Case report

The patient was a 30-year-old gravida 2 para 0110 woman referred after she experienced a fetal demise at 28 weeks. The patient was previously treated at an outside hospital for severe nausea and vomiting thought to be hyperemesis gravidarum during the second trimester of her last pregnancy. She had been admitted and treated with intravenous (IV) fluids and antiemetics until fetal demise and termination of pregnancy at 28 weeks. The patient had an upper endoscopy showing esophagitis and began treatment with a proton pump inhibitor for probable gastroesophageal reflux. She was asymptomatic and became pregnant again 6 months later. She began experiencing severe nausea and vomiting and was admitted at 20 weeks’ gestation. She was treated with IV fluids and Zofran (ondansetron) with slow diet advancement and was discharged after 4 days. Three days later, her symptoms recurred.

Her hospital course was remarkable for inability to tolerate a liquid diet and for recurrent vomiting only in the evening. A magnetic resonance imaging performed to evaluate for intestinal obstruction revealed uterine compressive obstruction at the level of the third portion of the
duodenum, with a diagnosis of congenital malrotation most likely. Surgical consultation advised that intervention at this point of the pregnancy was contraindicated. The patient was 22 weeks, and the risk of preterm birth after complex surgery was considered too great to attempt an uncertain procedure. In view of the enlarged uterus and the need for retroperitoneal dissection to correct an anatomically anomalous lesion with uncertain vascularity, the surgical opinion was to try nonoperative management first. A central catheter line was placed for TPN on day 3 of admission. The patient was gradually hyperalimented up to 2400 calories per day, with subsequent development of fatty liver changes. Her management was then changed to lower calorie intake to 1800 calories. The fatty liver abnormalities slowly improved. Because mother and fetus were doing well on TPN, surgery after 28 weeks was considered technically problematic and best deferred until postpartum. Her calories were increased and her liver function remained normal at 2000 calories. She was followed serially with sonograms every 3 weeks and liver function tests weekly. Progressive anemia developed despite folate, vitamin B12, and intramuscular iron. At 36 and 37 weeks, she was given Epogen injections. At 37 weeks and 3 days, an amniocentesis was performed for fetal lung maturity, which was positive. Labor was induced at 38 weeks with Cytotec, followed by oxytocin. The patient made satisfactory progress and had a normal vaginal delivery, delivering a healthy girl with an Apgar score of 9/10 and birth-weight of 6 lbs 13.5 oz. The patient’s postpartum course was marked by a gradual refeeding and then discontinuation of the PICC line. She was discharged home tolerating a soft diet. She recovered gastrointestinal (GI) function completely by her 6-week postpartum visit. She was advised to have surgical correction of her bowel malrotation before undertaking another pregnancy.

Eleven months after the birth of her daughter, she was evaluated with an upper GI series and small bowel series showing abnormality of the fixation of the duodenum, such that the third and fourth parts of the duodenum were to the right of the midline and the duodenum was dilated at the duodenojejunual junction. The patient’s colon and terminal ileum were in relatively normal position. Computed tomography (CT) of the abdomen and pelvis confirmed the findings, with occlusion of the main branch of the superior mesenteric vein accompanying the main superior mesenteric artery branches into the lower small bowel mesentery. It also demonstrated an enlarged early branch of the superior mesenteric vein connecting to collateral enlarged veins reconstituting the small bowel mesenteric venous vasculature.

During pregnancy, the enlarging uterus’ compression of the duodenojejunal junction caused the obstruction. The surgeon performed a Ladd’s procedure one year postdelivery, which was followed by partial obstruction at the duodenojejunal junction. The patient was readmitted to the hospital after 1 week and had a duodenojejunostomy and appendectomy. The patient’s recovery was uneventful after this second procedure. She became pregnant 23 months after the birth of her daughter. This pregnancy resulted in a full-term normal spontaneous delivery, without nausea, vomiting, or complications, of a healthy baby girl weighing 6 lbs 15 oz.

Discussion

The use of TPN in pregnancy is uncommon. Although there are no contraindications to the use of TPN in pregnancy, TPN should be reserved for pregnant patients in whom oral intake is not tolerated and in whom an enteral route of nutrition is not feasible. The indications include hyperemesis gravidarum unresponsive to conservative management, maternal weight loss exceeding 1 kg/week for four consecutive weeks, a total weight loss of 6 kg or failure to gain weight, preconception malnutrition, disease that increases basal nutritional requirements, hypoalbuminemia (albumin level <2 g/dL), and persistent ketosis [1].

