

BARIATRIC SURGERY REVERSES METABOLIC RISK IN PATIENTS TREATED IN OUTPATIENT LEVEL

Cirurgia bariátrica reverte risco metabólico em pacientes assistidos em nível ambulatorial

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ABSTRACT - Background: The conventional treatment of obesity presents unsatisfactory results on weight loss and its long-term sustainability, therefore bariatric surgery has been suggested as an effective therapy, determining sustainable long-term weight loss, reversal of components of cardiometabolic risk and improved quality and life expectancy. **Aim:** To investigate the clinical component of the cardiometabolic risk in patients undergoing bariatric surgery assisted on outpatient basis. **Methods:** The sample consisted of 47 patients with ages between 18 and 60 years, 72% females. Diabetes mellitus, hypertension, and dyslipidemia were prospectively evaluated by using the Assessment of Obesity-Related Co-morbidities scale. **Results:** Occurred improvement in these co-morbidities within 12 months after surgery. Co-morbidities resolved were greater than those improved. **Conclusion:** The study revealed that the Assessment of Obesity-Related Co-morbidities is a system that can be effectively used to quantify the degree of reduction of the severity of the cardiometabolic risk in response to bariatric surgery.

HEADINGS - Bariatric surgery. Cardiometabolic risk. Diabetes mellitus. Hypertension. Dyslipidemia.

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RESUMO - Racional: Diante dos resultados insatisfatórios do tratamento convencional da obesidade na perda ponderal e na sua sustentabilidade em longo prazo, a cirurgia bariátrica vem sendo apontada como terapêutica eficaz, determinando perda ponderal sustentável em longo prazo, reversão de componentes do risco cardiometabólico e melhora da qualidade e expectativa de vida. **Objetivo:** Acompanhar a evolução clínica dos componentes do risco cardiometabólico em pacientes submetidos à cirurgia bariátrica. **Métodos:** A amostra constituiu-se de 47 pacientes de 18 a 60 anos de idade, 72% do sexo feminino. A evolução clínica das comorbidades diabete melito, dislipidemia e hipertensão arterial, foi quantificada, procedendo-se ao cálculo de escores relativos à Avaliação das Comorbidades Relacionadas à Obesidade. **Resultados:** Houve redução significativa do escore médio de todas as comorbidades relacionadas à obesidade, desde a admissão até os 12 meses seguintes. Independente do momento de assistência nutricional, o contingente de pacientes que as tiveram revertidas superou aqueles apenas melhoradas. **Conclusão:** O estudo revelou que a Avaliação das Comorbidades Relacionadas à Obesidade é sistema efetivo para quantificar o grau de redução da gravidade do risco cardiometabólico em resposta à cirurgia bariátrica.

INTRODUCTION

Obesity and its co-morbidities have reached alarming prevalence, becoming a public health problem worldwide, independent of gender, age and social status. From the unsatisfying results seen in conventional treatment on weight loss and its long term sustainability, bariatric surgery has been pointed out as an efficient treatment, determining sustainable weight loss, cardiometabolic risk factors (CMR) and life expectancy and quality improvements^{7, 8, 12}.

Weight loss and maintenance after bariatric surgery can be understood by behavior changes that are inserted in the patient's life. The food habit change provided by the adoption of a high calorie diet associated to ingestion of high nutritional value foods and the

beginning of a regular physical activity, are essential measurements that help the weight loss after surgery. Besides behavior factors, the Roux Y gastric by-pass surgery technique contributes, through anatomy and hormonal changes, in a significant manner, to loss and maintenance of weight with the best co-morbidities^{1, 12, 14}.

Individuals submitted to bariatric surgery with nutritional assistance can achieve loss of 40 to 50% from the initial weight in a short period of time, being possible the long term maintenance². The favorable effect of the gastric pouch reduction and the jejunal derivation in Roux Y considering reversion and control of the CMR components is described in many populations^{10, 5, 9, 3}.

Mohamed *et al* (2009)¹¹ proposed an instrument capable of measuring, in a quantitative manner, the co-morbidities changes related to obesity after bariatric surgery, with this instrument it is possible to quantify the enhancement of revise the components of cardio metabolic risk.

Life expectation increase and mortality reduction with surgery is, partly, mediated by CMR reversion; therefore, the present study has as goal to evaluate and quantify the clinical evolution of CMR components in patients submitted to bariatric surgery by Roux Y laparoscopic method, assisted in ambulatory level.

METHODS

The study is transversal, with sampling by convenience, carried out at the nutrition ambulatory of the Universidade Federal de Sergipe (CAAE nº 0281.0.107.000-11).

