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SMART PEDI UPDATE

Pedismart Newsletter
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Dear Doctor,
Greetings from Micro Labs Limited. We are happy to bring you **"PEDI SMART"** which contain latest and interesting news in the field of Paediatrics.

This issue contains:

1. **Assessment of the prevalence, risk factors, and the impact of urinary tract infection on the course and severity of neonatal jaundice**
2. **Prevalence and subtypes of headache in children with benign joint hypermobility syndrome**
3. **Analysis of etiologies, clinical features, therapeutic treatments and outcomes of patients diagnosed with neonatal acute liver failure**
4. **Case report on Necrotizing Enterocolitis in infant with Twin - Twin transfusion syndrome**

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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SMART PEDI UPDATE

Assessment of the prevalence, risk factors, and the impact of urinary tract infection on the course and severity of neonatal jaundice

Introduction

Neonatal hyperbilirubinemia, characterized by a yellowish discoloration of the skin, sclera, and mucous membranes, affects a significant proportion of newborns. Approximately 1 in 10 newborns are at the risk of developing hyperbilirubinemia. While usually benign, it can be indicative of underlying conditions such as urinary tract infection (UTI).[1] According to the American Academy of Paediatrics (AAP) guideline, in such situation, urinalysis and urine culture should be performed in infants with conjugated hyperbilirubinemia.[2] Understanding the relationship between hyperbilirubinemia and UTI was crucial for appropriate clinical management. This study aimed to investigate the prevalence of UTI in jaundiced infants, identify potential risk factors, and assess the impact of UTI on jaundice severity.

Methods

This was a retrospective case control study analysed data from 150 jaundice infants. Patients were assessed for UTI based on urine culture, and various demographic and clinical parameters were recorded. All patients underwent phototherapy treatment and had a catheterization for UTI screening. Based on the findings of a urine culture, they were then divided into groups that had UTIs and non-UTI groups, a positive urine culture indicated the growth of ≥10,000 colony-forming units. Analyses were conducted on the clinical traits and factors associated with jaundice in both groups. Statistical analyses were performed to identify risk factors for UTI and assess its impact on jaundice severity.

Results

Of the 150 jaundice infants studied, 43 (29%) were diagnosed with UTI. Male gender, higher body weight, and antibiotic use were identified as independent risk factors for UTI. The mean time for onset of jaundice was 6.5 ± 6.2 days. Infants with UTI had longer hospital stays and poorer response to phototherapy. Multivariate logistic regression analysis revealed that a peak total bilirubin level higher than 18 mg/dl emerged as a risk factor for UTI. Escherichia coli (41.9%) was the most common pathogen isolated from urine cultures, followed by Enterococcus faecalis (30.2%), and Klebsiella pneumoniae (16.3%). Combination of ampicillin with gentamicin had a higher treatment success rate of 77%, followed by

combination of ampicillin with a third-generation cephalosporin exhibited a treatment success rate of 72%, while the combination of cefazolin with gentamicin showed a rate of 60%. Patients who received antibiotic were significantly less responsive to phototherapy, showing a smaller decrease in serum total bilirubin level at the 24th and 48th hour of phototherapy when compared to patients who did not receive antibiotic treatment, (2.9 ± 2.8 mg/dl vs 4.6 ± 3.2 mg/dl at 24th hour, and 4.5 ± 4.4 mg/dl vs 6.2 ± 4 mg/dl at 48th hour). Patients who received antibiotics treatment had a significantly longer length of hospitalization (Figure 1).

