

Nutrition and Hyperemesis Gravidarum

Aimee Brecht-Doscher, MD, Ventura County Medical Center, Ventura, California;

Hyperemesis Education and Research (HER) Foundation, Leesburg, Virginia

Sarah Jones, MBChB, Central Manchester Foundation Trust, Manchester, UK

Contact:

Aimee Brecht-Doscher, MD

Aimee.brecht-doscher@ventura.org

Ventura County Medical Center

3291 Loma Vista Road

Ventura CA 93003-3099

Abstract

Patients with hyperemesis gravidarum often have poor nutritional intake. The adverse effects of that poor intake for both mother and baby are reviewed and options for improving nutritional intake are discussed.

Introduction

Traditional teaching has usually been that hyperemesis gravidarum (HG) is temporary, the mother will recover, and the baby takes what it needs, and is not affected. In reality, there are both maternal and fetal effects with nutritional deficiency throughout pregnancy and providers caring for patients with HG should be aware of these in order to prevent complications for the mother and baby.

Vitamin Deficiencies

Specific vitamin deficiencies that have been documented to cause complications in the fetus and/or the mother are thiamine and vitamin K. Thiamine Deficiency in HG is known to cause Wernicke's Encephalopathy (or Dry Beriberi) and Wet Beriberi. Symptoms of Wernicke's Encephalopathy are mental confusion, ataxia and oculomotor disorders. However all three are present in only 49% of cases associated with HG (Chiossi, Neri, Cavazzuti, Basso & Facchinetti 2006). Wet Beriberi causes heart failure and peripheral edema. Wernicke's Encephalopathy appears to be more commonly reported in association with HG, but both have been reported (Indraccolo, Gentile, Pomili, Luzi & Villiani 2005). Wernicke's Encephalopathy is a devastating complication. In a review of 49 reported cases by Chiossi et al. (2006), only 28% of patients had a resolution of symptoms. Fetal demise appeared common, and the rate of fetal loss associated with Wernicke's encephalopathy in the same review was 48%. Although many think that Wernicke's encephalopathy is a complication associated with more prolonged illness, it has been reported as early as four weeks gestation (mean of 11-14 weeks gestation), and a duration of vomiting as little as two weeks (Selitsky, Chandra & Schiavello, 2006).

Prevention of thiamine deficiency is important, and all women with HG who require IV hydration and have been vomiting for more than three weeks should get thiamine supplementation (100mg/day IV or oral for three days) (ACOG, 2004). Thiamine should be given prior to the administration of glucose containing fluids. Because Wernicke's Encephalopathy has been reported with as little as two weeks of vomiting, earlier treatment with thiamine may be best.

Vitamin K deficiency is also reported with HG and has been shown to have both maternal and fetal effects. Maternal mucocutaneous bleeding and epistaxis have been

reported (Devignes et al., 2009). Fetal hemorrhage can occur even when maternal coagulation appears normal and can be devastating. Eventov-Friedman, Klinger & Shinwell (2009) reported a case of intracranial hemorrhage due to vitamin K deficiency at 32 weeks with hyperemesis. Binder syndrome, which includes facial and limb bone anomalies, appears to be due to vitamin K deficiency and has been seen with HG (Brunetti-Pierri, Hunter & Boerkoe, 2007). Women with HG who are not eating need Vitamin K supplementation. Some formulations of intravenous multivitamin supplementation do not include vitamin K and several of the reports of adverse outcomes of patients with HG and vitamin K deficiency have been in patients on parenteral nutrition and IV multivitamin supplementation. If the multivitamin supplementation that the patient on IV therapy is receiving does not include vitamin K, vitamin K should be given intramuscularly. The role of supplementation is less clear in women who are eating. Most women who are eating should get adequate vitamin K intake. However, the limited variety in the diet in some women with HG could result in a vitamin K deficiency and women with a very limited diet may benefit from supplementation.

