

Evaluation of Gastro-Pulmonary Aspiration by a Radioactive Technique: Concise Communication

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Seven selected patients were given 3–5 mCi of Tc-99m sulfur colloid orally at bedtime and the lungs were imaged in the morning. Two showed definite evidence of aspiration and one suggestive evidence. This is a simple, non-invasive method of demonstrating pulmonary aspiration of gastric contents.

J Nucl Med 18: 1079–1081, 1977

The classic clinical manifestation of pulmonary aspiration is dyspnea after meals or effort. Several published reports have implicated "silent" tracheo-bronchial aspiration of liquid gastric contents as one of the "trigger factors" in asthma (5), or as an etiologic factor in some cases of pulmonary fibrosis (6). This association has been made by showing an increased incidence of hiatal hernia and esophageal reflux in patients with those lung diseases.

No simple, noninvasive method of demonstrating pulmonary aspiration of gastric contents is available. Barium sulfate is used to evaluate aspiration during swallowing caused by fistulae or by derangements of swallowing function, but aspiration into the lung from the stomach is only rarely demonstrated. Bronchoscopy has been used occasionally to demonstrate foreign bodies or colored markers.

Accordingly a method has been developed to demonstrate gastro-pulmonary aspiration by external gamma counting. (Before human evaluation, several trained, awake dogs had pulmonary injections of Tc-99m sulfur colloid by endotracheal catheter.)

METHODS

The patients examined had severe fibrotic lung disease in association with hiatal hernia or neurologic disease.

At 10 p.m. the patients were given 3–5 mCi of Tc-99m sulfur colloid to drink, followed by 30–50 cc. of water to wash the material from the naso-

pharynx and esophagus. Several patients were counted at this time and there was little or no residual activity in the upper tracts, and none in the lungs. Some patients were given a glass of milk or custard if it was their custom to eat before retiring. The patient then went to bed until morning.

In the morning the lungs were imaged with a gamma camera in the anterior or posterior and right lateral projections for 100,000 counts each, with care to avoid the counts from the upper abdomen. Each image took 20–30 min, and more projections were taken if indicated.

RESULTS

Figure 1 shows the residual pulmonary radioactivity 24 hr after injection of Tc-99m sulfur colloid into the lungs of an unanesthetized, trained dog by endotracheal catheter. Some tracer has been swallowed, and little or none is seen in the urinary bladder.

Seven patients were examined. Two showed tracer in the lungs, and one showed questionable aspiration. Figure 2 shows a negative result on the next morning, with no radioactivity in the lungs but some in the stomach and colon. There is considerable ra-

Received March 15, 1977; revision accepted June 29, 1977.

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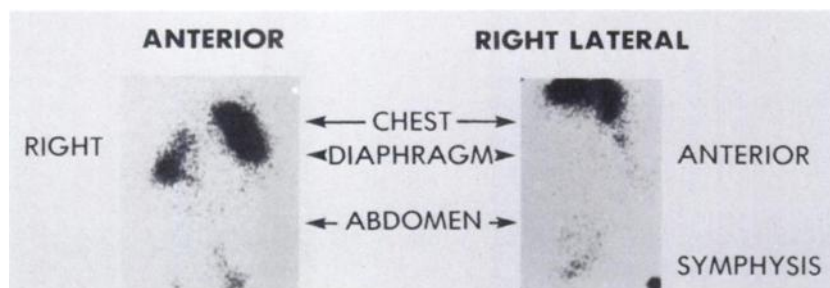


FIG. 1. Technetium-99m sulfur colloid was injected into both lungs of a dog. Scintiphoto, 24 hr later, shows it to remain in the lungs.

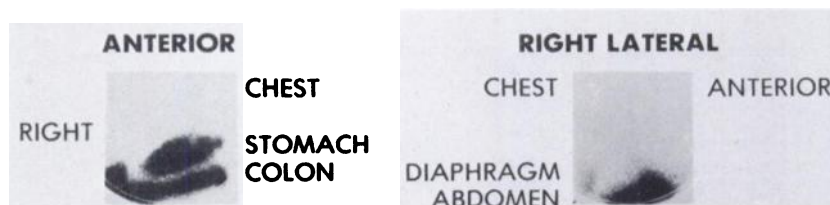


FIG. 2. No evidence of pulmonary aspiration in patient 24 hr after ingestion of Tc-99m. Radiotracer still present in stomach and colon.



FIG. 3. Aspiration in both upper lobes (arrows).

radioactivity in the stomach despite the overnight dilution and the 10-hr interval since the Tc-99m sulfur colloid was swallowed.

Figure 3 shows a 60-year-old man with gastroesophageal reflux demonstrated by gastrointestinal series, and a disabling chronic obstructive lung disease established by lung biopsy and pulmonary-function studies. There is activity in both upper lobes as a result of aspiration.

Figure 4 is from a 65-year-old woman with the same symptoms of gastroesophageal reflux, and disabling chronic obstructive lung disease established by lung biopsy and pulmonary-function studies.

There is activity in the left upper lobe as a result of aspiration.

DISCUSSION

Pulmonary aspiration of gastric contents during bed rest and sleep can be demonstrated by this simple, noninvasive technique.

The failure to demonstrate aspiration in some of these patients may indicate (a) that aspiration does not occur every night, or (b) that some aspirations are cleared from the lungs before the morning scintiphoto.

It is possible that repeated examinations will produce more frequent positive results—as may other procedures such as eating large meals before bedtime.

This technique is being applied clinically in the following circumstances: (a) a study to evaluate efficacy of repair of hiatal hernia to minimize progression of chronic obstructive lung disease; (b) a study to evaluate the best time for removal of endotracheal tubes post operatively—with the patient awake or not; (c) evaluation of the relation of aspiration to “flare ups” of asthma; (d) evaluation of the need for, and efficacy of, tracheotomy in the prevention of aspiration in patients with neurologic disorders.

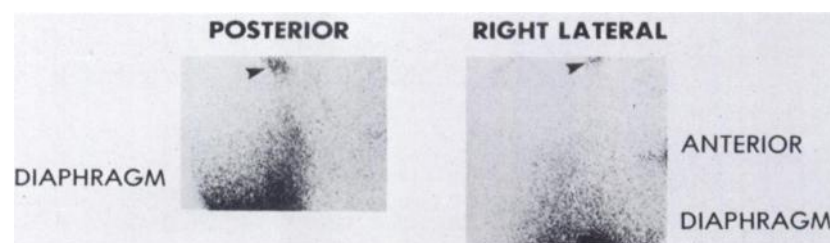


FIG. 4. Aspiration in left upper lobe (arrow).

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