



● *Original Contribution*

EVALUATION OF GASTRIC EMPTYING BY TRANSABDOMINAL ULTRASOUND AFTER ORAL ADMINISTRATION OF SEMISOLID CELLULOSE-BASED GASTRIC ULTRASOUND CONTRAST AGENTS

ZHIJUN LIU,^{*} ZHINING LIU,[†] YUHONG LI,[†] JINTAO GUO,[‡] JIANMIN LI,^{*} WEIDONG REN,^{*} SHAOSHAN TANG,^{*} LIMEI XIE,^{*} YING HUANG,^{*} LIPING HUANG,^{*} SIYU SUN,[‡] and YING ZHAO[§]

^{*} Ultrasound Department, Shengjing Hospital of China Medical University, Shenyang, Liaoning Province, China; [†] Ultrasound Department, First Affiliated Hospital of JinZhou Medical University, Jinzhou, Liaoning Province, China; [‡] Gastroenterology Department, Shengjing Hospital of China Medical University, Shenyang, Liaoning Province, China; and [§] Gastroenterology Surgery Department, Shengjing Hospital of China Medical University, Shenyang, Liaoning Province, China

(Received 6 November 2017; revised 1 April 2018; in final form 27 April 2018)

Abstract—Many previous studies have found that transabdominal ultrasound may allow precise measurement of gastric emptying of liquid meals. However, the clinical use of this technique has been hampered by the limitation that transabdominal ultrasound might not accurately measure gastric emptying of solid meals. It is more important to measure gastric emptying of solids instead of liquids, as gastric emptying of solids is more often delayed than gastric emptying of liquids in gastric motility disorders. Recently, transabdominal ultrasound after oral administration of a cellulose-based gastric contrast agents (TUS-OSCA) has been suggested to be effective in initial screening of gastric lesions. The aim of this study was to explore the accuracy of TUS-OSCA in the evaluation of gastric emptying of a semisolid meal. Twenty healthy young patients (10 males and 10 females aged 25.5 ± 2.5 y) were studied. Concurrent measurements of gastric emptying by scintigraphy and TUS-OSCA were performed after ingestion of 350 mL semisolid ultrasound agent labeled with 20 MBq ^{99m}Tc-sulfur colloid. There was no significant difference in the overall curves for gastric emptying time between scintigraphy and TUS-OSCA. There was a good correlation between the gastric 50% emptying times determined by scintigraphy (89.4 ± 1.8 min) and TUS-OSCA (92.5 ± 1.7 min). The correlation coefficient was $r = 0.922$ ($p = 0.000$). Current results indicate that TUS-OSCA is accurate, and the results are similar to those obtained by scintigraphy for gastric emptying of a semisolid meal. (E-mail: liuzj1@sj-hospital.org) © 2018 The Author(s). Published by Elsevier Inc. on behalf of World Federation for Ultrasound in Medicine & Biology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Key Words: Gastric emptying, Semisolid, Cellulose, Scintigraphy, Ultrasound.

INTRODUCTION

Scintigraphy is generally regarded as the gold standard for the measurement of gastric emptying in both clinical and research studies. This technique is relatively expensive, is associated with a low radiation burden (equivalent to approximately 0.5 mSv per study with ingestion of a meal labeled with 20 MBq ^{99m}Tc-sulfur colloid) and is not always readily available. Some studies have found that ultrasonography may allow the precise measurement of gastric emptying of liquid meals (Calletti et al. 1985; Shen et al.

2014). Because of the limits of transabdominal ultrasound, measurement of gastric emptying of solid meals is difficult, as the posterior wall of the stomach may be difficult to identify after the ingestion of solids (especially for solids presenting as hyper-echoic with posterior attenuation) (Phillips et al. 2014; Stevens et al. 2011).

There is a great difference in the rate of gastric emptying between liquid meals and solid meals. Gastric emptying of liquid meals is related mainly to the pressure pump, whereas emptying of solids and semisolid meals is controlled mainly by the peristaltic pump (Indireskumar et al. 2000). The peristaltic pump is affected mainly by coordination and contraction of the gastric antrum and pylorus. The pressure pump is controlled mainly by the opening of the pylorus and the pressure difference between stomach and duodenum. It is more important to measure

Address correspondence to: Jianmin Li, Shengjing Hospital of China Medical University, Shenyang, Liaoning Province, China. E-mail: liuzj1@sj-hospital.org

Conflicts of Interest: The authors declare no conflicts of interest.

gastric emptying of solids instead of liquids, as gastric emptying of solids is more often delayed than gastric emptying of liquids in gastric motility disorders (Phillips et al. 2014; Sachdeva et al. 2011).

