis of HEG are unrelenting with onset between the fourth and tenth week of gestation with symptoms resolving between the fifteen and twenty week of gestation. In some unfortunate cases, it can last the entire pregnancy (1). Weight loss of at least 5% pre-pregnancy weight is not uncommon. Physical findings of abdominal pain, fever, headache, or goiter suggest other potential diagnoses. The patient should also be assessed for any chronic condition associated with nausea and emesis that preceded the pregnancy. Management of this condition with fluids, pharmacologic agents and enteral nutrition (EN) support early on will prevent more severe complications.

INCIDENCE AND RISK FACTORS

Nausea and emesis are common during the first trimester of pregnancy; in fact, they may be the first sign of pregnancy for many women. These symptoms can occur as early as two weeks gestation and generally peak between eight and 12 weeks. About 50% of pregnant women have some nausea and emesis; 25% have nausea alone (2). HEG, the most severe form of nausea and emesis, occurs in approximately 0.3%–2% of pregnancies (3). Maternal risk factors for HEG include nulliparity, history of HEG in a previous pregnancy, mothers or sisters with HEG, a female fetus, (4) multiple gestations, increased body weight, or history of motion sickness or migraines (5).

ETIOLOGY

Several factors have been explored as potential causes for HEG, but the true etiology has yet to be elucidated. There is a close temporal relationship between onset and peak circulating levels of human chorionic gonadotropin (hCG) hormone and the development of HEG (6). Not all women develop HEG during pregnancy, possibly due to the varying biologic activity of different hCG isoforms or differences in their susceptibility to an emetogenic stimulus (7). Serum hCG concentrations tend to be higher in women with HEG who have an increase serum thyroxine (T4) level. Transient maternal hyperthyroidism is seen in about 60% of women with HEG, although hyperthyroidism by itself rarely causes vomiting (8,9). The hyperemesis resolves at the same time that thyroid levels return to normal, usually by 18 weeks gestation (10). A possible *Helicobacter pylori* infection should be investigated if the nausea and vomiting continues into the second trimester. One study compared psychological symptoms in pregnant women with and without HEG during their pregnancy and again post-pregnancy (11). Subjects in the midst of HEG symptoms were shown to have significantly higher psychological symptoms of depression, hysteria, psychasthenia, schizophrenia, somatization, obsessive compulsive behaviors, and anxiety than those pregnant women who were not suffering from HEG. In the post-pregnancy analysis there was no difference in the psychological scoring of patients who had endured HEG compared to those who had not. The authors attributed the stress and trauma of HEG as the cause of the psychological symptoms, rather than the reverse, and concluded that HEG is not a conversion disorder. It would be hard to prove that HEG is purely psychological as many women begin to vomit before they have a missed period or even know that they are pregnant.

CLINICAL CONSEQUENCES OF HYPEREMESIS GRAVIDARUM

Physiologic Effects

The emesis, discomfort and decreased appetite that accompanies HEG interferes with caloric and fluid intake leading to weight loss, dehydration, deteriorating nutritional state and often acid base and electrolyte alterations.

Assessment of pregnancy weight changes should be evaluated after fluid resuscitation. Continued weight loss during pregnancy should be avoided to assure that the infant attains a safe, appropriate weight for its gestational age. HEG symptoms that persist into the third trimester are associated with a higher incidence of low birth weight infants (12). Severe malnutrition in pregnancy can lead to spontaneous abortion, teratogenic effects, poor neurological development and preterm delivery.

(continued on page 19)

(continued from page 16)

Serum albumin levels decline with pregnancy, starting during the first trimester, due to expected fluid accrual. A mild to moderate ketonuria may be seen and reflects metabolism of fatty acids due to inadequate caloric and protein intake. Ketones readily cross the placenta and may impair fetal neuropsychological development (13).

