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DR. PRADEEP KUMAR DEBATA

Professor
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President NNF Delhi

Dear NNF Delhi Members
Wish you all a happy and healthy new year on behalf of NNF Delhi. May this year bring new accolades to our most loved NNF Delhi branch.

It's a feeling of pride that we are coming with our new edition of NeoClips (Neonatal Clinical Practice) for the 2nd year. In this occasion, I am feeling privileged to congratulate our Editorial Board Members, chaired by Dr. T J Antony and our Editor in chief Dr. Naveen Parkash Gupta, who are working tirelessly, to make each edition of NeoClips to see the light.

NeoClips is the platform for the Neonatologist to publish their studies, review articles and their clinical experience as case reports which help adding to the current knowledge. I am thankful to the authors who are contributing with their research works for publication and request all our Esteemed Members to contribute their research works and experience in a big way to enrich it further.

We all, as Neonatologists, are contributing towards the better survival of neonates. Many national and international programs are being launched to decrease neonatal mortality and we are approaching our set target by reducing the deaths among extremely preterm and asphyxiated neonates. Is this enough? The mere survival of neonates is not the solution. I feel we have to rethink our current strategy not only to decrease neonatal mortality but also to have the intact survival of our children. In this year of 2023, let us all focus on the intact survival of neonates rather than just decreasing Neonatal mortality.
With Regards

Dr. Pradeep Kumar Debata
President, NNF Delhi

From Secretary's Pen

DR KUMAR ANKUR

Secretary, NNF Delhi

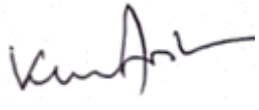
Dear friends,

Warm greetings from National Neonatology Forum, Delhi!

It gives me immense happiness to see the success of NNF Delhi's monthly E-Bulletin launched in February 2022 with the name 'NeoClips' (Neonatal Clinical Practice). Every month it's getting better & better. And credit goes to the Chief editor Dr Naveen Gupta & his exceptional team. Each system is covered separately in the OSCE section. This should be useful for our Neonatal Fellows/Residents and postgraduates. In the present issue, we have covered a review article on necrotising enterocolitis which is a life-threatening condition for premature neonates. Some interesting cases like epidermolysis bullosa and tachyarrhythmia in neonate has been covered in this edition.

We are requesting all the esteemed members to contribute to these E-bulletins. We shall be giving the due credits to all the contributors.

We eagerly look forward to your feedback and hope to give you an experience that you will cherish forever!



Dr. Kumar Ankur
Secretary, NNF Delhi

Editor's Desk

DR NAVEEN PARKASH GUPTA

Chief Editor, Neo Clips

Dear Friends,

Greetings from the NeoClips team.

As Editor, I would like to start by thanking the editorial team for the effort and the authors for their contribution to this and previous issues.

We have covered some interesting topics in the present issue.

The case report covers an interesting case of Multisystem inflammatory disorder in newborns post covid.

Necrotizing enterocolitis (NEC) is a challenging and potentially life-threatening condition for premature neonates. Management of NEC is covered in the review section.

An interesting case of epidermolysis bullosa has been covered in the picture of the month.
The image section describes a case of tachyarrhythmia in a neonate with duct-dependent cyanotic heart disease.

This issue OSCE is on a mixed bag which is having few interesting questions.

We hope that you will enjoy reading this issue. Please share your feedback with us. It will help us improve the journal.

Dr Naveen Parkash Gupta

Neonate with Post Covid Multi-system Inflamntory Syndrome

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Introduction:

Fever is a common problem in neonates and may generate significant parental anxiety. It is defined as a rectal temperature of ≥ 38°C (100.4°F). It may be because of environmental causes or may suggest an underlying infection ranging from mild viral infection to invasive bacterial infection. It can sometimes be a manifestation of post covid multisystem inflammatory syndrome in neonates (MIS-N). MIS-N has been increasingly reported worldwide with the spread of Coronavirus Disease 2019 (COVID-19) infection (1,6). The exact pathogenesis for MIS-N remains unclear. Virus-induced post-infective immune dysregulation plays an important role (2).

Case :

Late preterm (34 weeks) appropriate for gestational age female baby was born by normal vaginal delivery. The mother, a 26-year-old primigravida, was Covid positive in the third trimester but was Covid-negative at the time of delivery. Hisotry of leaking was present for 14 hours before birth. There were no other antenatal risk factors present. The baby's birth weight was 2450 gms. She required positive pressure breaths after the initial steps in view of a low heart rate(<100/min) following which she was shifted to the NICU on nasal CPAP. Her APGARS were recorded as 6 and 8 at one and 5 minutes (on support).

She was treated as a case of transient tachypnea of the newborn (TTN), received nasal CPAP, followed by HHHFNC for 2 days. She was shifted to room air and was discharged on day 4 of life.

The baby was readmitted on the 12th day of life in view of fever, decreased activity and intermittent groaning for 2 days. On examination, she was febrile, tachypneic and intermittently groaning. The baby was less responsive to stimuli. Fever with encephalopathy was considered and investigations were sent accordingly. She was started on HHHFNC in view of increased work of breathing. Antibiotics (Meropenem, Vancomycin) were started after sending a sepsis workup. The Sepsis screen was positive (CRP 39 mg/L, TLC 22000/cmm with neutrophilic predominance). Lumbar puncture was traumatic tap (twice at 48 hours interval). The fever persisted even after 48 hours of antibiotics and there was a rising CRP (97 after 48 hours of admission). So MIS-N was considered and covid antibody and inflammatory markers were sent. Covid antibody was positive (202 U/ml). Her CRP, ESR, D-dimer, Procalcitonin, Ferritin and Fibrinogen were raised but her LDH and triglycerides were normal (Table 1)

She was given IVIG 2 gms/kg over 48 hours. She also received steroids (IV methylprednisolone for first 3 days followed by oral prednisolone for 7 days).

Baby showed improvement in form of resolution of fever after 72 hours and decrease in inflammatory markers (CRP and procalcitonin) over next few days. Antibiotics were given for total of 7 days. Echocardiography, ultrasound cranium and abdomen were normal. Baby was discharged home after 9 days of hospital stay.

Discussion

Multisystem inflammatory syndrome in neonates (MIS N) is rare, unlike Pediatric multisystem inflammatory syndrome (PMIS) or MIS C. PMIS is a post-infectious inflammatory condition associated

with abnormal immune function, left ventricular cardiac dysfunction, coronary artery aneurysms, atrioventricular block and clinical deterioration with multiorgan involvement. Children of the age group 5-13 years are commonly affected. Post covid, in the initial year, no cases of MIS N were described in the literature. However, more recently this syndrome has been increasingly recognized in neonates. MIS N occurs secondary to maternal Covid infection during pregnancy [2]. MIS N usually presents in first week of life though it may present later during the first 28 days of life.

Given that the typical gap between signs and symptoms of COVID-19 and MIS-C presentation is 27 days (interquartile range, 21–36 days) in older children, a presentation with multisystem inflammatory syndrome within the first week

after birth could be consistent with MIS-N if maternal infection occurred 1–5 weeks prior to delivery and resulted in fetal infection or exposure to antibodies and cytokines (Fig. 2). With MIS-N, most neonates had multisystem involvement, elevated inflammatory markers with positive titers of IgG-SARS-CoV-2. The diagnostic criteria for MIS during the neonatal period (MIS-N) are controversial and evolving. Following are proposed criteria taken from Pawar et al (3).

Table 3. Proposed inclusion criteria for neonatal multisystem inflammatory syndrome (MIS-N) secondary to maternal SARS-CoV-2 exposure or infection.

(1) Age - < 28 days at time of presentation

(2) Laboratory or epidemiologic evidence of SARS-CoV-2 infection in the mother

- Positive SARS-CoV-2 testing by RT-PCR, serology (IgG or IgM—and not secondary to immunization), or antigen during pregnancy OR
- Symptoms consistent with SARS-CoV-2 infection during pregnancy OR
- COVID-19 exposure during pregnancy with a confirmed case of SARS-CoV-2 infection
- Serological evidence (positive IgG specific to SARS-CoV-2 but not IgM) in the neonate (and not secondary to maternal immunization)

(3) Clinical criteria (At least 2 should be present)

a. Rash or bilateral non-purulent conjunctivitis or mucocutaneous inflammation signs (oral, hands, or feet)

b. Hypotension or shock

c. Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NTproBNP)

d. Gastrointestinal symptoms resembling necrotising enterocolitis

(4) Laboratory evidence of inflammation

One or more of the following: an elevated C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, procalcitonin, D-dimer, ferritin, lactic acid dehydrogenase (LDH), or interleukin 6 (IL-6), elevated neutrophils, reduced lymphocytes, and low albumin

(5) No alternative diagnosis (viral or bacterial sepsis; birth asphyxia; maternal lupus etc.) that can explain the clinical features.

Management – Steroids and IVIG can be used. For cases requiring hospitalization, steroids are used for mild illness and IVIG is used in addition to steroids for moderate/ severe illness such as cardiac ventricular dysfunction, or for patients meeting diagnostic criteria for KD or with coronary artery dilation or aneurysms.

Discharge is recommended once a patient has been afebrile for 48 h with improving inflammatory markers and resolving multisystem organ involvement.

Outcome – There is limited data. Few case series report 10% incidence of mortality presumably from MIS-N due to cardiac dysfunction/shock, multiorgan failure, or NEC (2-5).

Key points:

1. MIS -N is not common but can be associated with high morbidity and mortality.
2. MIS -N is usually secondary to maternal Covid infection.
3. Supportive care is the key to management
4. In hospitalized neonates, Steroids and IVIG can be used depending upon severity.

