

Adrenal Hemorrhage in the Newborn: Scintigraphic Diagnosis

Sydney Heyman and S. Treves

Harvard Medical School and The Children's Hospital Medical Center, Boston, Massachusetts

Four neonates with abdominal masses following adrenal hemorrhages were investigated by renal scintigraphy. Characteristic photon-deficient lesions were noted in the suprarenal areas during the phase of whole-body radionuclide distribution.

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Most abdominal masses in the neonatal period are retroperitoneal. The differential diagnosis includes multicystic kidney, hydronephrosis, neuroblastoma and nephroblastoma (1,2). Adrenal abscesses rarely occur (3), but hemorrhages are not uncommon. The cause of adrenal hemorrhage remains uncertain but it has been associated with traumatic births. Other factors implicated in the development of adrenal hemorrhage include hypoxia, shock, septicemia, and intravascular coagulation (4). Since patients with unilateral or bilateral adrenal hemorrhages are usually treated conservatively, noninvasive diagnostic techniques are preferable. This report deals with the scintigraphic demonstration of adrenal hemorrhage in four infants.

CASE REPORTS

Case 1. H. B. was a full-term male infant admitted at 3 days of age because of severe blood loss associated with hemorrhagic disease of the newborn. He responded well to a blood transfusion and vitamin K. A right-sided abdominal mass was found on clinical examination. The i.v. pyelogram suggested an abnormality at the upper pole of the right kidney, and a radionuclide renal scan was requested. With the patient lying supine on the high-resolution collimator, 1 mCi of Tc-99mDTPA was injected intravenously. Sequential 1-min images were obtained over a 20-min period, starting immediately after injection, each having approximately 200,000 counts. Further delayed 500,000-count views were obtained at 4 hr. A similar technique was used in the subsequent cases. A representative image shows a photon-deficient area superiorly and laterally to the right kidney, displacing it medially (Fig. 1).

The scintigraphic appearance was consistent with an adrenal hemorrhage. However, because it was felt that a renal or suprarenal tumor could not be excluded, the patient was operated

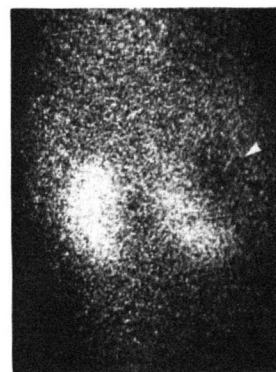


FIG. 1. There is a large photon-deficient area seen superiorly and laterally to right kidney (arrow) with medial displacement of upper pole.

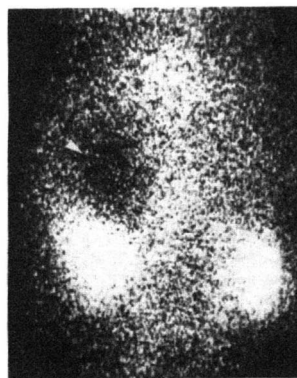


FIG. 2. In this case, note focal area of decreased activity superiorly and medially to left kidney, with lateral displacement of upper pole (arrow).

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For reprints contact: S. Treves, Div. of Nuclear Medicine, The Children's Hospital Medical Center, 300 Longwood Ave., Boston, MA 02115.

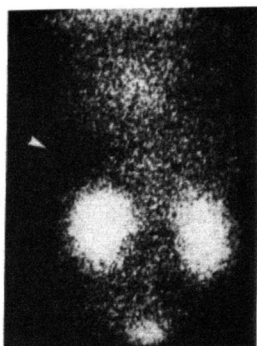


FIG. 3. A repeat study 3 wk later shows left kidney to be more nearly normal in position, with some resolution of defect (arrow).

on. A right adrenal hemorrhage was confirmed. The kidney was compressed and displaced but was otherwise intact. A radiograph taken at about 3 mo of age revealed calcification in the region of the right adrenal gland.

Case 2. B. deW. was a male infant born at term with a traumatic delivery. On day 2, a mass was palpated in the left flank. Adrenal hemorrhage was suspected and a radionuclide study requested. The study was done as in Case 1, using 1 mCi Tc-99m calcium gluconate. A large photon-deficient area was noted medially and superiorly to the left kidney, displacing it laterally (Fig. 2). The infant did well on conservative management. A followup study at 3 wk showed the defect to be smaller, with the kidney in the normal position (Fig. 3), and the patient continued to do well.

Case 3. M.M. was born at term with an uncomplicated delivery. On day 2, she was found to have a left flank mass associated with hematuria and proteinuria. The i.v. pyelogram showed a normal right kidney but nonfunction of the left kidney. During the phase of total-body opacification a radiolucency was noted in the right suprarenal area. A Tc-99m-Sn-Fe-Ascorbic acid-DTPA* scintiphoto revealed two areas of decreased uptake over both renal silhouettes, more marked on the left. In addition, the function of the left kidney was markedly decreased (Fig. 4). The original scintiphoto is shown on the left, whereas on the right a computer enhancement reveals the left renal outline more

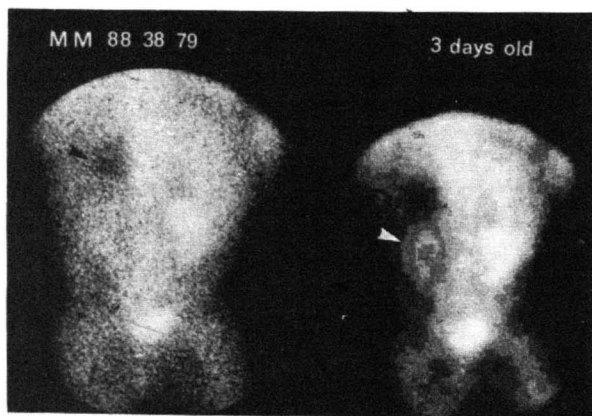


FIG. 4. Left panel shows decreased uptake over both kidneys, more marked on left (arrow). No function is evident in left kidney. With computer enhancement (right panel), renal outline is more clearly defined (arrow).

