

SASPEN Case Study

Based on a case study presented by J Vlok, BDietetics IV, and supervised by
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Background information

The patient, a full-term male infant, was born during a normal vaginal delivery on 7 August, 2010, and admitted to the Paediatric Intensive Care Unit (PICU) with gastroschisis. He was the second child of a 20-year-old single mother who did not attend antenatal care, but who reported no problems during pregnancy. She did not use any vitamin or mineral supplements before or during pregnancy and reported no smoking or use of alcohol during pregnancy.

Patient's course

The patient was intubated, ventilated and a central venous pressure (CVP) line inserted. The gastroschisis was covered in a silo bag and suspended above the abdomen with gravitational force used to lower the loops of bowel into the abdomen. On 18 August, 2010, the bowel had been reduced sufficiently for the patient to undergo surgery for closure of the abdominal cavity. The wound was closed under pressure, resulting in two vertical line incisions to allow skin closure over the gut. In the next few days, the patient developed respiratory distress and bacterial meningitis, and had several episodes of convulsions. The patient could not be weaned off the ventilator and stayed on total parenteral nutrition (TPN) until he passed away.

Diagnosis

Gastroschisis, with mild birth asphyxia.

Anthropometry

The patient's birthweight was 2.4 kg (a low birthweight infant), his length was 45.5 cm and his head circumference, 32 cm.

Nutritional management

Gastroschisis is a congenital defect of the abdominal wall that involves exposure of the infant's intestine to the open environment. Unlike in exomphalos (omphalocele), in the case of gastroschisis, the intestine has no covering membrane, but a thick fibrous

exudate over the herniated bowel.^{1,2} Even though the incidence of gastroschisis seems to be increasing worldwide, the aetiology remains unclear and is possibly multifactorial. Interference with foetal blood supply and other foetal insults (maternal smoking, alcohol and drug abuse, physical trauma and infections) during critical periods of development can result in anatomical defects.^{2,3} These are often not limited to a single anatomical structure. Therefore gastroschisis may be associated with other anomalies, such as intestinal atresia, as well as with chromosomal abnormalities.^{2,4,5}

According to Weir,⁵ women who are at greatest risk are young mothers with a low income, who are heavy smokers, undernourished and use over-the-counter medications with vasoactive properties, e.g. pseudoephedrine, in early pregnancy. It is difficult to determine contributing factors in this case, since the mother did not attend an antenatal clinic. The mother's socio-economic status and young age could have been contributing risk factors. It would have been interesting to know her preconceptional body mass index (BMI), as a low BMI has also been identified as a risk factor, especially in younger women.⁶ The mother volunteered the history that she did not smoke, or use alcohol during pregnancy, nor did she take a vitamin or mineral supplement periconceptionally. Dietary vitamin intake, as well as the use of a multivitamin supplement, have been associated with a reduced risk in both gastroschisis and omphalocele.^{4,7}

The patient was referred to the dietitian on 8 August, 2010, for nutritional management. Evaluation of birth anthropometric data, using the Babson-Fenton Foetal Infant Growth Chart,⁸ indicated that the patient was small for gestational age (SGA) and presented with symmetric intrauterine growth restriction (IUGR) as the weight, length and head circumference all fell below the 10th percentile.⁹ Patients with gastroschisis often present with IUGR and are frequently born prematurely.^{1,3}

The nutritional calculations were undertaken using the European Society for Paediatric Gastroenterology, Hepatology, and Nutrition's (ESPGHAN)¹⁰ recommendations for TPN in neonates, and TPN was started on 9 August, 2010. It was increased gradually over a period

of five days until maximum parenteral intake of 150 ml/kg was reached. It was kept at this rate for a period of three days, when it was reduced for 24 hours due to suspected sepsis, and then increased to 150 ml/kg again.

After surgery on 18 August, 2010, the plan was to start the patient on a semi-elemental infant formula and wean him off TPN gradually. Unfortunately, this could not be done due to him developing several medical complications. The prognosis for an infant with gastroschisis is determined primarily by the condition of the exteriorised wall; a contemporary mortality rate of around 8% has been reported.⁵ This patient passed away after developing respiratory distress, bacterial meningitis and convulsions.