Thiamine (B_1) deficiency has been reported in as many as 60% of HEG patients (14). The woman with HEG is prone to thiamine deficiency due to the increased demand for glucose metabolism, coupled with the inability to tolerate adequate food and vitamin/mineral supplements. Glucose metabolism is very active in the pregnant woman due to the hypermetabolic state of pregnancy and the developing fetus's energy needs and rapid tissue production. Thiamine deficiency can result in beri-beri symptoms that include fatigue, loss of appetite, emotional instability, sleep disturbances and abdominal discomfort. Advanced neuropathic manifestations of beri-beri include parethesias, weakness, tenderness and cramps of the lower extremities. The cerebral progression of thiamine deficiency resulting in Wernicke's encephalopathy has been reported in 33 cases in the past 20 years (7,15). The initiation of dextrose containing intravenous fluids or aggressive nutrition support, without the provision of thiamine, can precipitate Wernicke's encephalopathy. Thiamine administration of 100 mg IV or IM daily, or the same dosage enterally if tolerated, has been suggested for any patient with more than three-to-four weeks of emesis (16).

HEG can cause a mild increase in liver enzymes (up to four times the upper limit of normal) that return to normal when the HEG is successfully treated (17). Serum amylase may rise up to five times greater than normal, but this is usually salivary and not pancreatic amylase (18). Excessive retching during HEG may lead to esophageal rupture, Mallory Weiss tears, pneumothorax and pneumomediastinum.

Psychosocial Effects

The unremitting physiologic symptoms of HEG have been shown to have a substantial emotional effect on a woman's life. A woman with HEG often cannot carry on with her usual work, household, or social activities. She begins to isolate herself because she has no control over the vomiting and is embarrassed, fatigued, and frustrated. One study interviewed hospitalized women with HEG to determine the coping mechanisms they utilized to deal with the progression of this illness (19). As the symptoms became more overpowering, they had increasing difficulty communicating their feelings to those they would normally rely on for support, not wanting others questioning the severity of the symptoms and their ability to manage them effectively. The only way they could cope was to physically and socially withdraw and isolate themselves from all aspects of their life. Another investigation looked at the perceptions of women with HEG to better determine how this illness affected their lives and their assumption of the maternal role (20). In addition to feelings of isolation and loss of control, the subjects felt deprived of the usual pleasures that accompany the preparations for a new baby. They were unable to focus on the fetus and develop an emotional attachment while the symptoms persisted. Many patients considered terminating the pregnancy, thereby delaying the stages of maternal role attainment (21). Normally after delivery, mothers have already bonded with the infant and are ready to begin learning infant cues and developing infant care skills. Mothers with HEG tended to feel guilty about the lack of attachment to their newborns, while others became overprotective to make up for lost time. Clinicians working with HEG patients should not only assess the patient's feelings about their newborn, but also their perceptions of themselves in the maternal role. They may need extra time to discuss and deal with their feelings, bond with their infant, and develop healthy parenting and infant care skills.

NUTRIENT REQUIREMENTS

A pregnant woman needs additional calories (Kcal) to support the growth of the fetus, placenta and mammary and uterine tissues. Although prospective clinical trials are non-existent, it is current practice to provide approximately 80,000 calories over the entire pregnancy (22). The total energy needs of most pregnant women have been estimated to be 2,500–2,700 Kcal per day (23), however, caloric needs for each woman should be individualized and the health care provider

Table 1
Nutrient Requirements During Pregnancy (47 - 54)

Nutrient	*RDA/DRI*	*Key Considerations*
Protein	0.8–1.0 gm/kg protein/d + 10 gm protein/d per fetus using pre-pregnancy weight	Individuals who are protein deficient at conception, a goal of 1.2 – 1.7 gm/kg protein/d is ideal
Carbohydrate	50%–60% total calories	For gestational diabetes, CHO content may need to be decreased to as low as 40% calories
Fat	30% total calories	There is no established DRI for essential fatty acids during pregnancy, however it has been suggested intake should be at least 4.5%–6% of total calorie intake
Fluid	30 mL/kg	With nausea and vomiting, pregnant woman will need additional fluids to account for fluid losses with emesis
Folate	600 micrograms/d	With 400 micrograms coming from supplements or synthetic folic acid found in fortified foods
Iron	27 milligrams/d	Center for Disease Control and Prevention recommends all pregnant woman initiate iron supplementation of 30 mg/d at the first prenatal visit
Calcium	1000 milligrams/d for woman aged 19 to 50 years	1300 milligrams/d for women 18 years or younger

