# Gastroschisis & Omphalocele

*Defects in the abdominal wall associated with externalization of abdominal organs; omphalocele is a midline defect at the base of the umbilical cord and organs are contained within a herniated sac whereas gastroschisis is lateral to the umbilicus and the organs are not contained in a herniated sac, the lack of a covering sac predisposes the child to fluid and temperature loss as well as infection.*

**ANESTHETIC CONSIDERATIONS:**

- Neonatal patient / possibly preterm
- Complications of abdominal wall defect / external bowel
  - Aspiration risk
  - Hypothermia
  - Fluid & electrolyte imbalance
  - Infection
  - Primary vs. staged closure
- Co-Existing Congenital abnormalities (omphalocele > gastroschisis)
  - Down's, Beckwith-Wiedemann, congenital heart
  - Other GI tract abnormalities (intestinal atresia, stenosis, malrotation)
- Postoperative complications
  - Abdominal compartment syndrome
  - Ventilatory compromise (decreased lung compliance) may require ICU to wean

**ANESTHETIC GOALS:**

- Preserve temperature and prevent fluid loss (cover bowel, radiant heat / warming blanket, early surgical closure, monitor fluids / electrolytes)
- Protection of the airway from aspiration
- Communicate with surgeon with regards to airway pressures during closure

**HISTORY**

- Often antenatal diagnosis based on routine U/S (omphalocele or gastroschisis)
- Review pregnancy history and prenatal records
- Postpartum course – time of uncovered bowel, concerns of sepsis etc.
- Any other associated congenital defects (high suspicion for other defects with omphalocele)
  - Congenital heart
  - Syndromes
  - Intestinal abnormalities
  - Prematurity
- Degree of herniation - likely for primary or staged closure

**PHYSICAL**

- **VITALS** - HR, BP, $SpO_2$, temperature
- **HEENT** – syndromic appearance, associated defects, airway exam
- **CVS** – standard exam (consider associated defects) and including volume assessment: fontanel, pulses, skin turgor, JVP etc.
- **GI**
  - Midline periumbilical defect with peritoneal covering = omphalocele
  - Lateral abdominal wall defect with unprotected bowel herniation = gastroschisis
  - Size of defect and amount of herniated bowel (? Requiring staged procedure)

**INVESTIGATIONS**

- **Labs**
  - CBC, lytes, Bun, Cr, glucose, group & screen
- **Imaging**
  - +/- ECHO if concern of cardiac defect (with omphalocele can delay surgery for investigations as risk of hypothermia and fluid/electrolyte abnormalities less than with gastroschisis)

**OPTIMIZATION**

- Diagnosis is usually made antenatally, therefore plans should be made for delivery in a facility capable of treating neonate (e.g. planned 38 week C/S & treatment of neonate)
- Plan for immediate post delivery covering of bowel (sterile plastic bag, saline soaked sponges)
- IV access for volume replacement + glucose infusion (correct fluid & electrolyte abnormalities preoperatively)
- GI tract decompression (NG tube)
- Multidiscipline approach (consults: surgery / PICU / NICU / SCN etc.)
- Antibiotic prophylaxis for sepsis (e.g. ampicillin / gentamicin)

**ANESTHETIC OPTIONS**

- GA with ETT & NMB most common +/- postoperative ventilation
- Can be done with local (if small defect)
- Consider regional to facilitate post-procedure extubation (e.g. caudal-threaded epidural) if primary closure

**ANESTHETIC SETUP**

- **Drugs**
  - Standard emergency drugs
- **Equipment**
  - Standard CAS monitors + temperature monitoring
  - Good IV access (may want to avoid lower limb IVs)

- Warming blanket + radiant heaters
- Warm OR
- Foley (+/- bladder pressure transduction < 20 $cmH_2O$)
- Additional $SpO_2$ on lower extremity
- +/- A-line for HD & lyte monitoring
- NG tube

**MANAGEMENT OF ANESTHESIA**

- **Induction**
  - Gastric decompression
  - Pre-$O_2$, awake ETT
  - IV / Inhalational agents acceptable within goals of co-existing cardiac disease
- **Maintenance**
  - Most techniques acceptable, consider regional and minimizing opiates if small defect for repair, likely extubation post op
  - NMB required for abdominal closure (monitor bladder pressures, airway pressures and lower extremity perfusion for intolerance of closure)
  - Avoid $N_2O$
- **Emergence**
  - Consider on table extubation if small defect, no ventilation concerns, normothermic, analgesic strategy to avoid apnea (local / regional vs. narcotic)

**DISPOSITION & MONITORING**

- High acuity unit: PICU / NICU / SCN for postoperative ventilation / morphine infusion
- If large defect, ETT and PPV likely
- Staged repair may allow extubation and spontaneous ventilation
- Meticulous attention to fluid replacement (large 3rd space loss)
- Monitoring of bladder pressure, lower limb edema and hypertension

**COMPLICATIONS**

- Hypovolemia secondary to large 3rd space fluid shifts
- Instability secondary to increased intra-abdominal pressure following closure
- Decrease in lung compliance secondary to impaired diaphragmatic movement from reduced abdominal contents and increased intra-abdominal pressure
- Prolonged postoperative pain relief may be required
- Increased risk of NEC

**PATHOPHYSIOLOGY**

- **Omphalocele**
  - Herniation of the abdominal organs through the base of the umbilicus, contents contained within a hernia sac
  - This midline deformity is associated with other midline lesions, particularly congenital cardiac disease (20%)
  - Other syndromes are common (Down's, Beckwith-Wiedemann)
  - 75% or omphalocele have either cardiac lesion or a syndrome
  - 33% of omphalocele are preterm
  - Many are associated with additional intestinal abnormalities (atresia, stenosis, malrotation)
  - As a result of the hernia sac, these defects are less prone to massive fluid loss, temperature loss and infection
  - Mortality can be up to 30% due to cardiac lesion or prematurity
- **Gastroschisis**
  - Herniation of abdominal organs through a defect in the abdominal wall lateral to the umbilicus
  - The organs are not contained in a hernia sac, thus the child is at very high risk of massive fluid shifts, temperature loss and infection / sepsis
  - These babies must be protected with warm fluid filled plastic bags, and surgical reduction (staged reduction with Dacron silo) or repair is generally done within 12-24 hours
  - Antibiotic prophylaxis for sepsis is necessary
  - Gastroschisis is rarely associated with other congenital abnormalities except for other intestinal abnormalities (atresia, stenosis, malrotation)
  - There is a higher incidence of prematurity in gastroschisis than in omphalocele

**COMPARISON OF OMPHALOCELE WITH GASTROSCHISIS**

| | Omphalocele | Gastroschisis |
|---|---|---|
| **Incidence** | 1:6000 | 1:15,000 |
| **Gestation** | Premature | Term |
| **Peritoneal covering** | Present | Absent |
| **Incidence of other anomalies** | High | Low |

**REFERENCES**


- Miller, Morgan Barash Part V, Ch 43
- Liu MP et al Pediatric Emergencies, Neonatal Surgical Emergencies Anes Clinics of NA, Vol 19 N2 June 2001
- Stoelting Co-Existing Disease 4th Ed pp 696-9