Prolonged TPN is often needed in this population, as intestinal motility impairment can be a constant problem and return of gastrointestinal function can take several weeks to months.^{1,11} Chronic intestinal failure, defined as dependence on parenteral nutrition for longer than four months, has been diagnosed in 15% of patients treated for gastroschisis at the Great Ormond Street Hospital in the United Kingdom.¹² The gut may suffer a prolonged paralytic ileus, and these patients are also at an increased risk of developing necrotising enterocolitis (NEC), presenting with malabsorption and feeding intolerance.^{1,11} The deleterious effects of lack of enteral feeding on the gut are well known and the use of trophic or minimal enteral feeding (MEF) in these patients has been suggested.^{11,13} In a study done by Walter-Nicolet et al,¹¹ 1 ml/hour of the mother's own or donor milk was given as MEF as soon as five days after total bowel reintegration. Preconditions to starting MEF were respiratory and haemodynamic stability, normal findings on abdominal examination and gastric residual volumes of less than 30 ml/kg/day. After five

consecutive days of MEF, nutritive enteral feeding was given according to a nutritional protocol. It was shown that early MEF and a controlled increase in enteral nutrition improved the outcome of gastroschisis in these newborns.¹¹

Successful weaning off TPN, and establishing full enteral feeding, remains a challenge for the dietitian working with these patients. However, the medical nutrition therapy for patients with gastroschisis, as well as optimising the nutritional status of women of childbearing age, should be an important consideration for dietitians.

References

1. Shaw V. Surgery in the gastrointestinal tract. In: Shaw V, Lawson M, eds. *Clinical Paediatric Dietetics*. Oxford: Blackwell Publishing; 2007; p. 125-134.
2. Coovadia HM and Wittenberg DF. *Paediatrics and child health*. 5th ed. Cape Town: Oxford University Press; 2006.
3. Arnold, M. Is the incidence of gastroschisis rising in South Africa in accordance with international trends? *SAJS*. 2004; 42(3):86-88.
4. Botto LD, Mulinare J, Erickson JD. Occurrence of omphalocele in relation to maternal multivitamin use: a population-based study. *Pediatrics*. 2002;109:904-908.
5. Weir E. Congenital abdominal wall defects. *CMAJ*. 2003;169(8): 809-810.
6. Siega-Ritz AM, Herring AH, Olshan AF, et al. The joint effects of maternal pre-pregnancy body mass index and age on the risk of gastroschisis. *Paediatr Perinat Epidemiol*. 2009;23(1):51-57.
7. Torfs CP, Lam PK, Schaffer DM, Brand RJ. Association between mothers' nutrient intake and their offspring's risk of gastroschisis. *Teratology*. 1998;58(6):241-250.
8. Fenton TR. A new growth chart for pre-term babies: Babson and Benda's Chart updated with recent data and a new format. *BMC Pediatr*. 2003;3:13-17.
9. Anderson DM. Medical nutrition therapy for low birthweight infants. In: Mahan LK, Escott-Stump S, editors. *Krause's food, nutrition, and diet therapy*. St Louis: Saunders Elsevier; 2008. p.1117-140.
10. Koletzko B, Goulet O, Hunt J, et al. Guidelines on paediatric parenteral nutrition of the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) and the European Society for Clinical Nutrition and Metabolism (ESPEN), supported by the European Society of Paediatric Research (ESPR). *J Paediatr Gastroenterol Nutr*. 2005;41:81-84.
11. Walter-Nicolet E, Rousseau V, Kieffer F, et al. Neonatal outcome of gastroschisis is mainly influenced by nutritional management. *J Paediatr Gastroenterol Nutr*. 2009;48:612-617.
12. Kyraana E, Sprot A, Hussein H, Hill S. Long-term outcome of infants born with gastroschisis. *J Paediatr Gastroenterol Nutr*. 2006;42:E108.
13. Sharp M, Bulsara M, Gollow I, et al. Gastroschisis: early enteral feeds may improve outcome. *J Paediatr Child Health*. 2000;36:472-476.