

# EVALUATION OF RADIONUCLIDE GASTRO- ESOPHAGOGRAPHY AS A SUITABLE SCREENING TEST FOR DETECTION OF GASTROESOPHAGEAL REFLUX

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## ABSTRACT

*Thirty cases of recurrent pulmonary infection and ten control cases underwent radionuclide gastroesophagography endoscopy, histopathology and barium esophagography to evaluate the clinical efficacy of scintigraphic technique in, detection of gastroesophageal reflux. After ingesting 500 micro curie of Tc-Sulphur colloid mixed in milk, patients esophageal activity was monitored using the gamma camera for forty-five minutes continuously.*

*By using histopathology as standard of comparison, the sensitivity and specificity of radionuclide esophagography was 78.54 and 81.25%, respectively. Because of its physiologic nature, low radiation exposure and convenience, radionuclide esophagography is recommended as a suitable screening test for detecting gastro esophageal reflux where available.*

**Key words:** Gastroesophageal reflux, Scintiscanning, Sensitivity, Specificity.

Gastroesophageal reflux (GER) is defined as the retrograde flow of gastric contents across an incompetent gastroesophageal junction into the esophagus. Clinically, the common presenting complaint is vomiting, failure to thrive, aspiration, heart burn, or anemia due to hematemesis or malena(1-3).

Various techniques like endoscopy, intra-esophageal pH monitoring, histopathology, barium esophagography and radionuclide gastroesophagography are available to detect gastroesophageal reflux. All these modalities are not available in every centre. This study was undertaken to evaluate radionuclide gastro-esophagography and assess its sensitivity and specificity to detect GER in children.

## Material and Methods

The study population consisted of thirty cases of recurrent pulmonary infection and ten controls. Out of thirty patients, eighteen were males and twelve were females. Their age ranged from nine months to twelve years. The control group had eight males and two females out of a total of ten. They belonged to age group of nine months to eight years. All controls were asymptomatic. Radionuclide scintigraphy was performed after overnight fasting. The patient was orally administered 500 microcurie of <sup>99m</sup>Tc-Sulphur colloid mixed in milk by an infant feeding tube. A drink of water was given to clear the radiotracer

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from the esophagus. Then the patient was placed supine under the large field of view gamma camera with low energy all parallel collimator with stomach in the lower part of the field of view. Serial images were obtained at rate of one frame per thirty seconds for forty five minutes.

Barium swallow under fluoroscopy was performed by administering liquid barium sulphate orally or through infant feeding tube after fasting for six hours. Fluoroscopic screening was used to demonstrate spontaneous reflux. Besides this endoscopic examination and endoscopic histopathology was performed in all cases.

## Results

All tests performed were compared with presence of histological evidence of esophagitis, which was considered as the most specific of the tests available, grade 1 or more being taken as true positive. Currently the two criteria which are universally accepted as evidence of presence of gastroesophageal reflux are basal zone hyperplasia exceeding 15% of total epithelial thickness and papillary elongation greater than 66% of thickness(5,6). Nineteen out of 30 cases(63.3%) had evidence of esophagitis on histopathology (Table). Five patients (16.7%) had esophagitis of Grade  $\frac{1}{2}$ , while fourteen (46.6%) had esophagitis of Grade 1 or more. Esophagitis was not found in control subjects on histopathology.

Scintiscan was taken as positive for gastro-esophageal reflux when tracer was seen in esophagus in more than two frames (Fig. 1). The test was taken as negative if no reflux of tracer was seen into the esophagus from the stomach (Fig. 2). Reflux of radiotracer into the esophagus was seen in 14 (46.7%) of the 30 patients evaluated by scintiscan (Table). None of the controls showed evidence of reflux on scintiscan.

Endoscopy provides a direct visual method for detecting esophagitis due to gastroesophageal reflux. The normal esophageal mucosa is pale white in color. In cases of esophagitis due to reflux of gastric contents erythema and edema of mucosa or small ulcers and erosions are seen. On endoscopy 16 (53.3%) patients showed ab-

