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Original Article

The role of silent helicobacter pylori infection in intragastric ulcers induced by balloon insertion used for management of obesity

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ABSTRACT

Background: Obesity represents one of the common medical disorders that carries a high risk of morbidity and mortality. Insertion of intragastric balloon is one of the recently introduced lines of treatment of obesity. It allows patients to sense abdominal fullness and reduce their food intake. However, gastric ulceration may be a serious adverse effect that may be associated with intragastric balloon insertion.

Aim: To assess the role of silent helicobacter pylori infection in intragastric balloon-induced ulcers and to explore the possible methods for amelioration of this effect.

Methods: Thirty patients were divided into 2 equal groups; one of them received triple therapy for helicobacter pylori eradication and the other group received placebo treatment. Then, they underwent intragastric balloon insertion. After removal of the balloon, gastroscopy was performed to evaluate the gastric mucosal lesions, if present.

Results: There was significant decrease in the incidence of gastric erosions and ulcerations in the group that received triple therapy for helicobacter pylori eradication compared to the group that received placebo treatment.

Conclusion: Eradication of silent helicobacter pylori infection may represent a promising hope to decrease the incidence and improve symptoms of gastric erosions and ulceration that may be associated with intragastric balloon insertion.

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1. Introduction

Obesity is a serious metabolic disorder that may lead to negative health consequences. Obesity increases the prevalence of various diseases such as hypertension, diabetes mellitus, coronary heart disease, stroke, gastroesophageal reflux disease, gall bladder disease, sleep apnea, malignancy and non-alcoholic steatohepatitis [1]. Lines of treatment of obesity include lifestyle modifications, pharmacological therapy and bariatric surgery. Although intensive lifestyle modification was associated with only limited weight reduction, when it is combined with weight-losing drugs approved for long-term use, an additional weight reduction of 3%–9% may be

observed within one year [2]. However, these drugs may lead to harmful adverse effects [3].

Weight-loss surgery provides the most effective therapeutic modality for management of obesity. The major obstacles to surgical management of obesity are difficult accessibility, high cost, non-preference by the patients and significant morbidity and mortality. As a consequence, minimally invasive methods are needed for the treatment of obesity [4]. As such, endoscopic bariatric treatments were recently introduced. Among them, the intragastric balloon (IGB) has been the most frequently used in practice and the most studied line of treatment for obesity [5]. One or more intragastric balloons can be inserted in the stomach using endoscopic procedures under mild sedation in an outpatient setting. Intragastric balloons allow patients to sense fullness and reduce their food intake. Also, signals transmitted centrally through the vagal nerves by activated gastric stretching receptors could affect satiety [6]. Adverse effects following IGB placement

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include pain (33.7%) and nausea (29%). The incidence of gastroesophageal reflux disease, gastric ulcers and balloon migration was 18.3%, 2%, and 1.4% respectively. Serious adverse events may also occur including small bowel obstruction, perforation and even death [5,7].

Gastropathy and gastric ulceration are the most common adverse effects associated with intragastric balloon insertion. Up till now, the exact mechanism of this adverse effect is not fully understood. Constant pressure from continuous contact of the balloon with the gastric wall may result in gastric ulceration and even may induce perforation [8]. Diagnosis of the complications of balloon insertion may be a major challenge because patients usually present initially with non-specific symptoms [9]. Also, helicobacter pylori (*H. pylori*) infection was proposed as a strong predisposing factor to gastropathy and gastric ulceration following IGB insertion [10]. The aim of this study was to assess the role of silent helicobacter pylori infection in intragastric balloon-induced ulcers and to explore the possible methods for amelioration of this effect.

2. Patients and methods

This study was performed on 30 patients who attended to the outpatient clinics of Kafrelsheikh University hospitals, Tanta University hospitals and to a private clinic between January 2015 and February 2018. This study was reviewed and approved by the institutional Ethics Committee and a written informed consent was obtained from all volunteers.

2.1. Inclusion criteria

Class II or class III obese individuals (body mass index, BMI, ≥ 35) were included in this study. The BMI was calculated by dividing patient weight (in kilograms) by height (in meters squared). We selected patients who were found positive for helicobacter pylori (*H. pylori*) infection. The diagnosis of *H. pylori* was made according to histology (from endoscopic biopsies), rapid urease test or using stool antigen test.

