



IS THE WAIST/HEIGHT RATIO A BETTER PARAMETER THAN BMI IN DETERMINING THE CARDIOMETABOLIC RISK PROFILE OF OBESE PEOPLE?

A razão cintura/estatura é melhor parâmetro que o IMC na determinação do perfil de risco cardiometabólico dos obesos?

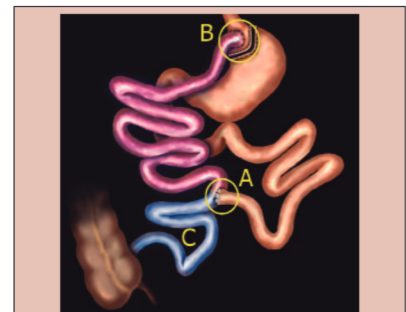
Andressa Bressan **MALAFAIA**¹, Paulo Afonso Nunes **NASSIF**^{1,2,3}, Ricardo Wallace das Chagas **LUCAS**³, Rodrigo Ferreira **GARCIA**^{2,3}, José Guilherme Agner **RIBEIRO**¹, Laura Brandão **DE PROENÇA**¹, Maria Eduarda **MATTOS**¹, Bruno Luiz **ARIEDE**¹

ABSTRACT - Background: The increased prevalence of obesity has led to a significant increase in the occurrence of metabolic syndrome, a recognized risk factor for increased morbidity and mortality from cardiovascular diseases. Hyperglycemia or type 2 diabetes mellitus, dyslipidemia and arterial hypertension are its main components. Since 2015, international guidelines have recognized the benefits of bariatric surgery in each isolated factor of this syndrome. **Aim:** To evaluate the impact of Roux-en-Y gastric bypass in this syndrome comparing pre- and postoperative periods with laboratory analysis and to compare waist/height ratio and BMI in relation to the determination of the cardiometabolic risk profile. **Methods:** A retrospective study was carried out, selecting 80 patients undergoing Roux-en-Y gastric bypass. Total cholesterol, HDL, LDL, triglycerides, fasting glucose, glycated hemoglobin, insulin, body mass index (BMI), vitamin D, vitamin B12, waist circumference and waist/height ratio in three periods were analyzed: the preoperative period from 1 to 6 months, postoperative from 1 to 6 months and postoperative from 1 to 2 years. **Results:** There was an improvement in all parameters of the clinical analyses. The preoperative BMI had a mean value of 39.8, in the preoperative period from 1 to 6 months, the values dropped to 33.2 and in the postoperative period of 1 year, the mean was 26. The perimeter mean values of 118.5 preoperatively, 105.2 postoperatively from 1 to 6 months and 90.3 postoperatively from 1 to 2 years. Waist/height ratio was 0.73, 0.65 and 0.56 in pre, post 1 to 6 months and 1 to 2 years respectively. **Conclusion:** Roux-en-Y gastric bypass improves metabolic syndrome and waist-to-height ratio is superior to BMI in the assessment of the cardiometabolic risk profile.

HEADINGS - Obesity, Metabolic Syndrome, Diabetes Mellitus, type 2, Anastomosis, Roux-en-Y.

RESUMO - Racional: O aumento da prevalência da obesidade levou ao aumento significativo da ocorrência de síndrome metabólica, fator de risco reconhecido para aumento da morbimortalidade por doenças cardiovasculares. A hiperglicemia ou diabetes mellitus do tipo 2, dislipidemia e hipertensão arterial são seus principais componentes. Desde 2015, diretrizes internacionais reconheceram os benefícios da cirurgia bariátrica em cada fator isolado desta síndrome. **Objetivos:** Avaliar o impacto do bypass gástrico em Y-de-Roux nesta síndrome comparando períodos pré e pós-operatório com análise laboratorial, e comparar a razão cintura/estatura e o IMC em relação a determinação do perfil de risco cardiometabólico. **Métodos:** Realizou-se um estudo retrospectivo com base prospectiva selecionando 80 pacientes submetidos à bypass gástrico em Y-de-Roux. Foram analisados o colesterol total, HDL, LDL, triglicérides, glicemia de jejum, hemoglobina glicada, insulina, índice de massa corpórea (IMC), vitamina D, vitamina B12, perímetro abdominal e relação cintura/estatura em três períodos: o pré-operatório de 1 a 6 meses, pós-operatório de 1 a 6 meses e pós-operatório de 1 a 2 anos. **Resultados:** Houve melhora em todos os parâmetros das análises clínicas. O IMC, no pré-operatório, teve a média dos valores de 39,8, no pré-operatório de 1 a 6 meses, os valores caíram para 33,2 e no pós-operatório de 1 ano média foi de 26. O perímetro abdominal teve média dos valores de 118,5, no pré-operatório, 105,2 no pós-operatório de 1 a 6 meses e 90,3 no pós-operatório de 1 a 2 anos. A relação cintura/estatura teve 0,73, 0,65 e 0,56 no pré, pós 1 a 6 meses e 1 a 2 anos respectivamente. **Conclusão:** O bypass gástrico em Y-de-Roux melhora a síndrome metabólica e a relação cintura/estatura é superior ao IMC na avaliação do perfil do risco cardiometabólico.

