

# “Minimal Intervention Management” for Gastroschisis

## A Preliminary Report

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### ABSTRACT

*The replacement of eviscerated bowel, without anaesthesia, has been performed safely in stable neonates with gastroschisis. This technique, termed “minimal intervention management”, was used in three infants treated at the Newborn Special Care Nursery of the University Hospital of the West Indies. Two infants had excellent results but one had bowel perforation during the procedure, necessitating conversion to formal laparotomy under general anaesthesia. In selected patients, advantages of this technique include the ability to be guided by patient response during the procedure in order to avoid excessive intra-abdominal tension, the avoidance of anaesthesia and minimal cost. This technique is proposed for wider use in developing countries.*

# “Tratamiento de Intervención Mínima” para la Gastroquiasis

## Un Informe Preliminar

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### RESUMEN

*El reemplazo del intestino eviscerado, sin anestesia, se ha realizado de manera segura en neonatos estables con gastroquiasis. Esta técnica, denominada “tratamiento de intervención mínima”, se usó en tres infantes tratados en la Guardería de Cuidados Especiales del Recién Nacido en el Hospital Universitario de West Indies. Los resultados fueron excelentes en dos de los infantes, pero el tercero tuvo una perforación intestinal durante el procedimiento, por lo cual se hizo necesaria la conversión a la laparotomía formal bajo anestesia general. En pacientes seleccionados, esta técnica incluye entre sus ventajas la posibilidad de ser guiada por la respuesta del paciente durante el procedimiento, para prevenir así una tensión intra-abdominal excesiva, evitar la anestesia, y asegurar un costo mínimo. Se propone que el uso de esta técnica se haga extensivo en los países en vías de desarrollo.*

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### INTRODUCTION

Gastroschisis refers to a congenital full thickness defect of the anterior abdominal wall, located almost always to the right of the umbilical cord. Bowel eviscerates through this defect and frequently becomes thickened, matted and foreshortened. Primary fascial closure is currently the treatment of choice (1–4), but in the presence of severe visceroperitoneal disproportion, staged closure (using a prosthetic silo at birth to house the intestines temporarily) can be life saving (2).

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Developed countries report mortality rates of 5%–10% for gastroschisis (1, 5, 6) while developing countries report mortality rates in excess of 60% (7, 8). Traditionally, corrective surgery for gastroschisis entailed general anaesthesia, with some cases requiring muscle paralysis and mechanical ventilation (2, 4).

Bianchi and Dickson first reported the reduction of gastroschisis without anaesthesia in 1998 (9). They described a bedside technique of replacing eviscerated intestines in awake newborns after a variable period of physiological stabilization. The authors called this technique “minimal intervention management” for gastroschisis (MIMG) or “elective delayed midgut reduction without anaesthesia” (9, 10). “Minimal intervention management” for gastroschisis uses the responses of the conscious unsedated child to control operator enthusiasm and so guard against excessive intra-abdominal tension (10). “Minimal intervention manage-

ment” for gastroschisis has evoked a mixed response in the medical literature with Kimble *et al* reporting good clinical outcomes in 25 of 35 patients (11) and Dolgin *et al* urging caution after unsatisfactory results in three of four patients (12).

“Minimal intervention management” for gastroschisis is relevant to practitioners working in developing countries where operating theatre time is limited and ventilatory support post anaesthesia is often not guaranteed. We herein report our preliminary experience with MIMG, derived from three patients treated at the Newborn Special Care Nursery at the University Hospital of the West Indies, Jamaica. This, to the best of our knowledge, is the first report describing the use of MIMG in a developing country.

### SUBJECTS AND METHODS

All three patients born with gastroschisis had immediate passage of a nasogastric tube, intravenous fluids (5% dextrose in 0.45% normal saline) at a rate of 200 mls/kg/24 hours, and parenteral clindamicin, gentamicin and metronidazole. Passage of a urethral catheter facilitated an empty bladder and urinary output monitoring. Patients were nursed on a radiant warmer with supplementary oxygen provided *via* head box. Heat and water loss from exposed viscera were controlled by housing the lower trunk and intestines in a plastic bowel bag until commencement of MIMG. Neither anaesthesia nor analgesia was administered. Eviscerated intestines were placed in the abdominal cavity, loop by loop, while an assistant applied steady upward traction to the umbilical cord, as shown in the figure (9). Post reduction of viscera, the abdominal fascial defect was occluded by umbilical capping in the manner described by Bowen (13), by suturing the umbilical cord to the rim of the fascial defect.



Figure: Upward traction on umbilical cord during bowel reduction.