should take into consideration pre-pregnancy body mass index (weight in kg/height in m^2), weight gain during pregnancy, fetal growth and other nutritional factors (24). During the first trimester, pregnant woman will need 25–40 Kcal/kg per day using the pre-pregnancy weight (25). During the second and third trimester, women and older adolescents (>14 years) need an estimated additional 300 Kcals per day (26) and an estimated extra 500 Kcals per day for younger adolescents who may still be growing (27). Close monitoring of maternal weight gain and fetal growth via ultrasonography exams will help the health care provider adjust the caloric recommendations. See Table 1 for further macronutrient and micronutrient requirements during pregnancy.

Micronutrients in Enteral Formulas

In a standard polymeric formula, with or without fiber, the volume of formula needed to provide the daily recommended intakes (DRIs) of micronutrients in pregnancy can vary significantly (range: 750 to 2250 mL per day). Depending on the volume of enteral formula the patient is to receive, patients may require further supplementation of macro- and micronutrients if requirements are not met. For those HEG patients who are using enteral formulas, the clinician will need to reevaluate whether a prenatal vitamin is needed to meet the DRIs of the micronutrients. Prenatal vitamins may be better tolerated in a chewable form; it also may help for the patient to take the supplement in the evening.

WEIGHT GAIN

Maternal weight gain has a great impact on the growth and health of the fetus. Suboptimal weight gain during the second and third trimester of pregnancy can result in low birth weight. In addition, inadequate maternal weight gain in the third trimester is associated with greater risk for premature delivery. If there is a rapid weight gain in pregnancy (>2 lb over one week), the woman should be assessed for preeclampsia or fluid overload. Recommendations for weight gain during pregnancy are based on the woman's pre-pregnancy BMI. To enhance the success of pregnancy, control

maternal postpartum weight retention, and decrease the likelihood of development of chronic disease, such as heart disease and diabetes, later in life for the fetus, weight changes should be monitored (24). See Table 2 for weight gain guidelines.

DIETARY GUIDELINES FOR HEG

Once the nausea and vomiting are under control and a liquid diet is tolerated, a dietitian can begin counseling the patient on initiation of an oral diet. Although there is very little scientific evidence to support these dietary interventions, practitioners have relied on these guidelines with reported success. Dietary management consists of small, frequent meals of bland, low odor, high complex carbohydrate, and low fat foods. Oral dietary guidelines can be found in Table 3 (28).

MEDICAL THERAPIES

If conservative treatment such as lifestyle and dietary interventions fail, pharmacological treatment should be considered. However, other causes of nausea and vomiting should be ruled out before proceeding with medicinal therapies.

The combination of doxylamine and pyridoxine, previously called Bendectin, continues to be one of the first-line therapies, despite the fact that it is no longer available in the United States. In the U.S., patients can get doxylamine and pyridoxine separately over the counter and take it at the same time. After numerous

(continued on page 25)

Table 2
Weight Gain Guidelines During Pregnancy (24)

Normal BMI (20–26)
- First trimester 2–5 lb
- 0.5–1.0 lb/week the second and third trimester

BMI <19.8, ideal weight gain is 28–40 lb
BMI 19.8–26, ideal weight gain is 25–35 lb
BMI >26.0–29.0, ideal weight gain is 15–25 lb
BMI >29.0, a minimum weight gain of 15 lb
Ideal weight gain for a woman carrying twins is 34–45 lb and for triplets is 50 lb