2.2. Exclusion criteria

Patients with hiatal hernia (>5 cm), Crohn's disease, major psychiatric disease, pregnancy, coronary artery disease, congestive heart failure, renal failure, moderate or severe valvular heart disease, atrial fibrillation, ventricular pre-excitation, bundle branch blocks, intraventricular conduction delays, electrolyte imbalance, chronic obstructive pulmonary disease, poor echocardiographic quality or previous gastrointestinal surgery were excluded from the study. Also, patients with allergies or resistance to medications used in the present study or previous treatment of *H. pylori* were excluded.

2.3. Groups

Patients were randomly divided into 2 equal groups of 15 patients each as follows:

Group 1: Received the standard triple therapy for *H. pylori* that consists of omeprazole 20 mg, amoxicillin 1000 mg and clarithromycin 500 mg, all twice daily orally for 14 days depending on the date of the office visit [11]. All subjects were encouraged to complete the full course of treatment and common side effects were explained. Side effects and compliance were documented on follow-up visits or telephone call by the nurse. *H. pylori* eradication was ascertained 4 weeks after completion of treatment by stool antigen test or, in cases in which gastroscopy was indicated for other reasons, by histological examination (including Giemsa

stain if negative on hematoxylin and eosin) of at least two antral and two body mucosal biopsies obtained through endoscopy and rapid urease test (Figs. 1 and 2). Proton pump inhibitors were held for two weeks before either endoscopic examination or stool antigen test and physicians interpreting the results were blinded to the treatment allocation. Three individuals were resistant to this eradication regimen that were excluded from the study and substituted with another three responsive individuals to keep the same group number. After complete eradication of *H. pylori* infection, patients underwent intragastric balloon insertion as a treatment of obesity [12].

Group 2: The patients of this group received placebo treatment. They underwent intragastric balloon insertion as a treatment of obesity [12].

2.4. Intragastric balloon procedure (Fig. 3)

Following routine laboratory tests, patients underwent an upper gastrointestinal endoscopic examination to exclude the presence of active gastric or duodenal ulcer, hiatal hernia or esophagitis. A fluid-filled balloon (BioEnterics Intragastric Balloon; Allergan Inc., Irvine, Calif., USA) was used in the study. The balloon placement procedure was performed under deep sedation with heart monitoring and oximetry. The introduction of the deflated balloon through the mouth and the positioning in the stomach cavity were performed under endoscopic control. After the inflation of the balloon with an injection of 550–700 ml isotonic saline solution with 10 ml methylene blue through a small filling tube attached to the balloon under endoscopic control, the tube was removed by gently pulling on the external end, leaving the balloon inside the stomach. The procedure was completed after confirming the correct positioning of the balloon. The balloon remained in the stomach for 6 months. To remove the balloon, an endoscopic procedure was conducted to puncture, deflate, grasp, and remove it [13]. After removal of the balloon, gastroscopy was performed to visualize the gastric mucosa and evaluate the gastric mucosal lesions, if present.

2.5. Statistical analysis

The statistical analysis of the results was performed using the statistical package for the social sciences (SPSS) version 18.0.

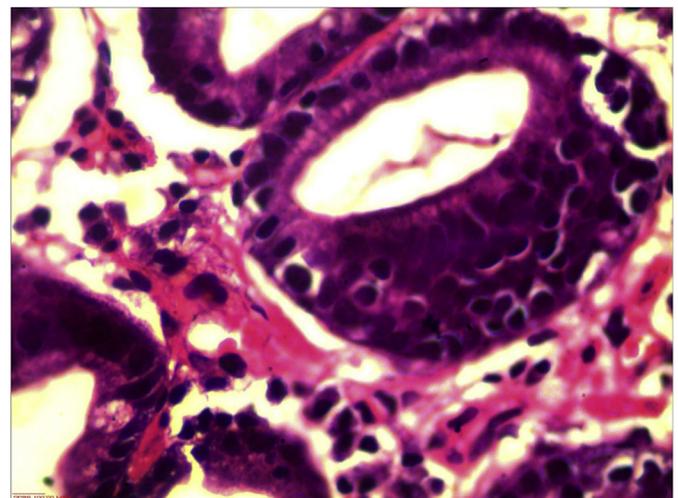


Fig. 1. Gastric mucosal glands infiltrated with chronic inflammatory cells mainly lymphocytes forming lymphoid follicles with reactive germinal center (H&E X 200).

