

CASE REPORT

GASTRIC EMPTYING SCINTIGRAPHY IN ASSESSMENT OF CHRONIC VOMITING

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Gastroparesis being multifocal abnormality is characterized by objective feeling of prolong time of gastric retention without any evidence of anatomical blockage. The key symptoms include early satiety, feeling of fullness after meals, nausea, vomiting, bloating, and upper abdominal pain. Radio isotopic Gastric emptying study using radiolabelled test food is integrated clinically for evaluation of functional gastric motility disorders. We present a young female having abdominal pain and vomiting for two months. She was investigated for anatomical causes and no abnormality was uncovered. Gastric Emptying scintigraphy revealed delayed lag phase and half gastric emptying time consistent with the diagnosis of Gastroparesis.

Keywords: Gastroparesis; Gastric Emptying Scintigraphy; Lag phase; Quantitative

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INTRODUCTION

Gastroparesis is a syndrome of empirically late gastric emptying without any mechanical obstruction and prime symptoms including early satiety, postprandial fullness, nausea, vomiting, bloating, and upper abdominal pain.¹ Evaluation of gastric dynamics by radionuclide labelled technique is simple, non-invasive, reproducible, easy to execute, precise and quantifiable. Scintigraphic gastric emptying procedures are well recognized as the standard technique to assess gastric emptying.² It is the only acceptable technique of quantitative evaluation of rate of gastric emptying. After labelling solid or liquid constituent of a meal, the number of counts measured by Gamma camera is directly comparable with the volume of the residual meal.³ Consideration of geometric shape of stomach is not required in this evaluation.

CASE PRESENTATION

A female patient of 16 years of age presented with vomiting and abdominal pain for two months. Pain was generalized abdominal pain for the last 2 months. Pain is of high severity, on & off in nature and colicky. She was also complaining of nausea on & off for the last 2 months. She was afebrile and heart rate was 88 beat/min. Her blood pressure was 90/60 mmHg. Abdomen on examination was non-tender and bowel sounds were normal. Rest of the clinical examination was unremarkable except impending cellulitis in right hand due i.v line.

Blood CP was normal with Hb of 11.9. Serum Amylase was 121 (up to 90U/L) was slightly insignificantly raised. Her electrolytes were normal and urea/sugar in normal range. Thyroid Profile showed euthyroid status. Liver function tests were also normal. Imaging studies

Abdominal Ultrasound, Endoscopy and CT scan did not show any obstructive lesion. Patient was referred for Gastric Emptying Study to rule out Gastroparesis.

Patient was advised overnight fasting and all the medications affecting gastric motility were stopped. Often stopping such drugs may not be possible due to patient's problem. Patient was administered radiolabelled meal. This consists of two eggs white portion. The eggs were mixed with Tc99m 1 mCi and cooked in non-stick fry pan till appears like omelette. This was placed in toasted bread and patient was asked to eat with simple water. Imaging was performed with a single head ADAC Camera Argus Epic. Patient was made to sit on the imaging table slightly inclining backward so that stomach is in the field of view and anterior image acquisition performed. Dynamic acquisition done with 1 frame/minutes for 90 minutes as it gives information about the movement of the meal within the gastric lumen. Study was continued for 4 hours by taking images at different intervals. Images were analysed visually for collection of test meal in stomach and emptying. Quantitative analysis includes log phase and time after which the half of test meal leaves the stomach. Gastric emptying scintigraphy images show collection of test meal in fundal region of stomach. Significant dumping of test meal is seen in the fundus at the end of study. Quantitation of the gastric emptying shows prolonged lag phase 44 minutes, i.e., long time to achieve peak level by test meal. Quantitation of Emptying of stomach shows significantly prolonged and T1/2 calculated as 1342 minutes. Percentage of test meal retained in stomach was about 65% after four hours. The prolonged lag phase and half gastric emptying time is compatible with the diagnosis of gastroparesis