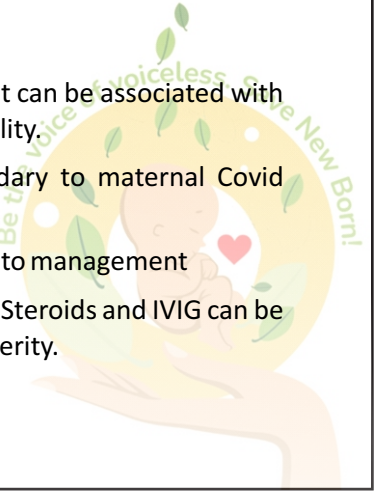

Table 1: Investigations

Investigations	Day of admission (DOA) - 1	(DOA – 3)	(DOA – 4)
HB (gm/dl)	16.7	15.8	12.8
TLC / DLC	22.6(80/14)	11.6(61/34)	8.1(30/59)
Bil/ SGOT/ SGPT/Alb	7.8/31.5/16.8/3.3		
Urea/creatinine	17.3/0.3		
Na/K/Ca/Phos	129/5.6/9.2/6.2	137/4.8	
CRP/ESR	39.11/55(10/7/22)	97	101/80
Pt/INR	13.1/1.12	11.2/1	
APTT	44.7	39	
PCT	9.163	1.395	
D-Dimer(0-250)	578	699	
Ferritin(11-300)	397.5	442.9	
LDH (225-600)	265		
Fibrinogen(200-400)	694	678	
Triglyceride(0-200)	140		
Covid antibody(IgG) (U/ml)	202		

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Necrotising Enterocolitis - Clinical Overview

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INTRODUCTION

Necrotizing enterocolitis (NEC) is the most common gastrointestinal surgical emergency in the neonatal intensive care unit (NICU) with very high morbidity and mortality. Mortality from NEC may sometimes reach 50% in patients who require surgery.(1,2)

EPIDEMIOLOGY

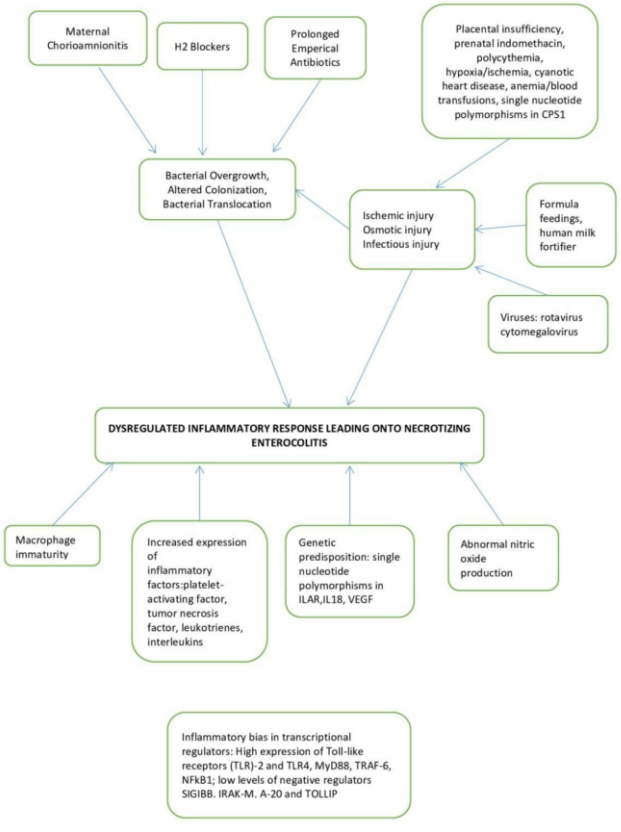
Factors that promote abnormal bacterial colonization and overgrowth along with gut ischemia with a history of enteral formula feeding usually precedes the onset of NEC. Multiple cohort studies have reported the incidence of NEC to vary from 2 to 13% in preterm and Very Low Birth Weight (VLBW) infants.(3) The development of necrotizing enterocolitis changes according to geographical and ethnic distribution, with lower frequencies in Japan, USA, Switzerland, and Austria, and higher frequencies in Northern America, Hongkong and Ireland.(4) The overall mortality rate for necrotizing enterocolitis has remained high 15-30%, even after advanced neonatal care.(5)

Age of onset of NEC varies with gestational age as depicted in Table 1.

Table 1

Gestational age	Age at onset
<30 weeks	20.2 days
31-33 weeks	13.8 days
>34 weeks	5.4 days
Full term	1–3 days

PATHOPHYSIOLOGY (6-8)



CLINICAL PRESENTATION

NEC typically presents with abdominal distension, blood in the stools and bile stained aspirates/vomits. A high index of suspicion based on history and physical findings is imperative for early diagnosis and prompt treatment.

General/systemic symptoms

- Lethargy
- Temperature instability,
- Feed tolerance
- apnoeic episodes,
- Shock,
- Bradycardia (slowing of heart rate),
- Poor feeding,

- Decreased peripheral perfusion
- Acidosis, oliguria, bleeding diathesis, respiratory failure and collapse.

Abdominal /enteric signs.

- Early gastrointestinal findings may be non-specific
- Abdominal distension or tenderness
- Gastric aspirates (>50% feeding residuals)
- Vomiting (of bilious, bloody, or both)
- Ileus (decreased or absent bowel sounds)
- Haematochezia (grossly bloody stools)
- Abdominal wall erythema or induration,
- Persistent localized abdominal mass, or ascites
- Abdominal Guarding

DIAGNOSIS

History and physical examination

- Maternal risk factors - Chorioamnionitis, h/o not receiving antenatal steroids, doppler changes, smoking, substance abuse etc
- Birth history like hypoxic/asphyxia insult.
- Natal history like stormy neonatal course, prematurity, IUGR, sepsis, bottle feeding, etc. should raise suspicion in a symptomatic neonate.
- Clinical features of both systemic signs and abdominal local signs/symptoms as discussed previously, clinches the diagnosis in the majority of cases.

Diagnostic tools

1. *Severe refractory hyponatremia, persistent metabolic acidosis and thrombocytopenia* comprise the **classic metabolic triad** in NEC.
2. *Hematological/ laboratory investigations*- Complete blood count- There may be anemia, neutropenia with a shift to left and thrombocytopenia
3. *Arterial blood gas analysis* -metabolic acidosis,
4. Serum electrolytes- hyponatremia,
5. Occult blood in stool.
6. *Blood culture* (positive in 40% cases)
7. CRP is usually raised.
8. *Radiological investigation*- AXR (abdominal x-ray), usually AP but should consider lateral decubitus if worried about perforation. Pneumatosis intestinalis is pathognomonic of NEC. Also, bowel wall edema, portal venous gas, gasless abdomen (indicating ascites) can be diagnosed on radiography.
9. *Ultrasound/doppler examination*- For detecting free fluid in the peritoneum, bowel wall thickness, and bowel wall perfusion, pneumatosis intestinalis and portal vein gas.

Biomarkers

Fecal biomarkers

Fecal calprotectin Increased fecal calprotectin is indicative of the increased presence of neutrophils in the intestinal epithelium suggestive of intestinal inflammation. (9) A cut-off value (480µg/g) of fecal calprotectin has a maximum sum of diagnostic sensitivity and specificity (sensitivity 100% and specificity 84.6%. (10)

Microbiota- Microbial composition of stool is different between NEC and non-NEC patients with an increase of Proteobacteria among NEC infants. There was an increase in the total bacterial count (9.8-fold) in affected newborns 24 hours before the occurrence of clinical manifestations of NEC primarily due to proliferation of E. coli species (21.6-fold).(11)

Fecal Volatile Organic Compounds (VOCs). Role is still under research, initial research suggests a quantitative relation of VOCs with the NEC severity.

Urine Biomarkers (12)

1. Intestinal Fatty Acid-Binding Protein (I-FABP). I-FABP is one of the most widely studied markers. Due to its rich source of peptides and proteins, urine may contain many biomarkers that can be easily and noninvasively collected.
2. Serum Amyloid A (SAA)
3. Prostaglandin E2 Major Urinary Metabolite (PGE- MUM).
4. Urinary Proteins- claudin-3

Biomarkers in Serum (12)

1. I-FABP. I-FABP exists exclusively in epithelial cells in the mucosal layer of the small intestine. Damage of intestinal epithelial cells causes the release of I-FABP proteins into the bloodstream.
2. Fibrinogen-γ Dimers
3. Ischemia-Modified Albumin (IMA)
4. Inter-Alpha Inhibitor Protein (IaIp)
5. Platelet-activating facto
6. Anaphylatoxins

Biomarkers associated with systemic inflammation: Increased C-reactive protein (CRP), white cell count, thrombocytopenia and high procalcitonin. Elevated

CRP and procalcitonin have been reported to be highly specific for NEC diagnosis in some studies.(12)

Other non-invasive markers

1. *Near-Infrared Spectroscopy (NIRS)*. Intestinal ischemia may be a causative factor of NEC that results in low regional tissue oxygen saturation (rSO2). NIRS measures rSO2 noninvasively.(10)
2. *Doppler Flow Velocity*. Doppler ultrasonography and flowmetry of the superior mesenteric arteries can measure the peak systolic velocity (PSV), end-diastolic velocity (EDV), resistivity index (RI), and pulsatility index (PI)