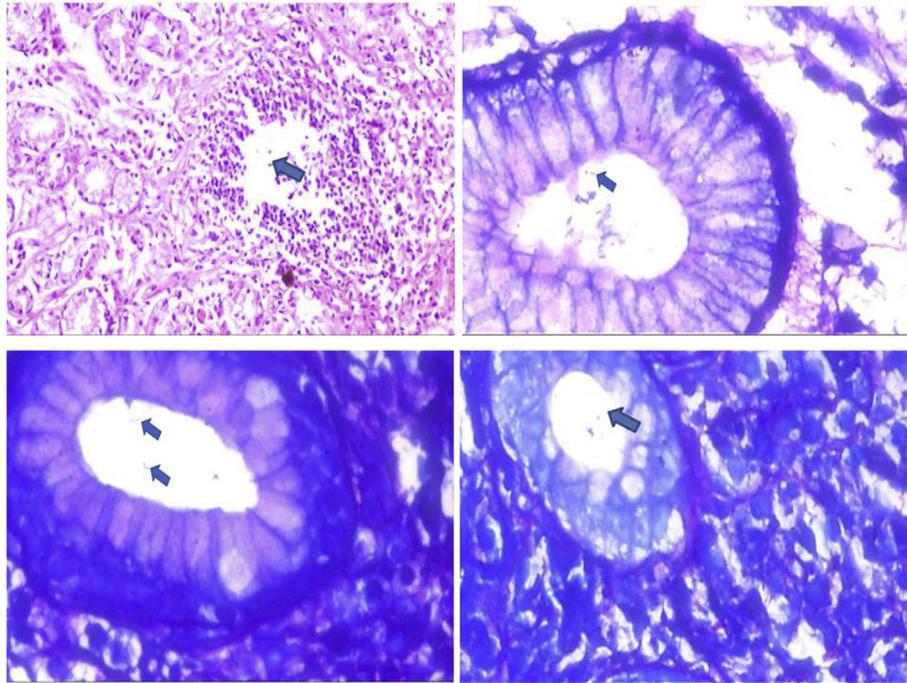


Fig. 2. *Helicobacter pylori* curved rod in the lumen of the gastric glands (Arrows) (H&E X 400).