Table 3
Suggested interventions to improve oral tolerance

When fixing meals
- Prepare foods that do not require cooking, like sandwiches
- Drink cool or chilled beverages
- Avoid eating in a room that is stuffy, too warm, or has cooking odors that may make one nauseated
- Consider having someone else remove covers from cooked foods, like frozen entrees, to avoid inhaling cooking odors

When eating
- Eat small frequent meals. Eat something every 2–3 hours to avoid hunger
- Drink fewer liquids with meals. Drinking liquids can cause a full, bloated feeling. Drink liquids 1/2 to 1 hour after meals
- Avoid these foods:
  - Fatty, greasy, or fried
  - Spicy or hot
  - Very sweet, such as candy, cake or cookies
  - With strong odors, like cooked broccoli, cabbage, fish, etc.
- Choose bland foods. Try toast, crackers, pretzels, rice, oatmeal, skinned chicken (baked or broiled, not fried), and fruits and vegetables that are soft or bland, like canned peaches
- Eat easily digested starches, like rice, potatoes, noodles, cereal and bread
- Pick low fat protein foods. Eat lean beef and pork, skinless chicken or turkey, eggs, and boiled beans
- Try eating salty, sweet food combinations, like potato chips or pretzels and Lemonade or sour patch kids, before meals

Other tips
- Rest after meals. Sit up in a chair for about an hour after meals
- Avoid sudden movements. Rise slowly from the bed
- Eat crackers, toast, pretzels, or rice cakes before getting out of bed
- When feeling nauseated, slowly sip on carbonated beverages
- Wear loose clothes
- Taking a multivitamin at the time of conception may decrease the severity of nausea and vomiting during pregnancy

(continued from page 21)

Table 4
Medicinal Therapies Commonly Used in HEG (7,29)

	Dosage	*Classification*	*Comments*
Antinausea			
• Promethazine (Phenegran)	12.5–25 mg orally, rectally, or IM q 4–6 hrs.	C	Bulk of evidence indicates no tetragenicity
• Prochlorperazine (Compazine)	5–10 mg orally q 6–8 hrs; 5–10 mg IM q 3–4 hrs; 2.5–10 mg IV q 3–5 hrs; 25 mg rectally q 12 hrs.	C	Clinically effective, but conflicting reports on safety
• Ondansetron (Zofran)	4–8 mg orally q 12 hrs; 0.15 mg/kg IV q 4 hrs.	B	Limited data
•Trimethobenzamide (Tigan)	300 mg orally tid – qid; 200 mg IM tid – qid.	C	Safety in pregnancy not clearly established
Motility Agents			
• Metoclopramide (Reglan)	5–10 mg q 6–8 hrs orally, intramuscularly or intravenously	B	Safe and effective in humans
Vitamin/Mineral Supplements			
• Pyridoxine (vitamin B_6)	10–25 mg tid – qid orally	A	Safe and effective in humans; component of Bendectin
• Doxylamine (Unisom)	12.5 mg tid – qid orally	B	Component of Bendectin
Antihistamine Medications			
• Droperidol (Inaspine)	0.625–1.25 mg IM/IV q 3–4 hrs	C	Limited data; droperidol with diphenhydramine effective without adverse outcomes in 1 study. Use with caution
• Meclizine (Antivert)	25–50 mg orally q 12–24 hrs	B	Conflicting reports on safety and efficacy. Not used very often
• Dimenhydrinate (Dramamine)	50–100 mg orally q 4–6 hrs. Do not exceed 400 mg per day. If taken with doxylamine, do not exceed 200 mg per day	B	
• Diphenhydramine (Benadryl)	25–50 mg orally/IM/IV q 4–8 hrs	B	
Corticosteroid			
• Methylprednisolone (Medrol)	16 mg q 8 hrs orally or IV × 3 days. Then taper over 2 weeks to lowest effective dose. If beneficial, limit usage to 6 weeks. If symptoms do not improve in 3 days → discontinue	C	Further studies needed to study efficacy. Corticosteroids should be used with caution in HEG pts and avoid prescribing before 10 weeks gestation