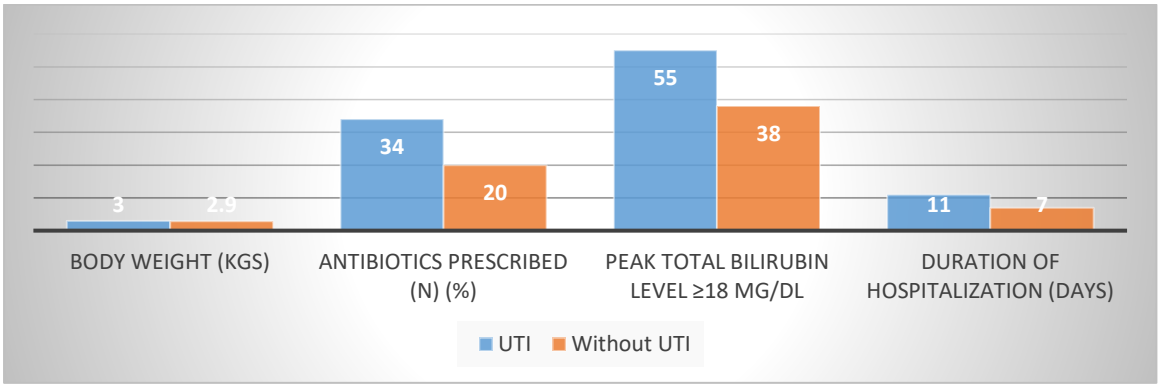

Figure 1. Comparison of results between UTI and Non-UTI group

Discussion

This study identified a peak total serum bilirubin level higher than 18 mg/dl as a risk factor for UTI in jaundiced patients.[1] This study results aligned with the previous research that suggested that jaundiced patients with concurrent UTI exhibit severe hyperbilirubinemia and poorer response to phototherapy.[3] The prevalence of UTI was 29% higher than the previous study results which reported 11% to 21.1 %.[4] Notably, UTI was more prevalent in male infants and those with higher body weights. The most common pathogen was Escherichia coli, with other significant pathogens being Enterococcus faecalis, and Klebsiella pneumoniae. Antibiotic regimens combining ampicillin with gentamicin showed highest treatment success rate.

Conclusion

This study concluded that infants with jaundice and UTIs also tended to have more severe hyperbilirubinemia, as seen by a higher peak total serum bilirubin level at serial follow-up. This study highlighted the association between neonatal jaundice and UTI, emphasizing the importance of considering UTI in evaluation of Jaundice infants.

In cases of neonatal jaundice, screening for UTI should be performed when the underlying cause is not evident.

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Prevalence and subtypes of headache in children with benign joint hypermobility syndrome

Introduction

Benign Joint Hypermobility Syndrome and headache has a significant relationship in children and adolescents

Benign Joint Hypermobility Syndrome (BJHS) is a benign hereditary connective tissue disorder causing musculoskeletal symptoms without other rheumatic disorders like Ehlers-Danlos syndrome (EDS), Marfan syndrome, SAPHO (synovitis, acne, pustulosis, hyperostosis and osteitis) and osteogenesis imperfect.[1] It is estimated that around 10-25% of children's and adolescents are affected by BJHS.[2] Recent studies have indicated a potential association between BJHS and comorbidities like gastroesophageal reflux disease and irritable bowel disease and focal hyperhydrosis. There were few studies on prevalence of headache in children with BJHS.[1] This study aimed to investigate the prevalence and subtypes of headache in children and adolescents with BJHS.

Methods

This was a school based observational study involving children and adolescents aged 7 to 16 years. Using stratified cluster and simple random sampling, 4832 students were examined for BJHS using Beighton criteria. Of these, 798 with BJHS were placed in case group and 912 age and sex matched students without BJHS were placed in control group. Headache prevalence and subtypes were evaluated using Child Headache-Attributed Restriction, Disability, and Social Handicap and Impaired Participation (HARDSHIP) questionnaires and international

classification of headache disorders (ICHD-III). The prevalence of headache was compared between two groups.

Results

The study included 798 patients with BJHS and 912 healthy children. In the age group of 7–11 years, the case group (with BJHS) had 3.37 times higher the frequency of headaches compared to the control group (P=0.001); in the age group of 12–16 years, the case group had around 5 times higher the frequency of headaches compared to the control group (P=0.001). When comparing children aged 12–16 with BJHS to those aged 7–11 with BJHS, the probability of headache was 3.7 times lower (P-value=0.001). However, there was no statistically significant difference (P-value=0.125) in the probability of headache between healthy children aged 7–11 and healthy children aged 12–16 (Table 1). In this case-control study, which involved 798 patients with BJHS diagnosed according to the Beighton criteria, headaches were reported by 292 (37%) of the patients compared to 122 (13.38%) in a healthy control group. Migraine was the most common headache type. Boys with BJHS had 1.5 times higher probability of headache than girls.

Headache	**7-11 years, n=1312**		**12-16 years, n=398**	
	Case	**Control**	**Case**	**Control**
Yes	196	88	96	34
No	409	619	97	171

Table 1. Distribution of headache group in case (with BJHS) and control group by age group

Discussion

This study showed a significant association between BJHS and headaches, with a higher prevalence and likelihood of migraines in children's with BJHS. Additionally, compared to healthy children, children with hypermobility had a 4.5-fold increased risk of migraine.[1] These findings align with the previous study which showed migraines were more common than any other headache and the prevalence of migraine in this result (healthy children) was approximately 7%, which was comparable to Kuwaiti children and adolescents studies.[3] Primary headache disorders significantly impact children's quality of life, leading to academic and social difficulties. Early interventions and management were essential to prevent long term disability.

Conclusion

BJHS was associated with an increased prevalence of headaches in children, necessitating greater awareness among healthcare professionals. Further research was needed to understand the underlying mechanisms and develop tailored management strategies for affected children.

