

Focally Accentuated Uptake In an Area of Increased Activity In Tc-99m HEDP Brain Scans

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Brain scans performed with Tc-99m HEDP in two patients with suspected intracranial lesions showed abnormal uptake characterized by a focal area of accentuated concentration in a region of increased radioactivity. Surgery revealed that the focal uptake represented the attachment of meningioma and the general region of increased activity corresponded to the meningioma itself.

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Technetium-99m HEDP (1-hydroxyethylidene diphosphonate) is widely used in bone scanning. According to recent observations, this radiopharmaceutical concentrates not only in osseous tissue but also in various intracranial lesions (1). We report two cases of meningioma which provided a unique appearance in Tc-99m HEDP brain scans and were confirmed by surgery.

CASE REPORTS

Case 1. A 46-year-old woman with right hemiparesis and an attack of unconsciousness was referred to our outpatient department for neuroradiological examinations. Thickening of the left parietal bone was observed in roentgenograms of the skull. Brain scans made 90 min after i.v. injection of 15 mCi of [^{99m}Tc] pertechnetate showed a large area of increased activity in the left parietal region (Fig. 1A) suggestive of neoplasm such as meningioma. The brain scan was therefore repeated with Tc-99m HEDP on the following day and an abnormal focal concentration, measuring about 3 × 3 cm in diameter, within the same region of increased activity observed on the pertechnetate study (Fig. 1B). Surgery confirmed that the dura had invaded the inner table of the calvarium in the area corresponding to the

focal concentration; the size of the attachment was about 4.5 × 2.5 cm.

Case 2. A 27-year-old woman who had been having symptoms of tinnitus and visual disturbance was examined. Skull radiographs showed erosion of the dorsum sellae, but no abnormality of the vault. Tc-99m pertechnetate brain scans revealed an area of increased activity in the left temporal region (Fig. 2A). Tc-99m HEDP brain scans demonstrated a focal concentration in the previously observed area of increased activity (Fig. 2B), the hot spot measuring about 3.5 × 3 cm. It was proven surgically to represent the attachment of meningioma, measuring about 2 × 2 cm in diameter.

In each case, histologic diagnosis was meningotheelial meningioma.

DISCUSSION

Grams and Jansen first reported that Tc-99m polyphosphate concentrated in cerebral infarctions (2). This phenomenon was confirmed by other investigators and the possibility of differentiation of

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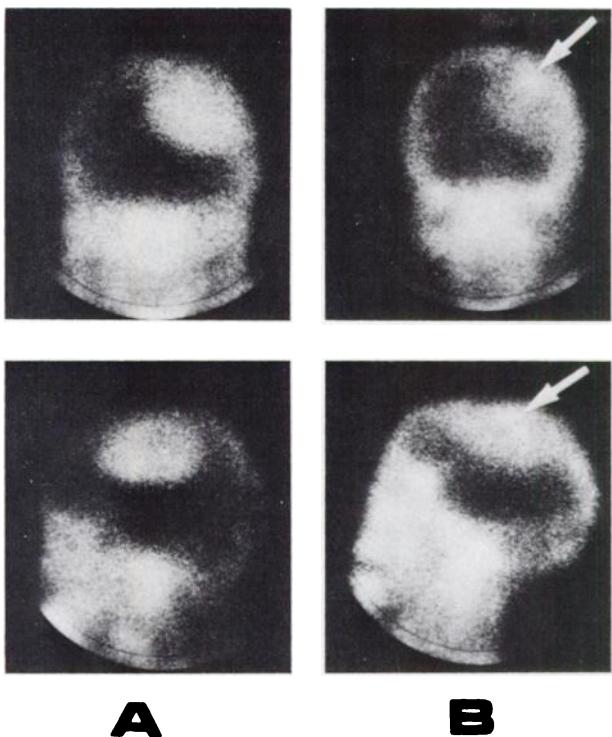


FIG. 1. Tc-99m pertechnetate brain scans (A) show an area of increased radioactivity in left parietal region. Tc-99m HEDP brain scans (B) demonstrate focally accentuated (arrows) activity in the region of less increased radioactivity.

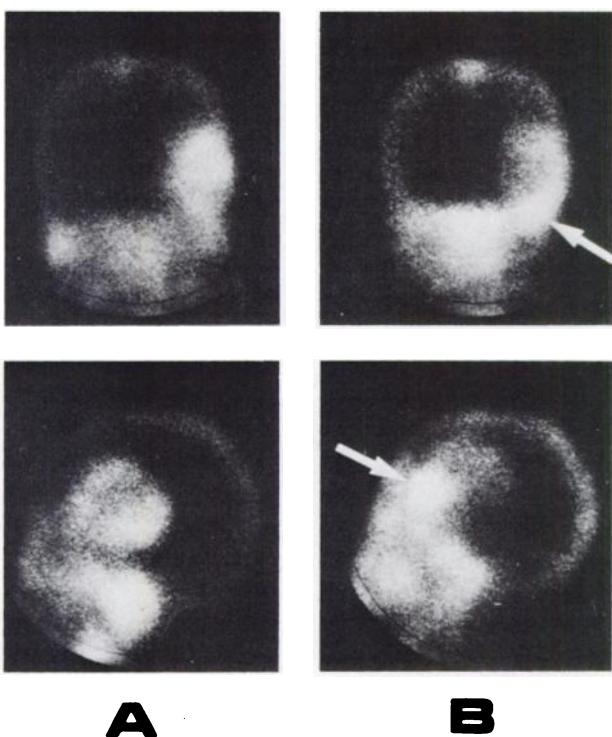


FIG. 2. Tc-99m pertechnetate brain scans (A) reveal increased radioactivity in left temporal region. Note focal accentuation of activity in the lesion (arrows) with Tc-99m HEDP brain scans (B).

cerebral infarctions from brain tumors has been discussed (3,4). Recently, Tc-99m polyphosphate has been used to increase diagnostic accuracy in combination with other radiopharmaceuticals (5,6).

Tc-99m HEDP has a great affinity for bone lesions. Conversely, this agent has less affinity for brain tumors than pertechnetate (4). This enables us to distinguish the attachment from the tumor by its focal increased concentration of activity in the Tc-99m HEDP brain scan, and surgery has confirmed that this spot represents the attachment of the tumor, whereas the larger area of radioactivity represents the mass. Tc-99m polyphosphate scans of meningiomas have been illustrated in the literatures (1,6), but the described appearance received little attention. In five meningiomas (two falx, two convexity, one sphenoidal ridge) studied with Tc-99m HEDP in our department, two convexity meningiomas produced this appearance. We believe that convexity meningiomas most frequently provide this pattern, but whether or not it is specific to meningiomas remains to be established, because other intracranial neoplasms that invade the skull may show similar findings.

It is important for surgeons to recognize the location and size of the attachment of a meningioma. With this additional information, they will be able to perform the operation more easily and, by sufficient resection of the attachment, can expect fewer recurrences.

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