Review Article

An Overview on Diagnosis and Management of Neonatal Jaundice

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Abstract

Neonatal jaundice is a common clinical condition in the neonatal age, most frequently in the first week of life. It manifests due to different physiological and pathological phenomena related to the metabolism process of bilirubin. Data from Saudi Arabia identifies physiological jaundice as the most common cause in the region, followed by indirect hyperbilirubinemia, early onset jaundice, direct hyperbilirubinemia, and persistent hyperbilirubinemia jaundice. Early recognition and prompt treatment of the condition are crucial to evade serious complications and promote the neonate's health. The present study reviewed the literature searching for the etiology of neonatal jaundice, diagnosis, risk factors, and management of this disease. PubMed database was used for articles selection, and gathered papers had undergone a thorough review. Jaundice in newborns is rather common and can be caused by a variety of factors. Many doctors believe that infant jaundice is a minor condition, but it is a severe condition that can cause irreversible brain damage. Everyone in the field of neonatology should be aware of this. Furthermore, parent education is critical and to those in the field of neonatology.

Keywords: Neonatal jaundice, Hyperbilirubinemia, Risk factors, Management

Introduction

Neonatal jaundice or neonatal hyperbilirubinemia is a condition that results from the accumulation of the bilirubin, a byproduct of heme breakdown, in the blood to the point start manifesting in a lab test and producing symptomology. Different physiological and pathological phenomena causes can participate in the emerging of this condition. Hence, newborn hyperbilirubinemia is a frequent clinical issue in the neonatal age, predominantly during the first week of life. Hyperbilirubinemia is defined as an increase in TSB (Total Serum Bilirubin) beyond the ninety-fifth percentile for age (high-risk zone) within the 1st seven days of birth [1-3]. Recent study in Mecca, Saudi Arabia, the researchers identified the utmost prevalent reasons of neonatal jaundice in the region where the majority of the cases were caused by physiological jaundice (53.9%) followed by direct hyperbilirubinemia (3.8%), early-onset jaundice (8.8%), indirect hyperbilirubinemia (15.9%), and persistent jaundice (17.6%) [4]. This paper aim to explore the important aspects of this disease, to provide the pediatric practitioner with the needed knowledge warrant the patients' safety.

Materials and Methods

For the selection process of relevant articles, the PubMed database was used. The following keys were used in the Mesh ((“Neonatal jaundice” [Mesh OR “Neonatal hyperbilirubinemia” [Mesh]]) AND (“Types” [Mesh] OR “Diagnosis” [Mesh] OR “Etiology” [Mesh] OR “Management” [Mesh] OR “Risk factors” [Mesh])). Neonatal jaundice or neonatal hyperbilirubinemia types, risk factors, evaluation, management, or diagnosis were among the selected publications for inclusion. All other publications that did not meet the criteria were eliminated since their topic did not contain any of the inclusion criterion results.

Review

Types and Etiologies of Hyperbilirubinemia

Jaundice in the neonate can arise due to multiple physiological and pathological conditions. Jaundice results

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from breast milk or breastfeeding, and hemolytic jaundice, having three subtypes because of jaundice associated with rhesus (Rh) incompatibility, ABO incompatibility, and Glucose-6-phosphate dehydrogenase (G6PD) deficiency have all been accounted in newborns [5].

Physiological Jaundice

It's the utmost prevalent kind of hyperbilirubinemia in neonates, and it has no long-term sequelae. High toxic levels of bilirubin may be linked to neurodevelopmental problems such as athetosis, hearing loss, and in rare circumstances, intellectual impairments. Jaundice caused by physiological immaturity generally develops within 24–72 hours of age and peaks within the fourth and fifth days of life in term newborns and by the 7th day of life in preterm neonates. The most common type of bilirubin is unconjugated bilirubin, with a blood level of less than 15 mg/dl. According to the American Academy of Pediatrics' latest recommendations, bilirubin contents up to 17–18 mg/dl can be considered acceptable healthful infants [5, 6].

Pathological Jaundice

Pathological jaundice is defined as bilirubin levels that exceed the normal range and require treatment. This kind of jaundice is defined as the jaundice emersion during twenty-four hours as a result of an enhancement in serum bilirubin higher than 5 mg/dl/day, peak values greater than the predicted common limit, conjugated bilirubin (darker urine staining), and the existence of clinical jaundice for more than two weeks [5, 6].

Breast Feeding and Breast Milk Jaundice

Infants who are exclusively breastfed have a distinct physiological pattern for jaundice than those who are artificially fed. Breastfed newborns' jaundice generally occurs between 24 and 72 hours of age, with a peak between 5 and 15 days, yet usually fades by the third week of life. Mild jaundice in breastfed babies might develop 10–14 days after delivery or recur during breastfeeding. A rare consequence of a severe variant of this jaundice is nuclear jaundice, where extremely high bilirubin levels build in the blood and produce brain damage. In such cases, hearing loss, behavioral problems, and permeant mental impairment may occur [7, 8].

Hemolytic Jaundice

The utmost prevalent reasons of hemolytic jaundice are Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency, ABO incompatibility, and Rh hemolytic illness.

