

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

Sydney Heyman, Peggy S. Eicher and Abass Alavi

*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  $^{99m}\text{Tc}$  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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For correspondence or reprints contact: Sydney Heyman, MD, Division of Nuclear Medicine, Children's Hospital of Philadelphia, 34th & Civic Center Blvd., Philadelphia, PA 19104.

# Radionuclide Studies Of The Gastrointestinal System

**Scott C. Dulebohn**



## **Radionuclide Studies Of The Gastrointestinal System:**

**Radionuclide Studies of the Gastrointestinal System** Leonard M. Freeman, M. Donald Blaufox, 1973 Radionuclide Studies of the Gastrointestinal System, 1973 *Clinical Nuclear Medicine* Hans-Jürgen Biersack, Leonard M. Freeman, 2008-01-03 The modern era of radionuclide imaging and therapy is well into its seventh decade During this era many national and international textbooks have been published in an attempt to educate not only the practitioners of our medical discipline but also referring physicians and medical students Some of the more recent large multitexts such as those by Ell and Ghambir Sandler et al and Henkin et al provide us with very comprehensive reference sources while some of the smaller texts totally written by two or three individuals e g Mettler Guiberteau and Ziessman O M ley Thrall have achieved popularity with radiology residents and other physicians in training The concept of Clinical Nuclear Medicine arose 3 years ago from a conversation between the editors who have been close friends for many years We have always felt that our relationship epitomizes one of the major strengths of nuclear medicine which is the very close ties and spirit of educational cooperation that exist between international colleagues We all share the same aim of doing whatever we can to optimize patient care whether it be by introducing new pharmaceuticals and instruments or by developing new techniques or approaches to performing our broad spectrum of clinical procedures Nuclear medicine physicians have almost uniformly been willing to share their expertise at national and international meetings The international nuclear medicine community unlike many other larger specialty areas has remained relatively small It was within this spirit that Clinical Nuclear Medicine was born **Walker's Pediatric Gastrointestinal Disease** Ronald E. Kleinman, Olivier-Jean Goulet, Giorgia Mieli-Vergani, Ian R. Sanderson, Philip M. Sherman, Benjamin L. Shneider, 2018-06-04 Radionuclide Studies of the Gastrointestinal System, 1972 *A Guide to Radiological Procedures* Frances Aitchison, 2009-01-01 Chapman and Nakielnys Guide to Radiological Procedures has become the classic concise guide to the common procedures in imaging with which a radiology trainee will be expected to be familiar Now fully revised and updated in line with current practice it will also prove invaluable to the wider clinical team that now delivers modern imaging services including radiographers and radiology nurses as well as a handy refresher for radiologists at all levels The highly accessible format has been retained with every technique described under a set of standard headings making it ideal for both quick reference and exam preparation The important topic of consent is reflected in an additional new chapter and the latest key guidelines are referenced throughout New to this edition is complementary access to the complete fully searchable eBook making it even more practical to use than ever before anytime anywhere Synoptic style makes for easy everyday quick reference as well as exam preparation Selectivity of techniques covered focuses candidates attention on what questions to expect Use of standard headings makes information highly accessible Now comes with complete access to the eBook version via Expert Consult Reflects changes in examination All new modalities fully covered *Source Book of Educational Materials for Nuclear Medicine*, 1981

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Crutchlow,Pamela J. Dudac,Suzanne MacAvoy,Bernadette R. Madara,2002 Quick Look Nursing Pathophysiology is designed to assist nursing students with basic pathophysiology of common adult health problems Organized by a body systems approach each section begins with a brief reviewof anatomy and physiology and includes a listing of diagnostic measures pertinent to that system Each section focuses on major adult health problems wit an emphasis on epidemiology of illness pathophysiological process occurring and goals for managing the condition A diagram chart or table accompanies each disease process **Toxicology Research Projects Directory** ,1979 **Nuclear Medicine in Pharmaceutical Research** M. Frier,A C Perkins,2002-04-12 This text defines the role and scope of nuclear medicine imaging techniques gamma scintigraphy in pharmaceutical research giving information from clinical trial data [Nuclear Medicine: Case Review Series E-Book](#) Harvey A. Ziessman,2010-11-18 This new edition of Nuclear Medicine in the popular Case Review series offers self assessment preparation for board reviews to help residents and recertifying radiologists stay on top in their field Dr Harvey

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