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Analysis of etiologies, clinical features, therapeutic treatments and outcomes of patients diagnosed with neonatal acute liver failure

Introduction

Hypoxic/ischemic injury and infection are the predominant etiologies of Neonatal acute liver failure.

Acute liver failure (ALF) is a sudden loss of liver function without prior liver disease, varying in incidence and etiology by age and region. Neonatal acute liver failure (NALF) is defined by liver synthetic dysfunction with an international normalized ratio (INR) ≥2.0 in the first 4 weeks of life.[1] Incidence of acute liver failure in the developed world is rare with an incidence of 10 cases per million across all age groups. In the United States, it was estimated that 1,600 cases of ALF were reported every year. NAFL is a rare condition with high mortality, differing significantly in etiology and clinical features from other age groups.[2] This study aimed to retrospectively analyse the etiologies, clinical features, treatments, and outcomes of NAFL to improve the early diagnosis and treatment.

Methods

This was a single-centre retrospective study conducted on infants. This study included term infants aged ≤28 days and preterm infants with a postmenstrual age less than 44 weeks with an INR ≥2.0. All coagulation test tests were reviewed to identify NALF. Extensive diagnostic workups were performed to determine the causes. Data was collected on demographics, clinical manifestations, laboratory and imaging results, interventions and outcomes. Comparisons were made based on the cause and result. The survival rate was estimated using the Kaplan-Meier method.

Results

About 58 patients with NALF were included for evaluation. The etiology of NALF was identified in 86.2% (50/58) of infants, with hypoxic/ischemic injury which was the most common etiology occurring in 29.3% (17/58) of the patients, followed by infection (27.6%,

16/58) and gestational alloimmune liver disease with neonatal hemochromatosis (GALD-NH) (10.3%, 6/58). The infection group included 8 (13.8%, 8/58) viral infection, 5 (8.6%, 5/58) cases of bacterial infection, 2 (3.4%, 2/58) cases of fungal infection and 1 (1.7%, 1/58) case of congenital tuberculosis. Of the viral infections, 87.5% (7/8) were caused by enterovirus infections, while the remaining 12.5% (1/8) were caused by rubella virus infections. Hypoxic/ischemic injury and infection was diagnosed at earliest. In the infection group, median INR was significantly lower when compared to GALD-NH group. Bleeding was a common complication in 44.8% of patients. Median age at diagnosis was 4 days. At the time of the last follow-up overall mortality rate was 50% (Figure 1) and 31% of patients showed complete recovery in liver function. The incidence of cholestasis was significantly higher among surviving patients (P=0.018).

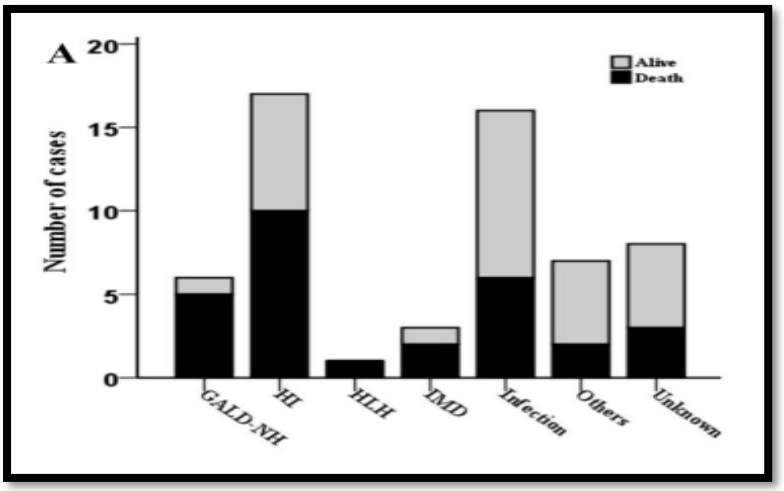

Figure 1. Outcomes showing that mortality rate was greater than 50% in the GALD-NH (83.3%, 5/6), HLH (100%, 1/1), IMD (66.7%, 2/3) and HI (58.8%, 10/17) groups.

Discussion

NALF is a rare and often fatal disease with high mortality rate. This study finding found that hypoxic/ischemic injury and infection as predominant cause for NAFL which was consistent with the results of Zozaya et al. study.[3] Viral infections, notably enterovirus, were the most common in the infection group. The indeterminate etiology rate was 13.8%, highlighting the challenging in diagnosing critically ill neonates. This study underscored the importance of identifying NAFL causes to initiate disease specific treatments and consider liver transplantation (LT) when necessary. The survival with native liver (SNL) was low and no patients received LT due to contraindication or parental refusal.

