



Surgical Conditions Affecting Neonates in Scotland Managed Clinical Network

POSTNATAL MANAGEMENT GUIDELINES FOR BABIES WITH GASTROSCHISIS

NOTE

This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined based on all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

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This document has been prepared by NHS National Services Scotland (NSS) on behalf of the Surgical Conditions Affecting Neonates in Scotland (SCANS) Network. Accountable to Scottish Government, NSS works at the heart of the health service providing national strategic services to the rest of NHS Scotland and other public sector organisations to help them deliver their services more efficiently and effectively. SCANS is a collaboration of stakeholders involved in the care of babies with surgical conditions, who are supported by an NSS Programme Team to drive improvement across the care pathway.

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Management after birth of babies with Gastroschisis

These guidelines have been developed by the Steering Group of the Surgical Conditions Affecting Neonates in Scotland (SCANS) Managed Clinical Network. These recommendations are applicable to all healthcare professionals caring for babies with Gastroschisis.

The guidelines are underpinned by the following key principles:

1. Babies with gastroschisis should be managed on a surgical neonatal intensive care unit (NICU) with joint care provided by neonatologists and paediatric surgeons (1). For the purposes of these guidelines, the surgical NICUs are located in Glasgow (Royal Hospital for Children), Edinburgh (Simpson's Centre for Reproductive Health) and Aberdeen (Royal Aberdeen Maternity Hospital)
2. Network pathways and processes should be in place to ensure that;
 1. Where there is an antenatal diagnosis of gastroschisis, the parent(s) receive multi-disciplinary counselling involving fetal medicine, neonatology and paediatric surgery, ideally as a joint session
 2. Where there is an antenatal diagnosis of gastroschisis, delivery is planned in a maternity unit co-located with a surgical NICU.
 3. Where the baby is born in a non-surgical centre, referral to the surgical NICU is performed in a timely manner, ideally within 2 hours of birth or sooner. Referral should be via the **ScotSTAR emergency line 03333 990 222**, which will initiate a conference call
 4. Repatriation from the surgical NICU to the local hospital is facilitated as soon as possible when clinically appropriate (2)
3. Throughout this document we use the term parent to mean all parents, carers and legal guardians, and the term mother to mean all women and people who have given birth.

Contacts details for the three surgical NICUs can be found in Appendix 1 at the end of this guideline.

Gastroschisis: Background

Gastroschisis is a defect that occurs due to failure of normal embryological anterior abdominal wall closure. Bowel herniates through the defect, which is usually small and to the right of the umbilicus. The vast majority of gastroschisis are isolated anomalies, but around one in ten is associated with a bowel complication e.g. ischaemia, atresia or late onset necrotising enterocolitis (NEC).

Delivery room (DR) management

Routine delay of umbilical cord clamping (DCC) for at least 60 seconds is recommended in babies who are not compromised at the time of birth²⁻⁴. Gastroschisis itself is not considered a contra-indication to DCC. When cut, the umbilical cord should be left at least 15cm long.

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- Neonatal staff with appropriate training and competencies should attend the delivery
- Stabilise the baby in accordance with NLS guidance
- Wrap the bowel carefully in occlusive (plastic) wrapping or place baby in a plastic bag. This will provide protection and minimise evaporative heat and fluid losses - wet gauze **should not** be used
- Position the baby on their right side. This avoids traction on the blood vessels which supply the bowel and minimises the risk of cardiovascular instability
- Intubation is not routinely recommended and any decision to intubate should be based on NLS guidance rather than the presence of gastroschisis
- Apply routine DR monitoring (oxygen saturations ideally on the right hand, heart rate and temperature)
- Insert a large bore (8 to 10 Fr) nasogastric or orogastric tube to empty the stomach
- Inspect bowel for colour, evidence of damage or bleeding; if any is identified inform the surgical team immediately
- Transfer the baby to NICU for ongoing care when stable

Ongoing neonatal unit management

1. Monitoring and vascular access

Standard NICU monitoring should be used. Secure peripheral venous access should be established early in the infant's admission to NICU. As many infants will need several weeks of parental nutrition, early insertion of a percutaneous long line (PICC) is recommended

2. Analgesia and sedation

Monitoring of pain/sedation using an appropriate assessment tool should be part of routine care.

