



# The First Report about the Laparoscopic Sleeve Gastrectomy-Induced Lactose Intolerance

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Published online: 9 January 2019  
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## Abstract

The impact of laparoscopic sleeve gastrectomy (LSG) on the lactose intolerance (LI) remains unclear. We checked 8 men and 34 women with mean body mass index (BMI) of  $43.94 \pm 5.89$  kg/m<sup>2</sup> for LI using hydrogen breath test and clinical examination before LSG and at 3 months postoperation. In addition to appropriate weight loss ( $34.30 \pm 5.51$  kg/m<sup>2</sup>), 1 man and 3 women, who had not LI at starting, were suffered from LI at 3 months postoperation. Among these four patients, the most and least LI was seen in women who had the lowest and highest percentage of excess BMI loss. It seems LSG can induce LI which must be monitored in postoperative follow-ups.

**Keywords** Bariatric surgery · Lactose intolerance · Weight loss · Secondary hypolactasia

## Introduction

Obesity is one of the most important preventable causes of death worldwide. Based on the annual report of the World Health Organization (WHO) in 2016, more than 1.9 billion adults were overweight. Of these, over 650 million were obese. Bariatric or weight loss surgery is a new therapeutic strategy for obesity. Since 2011, our team focuses on this therapeutic strategy and perform laparoscopic sleeve gastrectomy (LSG) and

Roux-en-Y gastric bypass. In addition, we provide nutritional and psychological advices for operated and non-operated obese patients [1]. Despite appropriate outcomes of weight loss, our operated patients suffered from mild to severe gastrointestinal symptoms including abdominal pain, bloating, nausea and vomiting, flatulence, and diarrhea especially after consumption of dairy products. Based on the clinical examination and obtained history, we suspected to secondary hypolactasia, also called lactose intolerance (LI). Therefore, the aim of the present study is to evaluate the LI in obese patients after LSG.

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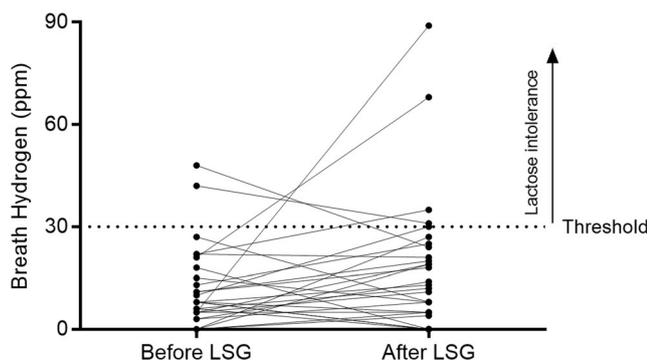
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## Methods

The protocol of this study was approved by Ethical Committee of Shiraz University of Medical Sciences. In this before-after self-control study, we checked 42 obese patients including 8 men and 34 women for LI using an accurate hydrogen breath test (HBT) and clinical examination before LSG and at 3 month postoperation. To perform HBT, the exhaled hydrogen levels were detected before and at every 30 min (30, 60, 90, 120, 150, and 180 min) in fasting patients after consumption of 25 g lactose powder in a 200-ml distilled water by LactoFAN Breath Analyzer (Fischer Analysen Instrument, GmbH, Leipzig, Germany). If the exhaled hydrogen increased over the 30 ppm (parts per million), the patient was diagnosed as a LI. In clinical examination, experiencing of gastrointestinal symptoms including abdominal pain,



**Fig. 1** Changes in the lactose intolerance based on measurement of exhaled hydrogen before and after laparoscopic sleeve gastrectomy

diarrhea, nausea, flatulence and/or bloating after use of milk or simple nonfermented dairy products was asked by an expert interviewer and recorded in a questionnaire. Also, patients' weight loss was calculated based on difference between pre and postoperative mean body mass index (BMI).

## Results

Unfortunately, 14 patients did not cooperate at follow-up. Preoperative mean BMI of our patients was  $43.94 \pm 5.89$  kg/m<sup>2</sup> which was decreased significantly to  $34.30 \pm 5.51$  kg/m<sup>2</sup> at 3 months after LG ( $P < 0.05$ ). In addition to appropriate weight loss, one man and three women, who had not LI at starting, were suffered from LI at 3 months postoperation. Among these four patients, the most and least LI was seen in women who had the lowest and highest percentage of excess BMI loss. On the other hand, LI in one patient was healed, and we see no LI-related changes in other patients (Fig. 1).

## Discussion

In the present study, the LI-inducing effects of LSG were described for the first time. We found that four obese patients who had not LI before LSG were suffered from LI at 3 months postoperation. LSG provides glucoregulatory benefits through the transmembrane G-protein coupled bile acid receptor that

important in the type 2 diabetes mellitus remission [2]. However, LSG is a restrictive surgery which physically decreases the stomach amount and limits the volume of food uptake [3]. Also, alteration of intestinal flora may be occurred in LSG due to the certain dietary restrictions and hormonal changes related to the removing of stomach. These alterations may affect the lactose digestion and adsorption and cause secondary LI [4]. The main pathophysiological mechanisms of this secondary hypolactasia are completely unclear and need further investigation. However, we think that primary surgical-related gastroenteritis and dietary changes can be the main causes. These possibilities must be attended in future studies using more complementary techniques, such as periodical measurement of serum glucose level, stool acidity test, pathological evaluation of intestinal biopsy, and assessment of stool sugar by chromatography.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Informed Consent** Informed consent was obtained from all patients.

**Statement of Human Rights** All procedures performed in this study were in accordance with the Ethical Committee of Shiraz University of Medical Sciences and with the 1964 Helsinki declaration.

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