

Nutritional Management in a Neonate with Short Bowel Syndrome: a case report from NICU, Tata Main Hospital, Jamshedpur

Lalat Barun Patra¹, Asit Kumar Mishra^{2*}, Md Waseem Uddin³, Kriti Sunder Rana³, M. Abhitej Reddy⁴, Tarun Kumar⁴

Department of Pediatrics, neonatology division, Tata Main Hospital, Jamshedpur, India

¹Specialist, ² Senior Consultant, ³Associate Specialist, ⁴Resident

Corresponding Author: Asit Kumar Mishra, Senior Consultant, Tata Main Hospital, Jamshedpur, India, Tel: +919204657193, E-mail: drasitmishra@gmail.com

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Abstract:

Short bowel syndrome (SBS) is a condition in which nutrients are not properly absorbed because a large portion of the small intestine is missing. The major causes of short bowel in neonates are necrotizing enterocolitis, gastroschisis, intestinal atresia and intestinal malrotation / volvulus. Factors that usually determine the subsequent survival of the neonate are remaining length of intestine after surgical resection, presence of ileocecal valve and colon, duration of parenteral nutrition and associated medical and surgical conditions. The incidence of SBS varies inversely with gestational age. Here we present a rare case of short bowel syndrome, following surgical resection for NEC in a term good weight (3.5kg birth weight, admission weight 4.3kg) male baby who presented on 29th day of life, with only 1/6th(45cm) of small intestinal length remaining after surgery.

Keywords: Short Bowel Syndrome, Necrotising Enterocolitis, Parenteral Nutrition, Small Intestine

Introduction:

The most common cause of intestinal failure in neonatal intensive care unit (NICU) is surgical. SBS as defined by a need for prolonged parenteral nutrition following bowel resection, usually for more than 3 months [1]. As per available epidemiological data, the prevalence of surgical SBS was 0.7% in very low birth weight (VLBW) infants born during the period 2002-2005 at the National Institute of Child Health and Development (NICHD) neonatal research network centres [2]. Similarly data from a Canadian tertiary NICU shows an overall occurrence of SBS as 22.1 per 1000 admissions, and 24.5 per 100,000 live births, incidence being higher in infants born at less than 37 weeks gestation (353.7 per 100,000 live births) than in full-term infants (3.5/100,000 live births) [3]. Necrotizing enterocolitis (NEC) is the most common cause of SBS (35%) in neonates, followed by intestinal atresia (25%), gastroschisis (18%), malrotation with volvulus (14%), followed by less common conditions such as Hirschsprung's disease with proximal extension of aganglionosis into the small bowel (2%) [4]. Studies show that in the absence of

surgical bowel lengthening procedures, an infant with about 35 cm of residual small bowel has a 50% probability of being weaned from parenteral nutrition [5]. In other series, the likelihood of developing SBS following bowel resection was greater when the residual intestinal length was less than 25% of the predicted length for a given gestational age [3]. After surgery the clinical outcomes depend on areas of intestine lost to surgery. Jejunal resection is associated with increased gastric acid secretion and increased gut motility but ileal mucosa can adapt and compensate for it, hence well tolerated. Ileal resection is more troublesome as it can lead to loss of absorptive area for fluids, electrolytes, bile acids and vitamin B12 giving rise to fat malabsorption and steatorrhea. Further, removal of ileocecal valve puts the baby at more risk as the valve protects retrograde flow of bacteria from colon to small intestine. Colonic resection is associated with severe fluid and electrolyte disturbances therefore colonic preservation, if possible, has better prognosis. Several studies have shown that serum citrulline level as a marker of remaining small intestine length and can be used to predict the time of weaning from parenteral nutrition [6]. The clinical presentation of SBS post surgery passes

through three stages namely acute phase lasting for 1-3 weeks, recovery phase lasting for few weeks to months, and maintenance phase with variable time period depending on clinical presentation and associated medical conditions.