If analgesia/sedation is required this should be administered according to local guidance.

3. Refer/discuss with specialist centre

Once stabilised babies born out with one of the three regional surgical NICU should be discussed with the nearest specialist team as soon as possible after birth. A conference call involving ScotSTAR Neonatal Transport Service should be initiated to facilitate timely transfer.

4. Fluid balance

Intravenous fluid management should be guided by local practice. Babies with gastroschisis may initially have high gastric losses, and consideration should be given to replacing these if volumes in excess of 20ml/kg are aspirated, especially if accompanied by signs of hypovolaemia. Normal (0.9%) saline with additional potassium chloride (10mmol/500ml) is recommended as replacement fluid.

5. Antibiotics

Antibiotics are not routinely required unless there are other risk factors for, or clinical signs of sepsis.

6. Enteral feeding

Enteral feeding is usually delayed until after surgical closure of the gastroschisis. Breast milk is recommended as there are general lifelong benefits, as well as a possible reduction in the risk of necrotising enterocolitis. Mothers should receive appropriate lactation support to enable them to establish a milk supply whilst their baby is in nil by mouth. Early involvement of a specialist neonatal dietician is advised if there are issues with weight gain and growth.

7. Surgical review

Surgical review of a patient with gastroschisis should occur within four hours of delivery wherever possible. Initial surgical assessment should include contents of the defect, the colour of the bowel, the presence or otherwise of 'peel' and any obvious atresia or a more complex scenario such as a closing defect. These should all be recorded on a standardised operation note. A decision should then be made on the most appropriate method of closure of the defect. This should not be delayed as heat and fluid loss will continue which may compromise the infant.

8. Specialist review / investigations

All babies should have a thorough clinical examination and be plotted on an appropriate growth chart. Additional investigations are not routinely required based on a diagnosis of gastroschisis alone.

9. Surgery

Bedside suture-less primary closure or routine silo placement are both equally acceptable and the choice of closure method will be determined by individual surgeon preference and the condition of the patient. If it is felt a sutured fascial closure is required, this should be performed in theatre under appropriate anaesthesia. Both suture-less closure and silo application should be performed with adequate analgesia administered by appropriate neonatal staff. Gastric and rectal decompression can be performed to facilitate reduction of bowel into abdomen or sac.

a. Silo Application

A silo of an appropriate size should be selected and the internal area moistened with 10ml of saline to facilitate placement. The procedure should be performed in an aseptic technique as much as possible. Once placed, the silo should be secured to the incubator in as perpendicular a position as possible, with care taken that the baby does not slide up or down the bed space. The silo should be secured with minimal tension. Gauze swabs can be placed at the base of the silo to absorb fluid losses and allow them to be measured. The umbilical cord should be kept long and wrapped in a dressing which prevents wicking of moisture. Reductions should be commenced within 24 hours of

placement and a silo should not remain for longer than 5 days if possible. Twice daily reductions with appropriate analgesia and using umbilical tape are most effective. The bowel should be assessed on a twice daily basis by a member of the surgical team to confirm perfusion, colour and health of the bowel.

b. Suture-less Closure

Suture-less closure can either be performed primarily if the abdominal contents can be safely returned to the abdominal cavity or after removal of a silo. This can usually be performed under conscious sedation administered by the neonatal team. The bowel is placed fully into the abdomen and the umbilical cord is placed across the defect. Benzoin solution, steristrips and tegaderm are then used to secure the cord in place. This dressing should be left on for a minimum of 7 days if possible. A change of dressing, or the removal should be performed by a surgeon.

