GASTROSCHISIS: INITIAL MANAGEMENT AND ABDOMINAL CLOSURE

POLICY

Gastroschisis is a congenital anomaly where the abdominal contents become herniated through a defect in the abdominal wall. The defect usually occurs to the right of the umbilical cord. A variable amount of intestine and occasionally parts of other abdominal organs are herniated outside the abdominal wall with no covering membrane or sac. The bowel can become damaged due to prenatal exposure to amniotic fluid.

Gastroschisis abdominal closure will occur by silo placement and reduction, primary closure and/or cord flap closure. Surgical management of infants with gastroschisis will depend on the degree of intestinal dilation, evidence of intestinal complications and the infant's physiologic stability.

There are two pre-printed order sets that should be used in the care of an infant with gastroschisis: (1) BC Women's Physicians Order Set #1: Gastroschisis Initial Management and (2) BC Women's Physicians Order Set #2: Gastroschisis Post Closure Management.

The bedside/primary nurse is responsible for gathering supplies needed by the surgical team for the silo placement and reduction and/or the cord flap closure. The Gastroschisis Kit in the Neonatal Intensive Care Unit (NICU) contains most of the supplies needed. Refer to the supply list in the kit and in the Appendix of this document for the complete list of supplies.

PROCEDURE

Delivery room management	Notes
1. Ensure surgical and neonatal teams are aware of impending delivery.	Anticipate associated problems, for example prematurity and intrauterine growth restriction (IUGR).
2. Prepare for specific management of the defect.	Bowel bag and sterile linens available in delivery room.
3. Prior to delivery review expectations of infant management with the team	Consider delayed cord clamping. Umbilical cord stump is to be left approximately 10cm long. The cord will be preserved and may be used for a cord flap (sutureless) closure.
Resuscitation and Initial Stabilization	**Notes**
1. Follow current Neonatal Resuscitation Program guidelines for resuscitation and stabilization.	Avoid bag and mask ventilation and CPAP to reduce the potential for gastric distension. Intubation is preferred if ventilation is required.
2. Wear sterile gloves and use a sterile flannel to receive the infant.	Avoid unnecessary handling of the exposed abdominal wall contents.
3. Administer Vitamin K IM prior to applying the bowel bag.	
4. Place baby's torso, lower extremities and bowels in a bowel bag as soon as possible.	A bowel bag will help to maintain effective thermoregulation by preventing evaporative heat and fluid losses. Refer to the Bowel Bag application policy NN.08.06.
5. Insert #8 or #10 Fr Replogle tube.	Aspirate with syringe and leave open. Decompression of the bowel is important to prevent gastric distension and reduce the risk of emesis and aspiration.
6. Transfer to the NICU.	Initiate the Gastroschisis package – with Physician Order set #1: Gastroschisis Admission Initial Management.

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Preoperative NICU Care	Notes
1. Position infant in a side-lying position, preferably on the right side if the defect is to the right of the umbilicus.	Support the bowel and torso with a rolled towel. Monitor bowel through the bowel bag for signs of ischemia, kinking and discoloration.
2. Provide appropriate umbilical cord management.	Maintain cord inside the bowel bag. Ensure bowel is not resting on top of the umbilical clip. Surgery may consider wrapping the umbilical cord.
3. Establish peripheral intravenous access as soon as possible.	Upper extremity access is preferred. Avoid umbilical catheter placement if possible in order to keep the bowel bag intact. If umbilical lines are to be inserted, cut a vertical slit in the bowel bag to allow access to the umbilical cord for insertion without taking the infant out of the bowel bag. Once lines are insitu and secured with bridge taping, bring lines through the bag and re-tape the bag closed to maintain moisture.
4. Maintain fluid and electrolyte balance.	Infants are at risk of alterations to their fluid balance related to a large evaporative surface of the defect, third spacing of fluids, and nasogastric suctioning.
5. Complete ordered blood work from the physician order set.	Blood samples can be obtained preoperatively by making a small slit in the bottom corner of the bowel bag, obtaining the sample and then resealing the bag.
6. NICU medical team to ensure a surgical admission consult is complete. The consulting physician completes the gastroschisis prognostic score (GPS) and documents the type of closure the infant requires.	The GPS is based on bowel appearance after birth. The visual scoring is based on key features of intestinal injury including bowel matting, necrosis, atresia and perforation. The GPS is a method for predicting outcome in neonates with gastroschisis.
7. Initiate antibiotic therapy	The course of therapy depends on the assessment of early onset sepsis (EOS) risk and the GPS. Course of antibiotic therapy will be ordered on the pre-printed order form.
8. Ensure developmentally supportive care.	Provide opportunity for non-nutritive sucking. Position infant with adequate nesting.
9. Provide family support.	Encourage mother to begin expressing breast milk. Ensure parents are aware of management plans.
Silo Placement with Cord Preservation	**Notes**
1. Check pre-printed orders to see which closure has been ordered for the infant.	Note date and time procedure will take place. Silo placement occurs at the NICU bedside. Staged silo repair allows for the gradual reduction of the herniated abdominal contents. Closure of the silo is usually performed over several days.
2. Antibiotic therapy must be administered 60 minutes prior to silo placement.	Check pre-printed orders to see which antibiotic course has been chosen.
3. Gather supplies needed for the surgical procedure. See list of supplies in the Appendix.	The Gastroschisis Kit in the NICU contains most of the supplies needed for silo placement. Refer to the supply list in the kit for a complete list.
4. Administer pre-medication to infant if ordered.	Record BIIP score. Provide comfort measures.