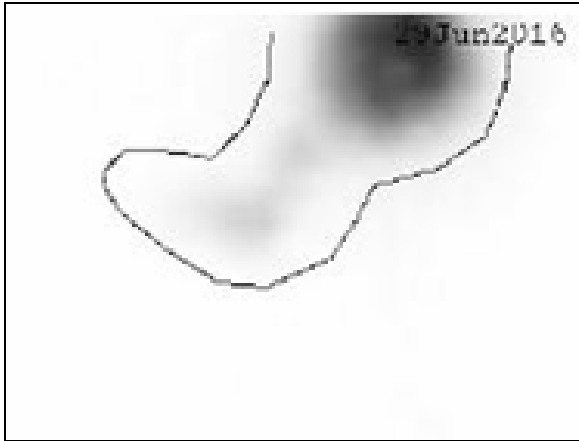


Figure-1: Gastric emptying study, retention of test meal in gastric fundus

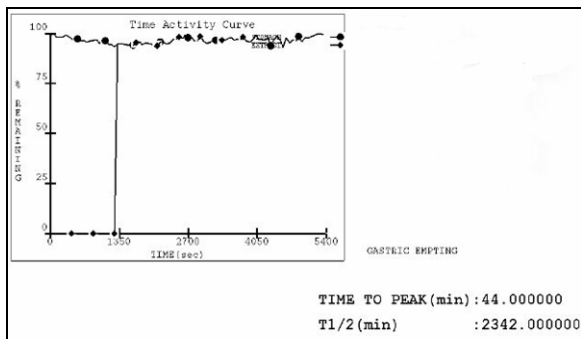


Figure-2: Gastric emptying curve showing prolong lag phase and gastric emptying T1/2

DISCUSSION

Gastroparesis can be suspected in patients presenting with history of nausea, vomiting, early satiety, and feeling of fullness after meals and abdominal distress.⁴ These symptoms associated with unprejudiced evidence of prolonged gastric emptying in the nonexistence of any anatomical obstacle, and characteristically with deficiency in conservation of normal nutrition using standard food.⁵ Causes of gastroparesis include diabetes, neurological, autoimmune/connective tissue diseases, drugs, malignancy, and idiopathic.⁶ Idiopathic gastroparesis is being the most common aetiology of gastroparesis and frequently female are more affected; usually young or middle aged.⁷ X-rays abdomen, sonography, barium contrast studies/endoscopy of upper gastrointestinal tract are incorporated in diagnostic workup. The aim of these investigations is to rule out physical blockade like cancers or other structural pathologies. Absence of mechanical cause of obstruction is indication for considering motility disorders.

Griffith *et al.* introduced Gastric emptying scintigraphy in 1966⁸ for uncovering the motility disorders of stomach and was further refined during

the following decade. Although in last couple of year's radiology, endoscopy, and manometry measurement showed significant advancement. Still scintigraphy is customary for the assessment of gastric motility in clinically, since it gives functional, non-invasive, and quantifiable measurement of gastric emptying rate.⁹ The inconsistency of clinical picture and recognized structural gastro-intestinal anomalies is usually misleading that sometimes results in an unclear clinical representation.¹⁰ Therefore, gastric emptying scintigraphy in this scenario can establish or exclude actual functional pathology and is able to document success or failure of treatment. Another distinct advantage of Gastric emptying scintigraphy is to characterize effectively the multifactorial physiology of Gastric emptying including function of fundus proximally and Antrum distally. Radionuclide study permits the exploration of intra gastric distribution of the radiolabelled meal between the fundus and the antrum.¹¹ Frequent scintigraphy may enable to quantify both regional and overall gastric emptying. Looking at proximal fundal and distal antral areas of images visually and quantification of regional emptying with regions of interest on fundus and antrum can be helpful in uncovering the physiological abnormalities. This provides better understanding symptoms of dyspepsia, especially when overall gastric emptying values are within normal limits.¹² Severity of gastric emptying can be graded by quantification of percentage of test remaining in stomach at 4 hours.¹³

- Grade I (mild) 11–20% retention at 4 h
- Grade II (moderate) 21–35% retention at 4 h
- Grade III (severe) 36–50% retention at 4 h
- Grade IV (very severe) >50% retention at 4 h.

Preferably, gastric emptying scintigraphy is performed in the morning with patient fasting overnight, however If overnight fast is unbearable, at least 6–8 hours fasting is mandatory. Tobacco and alcohol consumption must be deferred for at least 24 hours. Drugs affecting gastric motility include prokinetic agents, anti-secretory medicines, gastric acid suppression drugs, and tranquilizers can disturb gastric emptying.¹⁴ Drugs that may affect gastric emptying should be withdrawn for at least 24 hours.

Study is analysed visually and also quantitatively for the lag phase and rate of gastric emptying. The lag phase is the stay of radiolabelled meal in the stomach before it enters in to the bowel. No gastric emptying is observed during this time. This is the time taken for passage of food from fundus to the antrum. It indicates the time for the solid food to be broken into small constituent parts that are able to pass through the pylorus. It is predicted as the time from consumption of test meal to the first arrival of the radiolabelled solids in the proximal small

intestine. Normal values for lag phase are 20 ± 10 min (SD).¹⁵ After early lag phase there is a linear phase of gastric evacuating, therefore the results are described as percentage of holding of test meal after a define period of time e.g. two hours\four hours or half emptying time ($t_{1/2}$). Measurement of the retention of test meal is more accurate and more than 10% retention after four hours is considered as abnormal.¹⁶ Half gastric emptying is also prolonged in gastroparesis.

AUTHORS' CONTRIBUTION

JF: Basic ideas, manuscript, and write up were done, FT: Literature search, AHJ, RR: write-up and proof reading.

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