

## CASE SERIES

# Primary Closure Gastroschisis: Case Series

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### ABSTRACT

**Introduction:** Gastroschisis is a congenital abdominal wall defect characterized by herniation of abdominal viscera without a covering membrane. The primary goal of management is safe reduction of the herniated organs and closure of the abdominal wall defect while avoiding excessive intra-abdominal pressure. In rural and resource-limited settings, limited availability of silo devices may influence surgical decision-making.

**Case Series:** We report three neonates with gastroschisis managed with primary closure. Case 1 was a 12-hour-old male neonate and Case 2 was a 2-hour-old female neonate; both had minimal bowel edema and underwent early primary closure with favorable outcomes. Case 3 was a 26-hour-old male neonate who presented with severe bowel edema and dehydration. Despite primary closure, the patient developed abdominal compartment syndrome and died within 24 hours postoperatively. The different outcomes highlight the importance of timing and bowel condition in determining surgical strategy. Early presentation and minimal bowel edema were associated with good outcomes, whereas delayed presentation and severe bowel edema increased the risk of excessive intra-abdominal pressure and abdominal compartment syndrome. These findings emphasize the need for careful patient selection for primary closure. **Conclusion:** Primary closure can be an effective option in carefully selected gastroschisis patients who present early and have minimal bowel edema. Delayed presentation and severe bowel edema are associated with poor outcomes and a higher risk of abdominal compartment syndrome.

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### INTRODUCTION

Gastroschisis is a congenital malformation characterized by herniation of abdominal viscera through a paraumbilical defect without a covering membrane, with an intact umbilical cord (1,2). It is one of the most common abdominal wall defects, with an incidence of approximately 4–5 per 10,000 live births (1–3). The condition is more frequently observed in younger mothers, particularly those under 20 years of age (1).

Gastroschisis can be detected prenatally via ultrasonography as early as 12 weeks of gestation. Elevated maternal serum alpha-fetoprotein levels are commonly associated with abdominal wall defects. The condition may occur in isolation or be associated with gastrointestinal anomalies such as intestinal atresia, stenosis, or malrotation.

The primary objective of management is reduction of herniated viscera into the abdominal cavity and closure of the defect while minimizing bowel injury and avoiding excessive intra-abdominal pressure. The choice of surgical technique depends on bowel condition, degree of abdominovisceral disproportion, gestational maturity, birth weight, and associated comorbidities. Surgical approaches include primary closure and staged reduction. In rural settings, primary closure is often preferred due to limited availability of silo devices.

### CASE SERIES

#### Case 1

A 12 hours years old male baby came to Emergency Department Banyumas General Hospital with protrusion of intraabdominal's organ. Birth weights was 2640 grams and Apgar score was 9/10. Meconium passed before the admision. From phisical examination, the patient was in stable condition, mild dehydration present. We found the intestine, gaster, and part of liver protrude outside abdominal wall (Figure 1).



**Figure 1: Clinical Examination of Gastroschisis**

Then we performed a cito primary closure gastroschisis. During the operation, we found the intestine, gaster, spleen, and part of liver protrude. The incision was taken transversal at the level of umbilicus. The protrude could be returned to the abdominal cavity without tension. Abdominal compartment was not present with patient could be extubated and transferred to Perinatology. Post operation, patient given oral feeding gradually and could be discharged at 12 days postoperatively.



**Figure 2: Post operative condition**

### Case 2

A 2 hours old female baby came to Emergency Department Banyumas General Hospital with protrusion of intraabdominal's organ. Birth weight was 3700 grams and Apgar score was 9/10. Meconium haven't passed before admission. From physical examination, the patient was in stable condition, dehydration was not present. We found the intestine and gaster protrude outside abdominal wall.

Then we performed a cito primary closure gastroschisis. During the operation, we found the intestine and gaster protrude. The incision was taken transversal at the level of umbilicus. The protrude could be returned to abdominal cavity without tension. Abdominal compartment was not present with patient could be extubated and transferred to Perinatology. Post operation, patient given oral feeding gradually and could be discharged at 14 days postoperatively.