Category A = Well-controlled studies in humans show no fetal risk.
Category B = Animal studies show no risk, but human studies inadequate or animal studies show some risk not supported by human studies.
Category C = Animal studies show risk, but human studies are inadequate or lacking.

lawsuits associating Bendectin to birth defects, the pharmaceutical company voluntary took Bendectin off the market in 1983, although there was inadequate evidence (29). A few cohort and case-control studies with over 170,000 exposures demonstrated pyridoxine and doxylaimine combination to be safe, in particular relating to effects on the fetus (30).

If pyridoxine with or without doxylamine is not effective, a trial of antinausea medications should be considered. Clinicians typically begin with a trial of prochlorperazine or promethazine and if these medications are unsuccessful, a trial of other antinausea medications such as trimethobenzamide or ondansetron is instituted (7,29).

For severe nausea and vomiting, antihistamines, like diphenhydramine or droperidol, or a motility agent, such as metoclopramide, may be beneficial. Corticosteriods should only be considered as a last resort (7,29). See Table 4 for medications commonly used in patients with HEG.

BENEFITS OF ENTERAL NUTRITION (EN) OVER PARENTERAL NUTRITION (PN)

As pregnancy suppresses the immune system, pregnant women may be at an even greater risk for central venous catheter related bacterial and fungal sepsis while receiving PN (31,32). Pregnant women also have elevated coagulation factors that make them more prone to catheter related thromboembolism (33). In addition to the risks of PN, the solution, compounding and infusion supplies are estimated at $1,400 per week (34). Added to this cost are frequent lab draws, patient education and nursing care. Safe initiation of PN requires hospitalization to stabilize the patient's hydration, fluid and electrolytes, establish good glucose control and provide adequate home PN training. In contrast, if the woman with HEG has been adequately hydrated with IV fluid and her lab values are acceptable, EN can be initiated safely in the home. The estimated cost for home enteral nutrition is $56 per week (34).

ENTERAL NUTRITION IN HEG

Paradoxical Tolerance

EN allows the infusion of nutrients and fluid without the associated cephalic phase (visual cues, food aromas and flavors) that stimulates salivary and gastric secretions, which may play a role in inducing nausea and vomiting in HEG. If a woman with HEG has not responded to dietary manipulation and oral antiemetics, EN should be considered. EN, ideally via the gastric route, is an approach that has been shown to offer significant relief from nausea and vomiting, prevent hospitalization and lead to positive fetal outcomes (34–37). The health care provider should explain to the patient how nutrition via a nasogastrically placed small bore feeding tube could offer rapid HEG symptom relief while providing needed nutrition and fluids for both patient and infant. The possibility of symptom relief usually outweighs the aesthetic concerns of having a feeding tube.

In 1990, Barclay reported a retrospective review of eight HEG patients with persistent emesis and weight loss that was unresponsive to dietary manipulation, IV fluids and antiemetic medications. A continuous infusion via a nasoduodenal feeding tube placed fluoroscopically was well tolerated. During EN, lasting a mean of 21 days, overall weight gain was reported in six women; vomiting varied from sporadic to daily, five patients had ptyalism (an excessive flow of saliva) and all eventually had successful pregnancy outcomes (38). Two years later Boyce, et al published the successful use of EN in two HEG patients (35). Continuous EN was initiated gastrically (personal correspondence with the author) and within 24 to 48 hours, their symptoms resolved and both women expressed the desire to eat. EN was well tolerated and led to healthy full term deliveries.