DESCRITORES - Obesidade. Síndrome Metabólica. Diabete Melito tipo 2. Anastomose em Y-de-Roux.



RYGB demonstration: A) Jejunojunal anastomosis 120 cm from the duodenal flexure (biliopancreatic loop - in brown); B) Gastrojejunal anastomosis 120 cm from the jejunojunal anastomosis (food loop - in purple); C) Common handle (in blue).

Central message

The increase in the global prevalence of metabolic diseases is inexplicable when considering only environmental or genetic factors. There is a need to explore the possible roles of epigenetic factors. Despite gaps in our knowledge, evidence suggests that measuring waist circumference improves patient management and should be an integral part of a preoperative protocol to improve patient care and health.

Perspective

Much progress has been made in this interdisciplinary field in recent years, with many studies investigating various aspects of the metabolic syndrome and its associated epigenetic changes. Metabolically healthy obesity is not a stable or reliable indicator of future risk for cardiovascular disease. The waist circumference threshold for a given BMI category at different ages, by gender and by ethnicity will require further investigation. Evidence suggests that measuring waist circumference improves patient management and should be an integral part of a pre- and postoperative protocol.



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From the ¹Mackenzie Evangelical Faculty of Paraná, Curitiba, PR, Brazil; ²University Evangelical Mackenzie Hospital, Curitiba, PR, Brazil; ³Paulo Nassif Institute, Curitiba, PR, Brazil.

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Correspondence:
Paulo Afonso Nunes Nassif
E-mail: paulonassif@terra.com.br

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INTRODUCTION

The increase in the obese population in the world is exponential, it is estimated that 30% of people are overweight or obese, significantly increasing morbidity and mortality from cardiovascular, oncological, endocrine and liver diseases, among others^{11,38,41}.

Obesity, particularly abdominal obesity, is associated with resistance to the effects of insulin on the peripheral use of glucose and fatty acids, one of the components of the physiopathogenesis of type 2 diabetes mellitus, hyperinsulinemia and the increase in adipocyte cytokines. All these factors significantly increase cardiovascular risk, either alone or in combination. In addition to type 2 diabetes mellitus, other obesity-associated comorbidities, such as hypertension and dyslipidemia, are also direct risk factors for the development of cardiovascular disease. In this context, in 2014, Samson et al.⁴⁰ called the concomitance of these comorbidities as syndrome X, currently known as metabolic syndrome (MS)^{9,40}.

MS is characterized by abdominal perimeter greater than or equal to 102 cm in men and 88 cm in women; fasting glucose greater than 100 mg/dl; triglycerides above 150 mg/dl; HDL cholesterol less than 40 mg/dl in men and less than 50 mg/dl in women; and arterial hypertension (> 130 mmHg, > 85mmHg). It is believed that obesity and insulin resistance are the main factors for the development of this syndrome¹⁷.

Due to the need for a more effective treatment, the term "metabolic surgery" emerged from the recognition of the metabolic effects of bariatric surgery, in addition to weight loss. Currently, the most performed procedures are Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy. Most patients with MS obtain significant improvements with bariatric surgery⁵.

