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RIM SIGN IN BRAIN SCINTIGRAPHY OF EPIDURAL HEMATOMA

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A so-called rim sign has been shown in a patient with an epidural hematoma of a probable 7 days duration. The rim sign in the brain scan in cases of head injury is good evidence of either subdural or epidural hematoma.

Epidural hematoma usually produces a noncharacteristic peripheral area of increased activity in a ^{99m}Tc-pertechnetate brain scan (*1–3*). We recently encountered a patient with an epidural hematoma where the brain scan showed a so-called rim sign. The rim sign has been described in the literature occasionally in association with chronic subdural hematoma (*3–5*). Only once has an arcuate rim been described in a patient with an epidural hematoma, but the interpretation of the brain scan was complicated by a recent exploratory burr hole (*3*). Others have suggested the possibility of a rim sign in patients with epidural hematoma (*4*), but no scintiphotos of it have been published.

CASE

WC, a 53-year-old man, was referred from another hospital 5 days after he sustained a fall, hitting his head on the ground. Because of a history of alcohol intake, the patient was referred to the Central Detoxification Unit. His condition did not change in the following days—he was unable to sit or stand on his own—and he was transferred to the Toronto Western Hospital. Examination revealed a left-sided hemiparesis and left-sided homonymous hemianopia.

Seven days after the injury, a brain scan was done using the Nuclear-Chicago Pho/Gamma HP camera. Forty-five min following intravenous injection of 15 mCi of ^{99m}Tc-pertechnetate, scintiphotos showed a so-called rim sign. This was best seen in the right lateral and posterior views (Figs. 1 and 2). It was thought that the abnormality in the brain scan was compatible with a subdural hematoma involving mainly the right parietal area. Arteriography suggested a subdural hematoma in the area described. No radioisotope flow study was performed.

At surgery, a hairline fracture was found extending backwards from the squamous position of the temporal bone through the parietal towards the occipital bone. An extradural hematoma was evacuated measuring approximately 7 cm in diameter and 3 cm deep, as shown on the photograph taken at that time (Fig. 3). Membrane formation was recognized along the edges of the blood clot.

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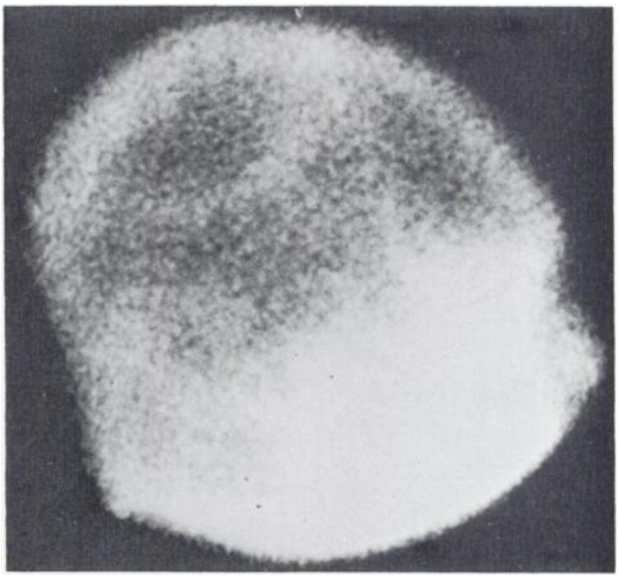

FIG. 1. Right lateral view of ^{99m}Tc-pertechnetate brain scan showing rim sign as band of increased activity extending down from anterior-parietal area and then posteriorly across temporo-parietal to occipital area.