Data collection was taken from records and protocols, using ambulatory assistance for the patients, in a period from May to June of 2012, 47 records of patients submitted to bariatric surgery, were selected. The records that were included in the study were properly filled, presenting all data, with diagnose at the admission of the following co-morbidities associated to obesity: arterial hypertension, dyslipidemia and diabetes mellitus.

Anthropometric data referring to weight and height were checked by recommended techniques and instruments, the Body Mass Index (BMI) was calculated and the nutritional state classified, according to cutting points of the World Health Organization⁶.

Biochemical and clinical data related to serum and plasmatic doses of triglycerides, total cholesterol, cholesterol – HDL, cholesterol – LDL and jejunal glucose, were collected. Further systolic and diastolic arterial pressure were measured.

Clinical evaluation of the cardiometabolic risk components (CMR) evolution was quantified,

according to a proposal presented in previous study, taking scores calculus related to Obesity-Related Co-Morbidities Evaluation (ORCE). It was based in a points system which attributed scores from 0 – 5, according to severity for CMR components: diabetes mellitus, dyslipidemia and systemic arterial hypertension (Figure 1). The scores were attributed to the admission time, surgery authorization and after surgery return, on the 3rd, 6th and 12th month, approximately.

Statistical analysis

The medium (X), standard deviation (SD), absolute (n) and relative (%) frequency, were calculated. Due to sample size and variables distribution, non-parametric tests were adopted. The W-Wilcoxon test was used to compare different moments of nutritional assistance. For categorical variables the Qui-Square test was used. A 5% probability statistical significance (p<0.05) was considered. Statistical analysis were carried out using the Statistical Package for the Social Science (SPSS), version 17.0 for Windows.

| AORC score | Description |
|--------------------------|--|
| Diabetes mellitus | |
| 0 | Absence |
| 1 | Glucose Intolerance |
| 2 | Diabetes mellitus (diagnosed) |
| 3 | Controlled with an oral anti-diabetic |
| 4 | Insulin therapy |
| 5 | Clinical Complications |
| Dyslipidemia | |
| 0 | Absence |
| 1 | Limit values (200-239 mg/dl) |
| 2 | Conventional control (diet + physical activity) |
| 3 | Single medication |
| 4 | Multiple medication |
| 5 | Non-controlled |
| Hypertension | |
| 0 | Absence |
| 1 | Limit values (systolic: 130- 139 mmHg; dyastolic:85-89 mmHg) |
| 2 | Conventional control (diet + physical activity) |
| 3 | Single medication |
| 4 | Multiple medication |
| 5 | Non-controlled |

FIGURE 1 - Assessment of Obesity-Related Co-morbidities (AORC)

RESULTS

Forty-seven patients participated on this study, being 72% women (44 y). At admission the prevalence of obesity grade III was 100%; at surgery and 12 months after, a percentage reduction was seen, for 80,9% and 34.2%, respectively (Table 1).

TABLE 1 - Patients characterization in bariatric surgery pre and post-operation in ambulatory assistance

| | n | % |
|--------------------------------------|--------|-------|
| Gender | | |
| Women | 34 | 72,0 |
| Age (years) | | |
| 20-39 | 18 | 36,0 |
| 40-59 | 27 | 57,0 |
| ≥ 60 | 2 | 4,0 |
| Nutritional state at admission | | |
| Eutrophic | 0 | 0,0 |
| Over weight | 0 | 0,0 |
| Obesity grade I | 0 | 0,0 |
| Obesity grade II | 0 | 0,0 |
| Obesity grade III | 47 | 100,0 |
| Nutritional state at surgery | | |
| Eutrophic | 0 | 0,0 |
| Over weight | 0 | 0,0 |
| Obesity grade I | 1 | 2,1 |
| Obesity grade II | 8 | 17,0 |
| Obesity grade III | 38 | 80,9 |
| Nutritional state post-operation | | |
| Eutrophic | 1 | 2,6 |
| Over weight | 3 | 7,9 |
| Obesity grade I | 11 | 28,9 |
| Obesity grade II | 10 | 26,3 |
| Obesity grade IIIa | 13 | 34,2 |
| | χ | DP |
| Age | 43,6 | ±9,8 |
| Admission age | 141,5 | ±27,0 |
| Surgery Age | 132,6 | ±27,0 |
| Post-operation agea | 101,9 | ±23,3 |
| Admission BMI | 53,5 | ±8,8 |
| Surgery BMI | 50,1 | ±9,2 |
| Post-operation BMIa | 38,6 | ±8,2 |
| Nutritional assistance time (years)a | 2,6 | ±2,0 |
| Pre-operation time (years) | 1,7 | ±1,8 |
| Post-operation time (years)a | 0,8 | ±0,7 |