5. Silo placement procedure performed by the surgical team.	
6. Once silo has been applied, position baby supine.	Suspend silo with twill ties and ensure a neutral position.
7. Assess comfort and pain after the procedure is complete.	
8. Monitor bowel hourly for changes in colour after silo application and after any repositioning of the infant.	Document the appearance of the bowel. Photos of the bowel can help for assessment between shifts.
Silo Reduction	Notes
1. Silo reduction occurs once or twice daily at the surgeon's discretion.	Time and date will be specified on the Physician's Orders.
2. Gather supplies for silo reduction at the bedside and silo dressing changes. See Appendix.	The Gastroschisis Kit in the NICU contains most of the supplies needed for silo reduction and dressing changes. Additional supplies can be found in the work stations in Rooms 41 and 42. Refer to the supply list in the kit for a complete list.
3. Assessment of comfort and pain.	Record BIIP score. Provide comfort measures.
4. Administer pre-medication to infant as ordered.	
5. Procedure performed by the surgical team.	Team may or may not change the silo dressing at the same time.
Cord Flap Closure	Notes
1. Obtain an OR package from the front desk	Flap closures are those in which the umbilical cord remnant and/or surrounding skin are used for the coverage of the abdominal wall defect without the use of sutures. Consent will need to be obtained for the cord flap closure. Surgery will need the OR record.
2. Gather supplies for the cord flap closure procedure at the bedside. See supply list in Appendix 3.	The Gastroschisis Kit in the NICU contains most of the supplies needed for the cord flap closure. Refer to the supply list in the kit for a complete list.
3. Assess comfort and pain.	Record BIIP score.
4. Administer pre-medication to infant if ordered.	
5. Procedure performed by surgical team.	
6. Antibiotic therapy continues for at least 48 hours post cord flap closure.	
7. Obtain BC Women's Physician's Orders – Gastroschisis Post Closure Management.	New orders are required after an abdominal closure procedure. Ensure Surgical Fellow completes the 'Final Checklist for Quality Assurance'.
Dressing change after initial cord flap closure	Notes
1. First dressing change is done 7days after primary cord flap closure or 10 days after silo-reduction followed by cord flap closure	Dressing changes will be done by surgical team.
2. Gather supplies required at the bedside. See list in the Appendix.	The Gastroschisis Kit in the NICU contains most of the supplies needed for the cord flap closure dressing change. Refer to the supply list in the kit for a complete list. Additional supplies can be found in the workstations of Rooms 41 and 42.

3. Procedure performed by surgical team.	
Primary Closure – Traditional Secured Method	**Notes**
1. Obtain an OR package for Primary Closure.	Primary closure order will be on the Physician Order set #1 Gastroschisis Initial Management.
2. Prepare infant for OR. Initiate the "Checklist for Pre-operative NICU Infants".	Consent obtained Bloodwork taken Check for additional orders from surgical team: ○ Arterial line placement ○ Foley Catheter insertion
3. Receive report from surgical team post-operatively.	
4. Initiate "Gastroschisis Post Closure Management" Order set.	Ensure surgical fellow completes the 'Final Checklist for Quality Assurance' on the Order set #2.
Postoperative Management and Monitoring	**Notes**
1. Follow orders from Gastroschisis Post Closure Management. ▪ Including: postoperative vital signs monitoring and assessment ▪ Maintain thermoregulation ▪ Postoperative fluid orders ▪ Monitor intake and output totals ▪ Target urine output ▪ Monitor and record BIIP ▪ Investigations; blood work	Specific wound care for the primary and cord flap closure is ordered on this order set. Follow instructions for wound care as per surgical team.
2. Monitor abdominal wall for tension and inflammation. Discuss need for hourly bladder pressure monitoring with physicians and surgeons.	Adverse signs and symptoms associated with increased intra-abdominal pressure include increasing respiratory support needs, decreased urine output, and hemodynamic compromise. Refer to Bladder Pressure Measurement Policy, NN.09.02). Bladder pressure is a proxy for intra-abdominal pressure which may increase 24 to 48 hours post operatively.
3. Initiate enteral feeding in consultation with the surgical team.	Anticipate a delay in the return of bowel function due to antenatal injury to the bowel caused by exposure to amniotic fluid. Replogle tube is changed to straight drainage once output has decreased and is no longer bilious.

