

SCINTIGRAPHIC EVALUATION OF GASTRIC EMPTYING TIME IN DIABETIC GASTROPARESIS

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ABSTRACT

Thirty-four diabetics (27 NIDDM, 3 IDDM, 1 FCPD and 3 IGT), male/female 2.8:1 and age range 23-68 years, with symptoms suggestive of gastroparesis were evaluated at MKCG Medical Collage Hospital, Berhampur. Gastric emptying time (GET) was assessed by radiostype scintigraphy (^{99}Tc -sulfur colloid test meal). Normal GET was assessed in 10 control patients (normal adults). The commonest symptoms associated were abdominal bloating, nausea, polyuria, tingling and numbness, weight loss and anorexia. Common clinical signs included absent ankle jerks, diabetic retinopathy, peripheral neuropathy and succession splash. Mean GET was 55.6 ± 10.3 min in controls versus 94.2 ± 9.8 min in diabetics. Delayed GET was observed in 21 cases of NIDDM (77.8%) and two cases of IDDM (66.7%). Paradoxically rapid GET was observed in two cases of NIDDM (7.4%). Radiostope technique is an easy, simple and non-invasive method of evaluate gastroparesis.

KEY WORDS: Diabetic gastroparesis, $^{99\text{m}}\text{Tc}$ -sulfar colloid radiostope scan.

INTRODUCTION

Diabetic patients frequently have morbid gastrointestinal symptoms like gastrointestinal dysmotility, epigastric discomfort, intractable vomiting, halitosis, gastric stasis, Bezoar formation, watery diarrhoea, unexplained loss of weight, malabsorption, altered bacterial flora, infections etc. (1). Severe gastroparesis of diabetes upsets the metabolic control, slows absorption of nutrients, induces malnutrition, recurrence of bleeding or candidiasis. It interferes which gastro intestinal (G.I) function through autonomic neuropathy, which interferes with sympathetic and parasympathetic innervations. Hyperglycemia itself also directly inhibits gut contractility. (2).

The emptying of a meal from the stomach is affected by the volume of the meal ingested, the physical characteristics of the meal, (including its protein, fat and carbohydrate contents), the amount

of fibre, its pH and osmolality, calorie content and a variety of hormonal and neuroregulatory factors (3)

Screening tests for objective assessment of gastroparesis include endoscopy and radiography (for exclusion of acid peptic disease, pyloric obstruction, infection or drug induced erosive disease). Confirmatory study of gastric dysmotility are undertaken by manometry, electrogastrography and radiostope scintigraphy (4-8)

MATERIAL AND METHODS

34 diabetic patients (NIDDM-27, IDDM-3, impaired GTt-3), within the age group 23-68 years, with M:F ratio 2.8:1, with symptoms suggestive of gastroparesis, attending the general medicine and endocrinology OPD of M.K.C.G. Medical Collage Hospital, Berhampur, during the period from December 1996 January 1999, were evaluated 10 normal adults (7 males, 3 females), who were not on any medication were studied as controls.

Patients having association liver disease, cardiac disease, renal disease, hypothyroidism, tuberculosis, collagen vascular disease and disease affecting autonomic nervous system were excluded from study. Patients treated with drugs G.I. motility like cisapride, metchloropropamide, baclofen, calcium channel blockers and anticholinergics were not included in the study. Patients who had undergone G.I. surgery, having evidence of malignancy and women with pregnancy were also excluded from the study.

Patients were kept fasting overnight. After elution of ^{99}MO (supplied by BARC, Mumbai), sulfur colloid was added as per specified protocol by BRIT, Mumbai. About 40 gms of jam, is layered over four pieces of standard slices bread (about 60 gms). 500 uci of $^{99\text{m}}\text{Tc}$ -sulfur colloid is taken in a disposable syringe and is sprayed uniformly over the four pieces of bread and sandwiched, avoiding spillage of radioactive material. It is eaten as quickly as possible, after thorough chewing, and the patient is allowed to drink about 200 ml of plain water.

Patients is positioned in a supine position under a large field of view Gamma camera, fitted with a parallel hole, low energy all purpose (LEAP)collimator. Serial static images were recorded for 60 seconds, at an interval of 10 minutes, till 50% of test meal is emptied from stomach. The images of different time intervals are displayed on the computer and an irregular ROI was drawn over the activity area. The per pixel count was determined and the values plotted on a semilog graph paper and the gastric emptying time (get) curve was formed. The half time ($t_{1/2}$) of gastric emptying was determined by extrapolating the curve at half of initial count. Similar procedure was repeated in the control group and the normal GET curve was formed.

OBSERVATIONS

Thirty-four diabetics were evaluated, of which 25 were males and nine females. Duration of diabetes varied from 1-17 years (Table 1). The commonest symptoms linked to gastroparesis were abdominal bloating (85.3%) and nausea (76.5%). Other associated symptoms included early satiety (50%) polyuria (44%), tingling and numbness (38.2%), weight loss (32.4%), anorexia (26.5%), vomiting (14.7%), pain abdomen (11.8%), foot ulcers (8.8%) and watery diarrhea (5.9%) (Table 2).

