

Scintigraphic Demonstration of Tracheo-Esophageal Fistula

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A tracheo-esophageal fistula, developed following radiotherapy for an esophageal carcinoma, was vividly demonstrated by radionuclide imaging. The abnormality was later confirmed by a barium esophagram and endoscopic examinations. The scintigraphic procedure, making use of a Tc-99m sulfur colloid swallow, appears to be a simple alternative method that may be clinically useful for the diagnosis of such a condition.

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Esophageal scintigraphy using Tc-99m sulfur colloid has been proven most encouraging for evaluation of esophageal transit (1-3). Imaging with a similar protocol, even without computer processing, has resulted in a clear illustration and eventual diagnosis of a tracheo-esophageal fistula. The radionuclide study is presented together with a brief review of the other currently available diagnostic procedures for this disease entity.

METHOD

The patient was positioned upright with his chest directly facing the detector of the scintillation camera, which has a crystal 15 in. in diameter and $\frac{3}{8}$ in. thick. A parallel-hole, low-energy, high-resolution collimator was used. Through a straw, the patient drew up 500 μ Ci of Tc-99m sulfur colloid, in 3 ml of water, into his mouth, temporarily holding it there. (As a precaution against contamination through spilled or coughed-up material, he held a large towel over his mouth.) With a multi-imager, serial, sequential scintiphotos (3 sec/frame) were obtained, starting at the moment that the patient was instructed to swallow. Subsequently several 2,000-ID (information density) static images were made, with area of interest positioned over the left lower bronchus.

CASE REPORT

A 54-yr-old black man was admitted because of persistent, severe, paroxysmal coughing and shortness of breath, while eating and drinking, for 4 days. He also complained of severe thirst and orthostatic dizziness for a couple of days before admission. Four months before this episode, following progressive dysphagia and loss of 55 lb of weight in about half a year, a squamous cell carcinoma, located at the middle third of his esophagus, was diagnosed by esophagram (Fig. 1), esophagoscopy, and biopsy. For this he had been treated with three courses of cisplatinum 20-mg infusion

chemotherapy, together with a total of 6,000 rads of local external radiation in divided doses (180 rads/day, 5 days a week, given every other week). With the treatment, he showed improved ability

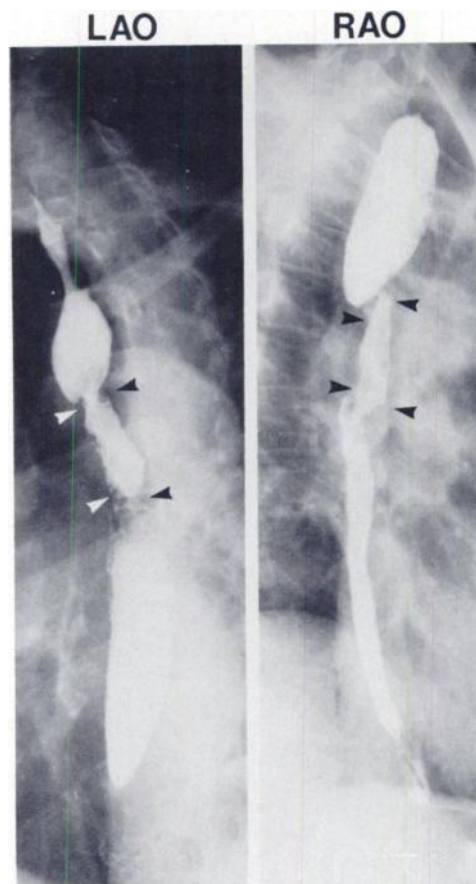


FIG. 1. Circumferential mid-esophageal carcinoma seen as non-distensible segmental contour defect (between arrowheads) on full-column barium examination of esophagus.