PREVENTION

Table 2 (13-22) summarizes the preventive strategies for NEC

Preventive strategy	Type of evidence	RR, CI evidence, recommendation levels	Grade of recommendation, conclusions	Authors'
1.Antenatal corticosteroids	Cochrane database systematic review 24	RR, 0. 50; 95% CI 0.32–0. 78; participants = 4702; studies = 10	Moderate-quality evidence	Evidence supports use of a single course of antenatal corticosteroids in women at risk of preterm birth for NEC prevention
2.Enteral probiotics	Cochrane database systematic review 22	Significantly reduced the incidence of severe NEC (stage II or more); typical RR, 0.43; 95% CI, 0.33–0.56; 20 studies, 5529 infants; mortality (typical RR, 0.65; 95% CI, 0.52–0.81)	Moderate-quality evidence	Evidence supports use of enteral supplementation of probiotics for prevention of severe NEC and all-cause mortality in preterm infants
3. Human breast milk	Cochrane database systematic review, 18 meta-analysis	Higher risk in formula-fed group: RR, 1.87; 95% CI, 1.23–2.85; I2 = 14%; nine trials, 1675 participants; RR, 0.03; 95% CI, 0.01–0.05; NNTH, 33; 95% CI, 20–100	Moderate-quality evidence	Evidence supports use of human breast milk or donor milk over formula milk for NEC prevention
4. Standardized feeding regimen	Systematic review	Meta-analysis of the six studies revealed a pooled RR of 0.13; 95% CI, 0.03–0.50)—i.e., introduction of a standardized feeding regimen reduced the incidence of NEC by 87%	Moderate-quality evidence	Evidence supports use of standardized feeding regimen whenever possible
5. Oral immunoglobulins	Randomized controlled trial	Not effective in reduction of NEC	Low-quality evidence	Not recommended
6. Arginine	Systematic review	Lower rate of NEC in group that received arginine compared with those given placebo (RR,0.38; 95% CI, 0.23–0.64	Low-quality evidence	Not routinely recommended
7. Glutamine	Systematic review	Not effective in reduction of NEC	No evidence	Not recommended

Preventive strategy	Type of evidence	RR, CI evidence, recommendation levels	Grade of recommendation, conclusions	Authors'
8. Enteral antibiotics	Retrospective study	Enteral antibiotic treatment leads to small reduction in NEC risk—RR, 0.47 (0.28–0.78); number needed to treat. 10 (6, 25). There was a statistically significant reduction in NEC-related deaths [RR, 0.32 (0.10–0.96); number needed to treat 14 (8, 100). However, concerns about increase in antimicrobial-resistant intestinal microbiota precludes routine use of this therapy	Very low-quality evidence	Not routinely recommended
9. Avoidance of prolonged antibiotic use	Retrospective studies	The use of prolonged initial empiric antibiotic (≥5 days' duration) started in the first 3 days of life associated with increased risk of NEC or death (61 vs. 51%).	Low-quality evidence	Not recommended to use routine empirical antibiotics
10. Avoidance of antacid use	Retrospective study	H2 blocker use associated with increased incidence of NEC; OR, 1.71; 95% CI, 1.34–2.19; *P* <.0001	Low-quality evidence	Avoid antacids in preterm babies.
11. Enteral lactoferrin	Systematic review	Oral lactoferrin prophylaxis alone compared with placebo—RR, 0.30; 95%, CI 0.12–0. 76) or in combination with a probiotic agent (RR, 0.04; 95% CI, 0.0–0.66)	Low-quality evidence	Not routinely recommended
12. Ibuprofen for PDA vs. indomethacin	Ohlsson et al., 2015	RR, 0.64 (0.45–0.93)	Moderate-quality evidence	Recommended
13. Oxygen saturation target levels lower [85–89%] vs. higher [91–95%] SpO_2	Askie et al., 2018 *	1.33 (1.10–1. 61)	Moderate-quality evidence	Recommended to use higher target saturation (91–95%)

Abbreviation: *CI,* confidence interval; *NNTH,* number need to treat for an additional harmful outcome; *NEC,* necrotizing enterocolitis; *OR,* odds ratio; *PDA*, patent ductus arteriosus; *RR,* relative risk; *SpO_2,* oxygen saturation.

* Source: Askie LM, Henderson-Smart DJ, Irwig L, Simpson JM. Oxygen-saturation targets and outcomes in extremely preterm infants. N Engl J Med. 2003 Sep 4;349(10):959-67. doi: 10.1056/NEJMoa023080. PMID: 12954744 .

Prematurity is the single greatest risk factor for NEC & avoidance of premature birth is the best way to prevent NEC.

- Because of the acute presentation of NEC, its rapid progression, and the lack of readily available screening tests, the most promising method of reducing NEC morbidity and mortality lies with prevention.
- Antenatal corticosteroids- In a meta-analysis, Roberts and Dalziel found that corticosteroids reduced the risk for NEC approximately by half (RR = 0.46, 95% CI: 0.29–0.74, 8 studies, N = 1675). Treating 32 mothers with steroids strongly reduces the incidence of 1 case of NEC.(15)

MANAGEMENT

MEDICAL

- Stop enteral feeds and insert NGT for gastric decompression.
- Volume-by- volume replacement of aspirates with N/2 saline.
- Start Total Parenteral nutrition.
- Start antibiotics depending on the recent antibiotic usage and antibiotic sensitivity pattern. 20-30% of patients with NEC have been reported to have a concomitant bacteremia.(23)
- Consider analgesia.
- Remove umbilical arterial or venous catheters, if any (to prevent ongoing mesenteric intestinal ischemia)
- Repeat blood investigations and AXR if clinical concerns persist. If signs and symptoms resolve, stop antibiotics after 48-72 hours and recommence feeds. (Stage 1)
- Circulatory support: If there are features of shock, appropriate management with normal saline bolus and inotropes. These babies have a high-volume requirement due to capillary leak syndrome.
- Stage II and III: Consider the need for early respiratory support by intubation and ventilation as increasing abdominal distension can cause diaphragmatic splinting. CPAP may worsen abdominal distension. Insert NGT for gastric decompression
- Correct electrolyte abnormalities, monitor urine output
- Check clotting, if abnormal and/or actively bleeding or DIC, consider FFP.
- Transfuse platelets if active bleeding, bloody aspirates, or platelet count < 25000.
- Maintain hemoglobin levels appropriate for gestational age and oxygen requirement based on transfusion guidelines. To prevent transfusion-related gut injury give irradiated or leucoreduced blood slowly. Feeds could be withheld temporarily.
- Monitor blood tests regularly ~12 hourly and blood gases/lactates ~ 4-6 hourly.
- Repeat the AXR if clinical deterioration.
- abdominal girth monitoring is recommended
- Consultation with a pediatric surgeon for further surgical intervention may be needed.
- When stabilized insert a percutaneous long line early as these infants will be NBM for many days and will require prolonged PN.
- If improving with medical management, continue antibiotics for 7-10 days and NBM for 10 days. (Stage 2)
- Start enteral feeds when the abdomen is soft, non-tender, non-distended with normal bowel sounds and no aspirates.

SURGERY

- Surgery 50% of neonates with confirmed or advanced disease will require surgical intervention.
- The one truly absolute indications for operative intervention are
  a. pneumoperitoneum
  b. presence of necrotic bowel wall
- Relative indications include
  1) diffuse pneumatosis intestinalis
  2) portal venous gas
  3) a fixed dilated loop of intestine
  4) clinical deterioration despite maximal medical therapy.
  5) Abdominal mass with obstruction
  6) Post-NEC strictures/adhesions
- Usually, a laparotomy is performed, however, some patients will be too sick for theatre and these patients may undergo peritoneal drainage.
- Laparotomy- The standard operation where

resection of gangrenous bowel and enterostomy formation or resection and primary anastomosis is done.

- Primary peritoneal drainage (PPD)- Consider PPD in ELBW neonates who are too unstable to undergo laparotomy or babies who are clinically unwell e.g. in shock and who are unfit for general anaesthesia.

PROGNOSIS AND COMPLICATIONS

Prognosis

Stage IIB and stage III NEC have a higher incidence of mortality (of over 50%). The overall mortality of NEC ranges from 20% to 40%, but can near100% in neonates with the most severe form of the disease.(5)

Short term or immediate complications

1) short-gut syndrome
2) total parenteral nutrition dependency
3) cholestatic liver disease related to total parenteral nutrition administration
4) malabsorption
5) line infections from chronic central venous access,
6) Intestinal Stricture leading to feeding intolerance (delayed complication)- Strictures occur in up to 35% of NEC survivors after recovery and reintroduction of enteral feeds. Although commonly it presents as feeding intolerance 2 to 3 weeks after starting of feeds, NEC associated strictures occur as late as 6 weeks.(24)

Long term complications

1) Neurodevelopmental delay-It has been proposed that bowel injury might initiate systemic inflammation potentially affecting the developing central nervous system (CNS). Patients with surgical necrotizing enterocolitis were more likely to have a mental developmental index or psychomotor developmental index < 70 compared to the control patients (n1= 1155, n2 = 2948). Laparotomy is associated with better neurodevelopmental outcomes and decreased mortality or NDI compared with peritoneal drainage.(25)
2) Growth failure
3) Chronic malabsorption

CLINICAL CHALLENGES / POINTS OF CONTENTION

Prematurity is the single greatest risk factor for NEC & avoidance of premature birth is the best way to prevent NEC

Precise etiopathogenesis remains elusive

Initial symptoms may be non-specific or the disease may have fulminant onset.

Surgical NEC has high morbidity and mortality. So early diagnosis and adoption of preventive strategies is imperative

Controversies in NEC exist with regards to risk factors like

Insufficient evidence regarding the timing of initiation and rate of increase of feeds in neonates especially in those with intrauterine growth restriction, also besides the osmolarity of feeds.

Umbilical catheter position does not affect the incidence of NEC.

Stopping of enteral feeding during blood transfusions might be protective against NEC.

For preterm babies, early dexamethasone in the first week increases the risk of gastrointestinal perforation.