The case:

A 29 day old term, singleton, appropriate for gestational age baby, delivered vaginally outside our hospital with a birth weight of 3.5 kg was admitted with c/o 4 episodes of bleeding per rectum. Perinatal history was uneventful, baby being discharged on day 2 of life on exclusive breast feeding. There was no history of premature rupture of membrane (PROM), prolonged labour, antepartum or post partum hemorrhage. There were no significant medical or surgical events during any of the trimesters. On examination at admission mild pallor and mild abdominal distension was present, rest other general and systemic examination were normal along with normal hemodynamic status. Baby was kept as probable volvulus / malrotation with sepsis, started on broad spectrum antibiotics as per our unit policy (cefoperazone-sulbactam and amikacin), oxygen, vitamin K, fluids and planned for X-ray chest and abdomen, urgent abdominal sonography. Initial sepsis screen was negative, Cerebrospinal fluid (CSF) analysis was normal; stool for occult blood positive, urine analysis was normal, Partial thromboplastin was mildly raised with normal prothrombin time. Renal and liver function test were normal and there was no abnormality in electrolytes and blood gas. X-ray abdomen showed probable intramural gas and ultrasound showed echogenic ascitis with subacute intestinal obstruction. Since diagnosis was in doubt paediatric surgery opinion was sought and planned for laparotomy. Intra-operative findings were massive gangrene of jejunum and ileum, hence leaving behind 20 cm of jejunum and 15 cm of ileum, rest of the small intestine segments were resected out. Post surgery baby was put on mechanical ventilator, started on total parenteral nutrition. Baby was extubated on 3rd postoperative day. post operative days 3-7 remained uneventful when child had many spikes of fever, blood parameters showing high C reactive protein, high leukocyte count, dropping haemoglobin level and profound thrombocytopenia, therefore previously placed central line was replaced with new one and antibiotic upgraded to meropenam and linezolid and fluconazole was added as blood culture showing growth of yeast. Fever spikes persisted for next 48 hours hence CSF repeated showing normal findings, chest x-ray showing new opacities right upper and middle zone. After extensive discussion it was planned to start tegicycline and azithromycin for atypical bacteria (Chlamydia) and stop linezolid. Fever spikes came down in next 24 hours, all blood parameters was normal at 48 hours of revised antibiotics administration. Continuous orogastric feeding at 0.5 ml per hour was initiated on day 10 post surgery and gradually increased at the same rate daily. Child was started on lansoprazole, domperidone to augment motility, and ursodeoxycholic acid. Stool output was very high initially but gradually came down around day 20 of surgery. With gradual increments in continuous gavage feeding full required feeding was achieved in 20 days post surgery and child was started on breast feeding exclusively and observed for 3 days. Child was discharged on calcium, multivitamins, ursodeoxycholic acid and domperidone in satisfactory condition

on day 24 after surgery with regular follow-up schedule being handed over to parents

Discussion:

Studies show that in the absence of surgical bowel lengthening procedures, an infant with about 35 cm of residual small bowel has a 50% probability of being weaned from parenteral nutrition [5]. In other series, the likelihood of developing SBS following bowel resection was greater when the residual intestinal length was less than 25% of the predicted length for a given gestational age [3]. After surgery the clinical outcomes depend on areas of intestine lost to surgery. Jejunal resection is associated with increased gastric acid secretion; increased gut motility but ileal mucosa can adapt and compensate for, hence well tolerated. Ileal resection is more troublesome as it can lead to loss of absorptive area for fluids, electrolytes, bile acids and vitamin B12 giving rise to fat malabsorption and steatorrhea. Further, removal of ileocecal valve puts the baby at more risk as the valve protects retrograde flow of bacteria from colon to small intestine. Colonic resection is associated with severe fluid and electrolyte disturbances therefore colonic preservation if possible, has better prognosis. Several studies have shown that serum citrulline level as a marker of remaining small intestine length and can be used to predict the time of weaning from parenteral nutrition [6]. The clinical presentation of SBS post surgery passes through three stages namely acute phase lasting for 1-3 weeks, recovery phase lasting for few weeks to months, and maintenance phase with variable time period depending on clinical presentation and associated medical conditions.

Conclusion:

SBS is the most common cause of intestinal failure in infants. Advancements in parenteral nutrition, strategies to prevent infections, surgical technique, and intestinal transplantation have greatly increased survival in patients with short bowel syndrome. In our case some of the points of interest are as follows. The baby was term good weight and presented late on 29th day of life. Typical clinical laboratory features of NEC were absent, the pathology being detected only after laparotomy. We could achieve full enteral feeding in only 21 days post surgery and parenteral nutrition could be weaned off early in contrast to many previous published literatures, without any obvious complication. Since we could achieve the goal in a setup like Tata Main Hospital (a secondary level nursery) we believe the time of complete weaning from parenteral nutrition in surgical short bowel babies can be achieved early post surgery if disciplined care is provided.

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