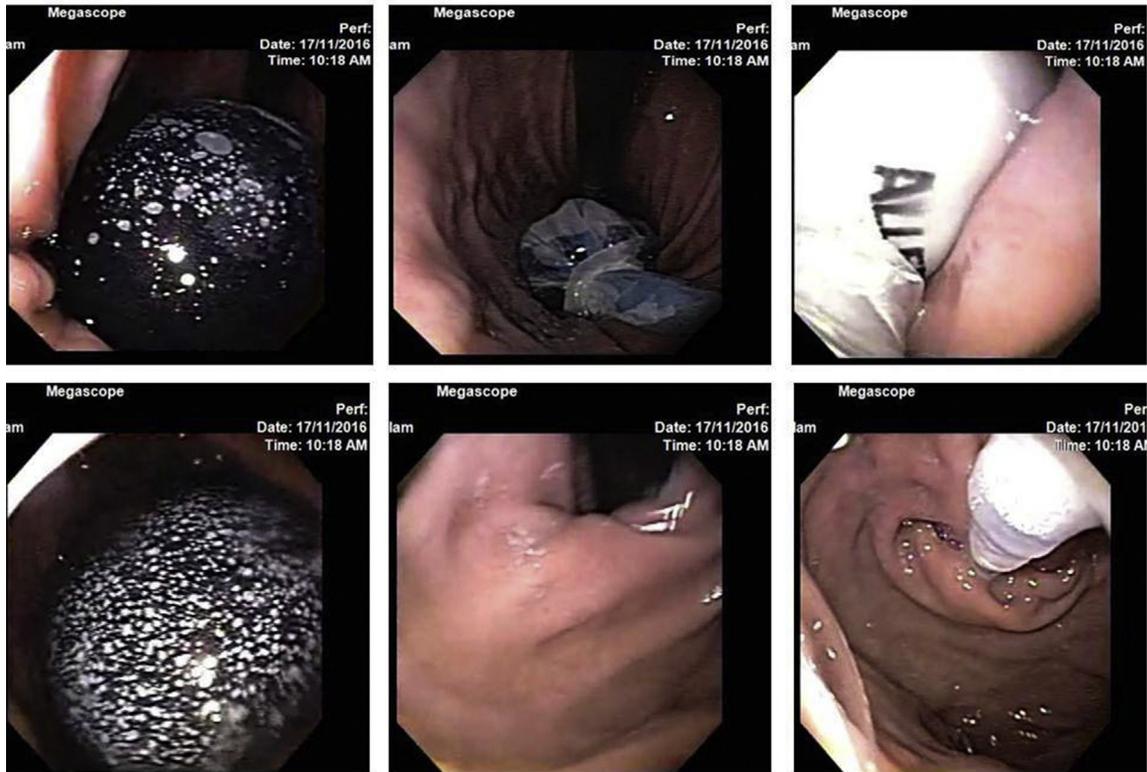


Fig. 3. Intra-gastric balloon insertion.

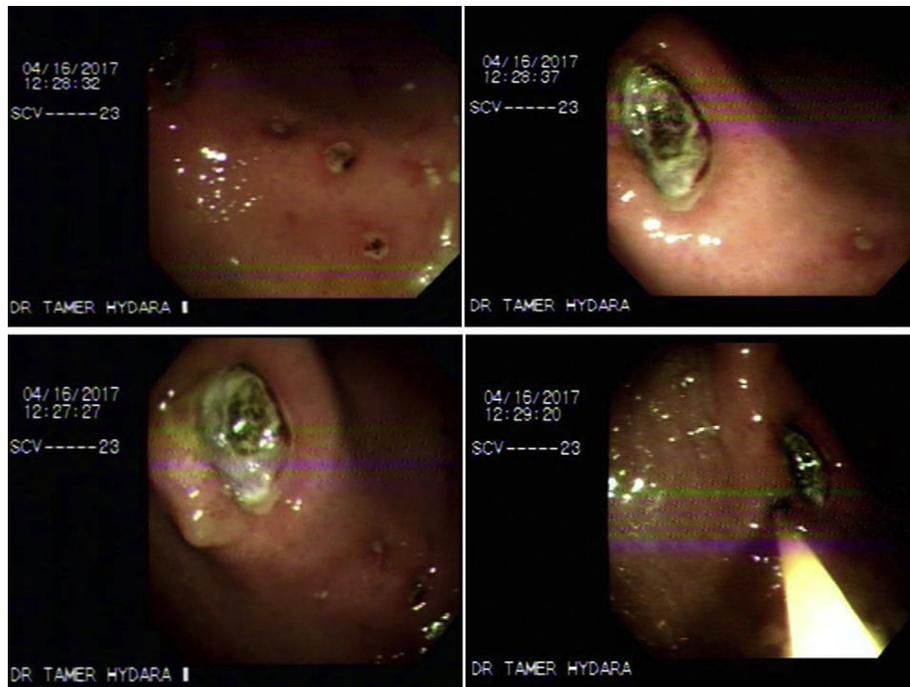


Fig. 4. Endoscopic views of untreated *H. pylori* infection group showing large angular ulcers with massive erosions.