### Case 1

A 1.54 kg male infant with gastroschisis, the first born of diamniotic twins was delivered vaginally at term. The other twin was normal. Apgar scores were four and eight after one and five minutes respectively. Bedside reduction of viscera was undertaken without anaesthesia four hours after delivery, in the manner previously described. Post reduction, the infant was given supplementary oxygen per head box maintaining adequate oxygenation. He had transient generalized oedema and abdominal distension for eight days. Intestinal ileus resolved on the tenth post delivery, full oral intake was established by day 20, and he was discharged home on day 25. Routine clinic review at nine months of age revealed a healthy thriving infant.

### Case 2

A 1.74 kg male was born per vaginam at 35 weeks gestation with gastroschisis and no dysmorphic features. Apgar scores were four and seven after one and five minutes respectively. Examination of the eviscerated bowel revealed external “peel” and severe oedema. During MIMG bilious fluid was seen draining from the umbilical port; the procedure was aborted and laparotomy performed under general anaesthesia. A 7 cm length of jejunum, an 11 cm segment of bulbous ileum and 7 cm of perforated ileo-caecal junction were excised because of doubtful viability. Pathological examination revealed the ileal segment to be an ileo-ileal intussusception with gangrenous intussusceptum. Post-operatively, high nasogastric aspirates and persistent abdominal distension necessitated re-laparotomy and adhesiolysis at age 28 days, this being complicated by a high output ileo-cutaneous fistula. Total parenteral nutrition over the ensuing 40 days was followed by successful resection of an ileal stricture and fistula. Recovery after the second procedure was slowed by the appearance of pneumatosis intestinalis and intractable bowel dysmotility. Enteral feeding however was continued despite these developments. At age seven months, he developed group D streptococcal septicaemia which caused seizures, ventilatory arrest and cerebral ischaemia. Now nine months old, he is severely growth retarded and manifests features of permanent brain injury.

### Case 3

Following diagnosis by fetal ultrasound at 22 weeks gestation, a 2.6 kg female infant with gastroschisis was delivered by planned Caesarian section at 38 weeks gestation. Apgar scores were six and eight after one and five minutes respectively. At birth, the eviscerated bowel appeared mildly oedematous without intestinal peel. “Minimal intervention management” for gastroschisis undertaken six hours after delivery was uneventful. On day 12, the infant developed aspiration pneumonia which responded well to supplemental oxygen administered *via*

head-box, intravenous antibiotics and chest physiotherapy. Oral feeds were commenced on day 20 and full feeds tolerated on day 27. She was discharged home on day 29. Repair of a small umbilical hernia was undertaken electively at age three months.

## DISCUSSION

Since MIMG was first reported in 1998 (9) there have been a number of reports detailing its use in developed countries (10–12) but we were unable to identify any reports on the evaluation or use of MIMG in developing countries. This is surprising because MIMG may be particularly suited to the poor infrastructure environment of developing countries.

“Minimal intervention management” for gastroschisis is not suited for all patients, clear exclusion criteria must apply in each case (12). Bianchi and Dickson advised the exclusion of infants in poor condition, due to respiratory distress, hypovolaemia or metabolic acidosis (10). Additional exclusion criteria suggested include visceroperitoneal disproportion, a narrow umbilical port relative to bowel mass and the existence of attenuated mesentery (10).

Case 2, who had dusky bowel, extensive intestinal ‘peel’ and a gangrenous intussusception developed intestinal perforation while being subjected to MIMG. The prolonged post-operative morbidity associated with this case supports the view that obstructed patients or those with doubtfully viable intestines should not be subjected to MIMG. These patients instead should be offered exploratory surgery under general anaesthesia in the controlled setting of an operating theatre.

*Pneumatosis intestinalis* (the radiological marker for necrotizing enterocolitis) and bowel dysmotility are two recognized complications of gastroschisis repair (12, 14–16). The *pneumatosis intestinalis* post-gastroschisis repair however is usually benign, making the cessation of enteral feeding non-mandatory in many cases (16). This reduces total parental nutrition dependency and related liver disease (14, 16).

Post-gastroschisis intestinal dysmotility, also a feature of Case 2, is a recognized cause of chronic feed intolerance and protracted total parental nutrition use (15, 16). These patients require meticulous and indefatigable supportive care in order to survive.

Pre-labour Caesarian section has been proposed to limit the formation of intestinal peel, which can pose a major mechanical impediment to primary abdominal wall closure (17). Primary closure facilitates early introduction of enteral

feeds reducing the need for total parental nutrition (17). Intra-uterine diagnosis during fetal ultrasound assessment allowed this management option in Case 3, with good results. In conclusion, with more positive reports, MIMG should gain wider usage among workers in developing countries. It is clear that exclusion criteria although still in evolution must be applied in each case. Larger studies are needed to elucidate definitive recommendations for developing countries.

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