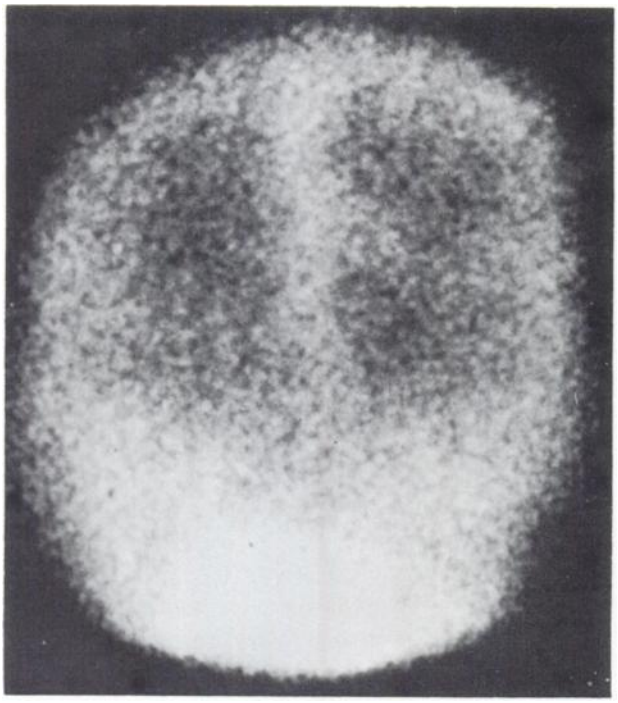

FIG. 2. Posterior view of ^{99m}Tc-pertechnetate brain scan showing rim sign as horizontal band of increased activity in right occipito-parietal area.

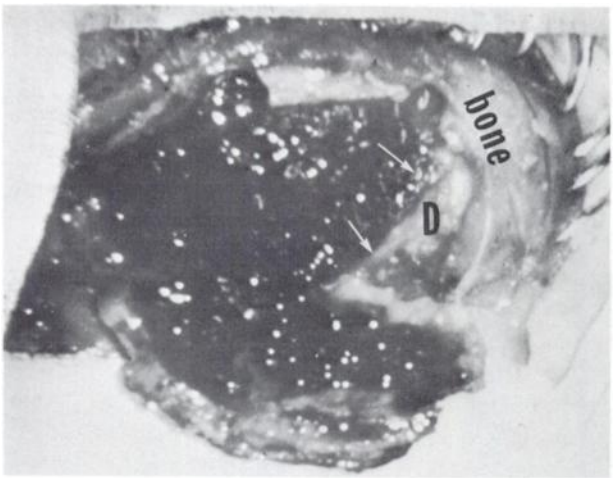

FIG. 3. Extradural hematoma shown immediately after bone flap was raised in right temporo-parietal area. Anterior edge of blood clot with remnants of membrane (marked by arrows) over pale dura (D) coincides with rim sign in anterior-parietal and temporal areas.

Postoperatively, the patient's vision as well as the strength in his limbs returned to normal.

DISCUSSION

The rim sign in a scintiphoto or scan could be defined as a thin rim of increased activity surrounding a large area of normal or decreased activity. If the rim of activity is thick, i.e., wider than the length of radius of the central area of decreased activity, a "doughnut sign" is said to be present. The rim sign in a brain scan is present only in a small number of larger peripheral lesions, usually subdural or epidural hematomas.

The location of the hematoma in the right parietal area at the operation on our patient, coincided well with the increased rim of activity seen on the brain scan. The line of the small fracture coincided only with a short length of the lowermost part of the rim sign and could therefore not account for the sign observed. The approximate diameter of the abnormality including the rim on the scan was 10 cm whereas the area inside rim measured 6 cm across. When compared with the actual lesion found at surgery, i.e., 7 cm, we concluded that part of the increased activity was located in the surrounding tissues, with some activity in the periphery of the hematoma. The organization of an epidural hematoma is achieved by granulation tissue membrane with its permeable capillaries sprouting into the blood clot from the outer layer of the dura (*6*). The membrane, more marked at the edges of the hematoma, noted at operation and clearly seen on the photograph (Fig. 3) together with inflammatory changes in a narrow area of tissues surrounding the blood clot, probably accounted for the increased rim of activity seen in the brain scan. It is probable, as organizational changes proceed deeply into the blood clot, that radioactivity in the hematoma also increases and that the rim sign tends to disappear. The presence of the rim sign in cases of head injury is very good evidence of the presence of a dural hematoma because other shaped brain scan abnormalities could be easily confused with ones resulting from minor trauma to scalp and skull.

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