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A pilot study on disturbed gastric myoelectric activity in obstructed defecation syndrome

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ABSTRACT

Background: Electrogastrography (EGG) is a noninvasive technique for recording gastric myoelectric activity. The aim of this study was to measure and record gastric myoelectric activity in patients with obstructed defecation syndrome (ODS) and to compare their results with those of normal individuals.

Methods: Forty-two patients (22 male) with ODS and a mean age of 41.02 y were enrolled in this prospective study after thorough clinical and physiologic assessment. Eleven normal subjects (six female) with a mean age of 39.2 ± 8.4 y were assigned to the control group. Both patients and controls were subjected to surface EGG in fasting and postprandial states. Data were recorded and analyzed via a computer system to reveal the EGG pattern in both groups.

Results: Abnormalities in the EGG were found in 24 (57.1%) of the 42 patients with ODS. EGG in ODS patients showed alterations in the fasting state in the form of a significant decrease of the normal gastric slow wave ($P = 0.03$) and a nonsignificant increase in gastric dysrhythmias. The EGG alterations of ODS patients were significantly improved in the postprandial state as the normal gastric slow waves significantly ($P = 0.006$) increased and the gastric bradycardia declined significantly ($P = 0.02$). No significant differences were observed in the power distribution between the ODS patients and the healthy controls.

Conclusions: Patients with ODS showed an altered EGG pattern compared with that of healthy control subjects. The alterations in ODS patients were more clearly observed during the fasting state and improved significantly after eating.

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Introduction

Electrogastrography (EGG) is a noninvasive technique for recording gastric myoelectric activity using electrodes placed on the skin of the abdomen over the epigastric area. A surface recording obtained using EGG is called an electrogastrogram.¹

Although EGG was first introduced by Alvarez in 1922,² its clinical utility was limited until it was popularized in the 1990s.³ Before the 1960s, it was uncertain whether EGG was a recording of gastric myoelectric activity or gastric contractile activity; it is now clear that EGG is a recording of gastric slow waves.¹

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Gastric myoelectric activity measured using EGG can be altered due to certain diseases or after stimulation; however, spontaneous alterations in this activity can occur. Disturbances in gastric myoelectric activity include gastric dysrhythmia, abnormal slow wave propagation, and electromechanical uncoupling.⁴ Gastric dysrhythmias are further subdivided into bradygastria, tachygastria, and arrhythmia.⁵

The clinical applications of EGG involve electrophysiological studies,⁶ assessment of the efficacy of an intervention or therapy,⁷ and detection of slow wave abnormalities in patients with gastric motility disorders such as gastroparesis and gastroesophageal reflux disease.⁸

Evidence for the correlation between gastric and colonic motor activities has been clearly demonstrated with the gastrocolic reflex, a physiological reflex that involves an increase in colonic motility in response to gastric distension and byproducts of digestion in the small bowel. This reflex is responsible for the defecatory urge after eating https://en.wikipedia.org/wiki/Gastrocolic_reflex,⁹ and is exaggerated in cases of irritable bowel syndrome (IBS),¹⁰ suggesting an important link between gastric and colonic motility.

The aim of this study was to record and measure the electric gastric activity in patients with obstructed defecation syndrome (ODS) and to compare their results with those of normal subjects to identify any alterations or disturbances in EGG in patients with ODS.

Patients and methods

Study design and setting

This prospective pilot study was conducted on 42 patients with ODS who were admitted to the colorectal surgery unit of Mansoura University Hospitals from January 2010 to June 2014 for surgical treatment of ODS disease. The EGG was performed in the Gastroenterology Surgery Centre of Mansoura University. Ethical approval for the study was provided by the Institutional Review Board of the Mansoura Faculty of Medicine. The trial was registered online at www.researchregistry.com with the unique identifying number *researchregistry1988*.

Subjects and controls

We included adult male and female patients with ODS. The causes of ODS in the patients are listed in [Table 1](#). We excluded patients with colonic or rectal inertia, patients with endocrine disorders such as hypothyroidism and diabetes

mellitus, patients taking medications that affect gastrointestinal motility, patients who underwent previous surgery for ODS, and patients who underwent any previous abdominal procedures. Control subjects were either admitted to the hospital for reasons other than ODS, or healthy volunteers who had their EGG testing on outpatient basis.

Assessment

A thorough history was obtained from all patients regarding symptoms of obstructed defecation such as straining, incomplete evacuation, number of bowel movements per wk, and the use of laxatives and enemas. In addition, patients were asked about the presence of upper gastrointestinal symptoms including dyspepsia, heart burn, regurgitation, and epigastric pain. Patients were submitted to Wexner constipation score,¹¹ clinical examination, anorectal manometry, and evacuation proctography. Colon transit time was measured for all patients to exclude patients with colonic or rectal inertia.

EGG technique

Surface EGG was applied to record gastric myoelectric activity. Before placement of the electrodes, hair at the recording sites was shaved, and the abdominal skin was cleaned with sandy skin-prep jelly (Omni prep.) to reduce the impedance.

Three surface electrodes were placed on the skin of the abdomen as follows: Two active electrodes were placed at the epigastric region, including one on the midline halfway between the xiphoid process and umbilicus and the other 5 cm distant and 45° above and to the left of the first electrode. The two active electrodes were connected to yield a bipolar EGG signal. The third electrode, which was used as a reference lead, was set on the patient's right side, 10–15 cm distant and at the same level as the first electrode.

The EGG signal was amplified using a portable EGG recorder (Digitrapper EGG, Synectics Medical AB, Synectics Medical Inc, Irving, TX), and the measuring frequency was 4 Hz. EGG was recorded in the supine position in the fasting condition (fasting for at least 6 h), and then the patient ingested a standard test meal (370 Kcal liquid-solid test meal), and postprandial EGG was obtained 1 h after ingestion of the test meal.

Recording of the EGG lasted for 30 min in the fasting and postprandial conditions. Signals were digitized and fed into a personal computer and analyzed with computer software (ElectroGastrGram, Version 6.02 D1P7) that employed "Running spectral analysis" frequencies of each spectrum that were interpreted and classified as follows: bradygastria, 0.5–2 cycles per minute (CPM); normal rhythm, 2–4 CPM; and tachygastria, 4–9 CPM.¹²

To minimize motion artifacts in the EGG signals, the skin was shaved and well prepared before the test to reduce impedance, and subjects were asked to not to talk, move, read, or make phone calls during the procedure. The recording, including raw signals and frequency spectra, was visually inspected for motion artifacts (large-amplitude deflections) in the signal, and the time periods containing motion artifacts were deleted before computational analysis. Subsequently, a

Table 1 – Causes of obstructed defecation in the patients studied.

Cause	Male	Female	Total number
Rectocele	1	14	15
Rectal intussusception	15	5	20
Anismus	6	1	7
Total number	22	20	42

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