BMI: Body mass index; n: absolute frequency, %: relative frequency, χ : medium; SD: standard deviation; ^a Sample Loss, n=38

Table 2, shows a significant reduction on average score of all co-morbidities related to obesity, CMR components, since admission up to 12 months after. The average score was, sensibly, higher for arterial hypertension, showing at admission a total of 80.9% patients in medication treatment or presenting complication, showing a considerable reduction at 3, 6 and 12 months post-operation. These findings were also expressed for the remaining CMR, dyslipidemia and diabetes mellitus type 2 components.

Table 3 shows the clinical evolution of the CMR components during nutritional assistance pre and post-operation and total. It was possible to evaluate that all co-morbidities evaluated, independent of nutritional assistance at the moment, the patients amount, that had them reverted overcame the one that had them just enhanced. Related to reverted co-morbidities, except one case of dyslipidemia, reverted still in pre-operative, all were reverted in post-operation or total assistance. It is important to note that the higher the

level of complications the longer it took for reversing the pathology, once that the patients that evolved from score 3 to 0 was higher in post-operation nutritional assistance, while that evolved from score 4 to 0, made necessary a higher intervention time, being the evolution, predominantly, in total assistance, therefore, since admission, involving pre and post-operation assistance. The reversion since the moment of highest complication, of the score from 5 to 0, was possible only for one diabetes mellitus case. The treatment medication abolition for mellitus diabetes and dislipidemia, was possible still at pre-operation in 2.1% and 4.2% of the cases respectively.

TABLE 2 - Co-morbidities assessment scores related to obesity (AORC), according to different nutritional assistance moments

| AORC score | Admission | Surgery | PO3 | PO6 | PO12 |
|------------------------|-----------|-----------|-----------|------------------------|------------------------|
| Diabetes mellitus | | | | | |
| Average score | 0,8±1,3 | 0,6±1,2* | 0±0** | 0±0** | 0±0** |
| ≤ 2 | 37 (78,7) | 38 (80,9) | 47 (100) | 43(100) ^a | 37(100) ^b |
| ≥ 3 | 10 (21,3) | 9 (19,1) | 0 | 0 | 0 |
| Dyslipidemia | | | | | |
| Average score | 2,1±1,6 | 1,8±1,6* | 0,1±0,4** | 0±0** | 0±0** |
| ≤ 2 | 18 (38,3) | 20 (42,6) | 46 (97,9) | 43 (100) ^a | 37 (100) ^b |
| ≥ 3 | 29 (61,7) | 27 (57,4) | 1 (2,1) | 0 ^a | 0 ^b |
| Hypertension | | | | | |
| Average score | 3±1,4 | 2,6±1,3* | 0,4±0,9** | 0,1±0,4** | 0,1±0,5** |
| ≤ 2 | 9 (19,1) | 9 (19,1) | 42 (89,4) | 42 (97,7) ^a | 36 (97,3) ^b |
| ≥ 3 | 38 (80,9) | 38 (80,9) | 4 (8,5) | 1 (2,3) ^a | 1 (2,7) ^b |
| Cardio metabolic risks | 8 (17) | 8 (17) | 0 | 0 ^a | 0 ^b |

AORC score ≤2: patients in non-medication treatment; AORC score ≥3: patients in medication treatment or presenting complications; cardiometabolic risks: AORC score ≥3 for all three co-morbidities: diabetes mellitus, dyslipidemia and hypertension; PO3: post-operation at three months, nearly; PO6: post-operation at six months, nearly; PO12: post-operation at 12 months, nearly. Average data and standard deviation [\bar{x} ±SD] or absolute and relative frequency [n (%)]. ^{ab} Sample loss, ^an=43, ^bn=37; * p<0,05; W Wilcoxon surgery test relating to admission; ** p<0,05; W Wilcoxon surgery test relating to post-operation.

DISCUSSION

In studies carried out in Brazil with bariatric patients, it was not still evidenced a method and/or instrument that can quantify the benefits of the surgery for the health of these patients. The AORC consists of a standardized and easy use method, proposing the evaluation of patients submitted to bariatric surgery, because the use of this instrument expresses in a quantitative form the clinical evaluation of the surgical treatment of obesity¹¹.

