Rectal Perchlorate for Unconscious Patients Prior to Brain Scintigraphy with Pertechnetate:
Concise Communication

David A. Turner, Amjad A. Ali, Magdalene G. Ochart, Arun N. Sukkerkar, Ernest W. Fordham, and Gorimella V. S. Rayudu

Patients undergoing brain scintigraphy with pertechnetate are frequently premedicated with oral perchlorate. However, the oral route is difficult to employ in unconscious or uncooperative patients or when oral intake is restricted. In such situations, rectal administration of sodium perchlorate dissolved in water is an effective alternative to oral administration.


Technetium-99m as sodium pertechnetate, which is widely used for brain scintigraphy, rapidly accumulates in the choroid plexus and salivary glands after intravenous injection (1). The presence of substantial amounts of $^{99m}$Tc in these organs degrades the quality of brain scintigrams. Hence, in many laboratories patients routinely receive perchlorate (KClO$_4$ or NaClO$_4$) prior to brain scintigraphy in order to inhibit salivary gland and choroid plexus accumulation of pertechnetate (1).

Perchlorate is generally administered by mouth. Although this route is suitable for most patients, it cannot be used conveniently when patients are unconscious or uncooperative (unless a nasogastric tube is in place) or when oral intake is restricted. Intravenous injection of sterile pyrogen-free solutions of perchlorate has been advocated (2,3), but this mode of administration may be painful (3). Furthermore, preparations of perchlorate suitable for intravenous injection are not commercially available (4).

Pertechnetate and iodide rapidly appear in the blood after rectal administration in dogs (5), as does pertechnetate introduced through a colostomy in a human (1). The similar biologic behaviors of perchlorate, iodide, and pertechnetate suggested that rectal administration of perchlorate might be an effective way of blocking salivary gland and choroid plexus trapping of $^{99m}$TcO$_4^-$ in unconscious patients who are sent for brain scintigraphy without nasogastric tubes in place. The following experiment was performed to test this hypothesis.

MATERIALS AND METHODS

Between February 1 and June 30, 1976, fourteen patients in a depressed state of consciousness arrived in our department for brain scintigraphy without nasogastric tubes in place. In our laboratory, the routine protocol for brain scintigraphy includes oral administration of 1 gm of NaClO$_4$ dissolved in 30 ml of cherry-flavored syrup about 5–10 min before intravenous injection of 19–20 mCi of Na$^{99m}$TcO$_4$.

Scintigraphy is begun about 4 hr later. Images consisting of 400,000 counts each are recorded in four projections (anterior, posterior, right and left lateral) on Polaroid 107 film. The routine protocol was followed for the above-mentioned 14 obtunded patients, with the exception that they received by rectum 1 gm of NaClO$_4$ dissolved in 30 ml of distilled water rather than the oral dose. The solution was drawn into a 50-ml disposable syringe, along with 10 ml of air, and introduced into the rectum by means of a size-24 French disposable rectal tube. The air was injected behind the solution to ensure complete emptying of the rectal tube. Brain scintigraphy was performed on all patients with an Anger scintillation camera.

Fourteen consecutive brain scintigrams of patients who had been imaged in the routine manner (i.e.,

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For reprints contact: David A. Turner, Dept. of Nuclear Medicine, Rush—Presbyterian—St. Luke's Medical Center, 1753 W. Congress Parkway, Chicago, IL 60612.
after receiving oral perchlorate) were selected without known bias from studies performed in our laboratory June 1 through June 3, 1976. These studies were arbitrarily numbered 1 through 14, and the studies with rectal perchlorate were numbered 15 through 28. The studies were then arranged according to a random permutation of the numbers 1 through 28. The images were presented in that order to three observers, who independently graded the degree of parotid gland visualization in each case without knowledge of the patient's identity or the route of perchlorate administration. The degree of parotid visualization was determined subjectively by comparing the reflectance (brightness) of the images in the region of the parotid gland with the reflectance in other regions. Each study was classed by the observers as showing “grade 1” (no or minimal), “grade 2” (moderate), or “grade 3” (intense) visualization of the parotid glands by comparing the lateral views of the study with a set of “standard” lateral brain scintigrams (Fig. 1).

RESULTS AND DISCUSSION

As can be seen from Table 1, the three observers detected virtually no difference between the degree of suppression of parotid radioactivity achieved by rectal administration of perchlorate and that resulting from oral administration. One may conclude, therefore, that rectal administration of perchlorate is an effective alternative to oral administration when patients are to be premedicated for brain scintigraphy. Rectal administration of NaClO₄ can be used to advantage in pertechnetate brain scintigraphy of unconscious patients, uncooperative children, or other patients in whom oral administration is difficult.

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