

Radionuclide Studies of the Upper Gastrointestinal Tract in Children with Feeding Disorders

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From the case records of Children's Hospital of Philadelphia and Children's Seashore House, Philadelphia, Pennsylvania

The case of a female infant with a feeding disorder and with inadequate growth is described. In her workup, there was no evidence of an organic disorder. Barium studies of the upper GI tract showed normal anatomy and function. A radionuclide milk scan was helpful in demonstrating mild reflux and significantly delayed gastric emptying. There was a good response to therapy.

Key Words: feeding disorder; reflux; gastric emptying; scintigraphy

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CASE PRESENTATION

Our patient is a 30-mo-old female referred for the evaluation of food refusal and inadequate growth. She was delivered 20 wk prematurely because of placenta previa. Ventilatory support was required for the first 4 wk of life. The neonatal period was further complicated by an intraventricular hemorrhage and retinopathy related to premature delivery. These both resolved and she was discharged at 2.5 mo of age on bottle feedings.

At 10 mo of age, she presented with a urinary tract infection at another institution. A voiding cystourethrogram and a sonogram were normal. Inadequate growth was noted and screening tests to exclude organic disease were obtained. These included electrolytes, complete blood count, thyroid function tests, liver function tests, serum amino acids and urinary organic acids. All were within normal limits and no recommendations were made.

At 16 mo, she was re-evaluated because of developmental delay, with growth parameters at 50th percentile for a 3-5-mo-old. She was receiving formula by bottle with small amounts of rice, beans or mashed potatoes two to three times a day. The child's mother was instructed to introduce a high caloric formula and nutritionally balanced spoon feedings.

She did not return for further assessment until the age of 29 mo. She had been switched to whole-milk and starchy table foods, but her growth parameters had remained at the 50th percentile for a 10-16-mo-old. She was admitted for re-evaluation of her inadequate growth. The child underwent testing for organic disorders

not excluded by medical history or physical examination. These included chest x-ray, urinalysis, electrolytes, complete blood count, thyroid function tests, liver function tests, serum amino acids and urinary organic acids. All results were within the normal range. Bone age assessment by x-ray was consistent with her chronological age. HIV testing was negative. During observation of several meals, our patient demonstrated normal oral motor skills but early satiety. At each meal she was initially interested and fed herself several bites, but she then stopped abruptly and could not be urged to take even her favorite foods. Because this pattern of food refusal had been seen in other children who also had gastroesophageal reflux, an evaluation for gastroesophageal reflux was recommended. Barium studies of the upper gastrointestinal tract showed normal anatomy and function. A milk scan was performed by the oral administration of 120 ml of milk containing 37 MBq (1 mCi) of ^{99m}Tc sulfur colloid.

The initial phase of the study with swallowed boluses, while the patient was in a semi-recumbent position, showed normal esophageal transit (Fig. 1). Sequential 30-sec images over the next 60 min, with the patient supine, revealed two significant episodes of reflux (Fig. 2). Simultaneous computer images were obtained at 5-sec intervals. Time-activity curves from regions of interest (ROIs) placed over the entire esophagus and over the upper half of the esophagus only, confirmed the reflux which reached to the upper esophagus (Fig. 3). Gastric emptying was delayed with 85% of the initial activity retained in the stomach at 60 min, and 61% at 120 min (Fig. 4A). These values are shown plotted on a semilogarithmic coordinates curve with the normal range also displayed (Fig. 4B). There was no evidence of pulmonary aspiration in images obtained over the lung fields, in both anterior and posterior projections, at the end of 1 and 2 hr following the initiation of the study.

Based on findings on the milk scan of mild, though significant, gastroesophageal reflux, and delayed gastric emptying, she was started on an antacid and a prokinetic agent. Without other therapy, her desire to select only certain edibles decreased and her intake of food increased. Subsequently, she was noted to have an optimal rate of weight gain.

DISCUSSION

Patient Selection

Certain clinical findings are frequently observed in patients with inadequate growth which may lead the pediatrician to initiate an evaluation for gastro-esophageal reflux and/or delayed gastric emptying. Patients with reflux tend

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