10. Post-operative Management

Gastric decompression should continue with appropriate nasogastric drainage. There is a risk of abdominal compartment syndrome after return of intestines to abdominal cavity; therefore, for at least the first 48 hours monitoring should include urine output, peripheral pulses, abdominal distension and comparison of the capillary refill of extremities.

Analgesia should be continued as required. An ongoing opiate requirement should trigger senior surgical review. Antibiotics should be discontinued 24 hours after closure unless culture positive or evidence of ongoing sepsis.

Early initiation of trophic feeding should be encouraged. This can be considered any time after closure but should have commenced within 48 hours after gastric output becomes non-bilious. Maternal breast milk should be recommended.

References

1. BAPM Service and Quality standards for provision of Neonatal Care in the UK, November 2022
2. Intrapartum Care for healthy women and babies. NICE guideline CG190, updated 2022, recommendation 1.14.14
3. RCOG Scientific Impact Paper 14, Clamping of the Umbilical Cord and Placental Transfusion, February 2015
4. Newborn Resuscitation and support of transition of infants at birth Guidelines, Resuscitation Council UK, 2021
5. Impact of Multidisciplinary Standardization of Care for Gastroschisis: Treatment, Outcomes, and Cost; *Journal of Pediatric Surgery* 53, 892, 2018
6. Children's Hospital of Orange County Gastroschisis Clinical Guideline, March 2018

Appendix 1: Contact details for 3 Surgical Units in Scotland

- **Glasgow**

Royal Hospital for Children: Receiving consultant neonatologist 0141 452 2114 and / or on call consultant paediatric surgeon via switchboard 0141 201 0000

- **Edinburgh**

On call paediatric surgical registrar or consultant paediatric surgeon via switchboard 0131 536 0000 and on call consultant neonatologist via same number

- **Aberdeen**

On call consultant neonatologist and on call consultant paediatric surgeon via switchboard 0845 456 6000. Alternatively contact the neonatal unit directly on 01224 552602.

Appendix 2: Transport Recommendations

Transfer of the infant with gastroschisis

Infants with gastroschisis born in a non-surgical centre will require an emergency transfer to a surgical unit for assessment and on-going management. These patients are at a high risk of deterioration and must be managed with caution.

Referral Process

Infants presenting with gastroschisis require transfer to the neonatal surgical regional centres in either Aberdeen, Edinburgh or Glasgow.

- Every effort should be made to ensure that these infants deliver in the appropriate surgical centre. Where that is not possible, planning should begin on presentation to their local centre for prompt transfer after birth.
- Referral is made by calling the **ScotSTAR emergency number 03333 990 222** and the relevant surgical and neonatal teams should be brought into the call. If the baby has been delivered, dispatch of the transport team should not be delayed by difficulties in bringing others onto the conference call. The call should be made before birth wherever possible, to allow confirmation of cot destination and immediate stabilisation plans to be made without delaying transfer.
- Referrals of these infants should be triaged by the on-call neonatal transport consultant and the team dispatched accordingly.

Transfer Considerations

- Follow the Delivery room management on page two of this guideline
- Leave the NG tube on free drainage and aspirate regularly. Close monitoring/documentation of output is necessary as these can be large and persistent in these infants. Losses should be replaced when $>20\text{mls/kg/day}$ in a well perfused infant. If replacing losses please use 0.9% sodium chloride with 10 millimoles of potassium per 500ml bag.
- Secure 2 points of IV access. Avoid the umbilical route in babies with gastroschisis.
- Infants should be **nursed on right side** to reduce tension on hepatic vessels
- IV fluids/ medications should be in 50ml syringes in preparation for transfer.
- Analgesia or sedation needs to be considered prior to transfer and handling of the baby. If felt to be needed IV paracetamol should be used in the first instance. It is likely that baby will need further pain relief in preparation for silo application upon arrival at the receiving centre.
- Ensure maximal interventions in place to minimise heat and fluid loss.
- Ensure the guidance of plastic wrap has been followed (see below).
- Keeping incubator doors closed and utilise heat shields when doors are open.
- Place the baby with the wrapped defect into a plastic bag especially for transfer into transport incubator
- Weigh nappies to allow adequate measurement of fluid balance.
- Ongoing frequent assessment for signs of hypovolaemia and hypothermia and address promptly.