Conclusion

This study showed that hypoxic/ischemic injury and infection are the primary causes of NALF and can be easily distinguished by unique clinical and laboratory profiles in neonates. Further research was needed to enhance diagnostic accuracy and optimize treatment strategies and improve outcomes for NALF patients.

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Case report on Necrotizing Enterocolitis in infant with Twin - Twin transfusion syndrome

Introduction

Twin-twin transfusion syndrome and Prematurity are the risk factors for developing Necrotizing enterocolitis.

Necrotizing enterocolitis (NEC) is defined by the symptoms of marked inflammation and bacterial infection of the intestines, ranging from epithelial injury to transmural injury and perforation. Bacterial invasion of the intestinal wall results in NEC where the toxins attach to Toll-like receptor 4 (TLR4), activating pathogen-associated molecular pattern (PAMP) receptors that rupture the intestinal barrier and permit the translocation of the bacteria.[1] NEC is one of the most dangerous diseases that affect newborns in neonatal intensive care. Long-term complications include strictures and adhesions of the intestine, cholestasis, short bowel syndrome, failure to thrive, and neurodevelopmental delay.[2] Twin-twin transfusion syndrome (TTTS) occurs when there is a volume imbalance where the anastomosis at the vascular equator between the two placentae shifts from the donor to the recipient twin which eventually increases the risk for NEC.[1] This report aimed to describe a case of NEC in an infant with a history of TTTS.

Case presentation

A 3 month-old female infant with a history of twin-twin transfusion syndrome (TTTS) and prematurity presented to pediatric emergency department (ED) with the history of bloody diarrhoea, emesis, lack of appetite, and lethargy for 4 days. Prior to presentation to ED, patient had episodes of choking and increased work of breathing after eating. Upon examination patient had pale skin, tachycardia, abdominal distension with guarding and hypoactive bowel sounds, a diaper rash, and bloody diarrhoea mixed with foul-smelling stool. Laboratory investigations showed thrombocytosis due to inflammation, high hemoglobin and haematocrit due to hemoconcentration, elevated procalcitonin due to sepsis, low white blood cell count (WBC) and neutropenia due to sepsis. Fecal occult blood test (FOBT) showed positive while the blood and stool cultures were negative. An X-ray imaging of abdomen showed dilated loops of the bowel and pneumatosis intestinalis (Figure 1). Therapy was started with intravenous (IV) fluids for maintenance of hydration and broad-spectrum antibiotics including IV vancomycin and meropenem. Patient underwent laparotomy to resect the grossly diseased intestine. Later, after 10 days, patient was discharged with clinical follow-up.

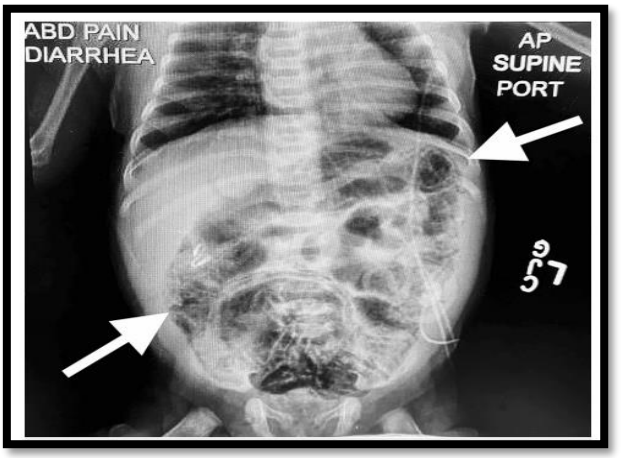

Figure 1. Abdominal x-ray showing dilated loops of bowel and pneumatosis

Discussion

This study finding suggested that bloody stools and abdominal distention were the symptoms of NEC which manifest within the first 2 weeks of life. In this case, prematurity and TTTS were the major risk factor for developing NEC. Standard treatment for NEC includes laboratory tests, IV fluids, and antibiotics.[1] In infants with NEC bowel resection surgery can be difficult for recovery.[3] As in this case, patient was 3 months old, recovery from the surgery can be better compared to neonate. Early assessment and diagnosis are crucial in patient with NEC for better successful outcome and recovery. It may be advantageous for NEC to encourage breastfeeding rather than to introduce formula feeding too soon. In neonatal intensive care units (NICUs), implementing probiotic supplements and strict infection control protocols into practice can also help prevent NEC.

Conclusion

This case report described occurrence of NEC in an infant with history of TTTS. This case demonstrated the higher risk of NEC in infants with TTTS, highlighting the necessity of early intervention and increased awareness.

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