On most studies, the co-morbidities control is presented in a qualitative form. In the present study the control referred was quantified, as proposed by Mohamed *et al* (2009)¹¹. After applying AORC a clinical evolution was observed marked by the significant reduction of average score of co-morbidities related to obesity (diabetes mellitus, arterial hypertension, dislipidemia), from the obesity surgical treatment, as of the pre-operation conventional treatment.

TABLE 3 - Cardiometabolic risk component evolution in patients submitted to bariatric surgery, according to different nutritional assistance

| Score evolution AORC | Diabetes | | | Dyslipidemia | | | Arterial hipertension | | |
|-------------------------------|----------|----------------------|----------------------|----------------|------------------------|------------------------|-----------------------|------------------------|-----------------------|
| | 1° | 2° | 3° | 1° | 2° | 3° | 1° | 2° | 3° |
| Reverse co-morbidity | | | | | | | | | |
| 3 → 0 | 0 | 8(17,4) ^a | 7(15,2) ^a | 1(2,1) | 22 (47,8) ^a | 16 (36,4) ^b | 0 | 27 (62,8) ^c | 14 (29,8) |
| 4 → 0 | 0 | 0 | 0 | 0 | 2(4,4) ^d | 10(21,3) | 0 | 6(12,8) | 19(44,2) ^c |
| 5 → 0 | 0 | 0 | 1(2,1) | 0 | 0 | 0 | 0 | 0 | 0 |
| Enhanced co-morbidity | | | | | | | | | |
| 3 → 1 | 1(2,1) | 0 ^a | 0 ^a | 1(2,1) | 0 ^a | 0 ^b | 0 | 0 ^c | 0 |
| 3 → 2 | 0 | 0 ^a | 0 ^a | 0 | 0 ^a | 0 ^b | 0 | 0 ^c | 0 |
| 4 → 1 | 0 | 0 | 0 | 0 ^d | 0 | 0 | 0 | 0 | 0 ^c |
| 4 → 2 | 0 | 0 | 0 | 0 | 0 ^d | 0 | 0 | 0 | 0 ^c |
| 4 → 3 | 0 | 0 | 0 | 9(19,1) | 0 ^d | 0 | 20(42,6) | 0 | 1(2,3) ^c |
| 5 → 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 → 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 → 3 | 1(2,1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 → 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Medication treatment reversed | 1(2,1) | 8(17,4) | 8(17,3) | 2(4,2) | 24(43,4) | 26(57,7) | 0 | 33(75,6) | 33(74) |
| No medication | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 13 | 32 |

1° Pre-operation nutritional assistance; 2° Post-operation nutritional assistance; 3° Total nutritional assistance; Relative and absolute frequency presented in data [n (%)]
^{a, b, c, d} Sample loss, ^an=46 ^an=46, ^bn=44, ^cn=43, ^dn=45

A higher nutritional assistance time before bariatric surgery, can contribute for co-morbidities control associated to disease, mainly, arterial hypertension, through the adoption of a new food habit and regular physical activity practice, being the patient capable of presenting, still in a pre-surgical period, important clinical enhancements associated to CMR⁶.

Previous studies show enhancement in several clinical manifestations of CMR being controlled or reduced in almost totality^{3, 5, 9, 10}. However, especially in case of diabetes, this enhancement can be attributed to weight loss and better resistance to insulin, since, the evolution of the same is observed almost immediately after surgical procedure¹².

Besides gastric reduction and duodenal derivation that directly help weight loss, enhancement or reversion of diabetes type 2, after surgery is due, mainly, for anatomic and hormonal alterations from the gastrojejunal derivation. Due to anatomic approximation between the stomach and the ileum, the food will reach the distal intestine earlier and, as consequence, a higher production of incretin GLP – 1 and GIP, besides the production of ghrelin. Once they are liberated, the incretin act in the pancreas stimulating the production of insulin that will contribute with the glycemic control^{1, 10, 12, 14}. The ghrelin production reduction is provoked by the gastric end exclusion characterizing the sacietogen effect of this surgery^{4,12}.

The reduction, or even the abolition of medication, after surgery treatment, as evidenced in this study is a condition, probably influenced by the long term sustainable weight loss, food habits improvement and regular physical activity practice, determined by surgery treatment of obesity, reflecting

not only in socio-economical life of the patients, but, mainly, enhancing the life quality of these individuals⁴.

By AOCR it was possible to evidence the clinical evolution of the patients submitted to surgery treatment of obesity in our institution.

CONCLUSION

The Assessment of Obesity-Related Co-morbidities is a system that can be effectively used to quantify the degree of reduction of the severity of the cardiometabolic risk in response to bariatric surgery.

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