Table 1: Age sex and Duration of Diabetes

Type of Diabetes	Age	Sex		Duration of diabetes
		Male	Female	
(n)	(yrs)			(yrs)
NIDDM(27)	37-68	20	7	3-15
IDDM(3)	24-41	3	0	5-17
FCPD(1)	35	1	0	7
IGT(3)	43-65	1	2	1-2

Table 2: Common Clinical Symptoms

Symptoms	No. of Cases	Percentage
Nausea	26	76.5
Vomiting	5	14.7
Abdominal bloating	29	85.3
Early satiety	17	50.0
Pain abdomen	4	11.8
Watery diarrhoea	2	5.9
Loss of weight	11	32.4
Loss of appetite	9	26.5
Polyuria	15	44.1
Tingling, numbness	13	38.2
Ulcer foot	3	8.8

Clinical signs included absent ankle jerks (64.7%), diabetic retinopathy (52.9%), peripheral neuropathy (47.1%), succussion splash (35.3%), postural hypotension (17.6%), cardiomyopathy (8.8%) and dermopathy (5.9%) (Table 3)

Table 3 : Common Clinical Signs

Sign	No. of. Cases	Percentage
Postural hypotension	6	17.6
Succussion splash	12	35.3
Peripheral neuropathy	16	47.1
Absent ankle jerks	22	64.7
Diabetic retinopathy	18	52.9
Cardiomyopathy	3	8.8
Dermopathy	2	5.9

Gastric emptying time (GET) was 55.6 ± 10.3 min in the control group, versus 94.2 ± 9.8 min diabetics. Delayed GET was observed in 21 cases of NIDDM (66.7%). One case of FCPD and three cases of IGT had normal gastric emptying time. Paradoxically, rapid GET was observed in two cases of NIDDM (7.4%)

Table 4: Gastric Emptying Time ($t_{1/2}$) in Different Groups of Diabetics

Diabetes	Normal GET	Rapid GET	Delayed GET
NIDDM	4(14.8%)	2(7.4%)	21(77.8%)
IDDM	1(33.3%)	0	2(66.7%)
FCPD	1(100%)	0	0
IGT	3(100%)	0	0
Control	10(100%)	0	0

Fig 1 : Gastric Emptying Time Curve

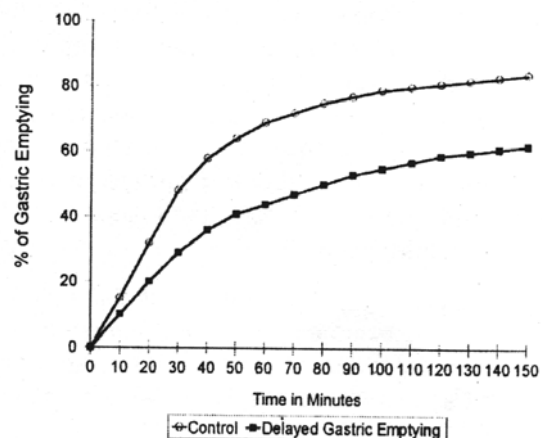
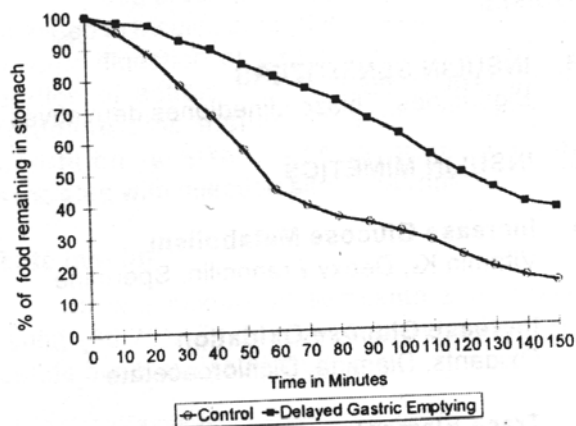


Fig 2 : Gastric Emptying Time Curve



DISCUSSION

Diabetic gastroparesis is one of the most common form of acquired autonomic neuropathy and gastric stasis is attributed to vegal neuropathy in cases of long standing, poorly controlled diabetics. Solid and liquid foods are not emptied from stomach at the same rate. Barium meal examination is inconclusive in cases of diabetic gastric stasis.

Isotopically labeled test meal allows the study of solid nutrients, yields multiple data points during a single study and does not require intubation.

Gastric emptying time in normal control group was 55.6 ± 10.3 minutes and is significantly delayed (94.2 ± 9.8 minutes) in cases of diabetics with symptoms of gastroparesis. The rapid GET noted in two cases of NIDDM is probably due to hyperacidity and hyper-osmolality of stomach contents, due to the test meal. No definite

correlation of GET to age, sex, symptoms of gastroparesis or duration of diabetes was found. The emptyinh pattern is exponential in some cases and linear in few other cases.

CONCLUSION

Gastroparesis is a well defined complication of diabetes mellitus and is attributed to reduced gastric contractility due to autovagotomy. Scintigraphic evulation of gastric emptying time is an easy, simple and non-invasive method. ^{99m}Tc sulfur colloid labeled to bread and jam is a suitable test meal for the study of gastric emptying time.

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