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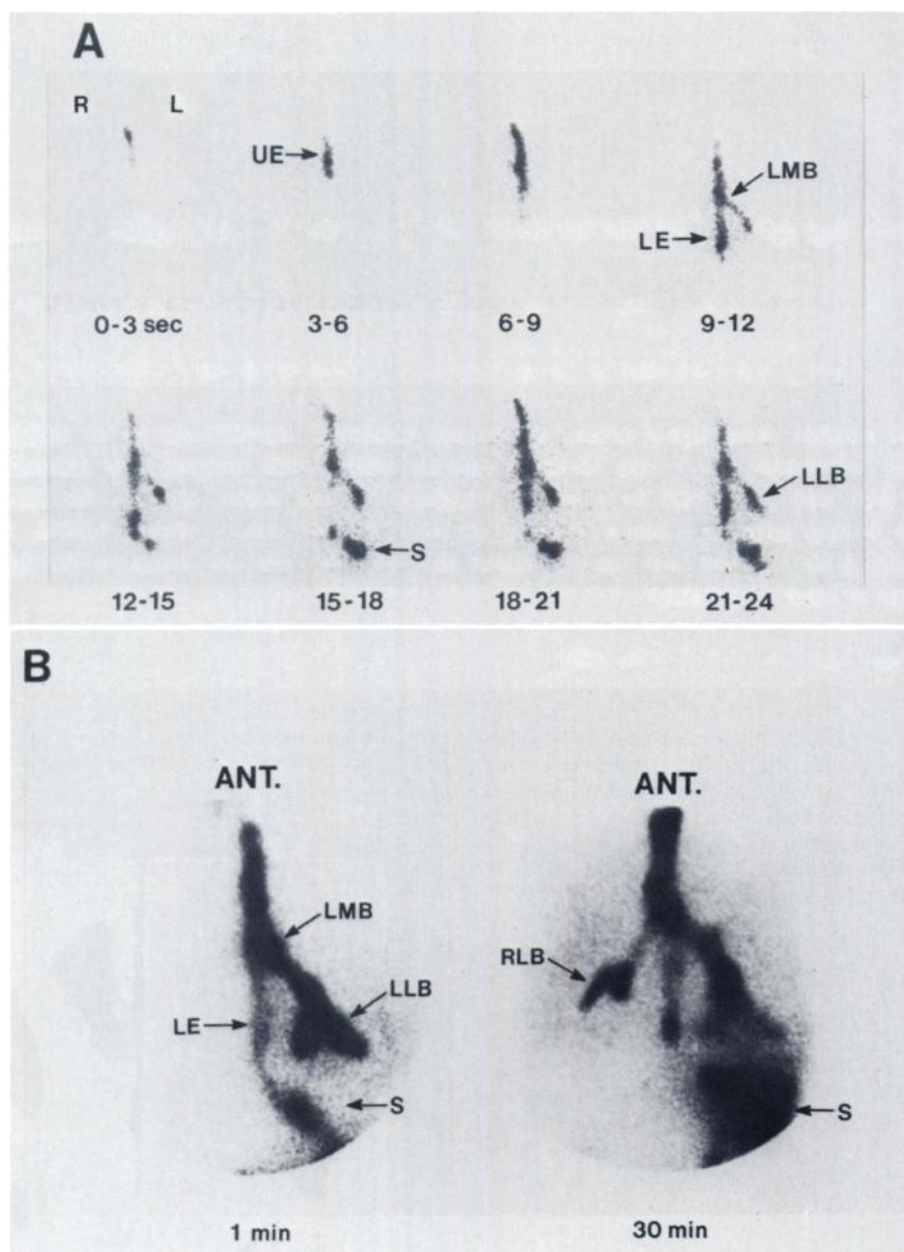


FIG. 2. Scintiphotos following Tc-99m sulfur colloid swallow. (A) Sequence of dynamic images at 3 sec per frame, beginning from time the patient was instructed to swallow. Arrows mark locations of upper esophagus (UE), lower esophagus (LE), stomach (S), left main bronchus (LMB), and left lower bronchi (LLB). Progression of swallowed bolus was evident, down esophagus into stomach, with simultaneous filling of left bronchus and distal esophagus. (B) Subsequent scintiphotos, at 1 min after swallow, reveal presence of radioactive colloid in esophagus, stomach, and left main and lower-lobe bronchi. Half an hour later, aspiration of radionuclide resulted in delineation of right lower-lobe bronchi (RLB) in addition.

