



Neonatal Adrenal Hemorrhage As A Complication of Traumatic Vaginal Delivery: Diagnosis and Follow-Up With Ultrasonography

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Adrenal hemorrhage is the most common cause of an adrenal mass in the neonate. The incidence is increased in preterm infants; in prolonged or complicated deliveries. Ultrasound can, in the differential diagnosis of adrenal masses, differentiate solid from cystic masses and those masses arising from the upper pole of the kidney. In this article we wanted to drive the attention of radiologists to the possibility of adrenal hemorrhage in neonates who were born after a complicated vaginal delivery without the specific findings of asphyxia and also to the differential diagnosis of adrenal masses recognized by coincidence. The patient was discharged on the 9th day and followed up in our outpatient clinic. Ultrasonography repeated at 1st and 2nd weeks of discharge showed significant and progressive reduction in the size.

Key Words : Neonate, Ultrasonography, Adrenal hemorrhage

Ultrasonografi ile Tam ve İzlemi Yapılan Travmatik Vajinal Doğumun Komplikasyonu Olarak Yenidoğanda Adrenal Kanama

Adrenal kanama yenidoğanda adrenal kitlenin en yaygın nedenlerinden birisidir. Pretermelerde, uzamış ve komplike doğumlarda insidansı artmaktadır. Adrenal kitlenin solid-kistik ayırımında ve ayırıcı tanısında ultrasonografi sıklıkla kullanılmaktadır. Burada asfiktik doğum bulguları olmayan, ko-insidental olarak adrenal kitle saptanan ve ultrasonografi ile kanama tanısı alan bir yenidoğan sunulmaktadır. Hasta izleminin dokuzuncu gününde taburcu edilerek poliklinik izlemine alındı, 1. ve 2. haftalarda yapılan ultrasonografide kitlenin boyutlarında anlamlı azalma saptandı.

Anahtar Kelimeler : Yenidoğan, Ultrasonografi, Adrenal kanama

Adrenal hemorrhage is the most common cause of an adrenal mass in the neonate and most commonly occurs on the right side, but may involve both glands.¹ The incidence is increased in preterm infants; prolonged or complicated deliveries especially with associated perinatal asphyxia or stress.²

Ultrasound (US) can, in the differential diagnosis of adrenal masses, differentiate solid from cystic masses and those masses arising from the upper pole of the kidney. Alternative diagnosis of masses, which do not show the characteristic changes of hematoma, includes neuroblastoma, Wilm's tumor and abscess.² The adrenal hemorrhage on ultrasound shows enlargement of the gland with mixed echogenicity and loss of the central echogenic stripe. Follow-up examinations show a mass that becomes hyporeflexive with gradual decrease in size.³

In this article we wanted to drive the attention of radiologists to the possibility of adrenal hemorrhage in neonates who were born after a complicated vaginal delivery without the specific findings of asphyxia such as hypoxic ischemic encephalopathy and also to the differential diagnosis of adrenal masses recognized by coincidence.

CASE REPORT

A 4800 g male was born from a 32-years-old, gravide 2, para 1, healthy mother who did not have any obstetric control during pregnancy, via vaginal delivery with cephalic presentation. The birth was noted to be traumatic; baby was cyanotic at birth and he was sent to our Neonatal Intensive Unit. His body temperature was 37 °C and blood pressure was 95/55 mmHg, other physical and neurological examination on admission was completely normal. Any

abdominal mass could not be detected and newborn reflexes were active. His BUN was 22 mg/dL, creatinine was 0.9 mg/dL, sodium was 140 mEq/L and potassium was 4.1 mEq/L. Routine neonatal ultrasonographic renal screening performed in our hospital, revealed a mass located on the upper pole of the right kidney, dislocating it downwardly. The patient was consulted with pediatric surgeons and computed tomography (CT) scan was requested. CT scan also revealed hypodense mass with smooth wall and size of 4,5x3 cm (Fig 1). We referred the patient to a pediatric radiologist and ultrasonographic examination revealed a loculated fluid collection at the right adrenal area, with mucous floating materials and septations within, dislocating the right kidney to inferior and lateral region, with a size of 4,8x3,2x3 cm (Fig 2). It was concluded that appearances were consistent with a right adrenal hemorrhage and follow-up examinations were suggested to document reduction in size of loculated collection and to exclude any underlying lesion that may have led bleeding. Coagulation parameters were checked, but they were normal and there was neither a reduction in hemoglobin level, nor hypotension, suggesting an adrenal insufficiency. The patient was discharged on the 9th day and followed up in our outpatient clinics. US repeated at 1st and 2nd weeks of discharge showed significant and progressive reduction in the size.

Figure 1. Computed tomography image of mass located on the upper pole of right kidney.

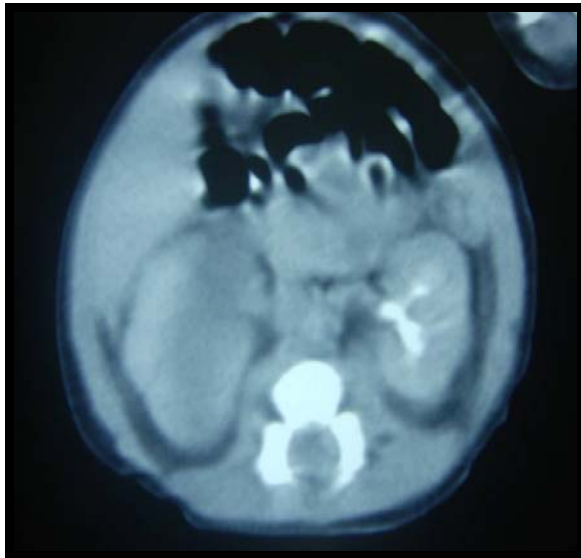


Figure 2. Ultrasonographic image of right adrenal hemorrhage.