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A Neonate with Skin lesions

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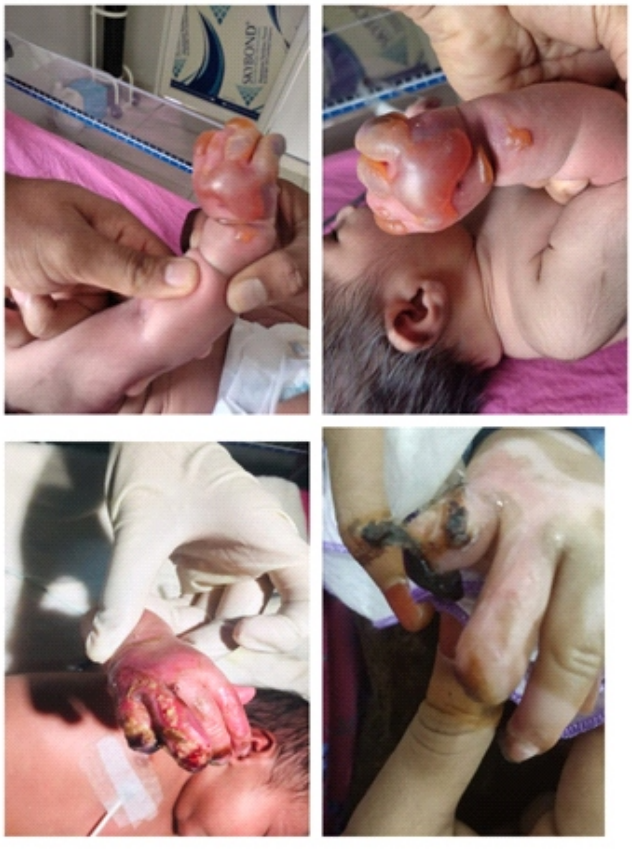

Clinical presentation Bullous skin lesions present since birth

Suspicion – Epidermolysis bullosa

Differential diagnosis of bullous lesions presenting at birth

1. Congenital or Inherited - Epidermolysis Bullosa, Ichthyosis bullosa, Incontinenta pigmenti, Ectodermal dysplasias, Cutis aplasia.
2. Infectious diseases like Herpes Simplex, Bullous impetigo, Staphylococcal Scalded Skin Syndrome, and other systemic conditions like Behcets disease.

Underlying pathology of epidermolysis bullosa

Type XVII collagen helps attach the epidermis to underlying layers of skin, making the skin strong and flexible. Mutations in the *COL17A1* gene prevent the normal formation of collagen XVII. As a result, the skin is less resistant to friction and minor trauma and blisters easily. Most *COL17A1* gene mutations cause Junctional epidermolysis bullosa (JEB) generalized intermediate, although a few individuals with mutations in this gene have had the more serious JEB generalized severe.

Investigations

1. Viewed under transmission electron microscopy (TEM) and/or immunofluorescent antibody/ antigen mapping.
2. Genetic testing – In our case, whole genome sequencing was positive for Homozygous ITGA6 NM_001316306.2 variant c.37delGp.Glu125fs*9 on Exon 5 which is likely pathogenic for the Junctional variant of Epidermolysis Bullosa associated with pyloric atresia, inherited as an autosomal recessive disorder.

Genetic testing is the preferred diagnostic method. Skin biopsy is performed only if genetic tests are inconclusive.

Management

A. Evaluation following initial diagnosis.

Since junctional type epidermolysis bullosa may be associated with other organ manifestations like pyloric stenosis, airway malformations, cardiac and haematological manifestations, a workup as follows is suggested:

1. Direct examination of airway
2. Evaluation for gastro oesophageal reflux disease
3. detection of existing osteopenia by skeletal radiographs or DEXA scan

4. Measurements of haemoglobin and electrolytes.
5. Consultation with a clinical geneticist and or genetic counsellor for pre-conceptional counselling of the future pregnancy.

B. Skin care

i. Skin must be protected from shearing stress.
ii. Primary non-adherent dressing with paraffin gauze dressing, strict asepsis, intravenous antibiotics as per skin condition and clinical suspicion of sepsis and water bedding to prevent skin damage.
iii. Chronic wound infection is a challenge. Appropriate antibiotics and antiseptics need to be applied.

C. Prevention of secondary complications

1. Appropriate management of fluid and electrolytes
2. Nutritional support
3. Supplements (calcium, vitamin D, multivitamins)
4. Iron deficiency anaemia to be treated appropriately.

D. Active surveillance

i. Annual blood counts and serum iron measurements
ii. Annual measurements of serum zinc, vitamin D and bone mineral density, as indicated.

Prognosis

Prognosis depends on the extent of skin involvement and the severity of associated organ involvement. Spectrum of disease with limited skin involvement and no underlying organ malformations, may have life expectancy till adulthood. However, severe junctional epidermolysis bullosa have a significant risk of mortality before age 2 years. Generalized severe epidermolysis bullosa also can be fatal. Death occurs after complications such as infection, malnutrition, and dehydration. After young adulthood risk of metastatic squamous cell carcinoma is also increased.

Key messages

1. Epidermolysis Bullosa, although rare, should be kept as one of differentials in neonates presenting with vesicobullous lesions since birth
2. Principles of management include gentle handling to prevent damage to the fragile skin, liberal use of emollients, judicious use of antibiotics and prevention of pressure sores by using water beddings.
2. If the precise mutation is identified, parental counselling and pre conceptional visits would be essential for early identification

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Double whammy in a newborn: Duct dependent heart disease with refractory tachyarrhythmia

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CLINICAL PRESENTATION: Term (39 weeks)/AGA with a birth weight of 3.1 Kg with no history of resuscitation at birth. He presented to the emergency on day 13 of life with central cyanosis and severe respiratory distress. The baby was intubated in view of severe respiratory distress and was transported to NICU. On examination HR-288/min, respiratory rate-74/min and SPO2 of 70% on ventilatory support and FIO2 of 100%. Abdominal examination revealed firm liver, palpable 3cm below the right costal margin in midclavicular line. On attaching ECG leads, there was tachycardia with narrow QRS complex, so with a diagnosis of supraventricular tachycardia (SVT) (Fig-1), adenosine was administered at a dose of 0.1mg/kg IV push. SVT terminated with adenosine to sinus rhythm within a few seconds. Post-Adenosine ECG showed a heart rate of 120/min, short PR interval with an initial slurring in the QRS complex suggestive of 'Delta wave'. In addition, the P wave was positive in chest lead I and aVF suggestive of atrial situs solitus with a sinus rhythm, however, there was abnormal R-wave progression with a RS complex in V1, V2 and QS complexes from V4 to V6 with progressively decreasing amplitude typical of dextrocardia (Fig-2). On chest radiograph, there was cardiomegaly, dextrocardia with oligemic lung field (Fig-3). On doing point of care ultrasound, a restrictive PDA and pulmonary atresia were observed suggesting a complex cyanotic congenital heart disease with duct dependent pulmonary circulation (Fig-3).

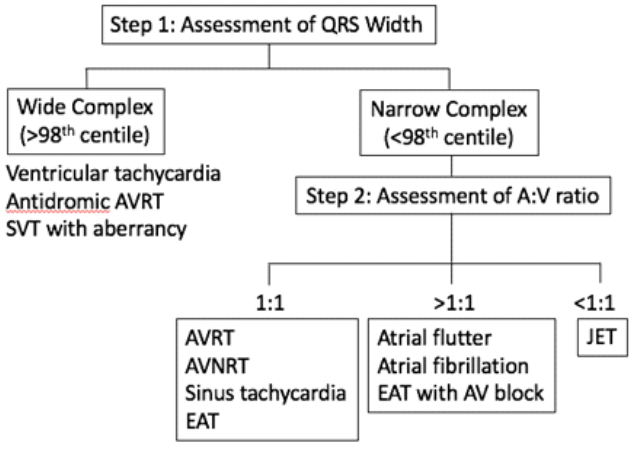
Course during hospital stay: In view of the above ECG findings during sinus rhythm, and occurrence of Adenosine responsive tachycardia (atrioventricular re-entrant tachycardia, AVRT), a diagnosis of Wolff-Parkinson-White syndrome was made. A detailed echocardiography by pediatric cardiologist showed congenitally corrected transposition of great arteries (ccTGA) with large ventricular septal defect, long segment pulmonary atresia with moderate sized PDA supplying confluent adequate sized branch pulmonary arteries, Ebsteins anomaly of tricuspid valve with severe tricuspid regurgitation and right ventricular dysfunction. AVRT recurred shortly after termination by Adenosine. Due to associated ventricular dysfunction, the baby was started on Amiodarone (loading dose of 5 mg/kg IV over 1 hr followed by maintenance dose at 5 µg/kg/min). The heart rate reduced to 240/min however SVT continued, therefore Amiodarone dose was further escalated to 10 µg/kg/min followed by addition of Esmolol infusion at 50 mcg/kg/min. SVT was terminated the next day and the hemodynamics gradually improved over the next 72 hours with a baseline saturation of 75-80% on room air. Child was extubated and gradually shifted to oral amiodarone at 5mg/kg/day. The baby was discharged after 14 days of hospital stay and is planned for close follow up.

Discussion:

Paroxysmal supraventricular tachycardia (SVT), with atrioventricular reentry as the underlying mechanism, is the most common tachyarrhythmia in newborns.[1] For simple understanding, there are two basic mechanisms of tachycardia – 1) re-entrant mechanism which is repetitive activation in a circular path, e.g. macroreentry circuits include AVRT, AVNRT (atrioventricular nodal reentrant tachycardia) and atrial flutter; microreentrant circuit like atrial fibrillation, 2) increased automaticity of a normal/abnormal focus, e.g. ectopic atrial tachycardia, junctional ectopic tachycardia (Flowchart).[1]

In a baby with suspected tachyarrhythmia, the first

step is to assess QRS width and classify it as 'wide complex' or 'narrow complex' tachycardia. A wide complex tachycardia is defined as duration of QRS complex >98th centile for age.[2] In a narrow complex tachycardia, the next step is to assess ratio of P to QRS complexes (A:V ratio). If the diagnosis is still unclear, the next step in a hemodynamically stable baby is to give Adenosine to decipher the mechanism of tachycardia.[1]