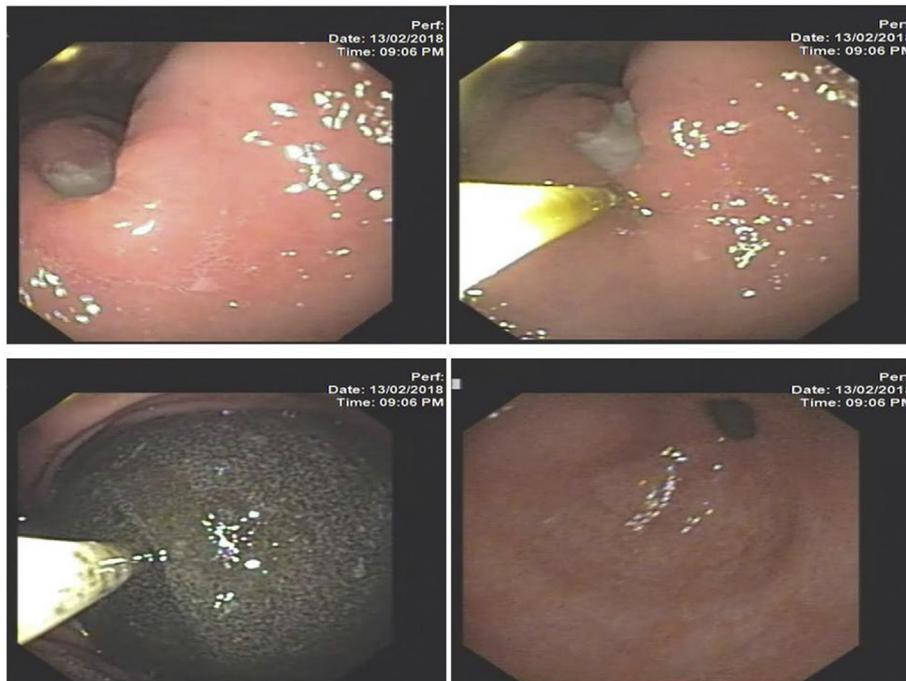


Fig. 5. Endoscopic views of untreated *H. pylori* infection group showing clean base antral ulcer.

Categorical variables were presented as counts and proportions. A paired Student t-test was used to evaluate differences between the preoperative and postoperative periods. The results were considered statistically significant when p-value was less than 0.05.

3. Results

Three patients (20%) of the group that underwent complete

eradication of *H. pylori* infection prior to intragastric balloon insertion showed minimal erosions and inflammation following extraction of the balloon. 2 patients (13.3%) of this group showed gastric ulcers and the remaining 10 patients (66.7%) didn't show any abnormality in the gastric mucosa on upper GIT endoscopy (Figs. 4 and 5). On the other hand, 9 patient (60%) of the group that didn't receive treatment for eradication of helicobacter pylori infection showed multiple ulcers that ranged from small anterior

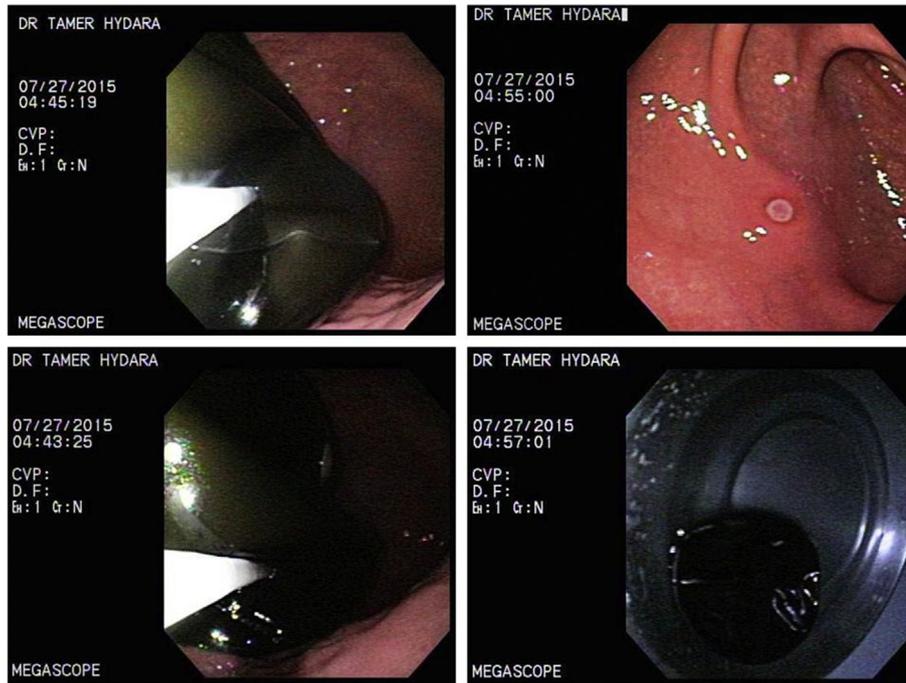


Fig. 6. Endoscopic views of treated *H. pylori* infection group showing small clean ulcer.



