Pedia Companion

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Pedia Companion Newsletter

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Dear Doctor,
Greetings from Micro Labs Limited. We are happy to bring you "PEDIA COMPANION" which contain latest and interesting news in the field of Paediatrics.

This issue contains:

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Best Regards,
Medical Team, Micro Labs Limited

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1. A Cross-Sectional Study of Neonatal and Maternal Risk Factors for Indirect Hyperbilirubinemia

Introduction:

Elevated total serum bilirubin (TSB) causes infant jaundice or neonatal hyperbilirubinemia, which clinically shows as yellowish discoloration of the skin, sclera, and mucous membranes. It is the most frequent medical issue in the first two weeks of life and a leading factor in postpartum readmissions to the hospital.[1] The clinical sign of hyperbilirubinemia is neonatal jaundice. When an infant presents within the first month of life, it is frequently the reason for hospital admission. [2] The objectives of this study are to identify neonatal and maternal risk factors for indirect hyperbilirubinemia, to compare neonates with risk factors and those without them, and to evaluate the appropriate therapy strategy based on the severity of the hyperbilirubinemia.

The most frequent maternal and neonatal risk factors for the development of neonatal indirect hyperbilirubinemia were older maternal age, G6PD deficiency, and ABO incompatibility.

Methods:

In this retrospective cross-sectional investigation, the medical files of newborns admitted to the paediatric department with indirect hyperbilirubinemia were examined. Researchers collected and compared information on the newborn demographics, prenatal history, birth weight, feeding style, maternal and neonatal laboratory assessments, care, and length of hospital stay.

Results:

404 newborns were included in 555 records. 209 (51%) of them were men. At presentation, the median indirect bilirubin level was 218 µmol/L. ABO incompatibility (n = 152, 37.6%) and glucose-6-phosphate dehydrogenase (G6PD) deficiency (n = 130/400, 32.5%) were the two risk factors with the highest frequency for newborn indirect hyperbilirubinemia. The most frequent maternal risk factor was age (>25 years) (n = 331, 81.9%), followed by caesarean delivery (n = 137, 33.9%). When compared to neonates with other risk factors, those with ABO incompatibility had a substantially higher mean indirect bilirubin level (234:9 68:5 versus 225:82:2 mmol/L, respectively) (P = 0:04). The usage of phototherapy considerably increased as bilirubin levels increased (P <0:0001). In 44 (10.9%) and 14 (3.5%) patients, intravenous immunoglobulins (IVIG) and exchange transfusion, respectively, were administered. The bilirubin levels of neonates who received IVIG were noticeably greater than those who did not (P = 0:005). The likelihood

of having associated risk factors was higher in newborn males (P = 0:008), people with reticulocytosis (P = 0:001), and people who had IVIG (P = 0:001).

Discussion:

In this investigation, the most prevalent and important newborn risk factor for indirect hyperbilirubinemia, affecting 37.6% of all neonates, was found to be ABO incompatibility. Other studies in Saudi Arabia (31.6%) and Iran (16.9%) also validated this finding, demonstrating that ABO incompatibility is one of the most prevalent risk factors.[3,4] In the current investigation, 22% of infants were born without any known risk factors for indirect hyperbilirubinemia. This proportion is considerably lower than that from Iran, where Pasha et al. showed that 50.7% of neonates had no risk factors. This variance could be explained by the occurrence of undetectable small blood group incompatibilities.[3]

Neonatal risk factors	*n* (%)
ABO blood group incompatibility	152 (37.6)
Glucose-6-phosphate dehydrogenase deficiency ($n = 400$)	130 (32.5)
Prematurity	88 (21.8)
Polycythemia	30 (7.4)
Rhesus factor incompatibility	27 (6.7)
Breastfeeding jaundice ($n = 157$)	12 (7.6)
Cephalohematoma	9 (2.2)
Urinary tract infection ($n = 91$)	7 (7.7)
Sepsis ($n = 168$)	3 (1.8)
Congenital hypothyroidism ($n = 160$)	1 (0.63)
Maternal risk factors	n (%)
Maternal age > 25 years	357 (85.8)
Cesarean delivery	137 (33.9)
Maternal race (East Asian)	88 (21.8)
Gestational diabetes/diabetes mellitus	63 (15.6)
Maternal hypothyroidism	36 (8.9)
Maternal UTI	11 (2.7)
Maternal hyperthyroidism	2 (0.05)
No maternal risk factors determined	44 (10.9)