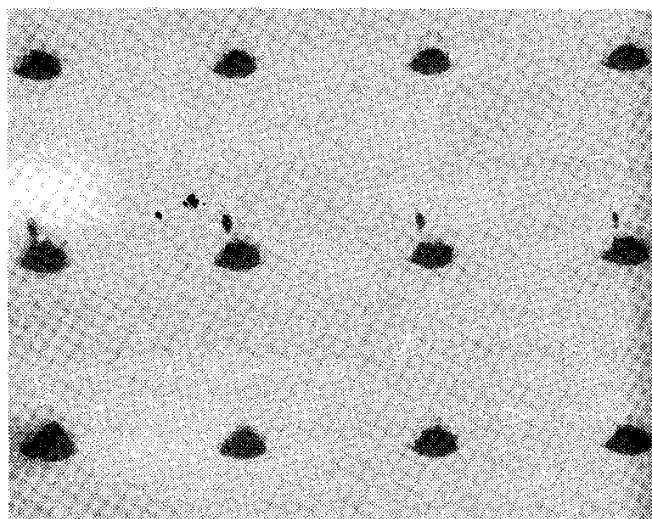


Fig. 1. Scintiscan showing reflux of radiotracer into esophagus.

TABLE Results of Various Modalities in Detecting Gastroesophageal Reflux

Category	No. of cases		Endoscopy	Histopathology	Barium studies	Scintiscan
Patients	30	Positive	16(53.3%)	19(63.3%)	6(20%)	14(46.6%)
		Negative	14(46.6%)	11(36.9%)	24(80%)	16(53.3%)
Controls	10	Positive	2(20%)	0(0%)	0(0%)	0(0%)
		Negative	8(80%)	10(100%)	10(100%)	10(100%)

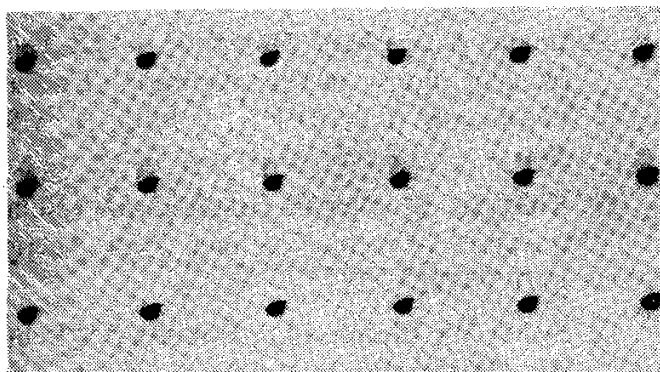


Fig. 2. Scintiscan showing no GER in serial images.

normal appearance of mucosa (*Table*). Two controls showed abnormal esophageal mucosa. The barium esophagogram can also demonstrate the gastroesophageal reflux on fluoroscopy. Six cases (20%) had a positive barium study (*Table*). There was no positive barium scan in control patients.

### Discussion

Endoscopy, endoscopic histopathology, barium esophagogram, and scintiscan have been used over the years to diagnose gastroesophageal reflux. It has been suggested by the studies performed previously, that a combination of these tests is more specific and sensitive(7).

Endoscopy provides a direct visual method for detecting esophagitis. Though endoscopy remains the commonest method for diagnosing esophagitis, it is subjective (8). Endoscopic diagnosis of esophagitis is based on mucosal erythema, erosion and ulcerations(5). Several studies have reported a poor correlation between endoscopic and histological findings(9,10). In our study the sensitivity and specificity of endoscopy were 78.57% and 68.75%, respectively. This technique is invasive in nature and more so the complications of endoscopic biopsy are high(15).

Reflux was demonstrated radiologically

in 20% of all patients with barium study. This compares well with all work done by Koltz(11), who found that 26% of patients with reflux had positive barium studies. The sensitivity and specificity of this test was 34 and 93%, respectively. Low sensitivity is probably due to restricted imaging time for want of reducing radiation burden.

The first significant study utilizing scintiscan to detect GER reported 90% correlation between presence of symptoms and reflux(12). Rudd and Christi suggested the practicality of radionuclide gastroesophagography in children, and also as a screening test (or detecting GER)(13). The sensitivity and specificity of this test have been found to be 78.54 and 81.25%, respectively. Thus, this test is sensitive and also highly specific for detecting gastroesophageal reflux. It appears to be more physiological test than other modalities, as no sedation is usually required and no provocative manoeuvres are needed to induce reflux. The another advantage of this study is that prolonged monitoring of esophageal activity is feasible with no additional risk of radiation to the patient. Thus we recommend the use of radionuclide gastroesophagography as a screening test in all suspected cases of gastroesophageal reflux where the facility for performing it can be made available.

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