Best Practice & Research Clinical Gastroenterology 28 (2014) 611–622

Contents lists available at ScienceDirect

Best Practice & Research Clinical Gastroenterology

7

Gastro-oesophageal reflux disease and obesity: Pathogenesis and response to treatment

François Mion, MD, PhD, Professor, Head of Department [a, *], Jérôme Dargent, MD [b, 1]

[a] *Hospices Civils de Lyon, Digestive Physiology, University Lyon 1, Physiology Department, INSERM U1032, LabTau, France*
[b] *Polyclinique de Lyon-Nord Rillieux, 941 Rue capitaine Julien, 69140 Rillieux-la-pape, France*

Keywords:
Manometry
Helicobacter pylori
Esophago-gastric junction
Bariatric surgery
Gastric bypass
Gastric banding
Sleeve gastrectomy

A B S T R A C T

The link between obesity and GERD is clear on all measures of the disease: clinical symptoms, erosive oesophagitis, acid esophageal exposure, and complications. The pathogenesis of this link may be due to general factors such as visceral adiposity, oestrogen levels, or decrease of *Helicobacter pylori* infection with increased gastric acid secretion. Increased abdominal pressure leads to disruption of the esophago-gastric junction and hiatal hernia, and esophageal motility may be modified by obesity. Weight loss does improve GERD, but lifestyle modifications and diet are usually insufficient in the long-term for morbid obesity. GERD and hiatal hernia are key issues in bariatric surgery, and are widely discussed because of important implications. It is not currently certain which procedure should be favoured in case of GERD; yet gastric bypass offers the best guarantee of success. Hiatal hernia repair is also deemed necessary by some authors at the same time of the bariatric surgery. Minimally invasive techniques pose a new challenge to this issue, both technically and theoretically.

Introduction

Although the association may not be causal, there has been a clear increase in the prevalence of obesity and gastro-esophageal reflux disease (GERD) over the last 20 years or so, in Western countries

* Corresponding author. Pavillon H, Hospital E. Herriot, 69437 Lyon cedex 03, France. Tel.: +33 472110136.
E-mail addresses: francois.mion@chu-lyon.fr (F. Mion), jerome.dargent@polyclinique-rillieux.fr (J. Dargent).
[1] Tel.: +33 472014500.

http://dx.doi.org/10.1016/j.bpg.2014.07.012
1521-6918/

but also in Asia and other countries [1]. The United States lead the way with close to 70% of adults either overweight or obese in some areas [2]. In Europe, the trends may not be as ominous, as shown by the OBEPI national survey performed in France by the pharmaceutical company Roche: 47% of French adults were overweight or obese in 2012. However, obesity almost doubled from 8.5% in 1997 to 15% in 2012.

GERD is one of many diseases clearly linked to obesity. We will review this evidence, and look at the mechanisms that may explain this link. We will also discuss the impact of weight loss on GERD symptoms and complications, and explore the specificities of GERD and obesity in the context of bariatric surgery.

Epidemiology of obesity and GERD

The strong positive association between obesity and GERD symptoms has been convincingly demonstrated in population–based studies over the past ten years [3–5]. For example, the data from the Nurses' Health Study described a dose-dependent relationship between increasing BMI and frequent (at least once a week) reflux symptoms [5]. The odds ratio for frequent GERD symptoms were above two for obese women (Body mass index, BMI >30 kg m^{-2}) as compared to normal weight individuals. This study also showed that an increase in BMI of more than 3.5 in women with normal BMI at baseline increased the risk of GERD symptoms (odds ratio: 2.8) as compared to women without weight change. The complications of GERD such as erosive oesophagitis, Barrett's metaplasia or adenocarcinoma are also clearly associated with increased BMI and obesity [6,7].

Besides symptoms and complications, GER can also be quantified based on esophageal acid exposure, as measured by esophageal pH monitoring. Ayazi et al [8], in a large retrospective study of patients with GER symptoms and esophageal 24 h-pH monitoring, found that 13% of the variation of esophageal acid exposure was due to BMI. Another study found that obesity at least partially explained the results of esophageal acid exposure; the most important anthropometric variable was waist circumference in this case [9]. Similarly, Merrouche et al found that BMI was significantly correlated to esophageal acid exposure in a group of obese patients evaluated by esophageal 24 h pH monitoring before bariatric surgery [10]. Recently, a study performed with wireless capsule pH monitoring during 48 h disclosed similar results: the odds ratio of having an increased esophageal acid exposure was five times higher in obese patients with GER symptoms than in normal weight patients with GER symptoms [11]. Total esophageal acid exposure time was significantly higher in obese subjects than in normal ones (9% vs 5%, $p < 0.05$). GER can also be quantified with the use of intra-luminal esophageal pH-impedance monitoring, a technology that allows the detection of all types of reflux, whether acid, weakly acid or alkaline. Schneider et al have shown that obesity does increase the total number of reflux episodes, as compared to normal weight subjects [12]. Esophageal pH-impedance monitoring is particularly useful to assess the persistence of GER, while on PPI therapy, and to evaluate if the symptoms are related to reflux episodes. A recent study showed that non-acid reflux episodes were more frequent in obese subjects compared to normal weight [13]. These authors also found that the total number of refluxes (acid and non-acid) was increased in supine position in obese patients. Furthermore, the concordance between symptoms and reflux episodes was more frequent in obese patients (59% of them had a positive symptom index) than in normal weight subjects (30%). This may explain why obese patients are more 'resistant' to PPI [14]: they have more non-acid reflux episodes on PPI therapy, and these reflux episodes are more frequently symptomatic.

Pathogenesis of GERD in obese patients: general factors

The link between BMI and GERD symptoms, esophageal acid exposure and GERD complications is therefore quite clear. Recent studies have proposed that abdominal rather than global obesity might be the real culprit. A large study of more than 80,000 subjects showed that abdominal diameter (a surrogate measure of visceral fat) rather than BMI was associated with frequent GER symptoms [15]. Based on measurement of abdominal fat by CT scan, two studies found a significant association between erosive oesophagitis and visceral fat [16,17]. The vicinity of visceral accumulated fat and the esophagogastric junction (EGJ) may partly explain the prevalence of GERD in obesity. Adipose tissue produces