



Original Research Article

CLINICAL STUDY OF ADRENAL HEMORRHAGE IN NEONATES: OUR EXPERIENCE

Kannepalli Srinivas¹, Goriparthi Ratnakumari²

¹Assistant Professor, Department of Paediatrics Surgery, Andhra Medical College, Visakhapatnam, India.

²Associate Professor, Department of Paediatrics, Andhra Medical College, Visakhapatnam, India.

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Corresponding Author:

Dr. Kannepalli Srinivas
 Assistant Professor of Pediatric surgery, AMC, Visakhapatnam, Andhra Pradesh
 Email:kannepalli0@gmail.com

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ABSTRACT

Background: Neonatal Adrenal hemorrhage is more common in neonates than in children or adults. The incidence ranges from 1.7 to 2.1 per 1000 births. Because adrenal bleeding may remain asymptomatic, the real occurrence is probably higher.

Materials and Methods: In this prospective observational study, we evaluated risk factors and clinical presentations, laboratory and ultrasonographic findings in 16 new-born babies diagnosed as adrenal hemorrhage with abdominal ultrasonography between January 2018 and July 2021 in Government General Hospital New-born Care Unit (NICU), Srikakulam.

Results: The male/female ratio was 2.5. The average age and birth weight at admission were 3 ± 2 days and 2500 ± 600 g, respectively. Out of 16 newborns, 10 were term and presented with neonatal jaundice in all, flank mass and anaemia in 7, hypotension in 2 and adrenal insufficiency in 2. Adrenal hemorrhage was right sided in 10, left-sided in 3 and bilateral in 3 new-borns. Resolution time of adrenal hemorrhage was a minimum of 6 weeks, maximum of 6 months in ultra-sonographic follow-up.

Conclusion: The most common clinical feature in new-borns with Neonatal adrenal hemorrhage was jaundice. Abdominal USG is required to determine adrenal hemorrhage in a newborn with swelling. Serial USG is the best modality for monitoring NAH to prevent unnecessary surgery.

Keywords: Neonatal Adrenal Hemorrhage, abdominal ultrasonography, Jaundice.

INTRODUCTION

Neonatal adrenal hemorrhage (NAH) occurs during the first weeks of life. The literature reports a varying incidence, initially thought to range from 1.7 to 3 per 1000 live births.^[1] The presence of NAH with screening abdominal ultrasounds in newborns assessed by several studies retrospectively, suggesting an occurrence of 16–29 per 1000 live births.^[2] In newborns adrenal vulnerable to hemorrhage due to unique vascular supply and large size compared to body weight. The hemorrhage occurs most often after a traumatic delivery or a neonatal course complicated by hypoxia, hypotension, or coagulopathy. The adrenal glands in newborns are approximately 10–20 times bigger in size in comparison with adults relative to body weight. Nevertheless, as 50–60 arterial

branches originate from 3 suprarenal arteries, an enhancement in vascularity is resulted.^[3,4] Adrenal hemorrhage occurs frequently on the right side (approximately 70%). The right adrenal gland anatomical location which is between the liver and spine, can easily lead to its compression. Furthermore, its compression due to the drainage of right adrenal vein into the inferior vena cava can predispose venous pressure alterations.^[5,6] However, 10% of the cases might have bilateral involvement.^[1] The adrenal hemorrhage etiology is multifactorial. During delivery, mechanical compression and alterations of venous pressure are considered the most probable causes. In hypoxia, with redistribution of blood to the central nervous system, heart, and adrenal glands, which results of congestion and endothelial damage leads to

hemorrhage.^[7] Asphyxia, shock, septicemia, and preexisting coagulation disorders are other factors inducing NAH. Furthermore, vaginal delivery, macrosomia, and fetal academia are presented as the most crucial predisposing factors of NAH, according to a retrospective survey.^[8] However, in a large proportion of cases, NAH cause could not be distinguished. NAH is more commonly occurred in term neonates. It is also observed in male neonates due to their higher birth weight.^[16] The NAH might remain asymptomatic; however, clinical symptoms include abdominal mass, poor feeding, vomiting, prolonged jaundice, and anemia. Jaundice is caused by hemolysis due to an enclosed hemorrhage is the frequent symptom.^[9,10] Discoloration, hematoma, swelling in scrotum, as well as lethargy, hypotonia and hypertension are among other symptoms.^[11,12] In NAH, hematuria is also clinical presentation.^[13] Hypovolemic shock is present in severe unilateral cases; however, hypoadrenocorticism is noticed in bilateral.^[16] Within the 28th to 175th day of life lesions are regressed and resolution occurs hence NAH is commonly self-limited.^[14] Ultrasound is the priority for both the preliminary screening and the follow-up assessment in neonates because portability, sensitiveness, non-invasiveness, and nonexistence of ionizing radiation. Computed tomography and magnetic resonance imaging is useful for the detection of hemorrhage and progression of hemoglobin breakdown.^[15]

MATERIAL AND METHODS

This study was carried out in newborns with adrenal hemorrhage admitted in Government General Hospital Newborn Care Unit, Srikakulam from January 2018 to July 2022. This is a prospective observational study. In this study inclusion criteria were newborns with jaundice, abdominal distension, birth trauma and perinatal asphyxia. All the patients were diagnosed using USG. Primary hospitalization reasons, gestational age, gender, delivery type, birth weight, postnatal age, presenting symptoms, predisposing causes, signs of adrenal insufficiency, site of NAH, levels of hemoglobin, peak bilirubin, glucose, sodium, potassium, coagulation test results, urine vanillyl mandelic acid (VMA) and USG findings were recorded. Cortisol levels and Adrenocorticotropic hormone (ACTH) were measured. USG was performed at two-week intervals during the follow-up in order to determine the resolution time.