Caloric Intake

The effects of decreased nutritional intake can be learned from extensive longitudinal research done on the victims of the Dutch Famine of 1944-1945. A large cohort of babies exposed to caloric restriction of 400-800 calories/day have been studied for the effects through adulthood. Many women with hg will have caloric restriction this severe, or worse, for several months during their pregnancy. One important lesson learned from these studies is that effects are seen from exposure during all three trimesters. Third trimester exposure has been associated with decreased birth weight, birth length and head circumference (Stein & Susser, 1975). Exposure during any stage in development was associated with glucose intolerance (Roseboom, de Rooij & Painter, 2006). Increased coronary disease, altered clotting, raised lipids, obesity, and breast cancer is seen with early gestation exposure (Roseboom et al., 2006). Increased incidence of obstructive airway disease, microalbuminuria is seen with mid gestation exposure (Roseboom et al., 2006). Increased schizophrenia, antisocial personality and affective disorders is also reported (Kyle & Pichard, 2006). Decreased caloric intake appears to

have multigenerational effects as well. Women exposed to famine in late gestation have babies with lower birth weight and women exposed to famine in early gestation with adequate nutrition later in pregnancy have babies with higher birth weight (Stein & Lumey, 2000).

In the study by Fejzo et al., (2009) women with HG had more than 15% weight loss, higher rates of gallbladder disease, liver dysfunction, muscle pain, renal failure, retinal hemorrhage, PTSD and longer recovery time. Twenty percent of patients in this study reported miscarriage, with one-third of those in second trimester. Higher rates of behavioral disorders in offspring were noted.

Optimizing Nutritional Intake in HG

The risks of inadequate nutritional intake during each trimester underscore the importance of optimizing nutritional intake for patients with HG. This can be accomplished by treatment with medications allowing for oral intake in most cases. If there is continued weight loss and inadequate caloric intake medications should be optimized, dehydration corrected with IV hydration, or supplemental enteral or parenteral nutrition started. It is hard to compare outcomes because no studies control for severity of disease and treatment failures, but it appears that optimizing medical therapy is preferable when that is successful. Holmgren, Aagaard-Tillery, Silver, Flint Porter & Varner (2008) did attempt this comparison and looked at 94 patients with HG treated with either PICC, NG/ND or medication alone and found similar neonatal outcomes, but 66% of patients with central catheters were treated for infection or thrombosis. Treatment groups were not randomized, but it does appear that when treatment with medications is effective, it is the safest method.

Enteral supplementation can be performed by placement of either nasogastric, naso-jejunal, naso duodenal, percutaneous gastrostomy, or PEG-jejunostomy. Enteral supplementation appears to have a much lower complication rate than parenteral nutrition. In several series the only complications reported were tube dislodgements. Saha, Loranger, Pricolo & Degli-Esposti (2009) reported a series of five patients with HG treated with NJ tubes and the only complications were 2 tube dislodgments. Vaisman, Kaidar, Levin & Lessing (2004) reported on 11 patients with HG and NJ feedings, and

there were no complications other than two patients who expelled the tube with vomiting and one tube blockage. Disadvantages of enteral feedings are the need for surgical placement in the case of gastrostomy tubes and that the NG/NJ tubes can be poorly tolerated by some patients. Other patients report improvement in HG symptoms after placement of the tube, and/or initiation of feedings. In certain areas, it can also be difficult to find radiology, surgery or gastroenterology specialists willing to place them in pregnant women. Education on the usefulness and safety of this treatment plan in patients with HG is necessary to make this available to more women who would benefit.

Parenteral supplementation is also effective, but has a higher risk of infectious complications than other treatments. Nuthalapaty, Beck & Mabie (2009) reported a 25% complication rate with use of parenteral nutrition during pregnancy and postpartum. Holmgren et al. (2009) reported a 66% rate of infection or thrombosis in patients with PICC during pregnancy. Although the risks associated with parenteral nutrition are significant, for patients who do not respond adequately to medication and do not tolerate enteral feedings, parenteral nutrition is the only option and shouldn't be withheld if needed.