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- If persistent acidosis, be sure to check the lactate, chloride and bicarbonate with each blood gas. In these infants it is common for an acidosis to be driven by high chloride following fluid resuscitation rather than a metabolic acidosis from hypo-perfusion.
- Prepare fluid boluses prior to departing from referral unit to deliver during the journey.

Positioning

Positioning of the infant will be key to optimise perfusion of the bowel, and to optimise visualisation of the bowel during the transfer. **The baby should be nursed on their right side** to reduce traction on hepatic and intestinal blood vessels. Lights should be on in ambulance/incubator for journey to allow good visualisation of the bowel with assessment throughout. Particular attention should be paid during loading and unloading as this is when there is considerable risk from movement. It is imperative to clearly document the appearance and size of the defect before during and on completion of the transfer.



- Bowel must be carefully assessed for signs of ischaemia or discolouration every 15 minutes and documented. Any signs of ischaemia or discolouration needs to be addressed promptly.
 - Observe for any kinks or twists of the bowel
 - Position the infant laterally and support the bowel
 - Assess the size of the defect – if this is small then particular caution will be needed. If discolouration / ischaemia develops the surgical team should be informed so that they can prepare for the patient arrival on NICU, or rarely, prepare for a transfer straight to theatre.

Parents

Parents need to be aware that there may be the need to expedite surgical review / surgical treatment on arrival in the receiving unit, and depending on the time-frames there is a chance that they may not be present when this happens.

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Suspicion of Ischaemic Bowel

The appearance of discoloured or ischaemic bowel makes the transfer more emergent. On these occasions, priority must be given to rapidly facilitating transfer of the infant to the transport incubator followed by rapid transfer to the destination hospital. Communication with the surgical team receiving the baby is imperative for any significant clinical change.

Appendix 3: SCANS Steering Group Membership

Claire Adamson	Clinical Nurse Manager	NHS Lothian
James Andrews	Consultant Paediatric & Neonatal Surgeon	NHS Greater Glasgow & Clyde
Shona Cowan	Consultant Obstetrician	NHS Lothian
Paul Cullis	Consultant Paediatric & Neonatal Surgeon	NHS Lothian
Janice Gibson	Consultant Obstetrician	NHS Greater Glasgow & Clyde
Lorna Hood	Nurse Consultant	NHS Forth Valley
Suzanne Krosnar	Consultant, Theatre and Anaesthetics	NHS Lothian
Pamela Lamont	Fetal Medicine Midwife	NHS Lothian
Jacinta Leonard	Staff Nurse, Critical Care	NHS Lothian
Andrew MacLaren	Consultant Neonatologist	NHS Greater Glasgow & Clyde & ScotSTAR
Carsten Mandt	Senior Programme Manager, SPN	NHS NSS
Carolyn McConnell	Neonatal Nurse	NHS Greater Glasgow & Clyde
Elaine McCover	Sonographer	NHS Grampian
Lynette McKenzie	Clinical Nurse Manager	NHS Fife
Vix Monnelly	Consultant Neonatologist	NHS Lothian
Inass Osman	Consultant Obstetrician	NHS Ayrshire & Arran
Neil Patel	Consultant Neonatologist	NHS Greater Glasgow & Clyde
Yatin Patel	Consultant Paediatric Surgeon	NHS Grampian
Rachel Richmond	Patient Representative	CDHUK
Lauren Shaw	Consultant Neonatologist	NHS Tayside
Judith Simpson	Consultant Neonatologist	NHS Greater Glasgow & Clyde
Ben Stenson	Consultant Neonatologist	NHS Lothian
Lisa Steven	Consultant Paediatric Surgeon	NHS Tayside
Gregor Walker	Consultant Paediatric & Neonatal Surgeon	NHS Greater Glasgow & Clyde