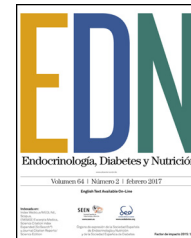




Endocrinología, Diabetes y Nutrición

www.elsevier.es/endo



ORIGINAL ARTICLE

Ghrelin levels could be involved in the improvement of insulin resistance after bariatric surgery

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Received 23 February 2017; accepted 11 May 2017

KEYWORDS

Bariatric surgery;
Laparoscopic
Roux-en-Y gastric
bypass;
Biliopancreatic
diversion of
Scopinaro;
Sleeve gastrectomy;
Ghrelin

Abstract

Background and objective: Ghrelin is a gastrointestinal peptide involved in regulation of body weight and energy balance. However, its behavior after bariatric surgery and its relationship to insulin resistance are still controversial. A simultaneous assessment was made of the association between changes in ghrelin levels and different variables after three types of bariatric surgery. **Patients and methods:** Ghrelin levels were measured in 103 morbidly obese subjects before and 6 months after bariatric surgery (Roux-en-Y gastric bypass (RYGB), biliopancreatic diversion of Scopinaro (BPD), and sleeve gastrectomy (SG)), and in 21 non-obese subjects. **Results:** Ghrelin levels increased after RYGB ($p < 0.05$), were unchanged after BPD, and decreased after SG ($p < 0.05$). The percent change in ghrelin levels (Δ -ghrelin) was associated to the type of surgery in a multiple linear regression model ($p = 0.017$). When the same analysis was only performed in subjects in whom the gastric fundus was maintained (RYGB and BPD),

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Δ -ghrelin was negatively associated to Δ -HOMA-IR ($p=0.001$). In morbidly obese subjects who underwent RYGB and BPD, the odds ratio of a lower Δ -HOMA-IR in patients with Δ -ghrelin in the Q1 quartile versus those with Δ -ghrelin in the Q4 quartile was 8.74 (1.73–44.06) ($p=0.009$).
Conclusions: Changes in ghrelin levels after bariatric surgery are associated to the presence or absence of the gastric fundus. After bariatric surgery, the decrease in insulin resistance was associated to increased ghrelin levels in procedures in which the fundus is not excluded.
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PALABRAS CLAVE

Cirugía bariátrica;
Baipás gástrico en Y
de Roux;
Derivación
biliopancreática de
Scopinaro;
Gastrectomía
tubular;
Ghrelin

Los niveles de Ghrelin podrían estar implicados en la mejora de la resistencia a la insulina después de la cirugía bariátrica

Resumen

Antecedentes y objetivo: La ghrelin es un péptido gastrointestinal que interviene en la regulación del peso corporal y del equilibrio energético. Sin embargo, su comportamiento después de la cirugía bariátrica y su relación con la resistencia a la insulina todavía está en discusión. Nosotros hemos realizado una evaluación simultánea de la asociación entre los cambios en los niveles de ghrelin y diferentes variables después de tres tipos de cirugía bariátrica.

Pacientes y métodos: Se analizaron los niveles de ghrelin en 103 obesos mórbidos, antes y 6 meses después de la cirugía bariátrica (baipás gástrico en Y de Roux [RYGB], derivación biliopancreática de Scopinaro [BPD] y gastrectomía tubular), y en 21 sujetos no obesos.

Resultados: La ghrelin sérica aumentó tras el RYGB ($p<0,05$), no se modificó tras la BPD y disminuyó tras gastrectomía tubular ($p<0,05$). El porcentaje de cambio en los niveles de ghrelin (Δ -ghrelin) se asoció con el tipo de cirugía en un modelo de regresión lineal múltiple ($p=0,017$). Cuando se realizó el mismo análisis solo con aquellos sujetos en los que se mantiene el fundus gástrico (RYGB y BPD), Δ -ghrelin se asoció negativamente con el Δ -HOMA-IR ($p=0,001$). En los sujetos obesos mórbidos sometidos a RYGB y BPD, la odds ratio de tener un Δ -HOMA-IR más bajo de las personas con Δ -ghrelin en el cuartil Q1 frente a aquellos con Δ -ghrelin en el cuartil Q4 fue de 8,74 (1,73-44,06) ($p=0,009$).

Conclusiones: Los cambios en los niveles de ghrelin después de la cirugía bariátrica están asociados con la presencia/ausencia del fundus gástrico. Después de la cirugía bariátrica, la disminución de la resistencia a la insulina se asoció con el aumento de los niveles de ghrelin en aquellas técnicas en las que el fundus no está excluido.

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Introduction

Bariatric surgery is the best available therapy to achieve significant and sustainable weight loss with the greatest chances of improving obesity-associated complications, but results vary widely depending on the procedure used.^{1–3} Biliopancreatic diversion of Scopinaro (BPD) has been shown to be superior to Roux-en-Y gastric bypass (RYGB) with regard to weight loss, although the results were based on a short follow-up period.^{2,3} However, BPD is not frequently used nowadays because of the complications presented.¹ RYGB is considered the standard reference in terms of safety and efficient weight loss. But laparoscopic sleeve gastrectomy (SG) is gaining more interest, not only as a first step in the treatment of high-risk subjects, but also because it is a simpler technique and a faster procedure than RYGB, and has shown excellent results in short-term excess weight loss compared to RYGB.⁴

It is clearly established that gut hormones change after bariatric surgery,^{5–8} although inconsistent data have

been reported.⁶ Nonetheless, to what extent this is a beneficial effect or simply a marker of the anatomical changes is still debatable. Ghrelin is a gastrointestinal peptide involved in the regulation of body weight and energy balance and produced mainly by the X/A cells of the gastric fundus. It is involved in appetite and food regulation, increases food intake and promotes fat accumulation.^{9,10} However, data are contradictory regarding the association between ghrelin and insulin resistance, with negative or no significant associations.^{5,11–14} The regulation of insulin resistance is complex and involves many pathways that are not fully understood and could probably also be controlled by neuroendocrine hormones, such as ghrelin.¹⁴

With this background, the aim of the present study was to undertake an evaluation of the serum changes in ghrelin levels 6 months after three types of bariatric surgery (RYGB, BPD and SG), and their relationship with different anthropometric and biochemical variables.

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