DOCUMENTATION

1. Nursing Flow Sheet.
2. Operating Room package.
3. Supply List in the Gastroschisis Repair Kit and Appendix.
4. B.C. Women's Physicians Orders:

Order Set #1 Gastroschisis Initial Management
Order Set #2 Gastroschisis Post Closure Management

APPENDIX

1. Supply List for Silo Placement

Supplies for Silo Placement (in the kit)	Additional supplies required (not in the kit)
☐ Bentec silos (sizes 5 cm, 7.5 cm)	☐ Sterile gloves
☐ Sterile plastics scissors	☐ 2 blue pads
☐ Betadine (*note expiry date)	☐ Face cloths (to dry baby prior to silo placement)
☐ Surgical gauze pack (contains 4 x 4s)	☐ Normal saline (warm)
☐ Cling dressing (2 inch)	☐ Glove liners (suction gloves)
☐ Vaseline gauze	☐ Twill ties (cut to length for suspending silo)
☐ Small Tegaderm (Opsite)	
☐ Umbilical tie	
☐ 2-0 silk ligatures	

2. Supply List for Silo Dressing Change and Reduction

Obtain supplies needed as per surgical team	
Silo dressing change supplies	Silo reduction supplies
☐ Sterile gloves for surgical team	☐ Normal saline (warm) (not in kit)
☐ Umbilical tie	☐ 4 x 4 gauze
	☐ Betadine (*note expiry date)
	☐ Cling dressing
	☐ Paper tape

3. Supply List for Cord Flap Closure and Dressing Change Supplies for Cord Flap Closure

Supplies for Cord Flap Closure (in the kit)	Dressing change supplies for cord flap closure
☐ Sterile plastics scissors	☐ Adhesive remover
☐ Scalpel	☐ 4 x 4s
☐ Duoderm (4 inch square)	☐ Normal saline (warm)
☐ 1 inch steristrips	☐ Jelonet (10 x 10 cm) (*note expiry date)
☐ Jelonet (10 x 10 cm) (*note expiry date)	☐ 2 x 2s (5)
☐ 2 x 2 gauze (5)	☐ Mepilex dressing (10 x 10 cm)
☐ Mepilex dressing (10 x 10 cm)	
☐ Mastisol (1 ampoule)	
☐ Betadine (dilute 1:4 with NS)	
☐ Normal saline	

REFERENCES

Baird, R., Eeson, G., Safavi, A., Puligandla, P., Laberge, J. M., Skarsgard, E. D., & Network, C. P. S. (2011). Institutional practice and outcome variation in the management of congenital diaphragmatic hernia and gastroschisis in Canada: a report from the Canadian Pediatric Surgery Network. *Journal of pediatric surgery*, *46*(5), 801-807.

Christison-Lagay, E.R., Kelleher, C.M., & Langer, J.C. (2011). Neonatal abdominal wall defects. *Seminars in Fetal & Neonatal Medicine, 16,* 164-172.

Cowan, K. N., Puligandla, P. S., Laberge, J. M., Skarsgard, E. D., Bouchard, S., Yanchar, N., ... & Network, T. C. P. S. (2012). The gastroschisis prognostic score: reliable outcome prediction in gastroschisis. *Journal of pediatric surgery*, *47*(6), 1111-1117.

Emami, C. N., Youssef, F., Baird, R. J., Laberge, J. M., Skarsgard, E. D., Puligandla, P. S., & Network, T. C. P. S. (2015). A risk-stratified comparison of fascial versus flap closure techniques on the early outcomes of infants with gastroschisis. *Journal of pediatric surgery*, *50*(1), 102-106.

Kelly, K.B. & Pnsky, T.A. (2013) Pediatric Abdominal Wall Defects. *Surgical Clinics of North America, 93,* 1255-1267.

Ledbetter, D.J. (2012). Congenital Abdominal Wall Defects and Reconstruction in Pediatric Surgery: Gastroschisis and Omphalacele. *Surgical Clinics of North America,* 713-727.

Lund, C.H., Bauer, K., & Berrios, M. (2006). Gastroschisis: Incidence, Complications, and clinical management in the neonatal intensive care unit. *Journal of Perinatal Neonatal Nursing, 21(1),* 63-68.

Razmus, I. S. (2011). Assessment and management of children with abdominal wall defects. *Journal of Wound Ostomy & Continence Nursing*, *38*(1), 22-26.

Sandler, A., Lawrence, J., Meehan, J., Phearman, L., & Soper, R. (2004). A “plastic” sutureless abdominal wall closure in gastroschisis. *Journal of pediatric surgery*, *39*(5), 738-741.

Skarsgard, E. D., Claydon, J., Bouchard, S., Kim, P. C., Lee, S. K., Laberge, J. M., ... & Yanchar, N. (2008). Canadian Pediatric Surgical Network: a population-based pediatric surgery network and database for analyzing surgical birth defects. The first 100 cases of gastroschisis. *Journal of pediatric surgery*, *43*(1), 30-34.

Williams, T., Butler, R. & Sundem, T. (2003). Management of the infant with gastroschisis: a comprehensive review of the literature. *Newborn & Infant Nursing Reviews, 3(2),*