Flowchart: Simplified algorithm for tachyarrhythmias with differential diagnosis

WPW syndrome is a term reserved for patients with 'WPW pattern' on ECG along with coexistence of symptomatic tachyarrhythmia. The hallmark findings of WPW pattern are short PR interval and prolonged QRS with initial slurring (pre-excitation) in the presence of sinus rhythm, as was seen in our case[3] The pre-excitation results from conduction through accessory pathways which are abnormal electrical circuits between atria and ventricles bypassing the AV node. The tachyarrhythmia usually associated with WPW syndrome is AVRT. AVRT can be orthodromic or antedromic. Orthodromic AVRT is the most common form of SVT in new born.[1] In orthodromic AVRT, impulse travels anterograde through AV node and retrograde through accessory pathway which results in a narrow QRS complex tachycardia with a retrograde P wave immediately following QRS. Less commonly, antidromic AVRT occurs in which anterograde AV conduction occurs through accessory pathway and retrograde conduction occurs through AV node resulting in a wide-complex rhythm on ECG.[1,4]

About one-fifths of neonates with SVT have an associated CHD; atrial septal defect (ASD), VSD, Ebstein's anomaly and ccTGA are the commonly associated defects.[5] Although ccTGA is more commonly associated with heart blocks, WPW syndrome typically occurs in ccTGA with associated Ebstein's anomaly of the left AV valve.[6]

Acute Management: Basic emergency support including cardiopulmonary resuscitation as clinically indicated should be initiated simultaneously with anti-arrhythmic interventions. Hypoxia, acidosis and electrolyte imbalance if present, need to be corrected. Synchronized electrical cardioversion is used for rapid conversion in haemodynamically compromised patients.[7] In hemodynamically stable patients, the elicitation of the so-called 'diving reflex' by application of cold water /ice to the face can be applied. Adenosine at dose of 0.1 mg/kg followed by subsequent doses of 0.2mg/kg to maximum of 0.5mg/kg given as rapid intravenous push followed by NS using a 3-way preferably close to the heart is very effective way of aborting acute episodes of re-entrant tachycardia. Adenosine, though does not terminate automatic tachycardias or atrial flutter, but helps to establish the diagnosis, when a simultaneous ECG is obtained during Adenosine administration.[1,7]

Chronic Management: Monotherapy or combination of Digoxin and beta blockers are the 1st line drugs for chronic prophylaxis. Amiodarone is a commonly used 2nd line drugs in refractory or unresponsive SVT. The duration of therapy depends on the type of tachyarrhythmia.[1]

Prognosis: In absence of structural heart disease, the prognosis of WPW syndrome is excellent with 60–90% of infants not having any recurrence after 1 year of age.[1]

Key Messages:

- SVT is one of the most common cardiac emergency in neonates requiring critical care.
- AVRT is the most common tachyarrhythmia in neonates
- Prompt recognition and appropriate pharmacotherapy of SVT in neonates results in good outcome.
- Associated structural heart defects can often complicate the clinical picture and management.
- Adenosine has an important role in establishing the diagnosis in a hemodynamically stable patient with

SVT.

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Fig. 1 : Monitor ECG

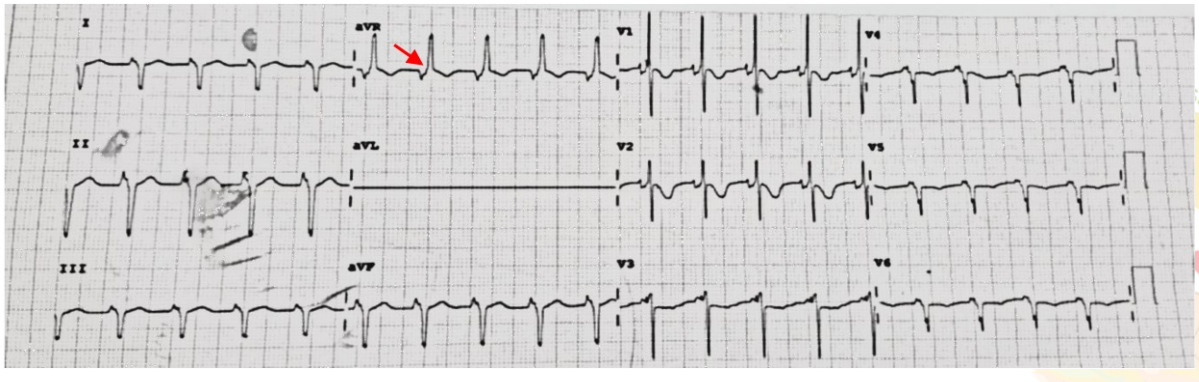

Fig.2 : ECG after adenosine. Short PR interval with wide QRS complex due to initial slurring in the QRS complex suggestive of 'Delta wave' (Red arrow). Abnormal R-wave progression with progressively decreasing QRS amplitude in chest leads typical of dextrocardia.

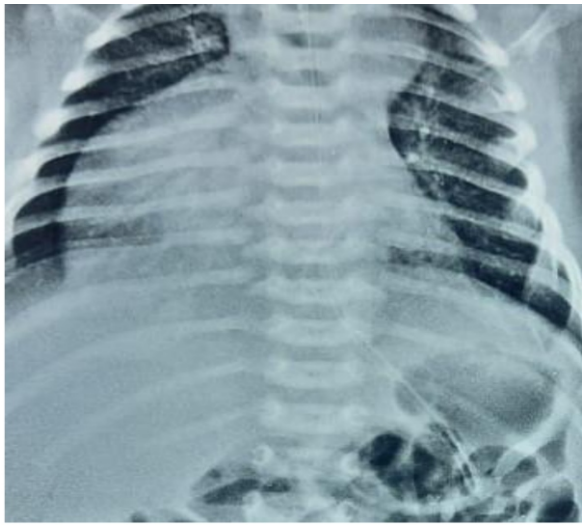

Fig.3 : Chest Xray showing dextrocardia with cardiomegaly and oligemic lung field

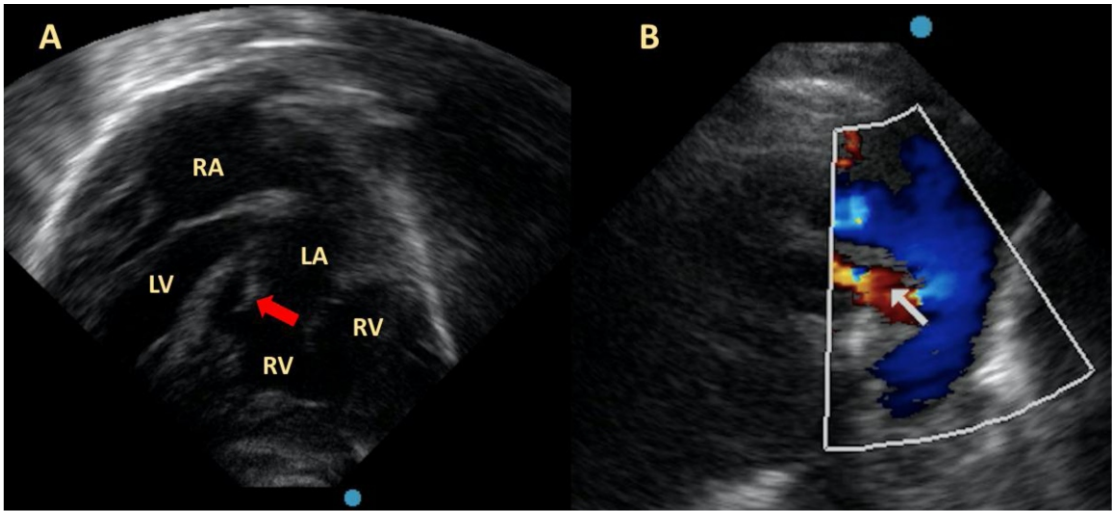

Fig.4 : A. Two dimensional echocardiography in apical 4-chamber view showing atrio-ventricular discordance with Ebsteins anomaly (red arrow). B. Suprasternal view showing Restrictive PDA arising from undersurface of arch (white arrow).

Journal Scan

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Expectant Management or Early Ibuprofen for Patent Ductus Arteriosus

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N Engl J Med 2023; 388 : 980-90

Research Question

Whether Expectant management for PDA in extremely premature infants is noninferior to early ibuprofen treatment with respect to necrotizing enterocolitis, moderate to severe bronchopulmonary dysplasia, or death at 36 weeks' postmenstrual age.

Hypothesis

Population	Infants with extremely premature birth (gestational age, <28 weeks) who had echocardiographically confirmed PDA with a diameter of more than 1.5 mm at the smallest point and who had a transductal left-to-right shunt between 24 and 72 hours postnatal age
Intervention	In the early-ibuprofen group, ibuprofen was administered according to the local protocol, preferably within 3 hours after randomization. It initiated at a median postnatal age of 63 hours at a median dose of 10 mg per kilogram of body weight, followed by two subsequent doses of 5 mg per kilogram. After a complete course of ibuprofen, echocardiographic evaluation was performed at least 12 hours after the last dose.
Control	In the expectant-management group, no treatment was initiated with the intention of closing the PDA. Unblinded echocardiography was allowed if indicated or primary-outcome event had occurred by a postmenstrual age of 36 weeks.
Outcome	The primary outcome was a composite of necrotizing enterocolitis (defined as Bell's stage IIa or higher), moderate-to-severe bronchopulmonary dysplasia, or death as assessed at a postmenstrual age of 36 weeks.

METHODS

- Design: International, multicenter, randomized, controlled noninferiority trial
- Randomization: Central Web-based system was used and stratified according to trial center and gestational age (<26 weeks or ≥26 weeks).
- Blinding: Neither clinicians nor parents could be blinded to the study
- Setting: Newborn infants were recruited from17 neonatal intensive care units in the Netherlands,

Belgium, and Denmark and was funded by the Netherlands Organization for Health Research and Development and the Belgian Health Care Knowledge Center.