to eat and drink until development of his current symptoms, immediately following his last dose of radiotherapy. Hence he was readmitted. Esophageal scintigraphy was performed as described above. The findings clearly indicated the presence of a tracheo-esophageal fistula (Fig. 2). A subsequent esophagram confirmed the diagnosis (Fig. 3). Bronchoscopy and esophagoscopy revealed tracheo-esophageal fistula from middle third of the esophagus to left main bronchus. A Celestin tube was inserted to bypass the fistula. His postoperative course was smooth, with only low-grade fever up to 101.8° F. His chest radiographs remained remarkably clear throughout the hospitalization, with only mild pleural scarring at the posterior left costophrenic angle. Intravenous hy-

peralimentation was gradually tapered off and liquid diet was started on the third postoperative day. He was able to tolerate regular diet on the eighth postoperative day. He was discharged 10 days after the operation, to be followed in the oncology clinic.

DISCUSSION

Tracheo-esophageal fistula can be congenital, encountered at birth, or may develop later in life as a result of mechanical, chemical, or radiation injuries. Aside from the congenital form,

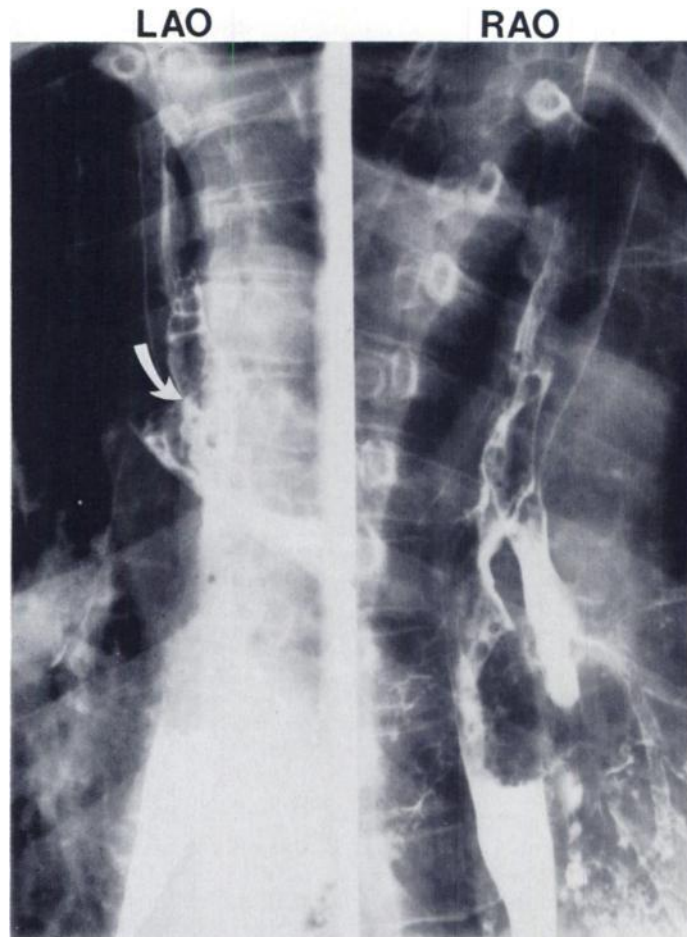


FIG. 3. Barium swallow shows filling of esophagus and bronchial ramifications with contrast material (views from left and right obliquity). Curved arrow indicates location of tracheo-esophageal fistula.

infection and neoplasm with tissue destruction are quite frequently contributing factors in its formation. The standard and most direct method of diagnosis for this condition, in patients who can follow instructions, appears to be through a barium esophagram. However, in pediatric and nonresponsive patients, contrast study with nasoesophageal intubation, or selective catheterization and endoscopy under anesthesia, may be necessary. Not only because these procedures are definitely more invasive but also because special skill and equipment are involved, they are much less readily available. Nevertheless, in elusive recurrence following surgical repair, both selective catheterization and endoscopy have been shown to be highly useful (4-7).