In 1993, Gulley, et al reported their experience with 30 HEG patients that were hospitalized and fed via a protocol that utilized continuous gastric EN (36). All patients were admitted to private rooms and received IV hydration and antiemetics. The patients and their significant others were gathered together and educated about HEG, given support and encouraged to ask questions and verbalize their feelings. If the nausea did not subside within 48 hours, EN was initiated at 50 mL per hour and advanced to meet the calculated needs as tolerated. They reported that their patients consistently described rapid and ongoing relief of nausea that began within one–two hours after the initiation of EN. Complete resolution of HEG was obtained by the 20th week in 28 patients, with two patients continuing EN up until

(continued on page 29)

(continued from page 26)

delivery. Twelve patients were discharged home on EN. One home patient was described as infusing her EN by continuous drip over 14 hours daily and working an eight hour shift when off of the EN. She reported complete resolution of the nausea and vomiting while receiving the EN but developed marked nausea when off the EN, progressing to vomiting with oral intake. All pregnancy outcomes were good with no maternal or fetal morbidity. Hsu, et al reported significant improvement in nausea and emesis of seven HEG patients within 24 hours of the initiation of nasogastric EN; all had full term deliveries with appropriate birth weights (34). In a 2004 case report by Vaisman, et al, it took a mean of five days for vomiting to cease after EN was initiated via endoscopically placed nasojejunal feeding tubes in 11 women with HEG (39).

Thus far, gastric EN appears to offer more rapid relief of nausea and emesis when compared to small bowel feedings in the HEG population. In addition, the Barclay study noted that ptyalism was common in the HEG patients fed via the small bowel. One more factor to consider is that endoscopic, radiographic or special bedside techniques are required to guide the feeding tube tip through the pylorus and advance it well into the small bowel.

Percutaneous Endoscopic Gastrostomy

Some authors have described the use of either a PEG or PEG-J tube in a few HEG patients and have reported successful outcomes (40-42). In these case reports, diet counseling and IV fluids with antiemetics were tried, but nasally placed feeding tubes were not. The authors stated that drawbacks to feeding tubes were tube dislodgment and blockage. They also noted sinusitis, epitaxis, gastroesophageal reflux and aspiration as potential risks, but none of these complications have been reported in any of the articles cited in this paper.

HEG RETROSPECTIVE CHART REVIEW

A retrospective chart review of HEG patients referred to our Nutrition Support Service at the University of Rochester Medical Center between 1998 and 2005 was performed (37). All patients (N = 26, average age was 25 years) received EN as four–six gravity drip feedings daily via an eight French, unweighted, nasogastric feeding tube; the mean gestational age at presentation was eight weeks, the mean duration of HEG symptoms at time of referral was 23 days and the mean weight loss from onset of symptoms was 4.4 kg. Results showed the mean time to cessation of emesis was 4.5 days, the mean time to stabilize and initiate steady weight gain was 3.6 days, the mean duration of EN was seven weeks, and the mean number of feeding tubes inserted per patient was 2.7. All patients achieved 95%–100% nutrition goals for pregnancy. No patient resorted to PN therapy. Twenty-two pregnancies went to full term (38–42 weeks), one delivered at 35 weeks and another at 32 weeks. The mean gestational age at delivery was 36 weeks. There was one intrauterine death at 23 weeks and one elective abortion. Of the live births, 100% of neonates weighed appropriate for their gestational age with the mean birth weight being 3.4 kg (7.48 lb). We concluded that gastric EN in HEG patients is safe and effective and avoids the potential complications of PN.

INSERTION AND CARE OF SMALL BORE FEEDING TUBES

It is often helpful for the woman with HEG to be accompanied by a significant other and to have taken an antiemetic medication prior to feeding tube insertion. A tube with an unweighted tip is easier to insert especially in women who have smaller nasal passages (43). Once positioned properly, the feeding tube itself should be marked at the nares so that any tube movement is noted. Water is the best solution for keeping a feeding tube patent (44). The tube should be flushed frequently to prevent clogging. If the tube clogs, it should be worked on as soon as possible to salvage the tube. Using a 60 mL syringe, aspirate as much fluid as possible from the feeding tube, then fill the syringe with warm water and try loosening the clog. If not effective, a declogging solution can be tried: one tsp. Viokase powder + 1/8th tsp. baking soda + 5 mL warm water (45), or a commercial declogging device is available (Clog Zapper™ @ www.corpakmedsystems.com). Instill as much of the declogging solution into the feeding tube as possible, let sit for 30 minutes, and then try to withdraw using a back and forth motion. This can be repeated again if necessary.