Two decades ago, a cellulose-based ultrasound contrast agent was approved to improve sonographic evaluation of the upper abdomen (stomach, duodenum and pancreas); the agent was safe and well-tolerated (Lev-Toaff et al. 1999; Lund et al. 1992; Sisler and Tilcock 1995). Recently, it was suggested that transabdominal ultrasound after oral administration of a cellulose-based gastric contrast agent (TUS-OSCA) is effective in initial screening of gastric lesions (Gottschalk et al. 2017; Ignee et al. 2017; Liu et al. 2014, 2015, 2016, 2017; Yegin and Duman 2016; Zheng et al. 2016). The aim of this study was to explore the accuracy of TUS-OSCA in the evaluation of gastric emptying.

METHODS

This study was approved by the Research Ethics Committee of Shengjing Hospital of China Medical University (2016 PS075 K), and each participant provided written, informed consent before involvement in the study. All experiments were carried out in accordance with the Declaration of Helsinki.

Patients

Twenty healthy young patients (10 male and 10 female) with a mean age of 25.5 ± 2.5 y and body mass index of 24 ± 2 kg/m², recruited by advertisement, were studied. Exclusion criteria were gastrointestinal disease or surgery, urinary system disease, cardiovascular diseases,

respiratory diseases, diabetes mellitus and other diseases. All patients were non-smokers. No patient had a history of relevant surgery, chronic alcohol abuse or epilepsy, or was taking medication known to influence gastrointestinal function for at least 7 d before the examination.

Methods

Patients fasted for more than 8 h on the day of the examination. The oral contrast agent Dongbeide (Zhongdaoaoode, Liaoning, China) is commercially available in packages containing 55 g each; the fiber length of the cellulose was 420–850 μ m. One package of the agent was mixed with 20 MBq ^{99m}Tc-sulfur colloid, and then the mixture was reconstituted by adding 350 mL of boiling water to form a homogeneous semisolid paste. The concentration of cellulose in the semisolid paste was 157 g/L. This 350-mL volume of the cellulose-based gastric ultrasound contrast agent labeled with 20 MBq ^{99m}Tc-sulphur colloid was cooled to a suitable temperature and then ingested within 5 min by the patients. The agent is slightly sweet with a pleasant taste and was easily accepted by patients. The agent-filled stomach appeared homogeneous with a mid- to high-level echogenicity. The semi-solid paste was denser than the gastric fluid and did not dissolve in water (Fig. 1). This characteristic of semi-solid pastes could prevent gastric fluid from interfering in ultrasonic testing. As illustrated in Figure 2a, the gastric fluid (anechoic) was floating at the surface of the semi-solid agent (echoic); the gastric fluid retained in the stomach did not interfere with the ultrasonic findings for the

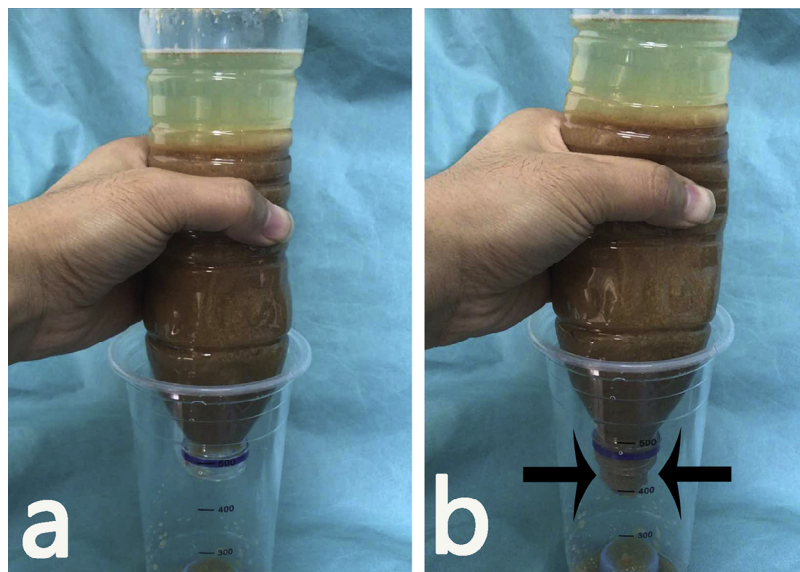


Fig. 1. Semisolid cellulose-based gastric ultrasound contrast agents. (a) When the bottle is upside down, the semisolid agents remain in the bottom of the bottle, with fluid floating at the surface of the agent, and the agents cannot flow out. (b) Only when the bottle was pressed with the fingers (mimicking gastric peristalsis), could the agents be squeezed out.

Download English Version:

<https://daneshyari.com/en/article/10227083>

Download Persian Version:

<https://daneshyari.com/article/10227083>

[Daneshyari.com](https://daneshyari.com)