

AN UNUSUAL CAUSE OF "DOUGHNUT" SIGN IN BRAIN SCANNING

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The "doughnut" sign in brain scanning was originally described in association with certain mass lesions having central necrotic, cystic, or avascular areas. A case in which this pattern occurred as a result of a superficial lesion, a large cephalhematoma, is presented.

The "doughnut" sign, a localized area of increased activity with a central zone of decreased tracer concentration, was originally described by O'Mara and associates (1) in 1969 in association with certain mass or space-occupying lesions of the brain having central areas of necrosis or diminished vascularity and cellularity. In their series the sign occurred in three metastatic carcinomas, a meningioma, an intracerebral hematoma, an abscess, and a cerebral vascular accident. An additional series by Gottschalk, et al (2) described eight cases, including four glioblastomas, two abscesses, one cystic astrocytoma, and one case of metastatic disease (2). Although O'Mara concluded that the doughnut sign had apparently little diagnostic or prognostic significance, in all cases described the lesions did represent intracerebral abnormalities having mass or masslike properties.

CASE REPORT

CW, a 3-year-old boy, was admitted to Charity Hospital of Louisiana at New Orleans in March 1974 with vomiting and questionable seizure activity following a fall from the top of a car on the day of admission. The patient had sustained a soft-tissue injury to the left parietal region. Skull radiographs demonstrated a linear nondepressed fracture in the left parietal region. Physical examination was negative except for a localized contusion in the parietal region and mild lethargy. The neurologic examination was negative. Echoencephalography showed a 4-mm midline shift from left to right. The electroencephalogram showed nonspecific diffuse dysfunction. Brain scanning on the day following admission

demonstrated a large peripheral localization on the left, which in the lateral projection showed a focal localization with a central area of diminished activity (Fig. 1). In the anterior projection, the peripheral activity extended outward indicating an extracranial abnormality (Fig. 2).

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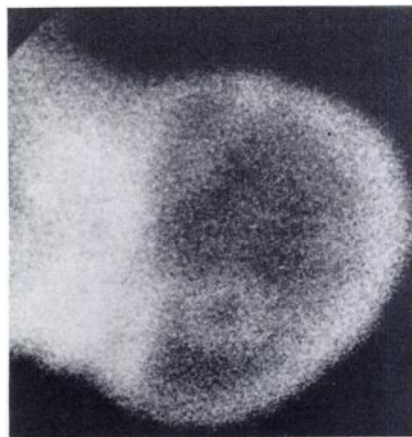


FIG. 1. Left lateral projection of ^{99m}Tc-sodium pertechnetate brain scan shows large focal localization in the frontal parietal region with central area of clearing, typical of "doughnut" sign.

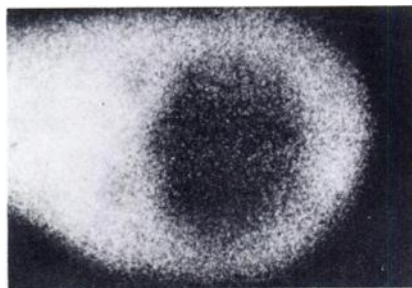


FIG. 2. Anterior projection of ^{99m}Tc-sodium pertechnetate brain scan taken on same day as scan in Fig. 1 shows peripheral position of abnormal localization.

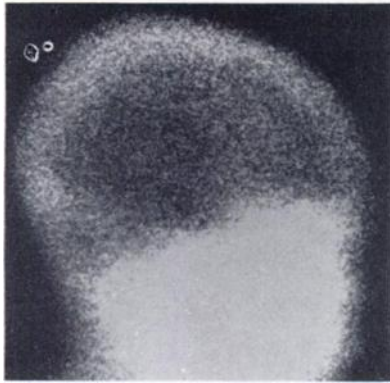


FIG. 3. Lateral projection of ^{99m}Tc -sodium pertechnetate brain scan on ninth day following admission shows complete resolution of abnormal localization initially noted.

The patient's hospital course was unremarkable with no further development of neurologic abnormality. On the ninth day following admission, essentially all of the soft-tissue swelling in the parietal region had resolved. Repeat scanning on that date demonstrated essentially complete resolution of the

abnormal localization previously noted (Fig. 3). The patient was discharged at this time with a diagnosis of resolved cephalhematoma.

DISCUSSION

Although the "doughnut" sign has not been found to have a specific diagnostic or prognostic significance, it is usually thought to represent an intracerebral abnormality. This case illustrates the need for considering possible extracranial disease when this sign is encountered, thereby possibly sparing the patient unnecessary instrumentation or further diagnostic procedures.

REFERENCES

1. O'MARA RE, McAFEE JG, CHODOS RD: The "doughnut" sign in cerebral radioisotope images. *Radiology* 92: 581-586, 1969
2. GOTTSCHALK A, ABATIE JD, PETASNICK JP, et al: The comparison between sensitivity and resolution based on a clinical evaluation with the ACRH brain scanner. In *Medical Radioisotopes Scintigraphy*, vol 2, Vienna, IAEA, 1969, p 563