ENTERAL NUTRITION REGIMEN

A polymeric formula with or without fiber may be used for the majority of HEG patients. In the clinic setting, health care providers can administer 60–120 mL of the formula over a few minutes through the tube, followed by a water flush. This will allow the clinician to check tolerance of the formula and provide some gastric nutrition to lessen the potential for nausea and emesis during the ride home. An EN schedule should include a progression of formula and water flushes to the "goal" regimen, over two-to-three days. This can be done with small frequent tube feedings four-to-six times per day, using a gravity bag with a roller clamp to adjust the rate. Advise the patient not to eat ***initially***; except for sips of water with medications, until the "goal" EN schedule is reached (in order to distinguish enteral versus oral intolerance). Restarting oral intake too early may precipitate nausea and emesis due to exposure to the sight, smell and taste of food. These visual, olfactory and gustatory signals may cause the woman to vomit up the feeding tube and possibly influence her decision to retry EN again. She should also be advised that if she does vomit up the tube, the tube tip usually would exit through the mouth. She then will need to pull the tube out through her nose. If desired, HEG patients can be trained to reinsert their own feeding tubes at home to avoid an emergency room or clinic visit. On occasion, a woman may do better with an EN infusion pump and deliver a continuous drip infusion around the clock or a few small frequent feedings during the day with a nocturnal drip infusion to make up the remaining volume. Women with HEG are generally awake and alert and we have not found it necessary to check gastric residual volume, as the feelings of fullness or nausea will let them know when to hold the EN. It would be prudent to have them either sitting upright or in a recliner chair during EN and avoid positions less than 30 degrees to prevent regurgitation. It also may be useful to suggest distraction techniques to help the patient get through HEG such as relaxation exercises, reading an engaging book, or watching a movie.

WEANING OFF TUBE FEEDINGS

An oral diet should be instituted before discontinuing EN. As oral intake increases, EN can be decreased while continuing to monitor fetal growth and maternal weight gain. EN can be discontinued when the pregnant woman is consuming and tolerating ≥75% estimated calorie, protein, and fluid needs for pregnancy. The clinical dietitian should follow-up with the HEG patient at least once following cessation of EN to ensure continued adequate oral intake.

EMOTIONAL SUPPORT

The patient with HEG needs to be encouraged to express her feelings and concerns. She and her significant other require a caring and supportive attitude from health care providers. The woman with HEG tends to isolate herself and is unable to resort to her usual methods of coping. We've found that phone contact from the health care provider between clinic visits is usually comforting for the patient and makes her feel less isolated. The woman with HEG needs to have her symptoms validated and receive emotional support from her significant other as well. One survey established that 85% of pregnant women with nausea and vomiting who phoned a hot line said that they received inadequate support from their significant other (46). Both patient and caregiver require reassurance that this is a self-limiting condition. The health care provider should monitor for signs of emotional and family stress that may aggravate the woman's HEG symptoms. These stressors need to be minimized in the home to optimize tolerance to the nutritional plan.

CONCLUSION

The diagnosis and treatment of HEG should take place as early as possible to prevent symptom exacerbation, overwhelming feelings of isolation and loss of control, and the need for hospitalization or extensive outpatient services. An individualized treatment plan needs to be formulated that includes symptom relief, adequate nutrition support, validation of the symptoms and emotional support. Health care providers should expect that the majority of women experiencing HEG would be ambivalent about their pregnancy for as long as their symptoms persist. Multiple interventions may need to be tried to provide symptom relief that enables the provision of adequate nutrients and fluid. Gastric EN is a safe and effective method to maintain nutrition and hydration and help alleviate the symptoms of HEG. ■

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