- Patients: 273
- Inclusion criteria: Infants with extremely premature birth (gestational age, <28 weeks) who had echocardiographically confirmed PDA with a diameter of more than 1.5 mm at the smallest point and who had a transductal left-to-right shunt between 24 and 72 hours postnatal age were eligible.
- Exclusion criteria: Exclusion criteria were contraindications to the administration of ibuprofen, the use of a cyclo- oxygenase inhibitor before randomization, persistent pulmonary hypertension (defined as a transductal right-to-left shunt during ≥ 33% of the cardiac cycle), a congenital heart defect (other than PDA or patent foramen ovale), a life- threatening congenital defect or chromosomal abnormality, or a congenital anomaly that was associated with an abnormal neurodevelopmental outcome.
- Sample size: For the primary analysis, noninferiority of expectant management was defined as compared with early ibuprofen treatment, as an absolute risk difference with an upper boundary of the one sided 95% confidence interval of less than 10 percentage points. With an estimated a priority risk for a primary-outcome event of 35%, a type I error of 5%, and a power of 80%, it was determined that a sample size of 564 patients (282 per group) would be required to exclude the noninferiority margin. Trial enrollment was stopped, before the anticipated sample size had been reached after the randomization of 273 patients (48.4% of the powered sample size), owing to the discontinuation of funding and slower-than-anticipated recruitment.

RESULTS: A primary outcome event occurred in 63 of 136 infants (46.3%) in the expectant-management group and in 87 of 137 infants (63.5%) in the early-ibuprofen group (absolute risk difference, −17.2 percentage points; upper boundary of the one-sided 95% confidence interval [CI], −7.4; P<0.001) (Table 1)

Moderate-to-severe bronchopulmonary dysplasia was diagnosed in 39 of 117 infants (33.3%) in the expectant-management group and in 57 of 112 infants (50.9%) in the early-ibuprofen treatment group (absolute risk difference, −17.6 percentage points; 95% CI, −30.2 to −5.0, RR 0.66 (95% CI 0.48-0.90)

Table 1.

Outcome	Intention-to-Treat Analysis				Per-Protocol Analysis			
	Expectant Management (N=136)	Early Ibuprofen (N=137)	Difference (95% CI)†	Risk Ratio (95% CI)	Expectant Management (N=133)	Early Ibuprofen (N=132)	Difference (95% CI)†	Risk Ratio (95% CI)
	number (percent)		*percentage points*		*number (percent)*		*percentage points*	
Composite primary outcome								
Necrotizing enterocolitis, moderate-to-severe bronchopulmonary dysplasia, or death‡	63 (46.3)	87 (63.5)	−17.2 (−7.4)§	0.73 (0.59 to 0.91)	60 (45.1)	83 (62.9)	−17.8 (−7.9)§	0.72 (0.57 to 0.90)
Components of primary outcome¶								
Necrotizing enterocolitis	24 (17.6)	21 (15.3)	2.3 (−6.5 to 11.1)	1.15 (0.67 to 1.97)	23 (17.3)	21 (15.9)	1.4 (−7.6 to 10.3)	1.09 (0.63 to 1.87)
Moderate-to-severe bronchopulmonary dysplasia‖	39 (33.3)	57 (50.9)	−17.6 (−30.2 to −5.0)	0.66 (0.48 to 0.90)	37 (32.2)	55 (50.5)	−18.3 (−31.0 to −5.6)	0.64 (0.46 to 0.88)
Death	19 (14.0)	25 (18.2)	−4.3 (−13.0 to 4.4)	0.77 (0.44 to 1.32)	18 (13.5)	23 (17.4)	−3.9 (−12.6 to 4.8)	0.78 (0.44 to 1.37)

* CI denotes confidence interval.
† The difference between groups is reported as the absolute risk difference. For the composite primary outcome, the 95% CIs are one-sided. For the components of the primary outcome, the 95% CIs are two-sided.
‡ The primary outcome and its components were measured at 36 weeks' postmenstrual age. Necrotizing enterocolitis was defined as Bell's stage IIa or higher.
§ The value in parentheses is the upper boundary of the one-sided 95% confidence interval; P<0.001 for noninferiority in the prespecified primary analysis.
¶ The 95% confidence intervals for the components of the primary outcome have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
‖ Moderate-to-severe bronchopulmonary dysplasia was measured in 117 infants in the expectant-management group and in 112 in the early-ibuprofen group in the intention-to-treat analysis and in 115 and 109 infants, respectively, in the per-protocol analysis.

Conclusion: Expectant management of PDA in preterm infants was noninferior to early-ibuprofen treatment at a postnatal age of 24 to 72 hours with respect to necrotizing enterocolitis, moderate to severe bronchopulmonary dysplasia, or death
Results suggested a lower risk of this outcome in the expectant-management group.

Strength of this study

In contrast to previous studies with a high incidence of open-label treatment,[3] this trial had a true nonintervention control group, which allowed for a clearer comparison between expectant management and ibuprofen treatment. This trial also affirms the evidence that use of ibuprofen early on will result in increased incidence of BPD which is consistent with data from various observational studies.[7,8]

Limitations

The main limitation is that even though the investigators recruited infants at 17 centers for almost 4 years, enrollment was stopped after only 48% of the planned sample size had undergone randomization.
The PDA diameter, which was used as an inclusion criterion, is an imperfect indicator of hemodynamically significant PDA[9]
Moreover, the ibuprofen doses used in this trial are the standard doses ie. 10 mg per kilogram of body weight, followed by two subsequent doses of 5 mg per kilogram, while the evidence of benefit exists when we use higher doses of ibuprofen (15/7.5/7.5 to 20/10/10 mg per kilogram).[2,10]
The trial takes into account only the short term adverse outcomes and nothing regarding the long term adverse neurodevelopmental outcomes in both the groups.

Reviewer's Comments

Despite a large body of basic science and clinical research and clinical experience with thousands of infants over 6 decades, there is still uncertainty and controversy about the significance, evaluation and management of patent ductus arteriosus in preterm infants, resulting in substantial heterogeneity in clinical practice (AAP Statement 2016).
Metaanalysis by Benitz (Journal of Perinatology) al suggested that treatment of ductus arteriosus doesn't lead to a reduction in any clinically significant outcome. Post this metaanalysis many RCTs comparing expectant to active management of ductus have been done (Table 2). So far no RCTs have shown any significant improvement in clinically important outcome following active treatmtent of ductus. Majority of RCTs have enrolled babies based on ductal diameter only (which is not the best parameter to detect hsPDA). May be there is a need to conduct RCTs enrolling babies with symptomatic ductus.

Table 2– RCTs comparing expectant treatment to active treatment of ductus arteriosus

RCT	Population, no of babies	Criteria, timing of echo	Primary outcome	Open-label treatment	Results
DeWaal (Journal of Pediatrics 2020)	< 29 weeks, n = 72, Pilot feasibility trial	PDA diameter > 1.5 mm and < 72 hours after birth	Recruitment rate and incidence of open label treatment Secondary - Mortality/ BPD	No	54% gave consent No difference in mortality and/or BPD
PDA RCT trial El-Khuffash J Pediatrics 2021	N = 60 Feasiblity trial	Based on PDA severity score (>5)	Death or BPD	Open label – 8 babies	Enrollment rate 88% No difference in Death or BPD (OR 0.8, 95% CT 0.3-2.1)
Beneductus trial (NEJM 2023)	< 28 weeks N = 273 Ibuprofen vs placebo	PDA diameter (> 1.5 mm in first 72 hours of life) Non inferiority trial	Composite of NEC, moderate to severe BPD or death at 36 weeks PMA	No	46.3% in expectant group 63.5% in early ibuprofen group (ARR -17.2%, upper boundary of 95% CI -7.4, p < 0.001 for non inferiority) No difference BPD was less in expectant group

Baby Oscar trial (PAS 2022)	23 – 28 weeks, n = 653 Ibuprofen/ Placebo	PDA diameter >1.5 mm in first 72 hours of life Superiority trial	Death or BPD at 36 weeks PMA	Yes (14.2% vs 29.8%)	69.2% in ibuprofen and 63.% in placebo (Risk ratio 1.09 (0.98-1.2), p = 0.104
Sung et al, JAMA Pedaitrics 2020	23-30 weeks, N = 142	6-14 days of life, PDA > 1.5 mm and respiratory support	Death or BPD at 36 weeks PMA	0%	No difference
PDA Tolerate trial (J Pediatrics 2019)	< 28 weeks, n = 200	Moderate to large PDA present between 6-14 days plus infant required greater than minimal respiratory support	Need for PDA ligation and PDA closure at discharge	Yes (approx. 50%) Also sicker infants received treatment in first week of life for ductus and not randomized	No difference in primary outcome No difference in Death/ BPD
TRIOCAPI trial (J Pediatrics 2021)	< 28 weeks, N = 228	Large PDA at 6-12 hours of age	Survival without cerebral palsy at 24 months corrected age	63% (Median 4 days)	No difference (71.3% vs 71.6%) (aRR 0.98, 95% CI 0.83 to 1.16, P=.83

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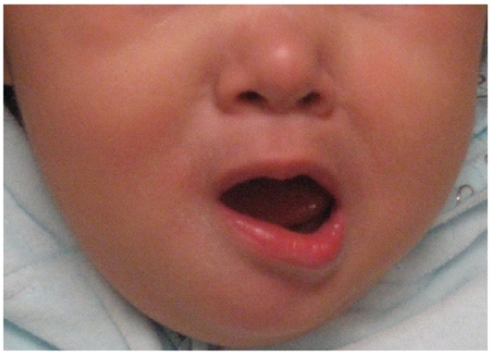
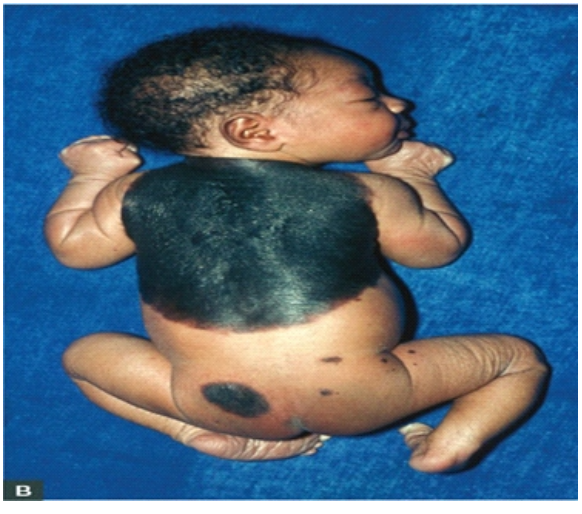
Question 1.



