Radionuclide Diagnosis of Hematoma of an Ovarian Cyst in a Neonate

We describe a newborn infant in which a Tc-99m methylene diphosphonate bone scan assisted in the diagnosis of an organized hemorrhage or hematoma occurring in an ovarian cyst. Radioactivity accumulated in the calcifying rim of the tumor. Extraosseous uptake of various Tc-99m phosphate combinations has been reported in the metastatic calcifications of hypercalcemia in the lungs, stomach, and blood-vessel walls of dialysis patients, in metastatic foci from osteogenic sarcoma, and in primary tumors of neuroblastoma and ganglioneuroma (1,2).

A black female of 36 wk gestation was born at home to a diabetic gravida 2, para 1. Physical examination revealed a hypotermic, hypotonic infant in no acute distress. A round, soft, well-circumscribed, ~6-cm, left-sided abdominal mass was palpated. Initial hemoglobin and hematocrit were 7.6 g and 24%. Total bilirubin was 14.0 mg%. The vanillylmandelic acid (VMA) evaluation was negative. The plain abdominal radiograph revealed a left midabdominal mass displacing the surrounding bowel gas (Fig. 1, left). No calcification was seen within the mass. An umbilical arteriogram (Fig. 1, center) showed a long artery (probably ovarian), originating from the abdominal aorta at about L2, running obliquely along the course of the poas toward the bony pelvis, then reversing itself toward the hypovascular mass. The early phase of total-body opacification showed a relatively thin rim of the mass suggestive of a cyst (Fig. 1, right). A longitudinal ultrasonographic scan of the abdomen, 3 cm left of the midline (Fig. 2), revealed a well-circumscribed mass characterized by a sonolucent margin and a predominantly solid, echogenic center with some fluid element. Six days after delivery, a Tc-99m methylene diphosphonate bone scan (Anger camera, 2 hr after injection of 2 mCi), showed a rim of radioactivity at the periphery of the lesion (Fig. 3, left and right).

Ovarian tumors in newborn infants are unusual. 50% of abdominal masses in the newborn are of renal origin, consisting mostly of multicystic and hydropnephrotic kidney. The great majority of early presenting tumors are benign. A simple cyst is the most common ovarian neoplasm. Ovarian cysts usually come to the attention of the clinician because of a large palpable mass, usually quite mobile because of a long pedicle. Complications include both acute abdomen secondary to the torsion of the cyst, rarely leading to intestinal obstruction, or rupture of the cyst, leading to hemoperitoneum. The torsion may produce ischemia or rarely, as in our case, an organized hematoma (3) in a gangrenous cyst. The most common ovarian tumor in the first four years of life is the simple cyst (41%) followed by the dermoid (19%).

With the presentation of a palpable abdominal mass in infancy, the differential diagnosis includes mesenteric cyst, duplication cyst, hydropneumosis, multicystic kidneys, urachal cyst, or a distended bladder. Our patient presented with anemia and jaundice as well as the abdominal mass. In an infant, anemia, jaundice, and mass are usually associated with adrenal hemorrhage and a traumatic delivery.

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FIG. 2. (Left) Dry-fixed aspirate with many spindle-shaped and triangular cells and nucleus eccentrically positioned in the cytoplasm. May-Grünwald-Giemsa X 400. (Right) Cell with coarse red granules in cytoplasm characteristic of medullary carcinoma. May-Grünwald-Giemsa X 1000.

FIG. 3. Bone scintigram: extraosseous accumulation in cold nodule of right thyroid lobe (arrow).
The radiologic workup of a tumor in the newborn usually begins with an intravenous urogram or ultrasound examination, depending on availability. Either will denote renal origin of the mass, multicystic or hydropnephrotic kidneys being the most frequent masses. In our patient, umbilical arteriography was performed initially because of the presence of an umbilical arterial catheter. This showed the mass not to be part of the kidney and to be relatively avascular. A pelvic-coursing artery, perhaps the left ovarian, was demonstrated. Ultrasound showed a predominantly echogenic pattern, indicating a solid mass. Hematomas have variable sonographic patterns (4). They can be hypoechoic, hyperechoic, or mixed, depending on the time of their presentation. With unclotted blood or homogenously clotted blood, the hematoma tends to have no internal echoes. With the occurrence of increasing clot lysis and fragmentation, there are internal echoes giving a complex pattern, as in our patient.

A radionuclide bone scan with Tc-99m methylene diphosphonate was used to see whether the tumor accumulated radioactivity, and to rule out metastasis or the presence of an extraosseous focus of neuroblastoma. Neuroblastoma sometimes has foci of microscopic calcification. Our MDP scan showed a peripheral rim of calcification, which is more indicative of an organizing hematoma than a malignant tumor. A rim of calcification has been detected radiographically in an adrenal hematoma as early as ten days (5). At autopsy, calcification has been noted as early as eight days after an adrenal hemorrhage in the newborn (6). The bone-seeking quality of Tc-99m phosphate compounds is not truly understood, but they can accumulate either in microscopic (as in our case) or in grossly apparent radiographically visible areas of calcification.

There have been sporadic reports of "halo" or "rim" signs in the literature. The "halo sign" (7) has previously been reported with the use of red blood cells labeled in vivo with pertechnetate (Tc-99m) to demonstrate a hematoma in the soft tissues of the arm in a dialysis patient. An incomplete rim of radioactivity was demonstrated with gallium-67 citrate (8) in the abdomen of a patient where the nuclide accumulated in a loop of bowel displaced by a large avascular mass.

In our patient, the acute bleeding probably occurred very late in utero, but with enough time for the complex echo pattern to occur. Our nuclide scan was performed six days postnatally in a search for extraosseous foci of neuroblastoma or metastatic bone disease. It showed a peripheral rim of increased radioactivity representing the microscopic calcification of an organizing hematoma. This is probably the earliest imaging way of diagnosing an organized hematoma undergoing calcification.

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