Rh Factor Hemolytic Disease

Rhesus hemolytic disease of the neonates (RHDN) is caused by maternal alloimmunization with red blood cells. When fetal red blood cells are positive for a specific antigen, as they commonly are when a baby with Rh-positive is born to an Rh-positive father and Rh-negative mother, maternal immunoglobulin (IgG) antibodies may cross the placenta into the fetal circulation and result in a wide range of symptoms in the fetus, from mild to severe hemolytic anemia to death; hydrops fetalis [9].

ABO Incompatibility

Infants born to mothers with the O blood type must be properly controlled for the first 72 hours. ABO incompatibility causes jaundice, which generally develops 24 hours after delivery. Workup for pathological jaundice should be done if severe jaundice or if it appears during twenty-four hours. Intensive phototherapy at SB 12–17 mg/dl is recommended depending on the baby's postnatal age, and an exchange blood transfusion may be required in certain severe instances [10].

Jaundice Associated with G6PD Deficiency

The most prevalent enzymopathy is G6PD, which is RBCs' enzyme shortage. It is a highly important illness in the hexose monophosphate pathway. Infants with severe jaundice in a family with a background of a geographic origin related to G-6-PD shortage or significant jaundice should be investigated for G6PD deficiency. Variations in the OATP2 and UGT1A1 genes result in decreased bilirubin conjugation, which has an essential effect on the formation of hyperbilirubinemia in G6PD defective infants [11-13].

Risk Factors

Risk factors for developing neonatal jaundice vastly vary due to the different underlying etiologies. ABO incompatibility, gestational age between 35 -36 weeks, pre-discharge bilirubin in the high-risk zone, detected jaundice within the 1st twenty-four hours of birth, history of jaundice in a sibling, exclusive breastfeeding, cephalohematoma or bruising, and East Asian race are all main risk factors in neonates over thirty-five weeks pregnancy. Prematurity is also linked to the development of severe hyperbilirubinemia. For the minor risk factors, maternal age over twenty-five, high intermediate-range of serum bilirubin, male gender, gestational diabetes with macrosomic baby, and polycythemia [14, 15].

Evaluation and Diagnosis

Biochemical lab investigations play a major role in evaluating jaundice; bilirubin contents can be measured by a transcutaneous device or by drawing a blood sample to determine plasma levels or total serum. Evaluation of transcutaneous bilirubin decreases the number of bilirubin blood tests; however, it is restricted if the infant has had phototherapy and by dark skin tone. The total serum bilirubin level should also be assessed if the transcutaneous bilirubin content surpasses the 95th percentile on the transcutaneous nomogram or 75 percent of the total serum bilirubin nomogram for phototherapy [16].

Blood grouping, Full Blood Cell (FBC), blood smear, Coombs's test, and G6PD are all recommended tests to explore the chances of hemolytic illness presence that may

lead to unconjugated hyperbilirubinemia. Serum aminotransferases must be ordered for evidence of hepatocellular damage, Gamma-glutamyl Transferase (GGTP) contents for evidence of hepatobiliary illness and prothrombin time, and serum albumin to investigate synthetic hepatic function in patients with conjugated hyperbilirubinemia [14, 17].

Management

Phototherapy

Phototherapy can readily cure hyperbilirubinemia with minimal side effects and evident efficacy. The effectiveness of phototherapy is proportional to the amount of exposed surface area: Phototherapy with two surfaces can be more successful than phototherapy with one. Source of light's spectrum: Instead of F20T12/B lights, special blue tubes with the designation F20T12/BB must be utilized. Reducing the neonate's distance to within 15–20 cm may increase energy production or irradiance in a phototherapy unit. Intermittent phototherapy is preferable to continuous phototherapy. Except for breastfeeding or diaper changes, phototherapy should not be interrupted [18].

Exchange Transfusion

If there is a danger of neurologic impairment, exchange transfusion is recommended, whether or not phototherapy is attempted. It is utilized to eliminate bilirubin from the circulation and sensitized red blood cells in iso-immune hemolysis and circulating antibodies. Exchange transfusions should be held exclusively within the newborn or Pediatric Intensive Care Unit (NICU/PICU) with highly qualified staff. The infant's blood is replaced in aliquots with crossed-matched blood in a double volume exchange blood transfusion (160 to 180 ml/kg) [19].

Pharmacological Treatment

Despite phototherapy, IV immunoglobulin is suggested for rising bilirubin contents caused by iso-immune hemolysis. IV immunoglobin should be commenced when the bilirubin content is within two to three mg/dl of the exchange transfusion level [20]. Other option includes the use of Phenobarbitone. This drug improves bilirubin processing, including hepatic absorption, conjugation, and excretion, which aids in lowering bilirubin levels. It has a margin of delay before it starts to work visibly; thence, it is advised to be used adjacently with other treatment measures [21].

Conclusion

Neonatal jaundice is rather frequent and can be caused by a variety of factors. Many physicians feel that infant jaundice is a harmless illness, but in reality, newborn jaundice is a dangerous disorder that can result in irreversible brain damage. This is something that all neonatologists should be aware of. Moreover, parent education is highly important. They should know that it can emerge any time after birth and that several conditions that inflict jaundice cannot be diagnosed at once. Additionally, education should not be directed to parents only. Nurses, pediatricians, obstetricians, and primary health providers must be educated to detect the earliest signs and changes hinting to neonatal jaundice.

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