

Curiositas (Neonatology)

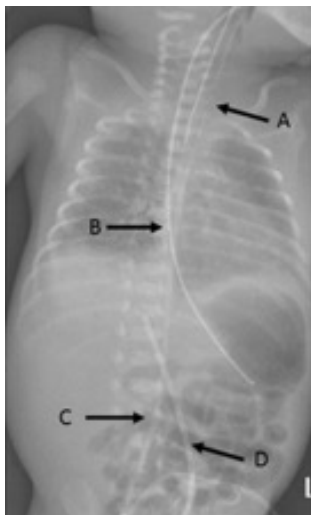
UNDERGRADUATE QUIZ



1. What abnormalities are seen on the x-ray and what is the underlying diagnosis?
2. How is this condition managed?
3. What is the prognosis?

Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

POSTGRADUATE QUIZ



1. What lines/tubes are noted on this x-ray of a preterm neonate?
2. Where should the tip of each lie when correctly sited?
3. Which requires adjustment in this particular case?

Dr David Cummins (ST5, Antrim Area Hospital), Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

HISTORICAL QUIZ



1. Who is the subject of this portrait?
2. What role did he play in the development of treatment for respiratory distress syndrome in preterm neonates?
3. What is his connection to the artist?

Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital.)

(Permission to use portrait provided by Dr David Sweet, the artist)

AND FINALLY...



1. Can you identify this logo?
2. What type of chart is seen within the logo?
3. What is the link between this logo and neonatology?

Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

ANSWERS See overleaf

CONSIDER CONTRIBUTING TO CURIOSITAS?

Please refer to 'Curiositas: Guidelines for contributors' <http://www.ums.ac.uk/curiositas.html> and email umj@qub.ac.uk with your ideas and submissions.



Curiositas: Answers

UNDERGRADUATE QUIZ

1. There is bowel filling the left hemithorax and obscuring the cardiomedial contour. This is consistent with a left sided congenital diaphragmatic hernia.
2. Respiratory stabilisation before surgery is crucial. Neonates with this condition should be intubated at birth. A nasogastric tube should be passed to decompress the stomach and bowel¹. "Gentle ventilation" should be employed to minimise barotrauma to the lungs although elective high frequency oscillation is not required². Nitric oxide may be utilised in cases of pulmonary hypertension, although evidence for benefit in diaphragmatic hernia is lacking³. Extracorporeal membrane oxygenation (ECMO) involves the use of an external gas exchange circuit, preventing further insult to the lungs, however careful selection of suitable cases is required as ECMO cannot reverse severe pulmonary hypoplasia⁴. Surgical intervention to reduce the herniated gastric organs back into the abdomen and close the diaphragmatic orifice is the definitive intervention but can only be undertaken when the baby has been adequately stabilised from a respiratory perspective^{1,2}.
3. Congenital diaphragmatic hernia is associated with a high degree of morbidity and mortality. A recent study in the United Kingdom and Ireland showed that 16% of neonates did not survive to surgery (other studies suggest that mortality rates range from 10-30%). Post-operative 30-day survival was 98% in those babies that had been adequately stabilised pre-surgery. Factors leading to a worse prognosis included those requiring inotropic support, those that were diagnosed antenatally and female infants⁵.

1. Kumar VHS. (2015) *Indian J Surg.* 77(4): 313-321.
2. Snoek KG *et al.* (2016) *Ann Surg.* 263(5): 867-74.
3. Barrington KJ *et al.* (2017) *Cochrane Database Syst Rev.* 1:CD000399.
4. Mugford M *et al.* (2008) *Cochrane Database Syst Rev.* 3: CD001340.
5. Long A. *et al.* (2018) *Arch Dis Child Fetal Neonatal Ed.* doi: 10.1136/archdischild-2017-313933.

Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

POSTGRADUATE QUIZ

1. A = Endotracheal Tube; B = Orogastric or Nasogastric Tube; C = Umbilical Arterial Catheter (UAC); D = Umbilical Venous Catheter (UVC).
2. The tip of a correctly inserted ET tube should be projected over the level of T1-T3 on a chest x-ray above the level of the carina¹. The tip of an appropriately sited orogastric or nasogastric tube should be projected over the stomach bubble below the level of the diaphragm¹. Umbilical arterial catheters can be used to gain relatively easy arterial access in neonates. Before insertion, the distance between the umbilicus and shoulder tip should be measured. The following table can be used to calculate the distance to which the UAC should be inserted:

Shoulder-Umbilicus Length (cm)	Insertion Length (cm)
8	10
10	12
12	15
14	18
16	20
18	22

An x-ray should be used to confirm the position after insertion. A UAC can be distinguished from a UVC as it will first descend toward the pelvic bone before turning upwards as it enters the

iliac artery before finally lying to the left of the spine. A high UAC should lie at the level of the diaphragm (T6-T10) and a low UAC at the level of L3-L5. It is important that it is not positioned at the level of L1 opposite the origin of the renal arteries¹. The length to which a UVC should be inserted can be determined by measuring the distance between the umbilicus and xiphisternum. Ideally the tip should be projected near the level of the diaphragm. Care should be taken to ensure it does not overlie the liver shadow¹.

3. The tip of the ET tube is at T2-3 and is appropriately sited. The tip of the OG tube is in the stomach. The tip of the UVC is just slightly low at the level of T11. However, the tip of the UAC is too high at T4 and should be retracted.

1. Neonatal Handbook (2017). Royal Jubilee Maternity Service, Belfast, Northern Ireland.

HISTORICAL QUIZ

1. The subject of the portrait is Professor Henry Halliday who worked as a consultant neonatologist in the Royal Jubilee Maternity Hospital.
2. Respiratory distress syndrome (RDS), previously known as hyaline membrane disease, occurs almost exclusively in preterm neonates. It arises from surfactant deficiency secondary to lung immaturity. Surfactant is produced by type 2 pneumocytes within the lungs and serves to reduce the surface tension of pulmonary fluids. In the past, RDS was associated with a high mortality. However, in the 1980s, trials focusing on the use of animal derived surfactants revolutionised neonatal respiratory care. Poracatant alfa, a porcine surfactant developed in Sweden is now the world's top selling surfactant. Professor Halliday was a key figure in the early clinical trials of poracatant alfa and the first baby to receive surfactant outside of Sweden was in Belfast in the mid 1980s^{1,2}.
3. The portrait was painted by Dr David Sweet who is a consultant neonatologist trained by Professor Halliday. He has been involved in clinical trials of a new synthetic surfactant.

1. Halliday HL. (2017) *J Paediatr Child Health* 53: 327-332.
2. Curstedt T *et al.* (2015) *Neonatology* 107: 321-329.

AND FINALLY...

1. This is the logo for Cochrane, a non-profit organisation dedicated to reviewing research in order to facilitate evidence-based medicine. Cochrane was founded in 1993 as the Cochrane Collaboration to provide systematic reviews of current evidence.
2. The chart within the logo is a forest plot, often used to summarise a meta-analysis. The y-axis typically shows the name of the studies whilst the x-axis usually represents the odds ratio or a similar measure of effect. The vertical line represents the line of null effect, where there is no difference between the intervention being assessed and that which it is compared against. Each horizontal line represents a study asking the same clinical question, and represents the 95% confidence intervals of each result. There is often a box included on the line which corresponds to study size. The diamond represents the point estimate and confidence intervals of all the studies combined.
3. The Cochrane logo is a simplified version of a full forest plot showing a meta-analysis of antenatal corticosteroid administration prior to premature labour¹. This analysis was influential in increasing the use of antenatal steroids given to mothers expected to deliver prematurely with the aim of accelerating foetal lung maturation. The current Cochrane review supports Crowley *et al.*'s original work from 1990^{1,2}, and the use of steroids remains the gold standard in expected preterm delivery.

1. Roberts D *et al.* (2017) *Cochrane Database Syst Rev.* 3: CD004454.
2. Crowley P *et al.* (1990) *Brit J Obstet Gynaec.* 97: 11-25.

(Permission to use logo obtained from Cochrane)



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