Conclusion:

The most frequent neonatal and maternal risk factors for developing neonatal indirect hyperbilirubinemia were ABO incompatibility, G6PD deficiency, and older maternal age. These characteristics were linked to male newborns, reticulocytosis, and IVIG use. Early recognition of such factors through screening can help with prompt care to help prevent serious complications of this common disorder.

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2.Does the Brain Pay a Price for Delayed Surgical Closure of the Patent Ductus Arteriosus?

Introduction:

The ductus arteriosus is a foetal artery that permits oxygenated blood from the placenta to bypass the lungs in pregnancy. With the initial breaths after delivery, the lungs fill with air, the pulmonary vascular resistance decreases, and blood flows from the right ventricle to the lungs for oxygenation. The ductus constricts as a result of the decreased ductus arteriosus flow and increased arterial oxygen tension. The ductus arteriosus does not close quickly in premature infants, and side effects may necessitate pharmacologic or surgical closure.[1] In extremely preterm newborns whose ducts were surgically blocked, studies found reduced brain and cerebellar volumes at term comparable age using volumetric MRI.[2] The current study looked at how key biomarkers affected brain growth and 2-year outcomes in a group of extremely/very preterm children who received surgical ductal closure in an effort to explain the mechanism(s) behind the relationship between disturbed brain growth and PDA closure.

Prolonged Patent Ductus Arteriosus is related with decreased cerebellar growth and unfavourable neurodevelopmental outcomes.

Methods:

This observational study included 106 preterm children who received surgical ductal closure and were born before 30 weeks of gestation (GA). The institutional standard of care for this patient population includes a Bayley III developmental test at the corrected age of 2 years and NIRS-monitored cerebral oxygen saturation (rScO2) during and up to 24 h after ductal closure. At the age corresponding to term, infants also underwent an MRI.

Results:

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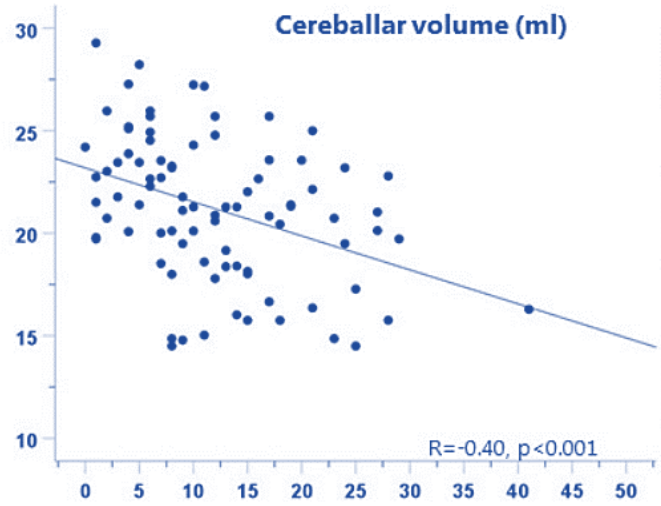
In this 10-year cohort, 106 infants with a GA ≤ 30 weeks who were continuously hospitalised to NICU had ductus arteriosus closure surgery. 90 newborns (median [range]: 25.9 wk [24.0-28.9]; 856 g [540-1350]) met the inclusion criteria. A PDA has a day range of 1 to 41. According to a multivariable linear regression study, a PDA's duration at 2 years of corrected age had a negative impact on cerebellar growth and motor and cognitive outcomes. According to SLR analysis, there was a negative correlation between PDA duration and cerebellar volume (Cer-vol) (r=-0.40, p<0.001).