Bivins et al., measuring the disappearance of Xe-133 introduced through a catheter into the esophagus in dogs with artificially created tracheo-esophageal fistulas, demonstrated the potential usefulness of radionuclide in the diagnosis of the problem (8). So far, however, no practical radiotracer method has yet been established for clinical application. Scintigraphic imaging of a Tc-99m sulfur colloid swallow, as shown by the case presented, can be performed just as easily and readily as an esophagram. The colloidal particles used in the procedure are less than 1 μ in diameter and conceivably should provide sensitive detection of even a minute fistulous tract. Also, with the quantity of technetium involved, the scintiscanning procedure would impose a less significant radiation burden to the patient than the radiographic contrast study, which requires fluoroscopic monitoring (9-12). It appears worthwhile to pursue and further evaluate, through correlative studies with the other diagnostic procedures currently available, the efficacy and merit of the scintigraphic method in the detection of tracheo-esophageal fistula.

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Cardiac Aneurysm Complicated by *E. coli* Abscess

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An *E. coli* myocardial abscess developed in the region of an old aneurysmal myocardial scar. In spite of vigorous antibiotic therapy fever and positive blood cultures persisted. A combination of In-111 WBC scanning and Tc-99m RBC gated heart imaging located the infection in the aneurysmal scar. The abscess was resected and the patient survived.

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A myocardial abscess developing in a pre-existing left-ventricular aneurysm is rare. There have been only seven previously reported cases (1-6). In contrast, there have been 15 reported cases of an infected left-ventricular aneurysm in the setting of an acute myocardial infarction (4,7,8). This report concerns a case of an abscess that developed in a pre-existing aneurysm of long duration, diagnosed preoperatively.

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CASE REPORT

A 73-yr-old man was hospitalized with a 3-wk prodrome of chills and night sweats, and a 1-wk history of diarrhea and vomiting. Before admission he had been treated for 5 days with erythromycin. There was a history of a large anterior-wall myocardial infarction (AWMI) 4 yr before. Cardiac catheterization and chest radiograph at 1 mo after the infarction demonstrated a large left-ventricular (LV) aneurysm with total occlusion of the left anterior descending (LAD) coronary and only minor changes in the right and circumflex coronary arteries. He had been on digoxin and diuretics since this episode, and was asymptomatic. The admission physical examination revealed blood pressure of 130/70,

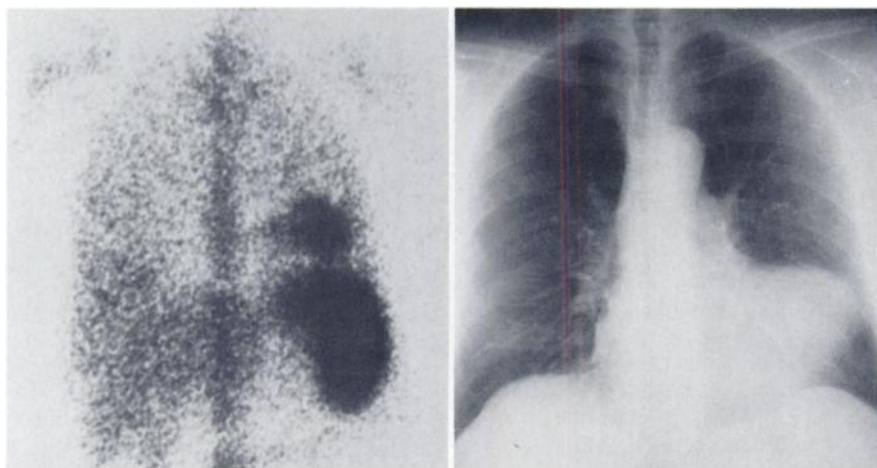


FIG. 1. Anterior view of thorax and abdomen, obtained with 800 μ Ci In-111 WBCs (left). Intense accumulation appeared in chest above spleen, and was initially thought to be pneumonia before examination of patient's chest radiograph. Six mCi of Ga-67 citrate was injected i.v. immediately after this scan because of complaints of left shoulder pain and concern for osteomyelitis not seen on this study. PA chest radiograph (right) demonstrates cardiac enlargement with grossly abnormal left-ventricular border highly suggestive of LV aneurysm. No pulmonary infiltrates are present, thus making pneumonia unlikely. Left hemidiaphragm is normal in position, making subdiaphragmatic location for In-111 WBCs unlikely. Infected mural thrombus and/or aneurysm was suspected at this time.