Fig. 7. Endoscopic views of treated *H. pylori* infection group showing mild inflammation of the gastric mucosa with minimal erosions.

wall ulcers with clean base to large angular ulcers with massive erosions (Two cases showed acid hematin based ulcer associated with melena by the 6th month after insertion of the balloon, 4 cases showed severe epigastric pain associated with gastric ulcer at the 5th month after balloon insertion and 3 cases had asymptomatic ulcers). Also, 6 cases of this group had moderate gastritis associated with moderate gastric erosions at 6 months noticed during extraction of the balloon (Figs. 6 and 7).

4. Discussion

Obesity is a medical condition that carries the risk of multiple health hazards that may endanger life [14]. For decades, several lines of treatment were proposed to manage obesity but recurrence was the major obstacle to these lines [15]. These lines include lifestyle changes, medications, or surgery. Intra-gastric balloon insertion is one of the new lines of management of obesity [16].

Besides its excellent safety profile, the main advantage of intragastric balloon insertion is preservation of the anatomy of the stomach. The fluid-filled balloons such as that used in the present study act by delaying gastric emptying from the stomach. So, patients will consume a smaller meal and feel satiety for a longer time [17]. On the other hand, the air-filled balloons mainly affect the stretch receptors of the stomach [18]. Also, the intragastric balloons are safe with low risk of incidence of serious adverse events. However, an increasing percentage of cases may present with gastric erosions and ulcerations noticed during extraction of the balloon [19].

The pathogenesis of intragastric balloon induced gastric ulceration is multifactorial. Yoo et al. [8] suggested that it may be due to direct pressure on the gastric mucosa which creates a state of mild ischemia that may predispose to mucosal necrosis and ulceration. Other studies proposed that helicobacter pylori may be an important factor in the pathogenesis of intragastric balloon induced gastric ulceration [20]. *Helicobacter pylori* may cause direct mucosal irritation, alter the gastric mucosal immune mechanisms and may affect gastric acid secretion [21,22]. This was in the same line with the results of the present study where patients with untreated helicobacter pylori infection showed significant increase in the incidence of gastric erosions and ulcerations associated with symptoms of epigastric pain, nausea and heartburn with variable degrees.

In the present study, eradication of helicobacter pylori infection was associated with significant decrease in the incidence of gastric erosions and ulcerations associated with significant decrease in symptoms of upper GIT ulcerations compared to patients with untreated helicobacter pylori infection. This was in agreement with Machytka et al. [23] who reported that eradication of helicobacter pylori infection is an essential step before insertion of adjustable intragastric balloons. Mojowska et al. [24] concluded that testing for *H. pylori* is mandatory for all patients who will undergo intragastric balloon insertion for early diagnosis of *H. pylori* infection and achievement of better outcomes.

In conclusion, eradication of silent *H. pylori* infection may represent a promising hope to decrease the incidence and improve symptoms of gastric erosions and ulceration that may be associated with intragastric balloon insertion.

Conflicts of interest

The authors have no conflict of interest to declare.

References

[1] Al-Mulhim AS, Al-Hussaini HA, Al-Jalal BA, Al-Moagal RO, Al-Najjar SA.