Days of PDA	Cerebellar volume (ml)
0-7	24.4 ±2.64
8-14	20.7 ±3.65
15-21	21.2 ±3.03
>21	18.0 ±2.79 *

Simple linear regression plots of cerebellar volume

Discussion:

The length of a PDA was the most significant independent predictor associated with less optimum cerebellar growth and worse Bayley III motor- and cognitive development in this 10-year cohort of preterm infants 30 weeks GA with surgically closed ductus arteriosus. scores at 2 years of adjusted age.[2] This study's results strongly imply that the length and intensity of an abnormal hemodynamic pattern, such as a left-to-right ductal shunt, may be crucial for brain development and prognosis. These results support past studies that claim it's not always optimal for the infant to delay surgical ductal closure due to the justified concern of problems from the procedure.[3]

Conclusion:

This study comes to the conclusion that the prolonged duration of a patent ductus arteriosus in this surgical group is associated with decreased cerebellar growth and unfavourable neurodevelopmental outcome.

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3. Should thoracoscopic surgery be the first option for newborns with congenital diaphragmatic hernia?

Introduction:

Congenital diaphragmatic hernia (CDH) is a disorder where the abdominal contents protrude into the thoracic cavity as a result of a developmental abnormality in the diaphragm. Hernias can be divided into various forms according on where in the diaphragm the defect is located. The CDH on the left side is more frequent. Right-sided or bilateral occurrences are quite uncommon.[1] The activities of the digestive system, nervous system, skeletal muscles, and cardiorespiratory system can all be affected by a diaphragmatic hernia to varied degrees. The sole curative method for CDH at the present is surgery. There are two different surgical methods: open and thoracoscopic.[2] Researchers compared the clinical efficacy, safety, and effectiveness of open and thoracoscopic CDH repair in this study.

In comparison to other methods, Thoracoscopic Congenital diaphragmatic hernia repair offers better cosmesis, a quicker recovery period after surgery, and a reduced recurrence rate.

Methods:

A retrospective investigation of newborns with CDH who underwent surgery in a hospital was conducted. This study involved neonates with a confirmed diagnosis of CDH who underwent primary surgical care at the hospital between the ages of less than and equal to 28 days. The study excluded neonates who did not undergo surgery after admission or those whose medical records were inadequate. Neonatal patients receiving thoracoscopic and open surgery have their numerous postoperative characteristics compared.

Results:

A total of 50 neonates participated in this trial (37 in the thoracoscopic group and 13 in the open group). Thoracoscopic surgery was linked to a significantly shorter hospital stay (13.32 vs. 18.77 days, p 0.001), shorter time to reach optimal feeding (8.21 vs. 13.38 days, p 0.001), earlier feeding (4.34 vs. 7.46 days), and shorter duration of postoperative

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mechanical ventilation (3.70 vs. 5.98 days, p 0.001). In the open group, there was one postoperative mortality, but there was none in the thoracoscopic group. The two groups had a median follow-up period of 23.8 months (20.5 months in open group and 25.0 months in thoracoscopic group). Although thoracoscopic surgery was linked to decreased recurrence rates (2.7% vs. 7.7%, p = 0.456), the difference was not statistically significant.

Discussion:

Previous research showed that thoracoscopic surgery took longer to complete than open surgery, but the recovery period following the procedure was quicker.[3] Thoracoscopic surgery took an average of 115.6 minutes, according to Lishuang et al's research, which is comparable to this study. According to Lishuang et al study , the survival percentage for CDH was 94.9%. While 92.3% of the open group and 100% of the thoracoscopic group survived, respectively, according to this research.