### Case 3

A 26 hours old male baby came to Emergency Department Banyumas General Hospital with protrusion of intraabdominal's organ. Birth weight was 3200 grams and Apgar score was 9/10. Meconium have passed before admission. From physical examination, the patient was in dehydration condition. We found severe edema on the intestine and gaster which protrude outside abdominal wall.

Fluid resuscitation and stabilization was done. Then we performed a cito primary closure gastroschisis. During the operation, we found the intestine and gaster protrude, severe edema without necrotic. The incision was taken transversal at the level of umbilicus then we decompressed the intestine by milking into the anus. The protrude could be returned to abdominal cavity. Patient still connect to ventilator with endotracheal tube and transferred to Perinatology. Post operation, patient is death on 24 hours period postoperatively due to abdominal compartment.

### DISCUSSION

Infants with gastroschisis are at high risk of intestinal vascular compromise due to twisting, compression, and impaired mesenteric perfusion. Continuous exposure of the bowel to the external environment increases the risk of infection, dehydration, hypothermia, and metabolic instability. In addition, associated conditions such as respiratory failure, electrolyte imbalance, hypoglycemia, and hyperbilirubinemia may further complicate clinical management (6).

Management of gastroschisis remains variable and controversial. Early reduction of the herniated viscera is a fundamental principle to prevent further bowel injury and heat and fluid loss. The choice between primary and staged closure depends on multiple factors, including the

degree of bowel edema, the extent of abdominovisceral disproportion, gestational maturity, birth weight, and the overall clinical condition of the patient. Although staged reduction using a silo theoretically allows gradual accommodation of bowel contents and maintenance of intra-abdominal pressure, prolonged silo use may be associated with local complications and infection (1).

In this case series, different outcomes were observed among the three patients. Patients in case 1 and case 2 underwent early primary closure and were discharged without major complications. In contrast, patient in case 3 experienced a poor outcome and died due to abdominal compartment syndrome. Several factors likely contributed to this difference. The third patient presented later (26 hours after birth) with significant bowel edema and dehydration, which may have increased intra-abdominal pressure following primary closure. Severe bowel edema is a known risk factor for abdominal compartment syndrome and compromised visceral perfusion (6). These findings highlight the importance of careful patient selection for primary closure. In patients with marked bowel edema, delayed presentation, or significant abdominovisceral disproportion, staged reduction may represent a safer approach to minimize the risk of excessive intra-abdominal pressure and related complications.

During outpatient follow-up, patients in case 1 and case 2 demonstrated satisfactory clinical recovery. Both patients tolerated enteral feeding well and showed no major complications such as wound infection, bowel obstruction, or feeding intolerance. These favorable short-term outcomes suggest that early primary closure in carefully selected patients with minimal bowel edema and stable clinical condition can be an effective strategy, even in resource-limited settings.

Timing of surgical intervention is another important determinant of outcome. Previous studies have shown that delayed surgical repair is associated with increased mortality. Early operative management helps prevent progressive bowel edema, heat loss, and fluid imbalance, which may worsen abdominovisceral disproportion and increase the risk of postoperative complications (2,7). Early surgical intervention prevents heat loss and worsening of intestinal condition. A previous study reported that patients who underwent surgery after 4 hours of life had a 2.7-fold higher risk of death compared to those operated within 4 hours (8).

In situations where primary closure is not feasible due to severe bowel edema or significant abdominovisceral disproportion, staged reduction using a silo is generally recommended (3). However, in rural and resource-limited settings where commercial silo devices may not be available, alternative strategies should be considered. Improvised silos using sterile intravenous fluid bags or other sterile plastic materials have been described as

practical and low-cost alternatives (9). These techniques may allow gradual bowel reduction while minimizing intra-abdominal pressure and reducing the risk of abdominal compartment syndrome. Development of standardized low-cost silo methods and improved resource allocation may further enhance gastroschisis management in rural hospitals.

## CONCLUSION

Gastroschisis is a congenital anomaly that requires prompt and appropriate surgical management to optimize outcomes. Primary closure can be an effective treatment option in selected patients, particularly those who present early, have minimal bowel edema, and demonstrate limited abdominovisceral disproportion. However, delayed presentation and severe bowel edema are important risk factors for poor outcomes and increase the risk of abdominal compartment syndrome following primary closure.

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