Abdominal wall defects in neonate

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

The incidence is 1:4000 live births.
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. Elongation and rotation of midgut occurs. By week 10, the midgut has returned to the abdominal cavity.

Failure of the viscera to return to the abdominal cavity result in omphalocele. Other intra-abdominal viscera including liver, bladder, stomach, ovary and testis can also be found in omphalocele sac.

The sac consists of the covering layer of umbilical cord and includes amnion, Wharton’s jelly and peritoneum.

The location of the defect is in the mid abdominal region.

The etiology of gastroschisis less clear, two theories

1. Failure of mesoderm to form in the anterior abdominal wall.
2. The ventral body theory, which suggests failure of migration of the lateral folds (more frequent on right side), is more accepted.

Diagnosis

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

Occurs with an increased incidence in mothers younger than 21 years of age.

Can be diagnosed sonographically prenatally by age of 20 weeks, intrauterine growth retardation (IUGR) also noted by U/S.

Bowel atresia is the most common associated anomalies with 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. And the bowel must be examined carefully for bowel atresia, necrosis, and perforation.
Surgical management:

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

Options

Primary closure

- Is practiced for neonate in whom reduction of the herniated viscera is thought to be possible. Traditionally the attempt of primary closure been done in operating room, but some surgeons prefer to close the skin only and leave the fascia separated, on bedside and without general anesthesia.
- Or using the prosthetic options when primary fascial closure cannot be achieved, using non-absorbable mesh or bio prosthetic material such as dura or porcine small intestinal sub mucosa can be used.

Staged closure

A prefabricated silo with a circular spring that is positioned under the fascial opening, without the need for suturing or general anesthesia. Can be inserted in delivery room or bedside. After placement, the bowel is reduced daily into the abdominal cavity as the silo is shortened by sequential ligation. When the content are completely reduced, fascial and skin closure are performed. This process takes between 1-14 days.

This procedure is used to avoid ischemic injury to the viscera due to the high intra-abdominal pressure.
Postoperative course

**Gastroschisis** is associated with abnormal intestinal motility and nutrient absorption, both of which gradually improve with time

- 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 hypoglycem 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

Immediate 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 larger defects but still easy to close without much loss of abdominal domain can also be closed soon after birth,

Staged neonatal closure:

The loss of domain in the peritoneal cavity prevent primary closure without an undue increase in intra-abdominal pressure

Staged closure in the neonatal period involves the use of different technique, of these the use of the existing amniotic sac with serial inversion which allows gradual reduction of the sac followed by sac excision and primary or mesh closure, or the amniotic sac is excised and replaced with mesh (use to bridge the fascial gap) and then closed over time.

Delayed staged closure

Used for large omphalocele, the sac is excised and a silastic ‘silo’ sewn to the abdominal wall, serial reduction once or twice daily
similar to that of gastroschisis done until definitive closure can be obtained

**Scarification treatment**

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)
- If a hernia develops, closure usually can be done after age of one year.
- **Post-operative complications**
  1. increase intra abdominal pressure
  2. acute hepatic congestion
  3. renal failure
  4. bowel infarction