Abdominal wall defects in neonate

Gastroschisis and omphalocele are the two most common congenital abdominal wall defects.

Differentiating characteristics between Gastroschisis and Omphalocele

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<th>Gastroschisis</th>
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<td>Bowel ± liver</td>
<td>Bowel only</td>
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<td>Absent</td>
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<td>Location of defect</td>
<td>Common (50%)</td>
<td>Uncommon (&lt;10%)</td>
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Diagnosis

- U/S these two conditions are often diagnoses on prenatal ultrasonography and are easily differentiated by the location of the defect and by the presence or absence of a sac surrounding the eviscerated bowel.
- Elevation of maternal α-feto protein
**Embryology:**

The abdominal wall forms during the 4th week of gestation from differential growth of the embryo causing infolding in the craniocaudal and mediolateral direction. The lateral abdominal folds of the embryo meet in the anterior midline and surround the yolk sac eventually constricting the yolk sac into yolk stalk that becomes the umbilical cord.

During the 6th week of gestation rapid growth of the intestine causes herniation of the midgut into the umbilical cord. By week 10, the midgut has returned to the abdominal cavity.

An omphalocele occurs if the intestine fails to return to the peritoneal cavity.

**The etiology of gastroschisis less clear, many theories**

1. Failure of mesoderm to form in the anterior abdominal wall.
2. Failure of lateral folds to fuse in the midline leaves a defect to the right side of the umbilicus.
3. Thrombosis of the right omphalomesenteric vein (umbilical vein) causing necrosis to the surrounding abdominal wall leading to right side defect.
4. Rapture of an omphalocele in utero

**Gastroschisis:**

**Perinatal care:**

Due to prolong exposure of the bowel of a neonate with gastroschisis to the damage effect of amniotic fluid, bowel edema, poor motility and malabsorption is noticed significantly.

The optimal mode and time of delivery for fetuses with gastroschisis has been debated for many years, but it better to be carried in tertiary
perinatal center so as to provide immediate neonatal and pediatric surgical experience.

**Neonatal resuscitation and management:**

- Intravenous fluid resuscitation, the neonates with gastroschisis have significant evaporative water loss from the open abdominal cavity and exposed bowel.
- Nasogastric decompression to prevent gastric and intestinal distension.
- The herniated bowel should be wrapped in warm saline soaked gauze.
- The infant placed with the bowel and legs in a plastic bag to reduce evaporative losses.
- Although gastroschisis most often is an isolated anomaly, thorough examination of the neonate should be done to exclude the coexistence of other congenital anomalies.

**Surgical management:**

The primary goal is to return the viscera to the abdominal cavity while minimizing the risk of damage to the viscera due to direct trauma or to increased intra abdominal pressure.

**Options**

**Primary closure**

- is practiced for neonate when reduction of the herniated viscera is thought to be possible
- Or using the prosthetic options when primary fascial closure cannot be achieved, non-absorbable mesh or bioprosthetic material such as dura or porcine small intestinal sub mucosa can be used.
- Another option is to reduce the bowel and place a piece of silastic sheeting under the abdominal wall to prevent evisceration, the
Silastic sheet is removed in 4 to 5 days and abdominal wall and skin are closed.

**Staged closure**

consist of placing the bowel into a silo constructed of Silastic sheets sewn together and sutured to the abdominal wall, the bowel is reduced once or twice daily into the peritoneal cavity, when the reduction is completed the definitive closure can be performed. This process takes between 1-14 days.

**Postoperative course**

- Enteral feeding is delayed for few weeks while awaiting return of bowel function.
- Nasogastric decompression.
- Parenteral nutrition.
- Prokinetics for treatment of GIT dysmotility e.g. erythromycin, metoclopramide, domperidone, cisapride.

The long term outcomes for patients born with gastroschisis are generally excellent.
The presence of bowel atresia is the most important prognostic determinant for poor outcome.

**Omphalocele**

**Perinatal care**

- Mode of delivery should be decided by the obstetrician. But in giant omphalocele cesarean section is preferable because of the fear of liver injury.
- Delivery at a tertiary center is preferable for immediate access to neonatal and pediatric surgical expertise.
Neonatal resuscitation and management

- A thorough search for associated anomalies should be done, (cardiac evaluation, renal, neonatal hypoglycemia for possibility of Bechwith-Weidemann syndrome, and blood sample for genetic evaluation if indicated).
- Intravenous access and fluid resuscitation, infants with omphalocele do not have as significant fluid and temperature losses as those with gastroschisis but the loss are higher than those with intact abdominal wall.
- The omphalocele itself can be dressed with saline soaked gauze to minimize those losses.
- Nasogastric tube.

Surgical management

Primary closure: treatment options depend on the size of the defect, gestational age and the presence of associated anomalies.

- In infants with small defects primary closure may be appropriate.
- In infants with large defects the loss of domain in the peritoneal cavity prevents the primary closure without an undue increase in intra-abdominal pressure.
  - Bilateral flaps that mobilize the muscle, fascia and skin of abdominal wall toward the midline.
  - Tissue expanders that are placed inside the peritoneal cavity.
  - Patch in the abdominal wall and close the skin over the patch. e.g of non-absorbable material such as Marlex, polypropylene mesh have resulted in high rate of infection
  Bioabsorbable materials such as small intestine submucosa, dura or human acellular dermis represent promising alternatives.
Staged closure:

- Once the omphalocele sac has been removed. A Silastic silo can be sewn to rectus fascia, serial reduction similar to that of gastroschisis, are performed until definitive closure can be obtained in operating theater, if fascial edges cannot be approximated, prosthetic closure can be utilized.

- Escharotics therapy which result in gradual epithelialization of the omphalocele sac, used for neonates who cannot tolerate operation. Iodine, silver sulfadiazine, and nystatine powder used for sac to granulate and epithelialize, once the patient is stable then ventral hernia can be repaired by one the previously mentioned method.

Postoperative course

- Most of patients require mechanical ventilation after primary closure for few days.
- Nasogastric tube for gastric decompression.
- Feeding can begin when nasogastric tube output is no longer bilious and bowel activity has occurred.
- Antibiotics for 48 hours (if there is no infection)

Post-operative complications

1. Increase intra abdominal pressure
2. Acute hepatic failure
3. Renal failure