DISCUSSION

Adrenal hemorrhage is the most common cause of an adrenal mass in the neonate.¹ The etiology is unknown, but the adrenal cortex is relatively large, extremely vascular, hyperemic and prone to vascular damage in the newborn: venous engorgement has been proposed as a mechanism.⁴ The cords of cells forming the cortex are separated by venous sinusoids. These may become extremely distended with blood as a result of anoxia or any condition causing visceral congestion. An alternative explanation is hypoxia causing reflex shunting of blood away from the splanchnic circulation and giving rise to hemorrhagic infarctions. So, severe stress situations, including difficult delivery, especially in infants of diabetic mothers, perinatal asphyxia, trauma, coagulation disorders, shock or septicemia in the newborn are associated with this condition. Presence of difficult delivery, perinatal asphyxia due to high birth weight explains the reason of adrenal hemorrhage in this case. The right adrenal is more often affected, as in our case, which is likely due to the fact that it drains directly into the inferior vena cava. The spectrum of presentation is considerable, ranging from asymptomatic to severe life-threatening intraabdominal hemorrhage. Similarly clinical examination may vary considerably and may be normal or demonstrate an abdominal mass with a significant hemorrhage.

Initial diagnosis of an adrenal mass in a child is made by US. This is also the method recommended for follow-up and differentiation from neuroblastoma.¹

Differentiation of cystic neuroblastoma from fetal adrenal hemorrhage may potentially be difficult.⁵ Neonatal adrenal hemorrhage associated with in situ neuroblastoma has also been reported.⁶

US examination of a normal neonatal adrenal gland reveals a relatively echo poor cortex and a thin central echogenic core which is considered to represent only the medulla.⁷ At birth the neonatal cortex is relatively thick with up to 80% composed of the thick fetal zone which involutes postnatally and a thinner peripheral zone which becomes the adult cortex. The relatively easier visualization of the neonatal adrenal is due to its proportionally larger size and the smaller amount of perirenal fat present.²

Adrenal hemorrhage in the newborn is considered to develop during the first 24 hr. It is usually intracapsular and may distend the capsule considerably.¹ In the early stages, US shows the adrenal hematoma to be solid and diffusely hyperechoic. The natural course of uncomplicated hemorrhage is central liquefaction with gradual shrinking. With liquefaction the pattern becomes more mixed, central hypoechoic regions develop, it decreases in size and eventually a sonolucent cyst-like structure appears. Within weeks, wall calcifications may appear, outlining the bleed and giving a characteristic rim-like image on plain films. With time, it become more compact and a stellate structure conforming to the configuration of the normal gland.^{1,2}

Adrenal hemorrhage is easily visualized on CT and magnetic resonance imaging (MRI), where the findings change with time following the natural course of hemorrhage. These techniques are not routinely used to monitor the disease but may be necessary for differential diagnosis in unclear cases.^{8,9} Follow-up examinations with US will show a decrease in echogenicity and a resolving mass in the case of adrenal hemorrhage. This will save further

investigations such as CT or MRI scan either as the first or confirmatory investigations.²

In undeveloped and developing countries like our country, midwives are mostly the only choice of women at time of delivery and without previous control midwives can be faced to help the delivery of a very large baby, mostly traumatized. So asphyxia is really a medical problem for this kind of countries. We think that medical professionals working in developing countries must be aware of the possible problems, and adrenal hemorrhage is one of these with or without accompanying hypoxic ischemic encephalopathy. This diagnosis must also be kept in mind by radiologists as it is the most common cause of adrenal mass in newborn, to avoid further investigations.

REFERENCES

1. Jacobsson H, Kaiser S, Granholm T, Ringertz HG. Neonatal adrenal haemorrhage at bone scintigraphy: a case report. *Pediatr Radiol* 1998; 28: 896-8.
2. O'Neill JMD, Hendry GMA, MacKinlay GA. An unusual presentation of neonatal adrenal hemorrhage. *Europ J Ultrasound* 2003; 16: 261-4.
3. Heij HA, van Amerongen T, Ekkelkamp S, Vos A. Diagnosis and management neonatal adrenal haemorrhage. *Pediatr Radiol* 1989; 19: 391-4.
4. Koplewitz B, Daneman A, Cutz E, Hellman. Neonatal adrenal congestion: a sonographic-pathologic correlation. *Pediatr Radiol* 1998; 28: 958-62.
5. Hamada Y, Ikebukuro K, Sato M, et al. Prenatally diagnosed cystic neuroblastoma. *Pediatr Surg Int* 1999; 15: 71-4.
6. Tubergen DG, Heyn RM. In situ neuroblastoma associated with an adrenal cyst. *J Pediatr* 1970; 76: 451-3.
7. Oppenheimer DA, Carroll BA. Sonography of the normal neonatal adrenal gland. *Radiology* 1983; 146: 157-60.
8. Sivit CJ, Ingram JD, Taylor GA, et al. Posttraumatic adrenal hemorrhage in children: CT findings in 34 patients. *AJR* 1992; 158: 1299-302.
9. Willems AP, Coppes MJ, Feldberg MA, et al. Magnetic resonance appearance of adrenal hemorrhage in a neonate. *Pediatr Radiol* 1989; 19: 210-1.

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