References

American College of Obstetricians and Gynecologists. Nausea and vomiting of pregnancy. (2004) *Practice Bulletin number 52*. Washington, DC: ACOG.

Brunetti-Pierri, N., Hunter, J. & Boerkoe, C. (2007) Gray matter heterotopias and brachytelephalangi chondrodysplasia punctata: A complication of hyperemesis gravidarum induced vitamin K deficiency? *American Journal of Medical Genetics*, Part A 143A2, 200-4.

Chiossi, G., Neri, I., Cavazzuti, M., Basso, G. & Facchinetti, F. (2006) Hyperemesis Gravidarum Complicated by Wernicke Encephalopathy: Background, Case Report, and Review of the Literature. *Obstetrical & Gynecological Survey*. 61(4), 255-68.

Devignes J, Grare M, Raft J, Vial F, Hacquard M, Bouaziz H, Lecompte T & de Maistre E. (2009) [A case of cutaneous and mucous haemorrhage secondary to vitamin K deficiency in hyperemesis gravidarum][Article in French] *Annales Francais d'Anesthesie et de Reanimation*. 28(7-8), 697-700.

Eventov-Friedman S., Klinger G. & Shinwell ES. (2009) Third trimester fetal intracranial hemorrhage owing to vitamin K deficiency associated with hyperemesis gravidarum. *Journal of Pediatric Hematology Oncology*. 31(12), 985-8.

Fejzo, M., Poursharif, B., Korst, L., Munch, S., MacGibbon, K., Romero, R. & Goodwin, TM. (2009) Symptoms and Pregnancy Outcomes Associated with Extreme Weight Loss among Women with Hyperemesis Gravidarum. *Journal of Women's Health*, 18(12) 1981-7.

Holmgren C., Aagaard-Tillery KM. & Silver RM. (2008) Hyperemesis in pregnancy: An evaluation of treatment strategies with maternal and neonatal outcomes. *American Journal of Obstetrics and Gynecology*, 198(1), 56.e1-4.

Indraccolo U, Gentile G, Pomili G, Luzi G & Villani C. (2005) Thiamine deficiency and beriberi features in a patient with hyperemesis gravidarum. *Nutrition*, 21(9), 967-8.

Kyle, U. & Pichard, C. (2006) The Dutch Famine of 1944-1945: a pathophysiological model of long-term consequences of wasting disease. *Current Opinion in Clinical Nutrition & Metabolic Care*, 9(4), 388-94.

Nuthalapaty FS., Beck MM. & Mabie WC. (2009). Complications of central venous catheters during pregnancy and postpartum: a case series. *American Journal of Obstetrics and Gynecology*, 201, 311.e1-5.

Roseboom, T., de Rooij, S. & Painter, R. (2006) The Dutch famine and its long-term consequences for adult health. *Early Human Development*, 82(8), 485-91.

Saha, S., Loranger, D., Pricolo, V. & Degli-Esposti, S. (2009) Feeding Jejunostomy for the Treatment of Severe Hyperemesis Gravidarum: A Case Series. *Journal of Parenteral and Enteral Nutrition*, 33, 529-534.

Selitsky T, Chandra P & Schiavello HJ. (2006) Wernicke's encephalopathy with hyperemesis and ketoacidosis. *Obstetrics and Gynecology*, 107(2 Pt 2), 486-90.

Stein, AD. & Lumey, LH. (2000) Relationship between maternal and offspring birth weights after maternal prenatal famine exposure: The Dutch Famine Birth Cohort Study. *Human Biology*, 72(4), 641-54.

Stein, Z. & Susser, M. (1975) The Dutch Famine, 1944-1945, and the Reproductive Process. I. Effects on Six Indices at Birth. *Pediatric Research*, 9(2).

Vaisman N., Kaidar R., Levin I. & Lessing JB. (2004) Nasojejunal feeding in hyperemesis gravidarum--a preliminary study. *Clinical Nutrition*, 23(1), 53-7.