Parameter	Thoracoscopic group ($n = 37$)	Open group ($n = 13$)	t	p
Hospital stay (day)	13.32 ± 2.15	18.77 ± 2.89	3.771	<0.001
Postoperative mechanical ventilation (day)	3.70 ± 0.77	5.98 ± 1.06	5.276	<0.001
Postoperative start feeding time (day)	4.34 ± 0.93	7.46 ± 1.45	5.161	<0.001
Time to reach the target feeding (day)	8.21 ± 1.58	13.38 ± 2.22	1.755	<0.001

Comparison of postoperative recovery

Conclusion:

A safer and more efficient surgical treatment for newborns, thoracoscopy CDH repair offers superior cosmetic results, a quicker recovery after surgery, and a lower recurrence rate than previous techniques. For surgeons with expertise, it can be regarded as the first option for treating CDH in newborns.

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4. A case report on Congenital Erythropoietic Porphyria: Very Early Diagnosis and Management

Introduction:

Most patients with congenital erythropoietic porphyria (CEP) have severe cutaneous photosensitivity with blisters and increased skin friability across light-exposed areas. The majority of those who are affected experience an early or birth-related onset.[1] It is an uncommon type of porphyria that results from an enzyme called uroporphyrinogen III synthase deficiency in the heme production pathway (UROS). Nonphysiological porphyrins build up in bone marrow, red blood cells, skin, bones, teeth, and spleen as a result of uro porphyrinogen III synthase deficiency. So, prolonged intravascular hemolysis, extreme photosensitivity, and ultimately irreversible mutilating abnormalities are all effects of sun exposure. Hematopoietic stem cell transplantation (HSCT) is the only therapeutic option for CEP that is curative. This is the earliest known instance till date and involves a young girl in whom precocious genetic testing enabled early identification and permitted curative treatment with HSCT for CEP at the age of 3 months.

Hematopoietic stem cell transplantation is a successful treatment for congenital erythropoietic porphyria

Case Presentation:

A girl who had severe symmetric intrauterine growth retardation and was delivered vaginal delivery at 385/7 weeks of pregnancy (birth weight: 2240g) was born. Parents were third-degree cousins who were married consanguineously. This was the fourth pregnancy for a multiparous woman who had previously given birth to a healthy girl after having twins, one of whom died during pregnancy. Intrauterine growth retardation made this pregnancy difficult, as did other ultrasonography abnormalities such a cystic hygroma at 12 weeks and the later development of a short femur, cardiomegaly, and pericardial effusion that may have indicated hydrops fetalis. Amniocentesis, karyotype, comparative genomic hybridization (CGH), and an infection panel performed before conception were noncontributory. Hepatosplenomegaly, hematuria, and blue-red skin papules eruption consistent with blueberry muffin rash were seen in the patient at delivery (Figure 1A). Later, a cutaneous blister appeared on the pulse oximetry location (Figure 1B). The results of the tests revealed cholestasis without associated transaminitis, regenerative normocytic anaemia. Early genetic testing and genetic referral were prompted by the family history. The early diagnosis of CEP was made possible by the discovery of a homozygous mutation in the UROS gene, variation (c.217>C, p.[Cys73Arg,]), by means of an expanded metabolic gene panel (Fulgent

Genetics). Blood transfusion dependence from birth is associated with the homozygous c.217T>C [p. Cys73Arg] mutation, which results in less than 1% of normal UROS activity. Urinalysis revealed noticeably increased uroporphyrin and coproporphyrin levels. Blood transfusions, physical sun-blocks, and strict sun avoidance were all part of supportive care. An allogenic HSCT was, however, presented due to the disease's unusually early onset and the dismal prognosis. As a result, the patient had an unrelated HSCT from a 10/10 HLA identical donor at the age of three months. Busulfan (days 6 to 33; 5 mg/kg/dose), fludarabine (days 8 to 3; 1 mg/kg/dose), and alemtuzumab (days 8 to 6; 0.167 mg/kg/dose) were the main components of the conditioning regimen. As a preventative measure against graft-versus-host disease (GVHD), cyclosporine and mycophenolate mofetil were given. Anti-infectious prophylaxis comprised amoxicillin for bacterial infections, fluconazole for fungal infections, micafungin, trimethoprim, palivizumab, and weekly intravenous immune globulin administration. On day +15, the neutrophil engraftment was completed. Two months after HSCT, full donor chimerism was confirmed. Thrombotic microangiopathy (TMA) and recurrent pericardial effusion complicated the HSCT. Around day +7, the patient experienced the onset of TMA, which was accompanied by acute kidney failure, pericardial effusion, hypertension, hematuria, and proteinuria as well as noticeably raised C5b9 levels in the blood. Treatment for thrombotic microangiopathy involved switching from cyclosporine to prednisone and eculizumab. Prednisone tapering resulted in recurrent pericardial effusions without any indication of TMA. Treatment included colchicine, fluid drainage, glucocorticoids, and finally pericardiectomy. Despite stopping cyclosporine 11 months after HSC, she did not exhibit any symptoms of veno-occlusive illness or acute GVHD. The patient had a successful outcome with a notable decrease in urine porphyrin levels two years following HSCT. Erythrodontia without any skin lesions or hepatosplenomegaly was discovered during a physical examination. Red cell and platelet counts had returned to normal following a complete blood count. Normal results were obtained for echocardiography, electrolytes, renal function, albumin, and liver function.