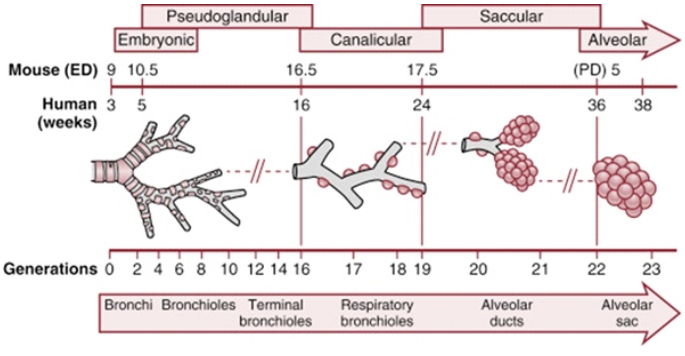
a) Identify the disorder
b) Name two associated abnormality
c) Name two syndromes associated with this condition

Question 2.



a) Identify the disorder?
b) Two anticipated complications
c) What symptoms and investigations to be followed up for the baby?

Question 3.



a) At which stage are lamellar bodies formed?
b) At which stage does surfactant release begins?
c) What is the protein content (%) of surfactant?

Question 4.

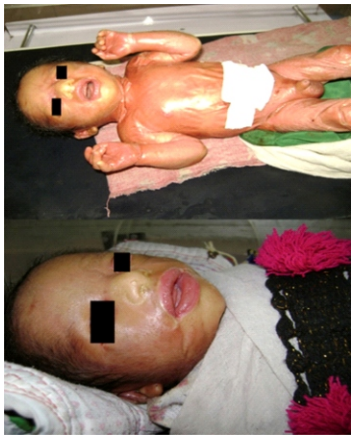
a) What does the acronym LATCH in the breastfeeding assessment score stand for??
b) What is the maximum and minimum score provided?

Question 5.

A extremely premature (25 wk) infant with past medical history of serious bacterial infection, NEC requiring prolonged parenteral nutrition and CLD on day 83 of life had an incidental finding of rib fracture bone on x-ray and was later diagnosed as a case of osteopenia of prematurity?

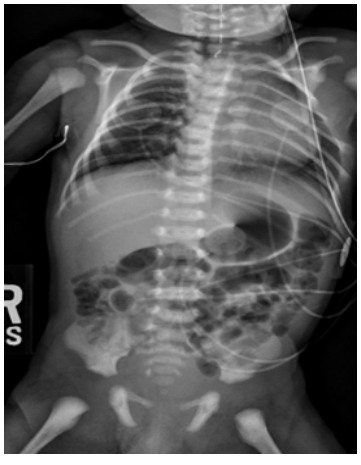
a) When a Xray is warranted in case of osteopenia of prematurity
b) What is the Koo's classification?
c) Name two medications which increases the risk of osteopenia of prematurity?

Question 6.



a) What causes collodion membrane?
b) Name the most common inheritance pattern and most common underlying disorder.
c) What are the two most common cause of mortality in this condition?

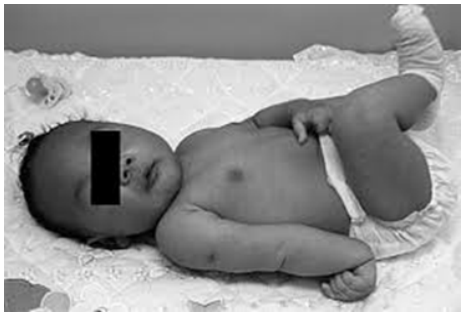
Question 7.



This is xray of term baby who presented with cyanosis after feeding.

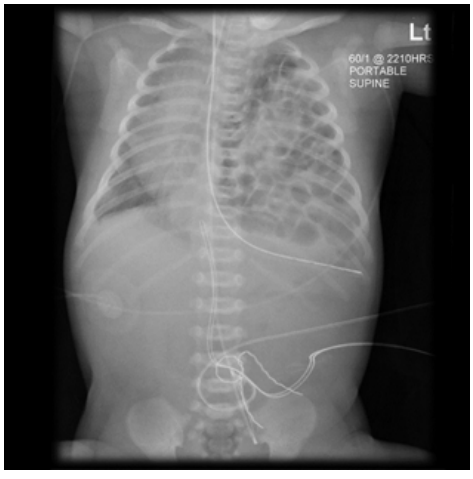
a) Name three important findings in Xray.
b) What is the most common type of this condition?
c) Two important prognostic factors.

Question 8.



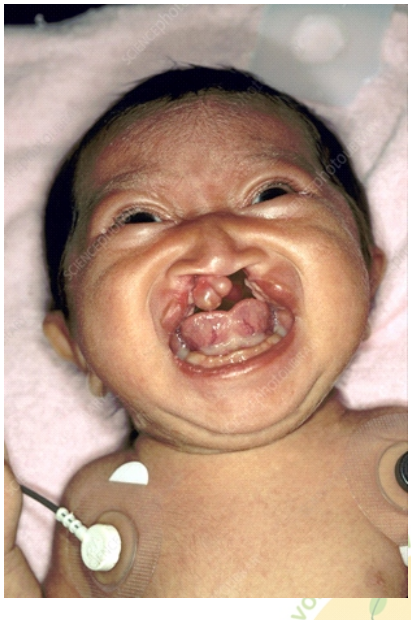
a) Identify the condition and associated risk factors.
b) Besides the limb examination what other things should be examined?
c) What are the favorable prognostic indicators?

Question 9.



a) Identify Xray.
b) Name few antenatal prognostic factors.
c) What is FETO and rationale behind it?

Question 10.



a) Identify the problem
b) Two drugs taken in antenatal period associated with this condition
c) Three genetic syndrome associated with the condition
d) Ideal age for correcting the malformation

Answer 1.

a) Congenital deficient or hypoplastic depressor anguli oris muscle (CHDAOM). It is a rare anomaly causing asymmetric crying facies. The depressor anguli oris muscle (DAOM) attaches itself from the mandible to the corner of the mouth, functioning to lower the corresponding side of the mouth. In the setting of unilateral CHDAOM, the lower lip appears to be horizontal at rest while appearing to be elevated on the hypoplastic side during crying as compared to the normal side.

b) Congenital heart disease, congenital dislocation of hip. Other congenital malformations can occur in up to 45 to 70% of the cases. These malformations most commonly involve the head and neck region and the cardiovascular system. A wide variety of Cardiac anomalies including VSD, ASD,PDA, Coarctation of aorta and Tetralogy of fallot may occur.

c) VACTERL, Digeorge, Cayler cardiofacial syndrome, trisomy 18. CHDAOM in itself is a clinical diagnosis and if isolated is a benign condition, Yet it has been suggested that the diagnosis of CHADOM maybe an indicator of concomitant abnormalities.

Answer 2.

a) Giant congenital melanocytic nevus. It is a skin condition characterised by an abnormally dark noncancerous patch that is produced by pigment-producing cells called melanocytes. It is present at birth or noticeable soon after birth. The nevus may be small at birth but it usually grows at the same rate as the body grows And will be eventually at least 20 cm across. The nevus can appear anywhere on the body but it most commonly involves trunk and the limbs. Affected individuals may have one or two or multiple small nevi scattered over the skin which are known as satellite or disseminated nevi.

b) Melanoma, neurocutaneous melanosis. Individuals with giant congenital melanocytic nevus have a 5 to 10% lifetime risk of developing malignant Melanoma. Some people with giant congenital Melanocytic nevus may develop condition called neurocutaneous melanosis Which is the presence of melanocytes in brain and spinal cord

c) Hydrocephalus, seizure, developmental delay; MRI Brain. The growth of melanocytes in the in the central nervous system results in increased pressure in the brain headache, vomiting and seizure.

Answer 3.

a) Canalicular. Lamellar bodies are the storage form of surfactant released by fetal type 2 pneumocytes. A count > 30000 to 55000 /µL is highly predictive of pulmonary maturity, whereas a count below 10,000/µL suggests a significant risk for RDS. Neither meconium nor blood has a significant effect on the lamellar body count.

b) Saccular. Pulmonary surfactant production begins at 24 weeks; however, the production of adequate amounts to prevent atelectasis is not until 32 weeks. Therefore infants born after 32 weeks have a much higher chance of survival than those born at 24 weeks. Surfactant pool in preterm infants who have respiratory Distress Syndrome (RDS) is 10 mg/kg compared with term infants who have an estimated pool size of 100 mg/kg surfactant.

c) 8-10%. Approximately 90% is formed by phospholipids (phosphatidylcholine, phosphatidylglycerol, phosphatidylethanolamine) with the remaining 10% formed by proteins. These are primarily four surfactant proteins (surfactant proteins A-D), each with its particular function; surfactant protein A and D (SP-A, SP-D) function in innate immunity. Hence degradation of these proteins may increase susceptibility to lung inflammation and infection. Surfactant protein B and C (SP-B, SP-C) contribute to the surface properties of surfactant. SP-B and SP-C

organize the surfactant protein into tubular myelin, which is essential in reducing surface tension.

Answer 4.

	0	1	2
L Latch	Too sleepy or reluctant No latch achieved	Repeated attempts Hold nipple in mouth Stimulate to suck	Grasps breast Tongue down Lips flanged Rhythmic sucking
A Audible swallowing	None	A few with stimulation	Spontaneous and intermittent < 24 hours old Spontaneous and frequent >24 hours old
T Type of nipple	Inverted	Flat	Everted (after stimulation)
C Comfort (breast/nipple)	Engorged Cracked, bleeding, large blisters or bruises Severe discomfort	Filling Reddened/small blisters or bruises Mild/moderate discomfort	Soft Non-tender
H Hold(positioning)	Full assist (staff holds infants at breast)	Minimal assist (i.e. elevate head of bed, place pillows for support). Teach one side; mother does other. Staff holds and then mother takes over	No assist from staff Mother able to position / hold infant

LATCH is a breastfeeding charting system that provides a systematic method for gathering information about individual breastfeeding sessions. The system assigns a numerical score, 0, 1, or 2, to five key components of breastfeeding.