The literature revealed six patients who were on TPN for at least the 16 weeks our patient was treated (Table 1). Diagnoses included Crohn’s disease and short bowel abnormalities, hyperemesis gravidarum, and pancreati-

<table>
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<tr>
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<td>Hyperemesis gravidarum, psychiatric problems</td>
<td>20 weeks</td>
<td>Term delivery</td>
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Table 1 Total parenteral nutrition in pregnancy for 16 weeks or more.
tis, but none had obstruction or malrotation. Three of the patients were on TPN for their entire pregnancy due to the fact that they were already being nourished with TPN prior to conception [6, 9, 10]. One of the patients underwent fertility treatments while on parenteral nutrition [6, 9, 10].

With nutritionist consultation, TPN for the pregnant patient is designed by calculation of the basal energy expenditure (BEE) to determine the daily TPN caloric requirements [1].

Daily TPN caloric requirement = [BEE × 1.25 kcal] + 300 for singleton pregnancy or 500 for twin pregnancy.

Iron must be given parenterally, usually by intramuscular injection, as well as vitamins A, E, and B6 and folate given daily to meet the increased erythropoietic demands of pregnancy. Hypocalcemia and electrolyte disturbances should be corrected. Close monitoring of maternal liver function, cholestasis level, and renal function is necessary. Maternal weights and serial fetal ultrasound should be utilized to document nutritional adequacy [1].

In general, the complications of TPN include infection and thrombosis as a result of central catheter placement. Russo-Stiegitz et al. [7] reported an incidence of preterm delivery comparable with the overall preterm birth rate and have suggested that preterm labor is not a complication of TPN.

The metabolic complications of TPN include hyperglycemia and metabolic acidosis, which may have many potential causes. Inadequate thiamine supplementation in TPN has been observed to be associated with life-threatening metabolic acidosis. Thiamine, in its active form thiamine pyrophosphate, is essential for carbohydrate metabolism, and a deficiency results in a shift toward the glycolytic pathway and a buildup of lactate [4]. Hepatic dysfunction and steatosis are linked to TPN infusion, and possible etiologies include excess caloric, carbohydrate, or fat intake. There is also an increased risk of cholestasis in patients receiving TPN [3, 5].

Intestinal obstruction rarely occurs in pregnancy, with a reported incidence ranging from 1 in 1500 to 1 in 66,000 deliveries. However, maternal mortality rates range from 6% to 20%, and pregnancy loss rates, from 26% to 56%. Most pregnant patients with intestinal obstruction during pregnancy (53–59%) have adhesions as a result of prior surgeries. Volvulus is the second leading cause of obstruction in pregnancy. Bowel obstruction in pregnancy is often misdiagnosed because symptoms such as nausea, vomiting, and abdominal pain are common in pregnancy. In general, intestinal obstructions in pregnancy have been treated with surgical correction with immediate delivery of term or preterm infants. Malrotation of the midgut with obstruction presenting in pregnancy has been reported only once previously. That case was diagnosed at 27 weeks by laparotomy for suspected abruption and was fatal due to total small bowel necrosis [8]. This is the first report of intestinal obstruction due to malrotation managed with TPN during pregnancy.

Malrotation of the midgut is due to an arrest of the rotation of the intestine during early fetal development. Most present during the first 4 weeks of life with intestinal obstruction from adhesive peritoneal bands (Ladd’s bands), volvulus, or intussusceptions. The majority of the remainder of congenitally occurring gut malrotations usually remain asymptomatic throughout life. Some present acutely with midgut volvulus and intestinal ischemia or suffer with recurrent, chronic abdominal pain labeled as functional illness, adhesions, chronic pancreatitis, appendicitis, or Crohn’s disease [2]. The diagnosis is therefore dependent on a high degree of clinical suspicion that should be confirmed with the appropriate radiologic studies. Radiology may demonstrate a dilated duodenum, a right-sided duodenojejunal junction, and a duodenum failing to cross the midline and ascend to the level of the pylorus. CT scanning may be useful in identifying an abnormally positioned superior mesenteric vein positioned anterior or to the left of the superior mesenteric artery. The Ladd’s procedure is the standard of care.

Congenital malrotation of the midgut should be considered in pregnant patients who present with severe vomiting or abdominal pain. Our patient is unique in that once diagnosed, she was maintained on TPN for adequate nutrition, delaying surgical treatment until after the birth of her daughter. There were no adverse effects to the fetus due to TPN. TPN alimentation can be considered to maintain a pregnancy to term when intestinal obstruction is due to complex malrotation and surgery is not advisable.

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References


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