A recent review by Hwuang¹⁷ exploring ideal waist-to-height ratios and subsequent comments^{6,32} concluded that height-adjusted waist circumference (known as waist circumference index) is superior to BMI in its association with body fat. This conclusion contrasts with the recent IAC and ICCR (International Atherosclerosis Society and International Chair On Cardiometabolic Risk) Consensus report on visceral obesity, which argued that waist circumference thresholds alone are adequate for the assessment of abdominal obesity in clinical practice^{3,36}.

There is an unmet need to promote consistent and universal public health message that visceral/central/abdominal obesity is associated with adverse health outcomes³². The authors of this research have used the waist-to-height ratio (WHtR) for almost 25 years as an adjunct indicator to BMI. It is a better predictor for central obesity, and superior for cardiovascular risk factors². But the waist circumference index is superior to the WHtR in this respect.

The National Institute of Excellence in Health and Care - NICE - recognized the value of WHtR as an indicator of initial risk to health. We use recent data from the UK to explore whether the WHtR-based classification identifies more cardiometabolic risk than the 'matrix' based on BMI and waist circumference currently used for screening. Data from the Health Survey for England of 4112 obese people were used to identify cardiometabolic risk, as indicated by elevated glycated Hb, dyslipidemia, and hypertension. HbA1c, total/HDL cholesterol and systolic blood pressure were more strongly associated with WHtR than 'matrix'. The WHtR 0.5 cut in the initial screening translates to a simple message: the waist should be less than half the height. This allows individuals to be aware of their health risks³.

WHtR is a simple anthropometric predictor for central body fat and is easy to use from a health education perspective. WHtR >0.5 was proposed as the first level of health risk. BMI is the most used to define weight status in relation to height, and its units are in kg/m²³⁶. Despite the strong correlation between body fat and BMI, it cannot distinguish between lean mass and fat mass^{15,35}. Thus, it is important to analyze each factor that makes up MS individually, in order to verify the real impact of bariatric surgery on each comorbidity.

Thus, this study aimed to evaluate the impact of Roux-en-Y gastric bypass comparing the pre- and postoperative period of 1 to 6 months, and the postoperative period of 1 to 2 years in MS and compare waist ratio/height and BMI in relation to the determination of the cardiometabolic risk profile.

METHOD

Data were collected from the prospective file of electronic medical records of Instituto Paulo Nassis, in Curitiba, PR, from January 2017 to December 2019. This work was approved by the Research Ethics Committee of Mackenzie Evangelical Faculty of Paraná, Curitiba, PR, Brazil, under number 4,324 .990.

Sample

Eighty patients who participated in a one-year multidisciplinary bariatric surgery preparation program were evaluated.

The inclusion criteria were: 1) patients who underwent bariatric surgery by RYGB and who had laboratory measurements from three different periods; 2) standard collection 1 to 6 months before the operation; 3) standard collection from 1 to 6 months postoperatively; 4) standard collection from 1 to 2 years postoperatively.

The only exclusion criterion was being under 18 years old and over 65 years old.

Variables analyzed

The following were researched: 1) clinical analyzes were on fasting glucose, serum insulin, glycated hemoglobin, total cholesterol, total triglycerides, HDL and LDL; 2) BMI of each patient before and after the operation in the same periods; 3) abdominal perimeter measured with an inextensible measuring tape in the smallest curvature located between the ribs and the iliac crest, at the normal expiratory moment; 4) waist/height ratio determined by dividing the smallest curvature located between the ribs and the iliac crest, at the normal expiratory moment, by height, measured in centimeters.

Operative technique

The RYGB consisted of building a small gastric reservoir (stomach with about 20 ml) performing two anastomoses, the gastrojejunal and the jejunojejunal (Figure 1). The rest of the stomach and the diverted intestine were not removed from the body, just excluded from the path taken by food and digestive enzymes. This deviated part anastomoses 120 cm from the duodenojejunal flexure with the jejunum, characterizing the biliopancreatic loop (Figure 1A). From the jejunojejunal anastomosis to the small gastric reservoir, also 120 cm long, characterizes the alimentary loop (Figure 1B). From the jejunojejunal anastomosis to the ileocecal valve, we have the common loop (Figure 1C).