Gastroesophageal Scintiscanning in Children

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Four patients' positions were tested in search of increased sensitivity of gastroesophageal scintiscanning for the detection of reflux in children: supine, prone, left lateral, and 30° right posterior oblique. The sensitivity was highest when the child was placed in supine position. A 60-min recording period increased the sensitivity of the technique, and is thus preferred to a shorter recording time.

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The present study is devoted to several factors that could influence the sensitivity of gastroesophageal (GE) scintiscanning, namely, the duration of the test and the position of the patient under the camera.

MATERIALS AND METHODS

Gastroesophageal scintiscanning. The technique has been well described by several authors (*1–4*). In our department, a large-field scintillation camera and a minicomputer are used. A 200-μCi dose of Tc-99m sulfur colloid, mixed with an amount of milk representing half the usual meal, is given orally. The rest of the milk is given immediately following, in order to wash down the remaining radioactivity in the mouth. The patient is allowed to belch, and is then placed over the detector for a 1-hr recording period, using 20-sec frames. For the purpose of the present work, three parameters were used: (1) the presence or the absence of reflux (detection rate), (2) the frequency of the reflux peaks during the recording period, and (3) a reflux index, similar to the index described by Fisher et al. (*5*), which takes into account the number of the reflux episodes, the height of each peak, and the durations of the peaks. The details of our procedure have been recently published (*6*).

Position of the patient on the camera. In a first study, 60 children between 15 days and 7 yr old were included. Each presented at least one episode of GE reflux on scintigraphy. The 1-hr recording period was divided into three 20-min intervals, allowing each patient to be placed successively in three different positions: supine, prone, and left lateral. The order of the positions were regularly changed, thus avoiding any influence on the results of the time lapse between meal and recording period (Table 1). In a second study, including 28 children with reflux, the 30° right posterior oblique view was compared with the supine position (Table 1). The level of statistical significance was evaluated by means of the proportion test for the detection rate and the nonparametric Mann-Whitney U-test for the number of reflux peaks and the reflux index.

Effect of the duration of the test. Another 25 patients with GE reflux were placed for 1 hr in the supine position. The recording time was divided into 30-min intervals in order to evaluate the effect of the duration on the sensitivity of the method.

RESULTS

Position of the patient. Tables 2 and 3 show the comparison between the different positions. The supine position provided the highest sensitivity relative to the prone and the left lateral positions, regardless of the chosen criterion: detection rate, number of peaks, or reflux index. The detection rates were comparable in 30° right posterior oblique and supine position, but the number of reflux peaks and the reflux index were higher in the supine position.

TABLE 1. ORDER OF POSITIONS*

20′	20′	20′	First study
S	P	L	10 patients
S	L	P	10 patients
P	L	S	10 patients
P	S	L	10 patients
L	P	S	10 patients
L	S	P	10 patients
30′	**30′**		**Second study**
S	R		14 patients
R	S		14 patients

* S = supine, P = prone, L = left lateral, R = 30° right posterior oblique.

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TABLE 2. EFFECT OF PATIENT POSITIONING

	Detection rate	Number of reflux peaks	Reflux index
First study			
Supine	43/60	118	351
Prone	34/60	66	134
Left lat.	24/60	52	136
Second study			
Supine	24/28	80	205
30° right post. obl.	20/28	44	135

Duration of the test. In 12 patients, reflux was evident in both half-hour periods. In 13 patients, on the contrary, reflux occurred only during half of the time: in seven patients during the first half hour only, and in six patients during the second half hour only.

DISCUSSION

GE scintiscanning is a simple technique for the demonstration of reflux, and appears particularly suitable for the pediatric age group. Rudd et al. (*4*) using 200 μCi of Tc-99m, reported a whole-body dose about 25 mR and a small-bowel and proximal-colon dose up to 100 mR. The authors estimate the skin radiation dose from barium gastroesophagography to be several times these levels.

In a previous study (*6*) we found scintiscanning to be a sensitive technique compared with radiography. Similar findings have been reported by some authors (*3,4,7*). Others found a low sensitivity for the scintiscan (*1,8*). The results of the different authors are sometimes difficult to compare, owing to the variable methods used. Fisher et al. (*5*) increased the reflux detection rate by using an abdominal pressure binding. This result, however, was not obvious when the technique was applied to children (*4,9*).

The prone position was chosen in the present study because it produces a physiological compression of the abdominal wall. Our results, however, indicated a lower detection rate in this position, compared with the supine position. The interposition of air between the stomach and the cardiac region, which occurs in prone position, might explain these results.

The left lateral position, which has been proposed by some authors (*10,11*), did not provide better results. The 30° right posterior oblique position has the advantage of placing the gastroesophageal junction at the lowest point of the gastric fundus, thus increasing the chances of detecting reflux. The results obtained in this position did not show any improved sensitivity. Finally, the supine position remains the most convenient for this kind of study in children and in our experience with several hundred of these procedures, we have not encountered aspiration of the tracer during the recording period.

The duration of the recording period plays a nonnegligible role in the sensitivity of GE scan. Fisher et al. (*5*) use a 20-min recording period. It is obvious from the present study that reflux would have been missed in at least 25% of the cases should a 30-min recording period have been used instead of 1 hr.

TABLE 3. EFFECT OF PATIENT POSITIONING AND SIGNIFICANCE LEVELS (P VALUE)

	Detection rate	Number of reflux peaks	Reflux index
Supine vs. prone	<0.01	<0.01	<0.01
Supine vs. left lat.	<0.001	<0.001	<0.01
Prone vs. left lat.	<0.01	>0.10	>0.25
Supine vs. R. post. obl.	>0.10	<0.05	<0.01

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