clearly. A diagnosis of bilateral adrenal hemorrhages and left renal-vein thrombosis was made. The patient was treated conservatively, requiring steroid replacement for a transient adrenal crisis. Followup radiographs and ultrasonography revealed complete resolution of the adrenal hematomas. The left kidney had shrunk to half normal size but functioned on i.v. pyelogram at two months of age.

Case 4. B.R. was a male infant born at term following a low forceps delivery because of fetal distress. The 1- and 5-min Apgar scores were 1. On admission at 12 hr of age, he was oligemic and having generalized seizures. A mass was palpated in the left flank. The urine showed a heavy sediment with proteinuria, raising the question of acute tubular necrosis secondary to hypoxia. A 24-hr collection of urine for vanillylmandelic acid was normal. The i.v. pyelogram showed good function of the left kidney, which was depressed, probably by a suprarenal mass, but a hypolucent suprarenal area was not detected. The scintiphotos performed with Tc-99mDTPA revealed whole-body distribution with clear visualization of both kidneys (Fig. 5). The left appeared to be compressed above by an avascular area (arrows). This was thought to represent an adrenal hemorrhage. At 2 mo of age, the infant appeared to be completely normal. Radiographs revealed calcification in the region of the left adrenal gland.

DISCUSSION

Adrenal hemorrhage in the newborn may be asymptomatic, being identified by calcification of the adrenal later in life. Less frequently, the hemorrhage may be extensive, leading to death from exsanguination or hypoadrenalism (5). The condition has also been associated with hypoglycemia, hypotension, and prolonged jaundice (4,6-8). It is important to establish the diagnosis to obviate unnecessary surgery.

The investigation of flank masses in the neonate should include an i.v. pyelogram, using the technique of whole-body opacification. Adrenal hemorrhage may present as a suprarenal radiolucent area (8), although this is sometimes not obvious because of immaturity of renal function in the first few days of life. In the newborn, radionuclide renal studies are more useful than the i.v. pyelogram, since they can demonstrate the presence, location, and function of the renal units. Ultrasonography would suggest adrenal hemorrhage by a finding of either echolucent or mixed solid and cystic masses (9), but it would not provide information on renal function.

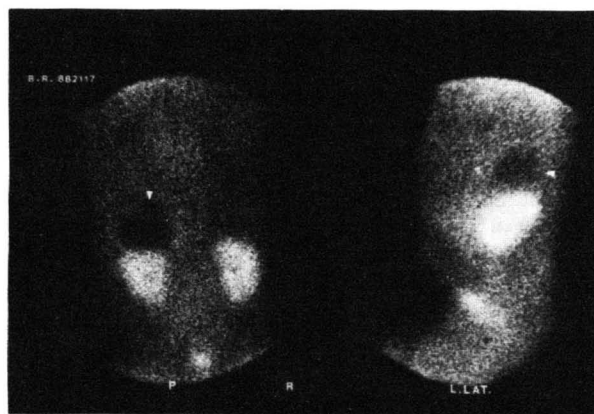


FIG. 5. Both kidneys are clearly visualized. Note large avascular area above left kidney, compressing upper pole (arrows).

Scintigraphically, adrenal hemorrhages present as photon-deficient areas situated above the kidneys, causing either renal displacement or compression if they are sufficiently large. Renal function is preserved, unless there is an associated lesion such as the renal-vein thrombosis in Case 3. A possible source of confusion is a distended gastric fundus, which may simulate a left suprarenal mass (10). In our experience, this does not cause distortion of the renal outline. The problem can be resolved by obtaining multiple projections or by deflating the stomach using a nasogastric tube.

Adrenal hemorrhage, abscess, and neuroblastoma may all be expected to have similar scintigraphic appearances. Abscesses are rare, and the mass would not be expected to appear till the end of the first week, following evidence of sepsis. With neonatal neuroblastoma, urine collections for vanillylmandelic acid and hemovanillic acid may be positive. During i.v. pyelography, the stage of whole-body opacification may show mottled lucent areas within it, though a totally lucent image is less likely (8). Neonatal Wilms' tumors are rare and can usually be differentiated by their intrarenal location. Similarly, a mass caused by hydronephrosis can be differentiated. Followup studies showing resolution of the avascular focus are also useful, as demonstrated by Case 2.

Radionuclide renal studies in the neonatal period are useful in the assessment of renal function. Through the evaluation of the phase of whole-body radionuclide distribution, information may be obtained concerning the location and vascularity of abdominal masses.

FOOTNOTE

* Renotec. Squibb & Sons, New Brunswick, NJ

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June 28, 1979

Georgia World Congress Center

Atlanta, Georgia

The Pediatric Nuclear Medicine Club will hold its Annual Meeting at the time of the Society of Nuclear Medicine Annual Meeting. It will be an open meeting; members and nonmembers are invited to bring short case presentations (35-mm slides only). The meeting will be held 5:30 p.m.-7:30 p.m.

For more information contact:

H.T. Harcke
Div. of Nuclear Medicine
St. Christopher's Hospital for Children
Philadelphia, PA 19133