RESULTS

During the study period, 567 newborns with jaundice and abdominal distension were admitted in NICU underwent ultrasound examination and found 16 newborns with adrenal hemorrhage (2.8%). Out of the 16 newborns, 11 male and 5 female. The clinical feature mostly observed in infants with

adrenal hemorrhage was jaundice, in 68.7% of cases (n=11). Eight of them presented with prolonged jaundice, other presentations were paleness (44%, 7), flank mass (44%, 7), discoloration of the scrotum (25%, 4), hypotension (12.5%, 2) and hypotonia and lethargy (12.5%, 2). Adrenal insufficiency present in 2 (12.5%) newborns. All newborns had normal levels of VMA in urinary excretion. Neonatal adrenal hemorrhage was in 10 newborns on right-side, left-side in 3 and bilateral in 3. Adrenal hemorrhage sizes were minimum 24x28x22 mm and maximum of 58x46x53 mm. A minimum of 6 weeks and maximum of 6 months' time took for resolution of adrenal hemorrhages was in ultra-sonographic follow-up. In 4 newborns after resolution of hemorrhages Calcifications in adrenal glands were observed.

DISCUSSION

Neonatal Adrenal Hemorrhage is a relatively uncommon condition persistently seen in term male infants.^[6,7] Out of 16 new-borns with Adrenal Hemorrhage in our study, 12 (75%) were term male babies and 11 (68.7%) were male babies. The most established predisposing causes of NAH are Birth trauma, prolonged labour, intrauterine infection, perinatal asphyxia or hypoxia, large birth weight, septicemia, hemorrhagic disorder and hypofibrinemia.^[11] In our study, Birth trauma and prolonged labour were the significant predisposing causes of NAH.^[6,11] The most consistent clinical presentations were persistent jaundice and flank mass. However, NAH may also present with scrotal hematoma, adrenal insufficiency or shock and maybe diagnosed incidentally.^[8,11] The most common presentations in our series were Jaundice, paleness and flank mass. In term infants, NAH is most extensively observed while adrenal insufficiency due to NAH is rare.^[8,11] Ruminska et al,^[11] reported adrenal insufficiency in a term infant with bilateral AH and stated that supplementation with glycol and mineralocorticoids was required. The adrenal gland has considerable regenerative capacity, and most NAH is not associated with significant adrenal insufficiency. In addition to NAH, prematurity and severe underlying diseases such as sepsis, DIC, perinatal hypoxia and intraventricular hemorrhage are also potential causes of adrenal insufficiency in these patients. Cytokine-related suppression of ACTH or cortisol synthesis, inadequate perfusion of the adrenal gland, a limited adrenocortical reserve or immaturity of the hypothalamic-pituitary-adrenal axis partly responsible for the development of adrenal insufficiency.^[17] NAH may present with scrotal swelling and bluish discoloration.^[8,11] In NAH adrenal gland capsule is ruptured, blood passes to the scrotum through the patent processus vaginalis results swelling and bluish discoloration of the scrotum. In our study 3

of our new-borns present with scrotal swelling and/or discoloration. These may be differentiated from torsion of the testis, orchitis, scrotal or testicular edema, hydrocele, inguinal hernia. USG of the abdomen and scrotum should be performed in infants with scrotal swelling or ecchymosis in order to determine NAH. If differential diagnosis between NAH and torsion of the testis cannot be established, nuclear scanning or colour Doppler analysis is required.^[17] The right adrenal gland is the frequent (38%-100%) site of NAH. Frequencies of 8%-38% for bilateral NAH have been reported.^[11] In our study, 10 new-borns had NAH on the right side (62.5%) and 3 had bilateral NAH (18.7%). Differential diagnosis of NAH should be performed with neonatal neuroblastoma, adrenal abscess, cystic neuroblastoma, cortical renal cyst, and obstructed upper cortical renal cyst and an obstructed upper urinary tract in the duplicated kidney.^[5,6] Urinary VMA levels are useful in the differentiation of NAH from neuroblastoma. VMA levels were normal in all our patients. The ultra-sonographic appearance of NAH depends on the age of hematoma, and this gradually resolves with age. Diagnosis and follow-up of NAH using USG is the most effective modality and avoids unnecessary laparotomy. Serial USG can demonstrate decreases in size and echogenicity, multiloculated cystic mass, calcifications and complete resolution of NAH. Calcification has been observed in 2 of our newborns. NAH was followed up using USG at four-day to one-month intervals.^[11,18] NAH usually resolves between 3 weeks to 6 months. In our study, it resolved between 6 and 20 weeks.

CONCLUSION

Neonatal adrenal hemorrhage occurs in newborns with male preponderance presented as unexplained jaundice. Abdominal USG is the mainstay of diagnosis to determine NAH in newborns with flank mass. Serial USG is the best modality for monitoring NAH and can prevent unnecessary surgery.

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