Discussion:

The success of HSCT in the treatment of severe CEP has previously been demonstrated in a number of case studies. This case study, however, illustrates the influence of a very early diagnosis and treatment on the course of CEP.[2] Due to a homozygous mutation in the UROS gene p. Cys73Arg, the most common mutation for CEP, this patient had a severe version of the disease.[2] This patient's urinary porphyrin levels dramatically decreased but remain above the normal range. Similar circumstances were also recorded in other case reports of effective HSCT for the treatment of CEP, most notably in a recent study that reported near-normal biological levels of porphyrins 25 years after HSCT.[3]

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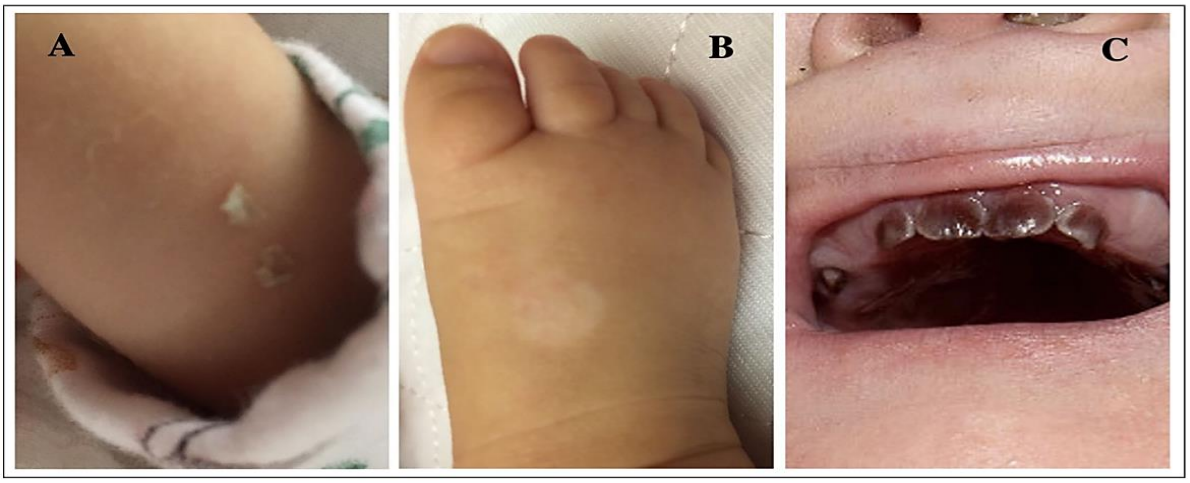

Figure 1. (A) Blue-red skin papules eruption, (B) cutaneous blister on the pulse oximetry site and (C) erythrodontia (pictures provided with the family's authorization).

Conclusion:

In this case report, the author draws the conclusion that hematopoietic stem cell transplantation is a successful treatment for CEP and details the short-term advantages of HSCT in the youngest patient with a severe neonatal phenotype of the disease. It implies that early detection and intervention could stop the progression of CEP's fatal and devastating effects.

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