- Obesity disease and surgery. *Int J Chronic Dis* 2014;2014:652341.
- [2] Ryan DH, Kahan S. Guideline recommendations for obesity management. *Med Clin* 2018;102:49–63.
- [3] Rankin W, Wittert G. Anti-obesity drugs. *Curr Opin Lipidol* 2015;26:536–43.
- [4] Dargent J. Novel endoscopic management of obesity. *Clin Endosc* 2016;49:30–6.
- [5] Kim SH, Chun HJ, Choi HS, Kim ES, Keum B, Jeon YT. Current status of intragastric balloon for obesity treatment. *World J Gastroenterol* 2016;22:5495–504.
- [6] Kentish SJ, Page AJ. The role of gastrointestinal vagal afferent fibres in obesity. *J Physiol* 2015;593:775–86.
- [7] Tate CM, Geliebter A. Intragastric balloon treatment for obesity: review of recent studies. *Adv Ther* 2017;34:1859–75.
- [8] Yoo IK, Chun HJ, Jeon YT. Gastric perforation caused by an intragastric balloon: endoscopic findings. *Clin Endosc* 2017;50:602–4.
- [9] Martins Fernandes FA, Carvalho GL, Lima DL, Rao P, Shadduck PP, Montandon ID, et al. Intragastric balloon for overweight patients. *J Soc Laparoendosc Surg* 2016;20. e2015.00107.
- [10] Coskun H, Bozkurt S. A case of asymptomatic fungal and bacterial colonization of an intragastric balloon. *World J Gastroenterol* 2009;15:5751–3.
- [11] Safavi M, Sabourian R, Foroumadi A. Treatment of *Helicobacter pylori* infection: current and future insights. *World J Clin Cases* 2016;4:5–19.
- [12] Żurawiński W, Sokółowski D, Krupa-Kotara K, Czech E, Sosada K. Evaluation of the results of treatment of morbid obesity by the endoscopic intragastric balloon implantation method. *Wideochir Inne Tech Maloinwazyjne* 2017;12:37–48.
- [13] Koc F, Kayaoglu HA, Celik A, Altunkas F, Karayakali M, Ozbek K, et al. Effect of weight loss induced by intragastric balloon therapy on cardiac function in morbidly obese individuals: a pilot study. *Med Princ Pract* 2015;24:432–5.
- [14] Hruby A, Hu FB. The epidemiology of obesity: a big picture. *Pharmacoeconomics* 2015;33:673–89.
- [15] Elfhag K, Rössner S. Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obes Rev* 2005;6:67–85.
- [16] Wirth A, Wabitsch M, Hauner H. The prevention and treatment of obesity. *Deutsch Ärztebl Int* 2014;111:705–13.
- [17] Giardiello C, Borrelli A, Silvestri E, Antognozzi V, Iodice G, Lorenzo M. Air-filled vs water-filled intragastric balloon: a prospective randomized study. *Obes Surg* 2012;22:1916–9.
- [18] Giuricin M, Nagliati C, Palmisano S, Simeth C, Urban F, Buri L, et al. Short- and long-term efficacy of intragastric air-filled balloon (Heliosphere® BAG) among obese patients. *Obes Surg* 2012;22:1686–9.
- [19] Souto-Rodríguez R, Alvarez-Sánchez M-V. Endoluminal solutions to bariatric surgery complications: a review with a focus on technical aspects and results. *World J Gastrointest Endosc* 2017;9:105–26.
- [20] Bekheit M, Abdelsalam WN, Sgromo B, Catheline JM, Katri K. Is conservative management for gastric perforation secondary to intragastric balloon possible? Case report and review of literature. *Obes Surg* 2014;24:968–70.
- [21] Diaconu S, Predescu A, Moldoveanu A, Pop C, Fierbințeanu-Braticevici C. *Helicobacter pylori* infection: old and new. *J Med Life* 2017;10:112–7.
- [22] Kabel AM. Bleeding disorders: insights into aetiology, pathogenesis, diagnosis and management. *Int J Hematol Dis* 2014;1:22–6.
- [23] Machytka E, Klvana P, Kornbluth A, Peikin S, Mathus-Vliegen LE, Gostout C, et al. Adjustable intragastric balloons: a 12-month pilot trial in endoscopic weight loss management. *Obes Surg* 2011;21:1499–507.
- [24] Mojowska A, Gazdzinski S, Fraczek M, Wyleżoń M. Gastric ulcer hemorrhage – a potential life-threatening complication of intragastric balloon treatment of obesity. *Obesity Facts* 2017;10:153–9.