Max-10 and min. 0

With the LATCH system, the nurse can assess maternal and infant variables, define areas of needed intervention, and determine priorities in providing patient care and teaching.

Answer 5.

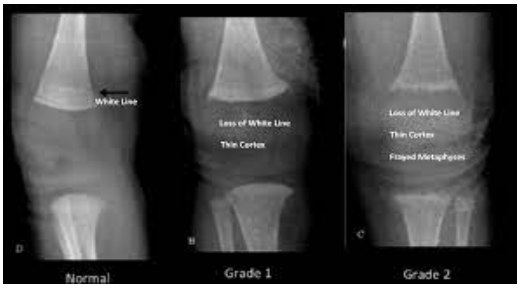
a) When 2 values of ALP measured at least 1 week apart exceed 800 IU/L or a single value of >1000IU/L

b) Koos classification:

i. presence of bone rarefaction

ii. presence of bone rarefaction associated with metaphyseal alterations, shadow, and subperiosteal bone formations

iii. associated with the presence of spontaneous fractures



c) Corticosteroids, Furosemide, prolonged TPN

Answer 6.

a) Due to abnormal desquamation process. The collodion baby is described as a congenital condition characterized by the presence of parchment-like or cellophane membrane covering the whole body which cracks and peels off within 2–4 weeks. Due to thickened skin structure and pulling of soft tissues around the lips and conjunctivae, ectropion and eclabium develop.

b) Autosomal recessive (75%). The two most common underlying diseases are:

i. Lamellar ichthyosis

ii. Non-bullous congenital erythroderma

Around 60%–80% of collodion babies eventually develop into non - bullous congenital ichthyosiform erythroderma (NBCIE) or lamellar ichthyosis and around 10%–20% evolve into normal skin as self-healing collodion baby or other ichthyosiform syndromes

c) Dehydration (Hypernatremia) and infection. Loss of skin integrity may cause hypothermia, increased insensible water loss and electrolyte disorders, skin infections, and sepsis.

Answer 7.

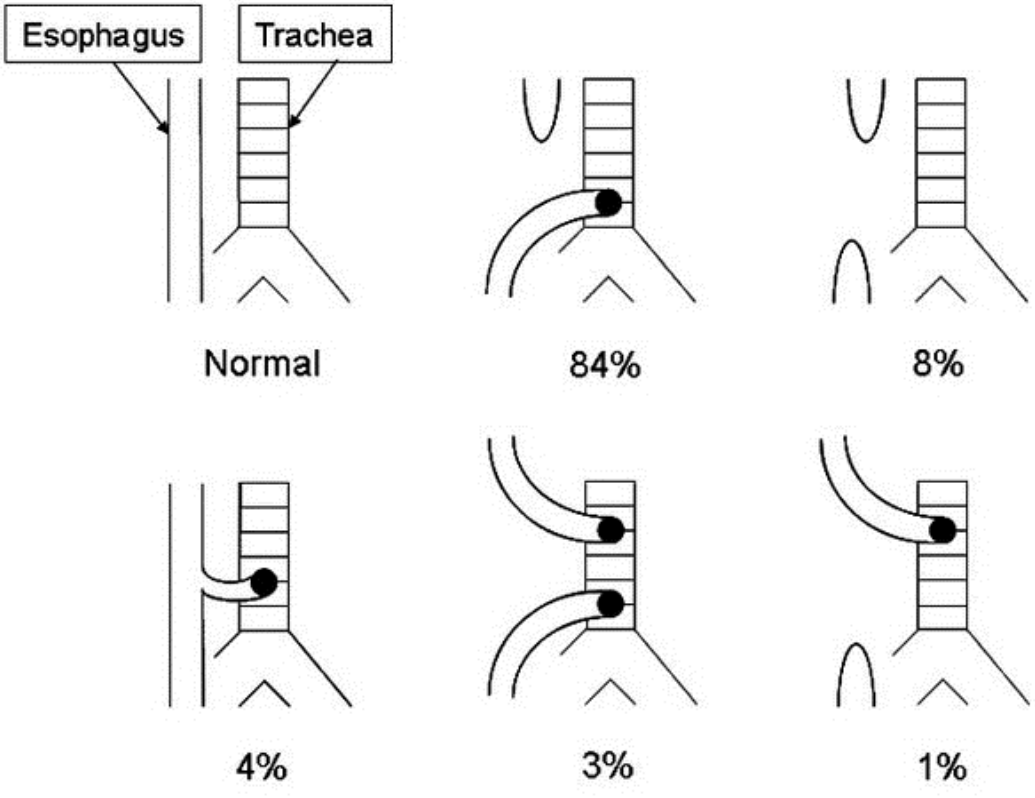
a) Finding on Xray:

i. Orogastric tube blocked in the proximal esophagus pouch

ii. Presence of bowel gas

iii. Clear lung field

b) MC type : proximal atresia with distal fistula



c) Prognostic factors: VLBW and presence of pneumonia and Congenital abnormality- poor prognosis

Waterstons classification

Category	Weight and co-morbidities	Surgical timing	Survival rates (%)
A	2 500 g	Immediate surgery	100
B	1 800–2 500 g pneumonia and congenital anomalies	Short-term delay, plus stabilisation	95
C	1 800 g severe pneumonia and congenital anomalies	Staged repair	35

Spitz classification

Group	Birthweight	Cardiac abnormalities	Survival (%)
I	> 1 500 g	Without	98
II	< 1 500 g	Or	80
III	< 1 500 g	With	50

Answer 8.

a) Erbs palsy plus (C5, C6 and C7 injury): adduction and internal rotation of arm, extension and pronation of forearm and flexion of wrist and fingers Risk factors are macrosomia (large baby) and shoulder dystocia. However, Erb's palsy may occur following Caesaran section. The experience of the delivering physician may not influence the risk of Erb's palsy (0.9 to 2.6 per 1000 live births). Differential diagnosis includes clavicular fracture, osteomyelitis and septic arthritis. Shoulder dystocia and fetal macrosomia.

b) Ptosis and miosis (Horners syndrome) and asymmetric chest cavity expansion with impaired oxygenation (Diaphragmatic palsy)

c) Early clinical improvement in 2 to 4 weeks, elbow flexion, shoulder external rotation and forearm supination at 3 months and recovery of antigravity strength in biceps, triceps and deltoid muscle by 4.5 months

Answer 9.

a) Left sided CDH with mediastinal shift

b) Antenatal prognostic factors:

i. Associated structural malformation

ii. Abnormal microarray findings

iii. Large volume of liver herniation

iv. Lower fetal lung volume. MRI offers visualization of the fetal lung and liver that is less dependent on maternal and fetal positioning. It is an accurate way to calculate total fetal lung volume. (Weems et al)

- O/E total lung volume less than 25%, predicative survival < 15%
- O/E total lung volume greater than 35%, predictive survival may be greater than 80%

Most significant post natal factors affecting survival: pulmonary hypoplasia, persistent pulmonary hypertension.

c) Fetal endoscopic tracheal occlusion
Obstructs the normal egress of lung fluid during pulmonary development resulting in increased transpulmonic pressure and hence better lung growth

Answer 10.

a) Cleft lip (CL) and Cleft palate (CP). CL/P prevalence is highest in the Asian and American populations and lowest in African populations. The gender distribution of cleft lip and palate is not equal in general. The incidence of CL/P is 2 times higher in men than in women, whereas that of CP is higher in women

b) Valproate, Topiramate. Several factors may increase the likelihood of a baby developing a cleft lip and cleft palate, including:

- Family history. Parents with a family history of cleft lip or cleft palate face a higher risk of having a baby with a cleft.
- Exposure to certain substances during pregnancy. Cleft lip and cleft palate may be more likely to occur in pregnant women who smoke cigarettes, drink alcohol or take certain medications.
- Having diabetes. There is some evidence that women diagnosed with diabetes before pregnancy may have an increased risk of having a baby with a cleft lip with or without a cleft palate.
- Being obese during pregnancy. There is some evidence that babies born to obese women may have increased risk of cleft lip and palate.

c) Digeorge syndrome, Pierre robin sequence, Treacher Collins syndrome Approximately 70% of CL/P patients and 50% of CP patients are non-syndromic. In the remaining patients, a wide range of malformation syndromes can manifest, including chromosomal anomalies and teratogens as well as more than 500 defined Mendelian syndromes

d) 3 to 6 months for cleft lip and 6-12 months for cleft palate

Instructions for Authors

Review Article	**The article should be approximately 2-3 pages long with a word count of 2000-2500 words. Author should summarize key practice points at the end. Please include 5-6 references as suggested reading.**
Case Report	**This would be a summary of the case discussed in that months clinical meeting. Interesting cases even if not presented may also be submitted. It should include the clinical presentation and a brief discussion about the condition. Word count should be 1000-1500. Please include 2-3 references at the end.**
Journal Scan	**Some recent research paper of interest to pediatricians and neonatologists. The structure should include Introduction, Research question, Hypothesis, Methods, Results, Limitations and strengths of study, Reviewers comments. Word count should be approximately 1000 words. Please include 2-3 references if needed at the end.**
Picture of Month	**An interesting case related to neonatal practice. It should have a brief case history and a commentary, all fitting on one page along with the pictures.**
Image section	**Any interesting Xray, Ultrasound, CT or MRI of clinical interest. Brief clinical presentation and about the condition should be summarized on one page along with image.**
OSCE	**About 10-12 questions would be included in this section along with answers.**

Contact Us

On behalf of committee, I request all members of NNF, Delhi to actively contribute to various sections of the newsletter.

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