

PULMONARY EVALUATION PRE AND POST SURGERY IN PATIENTS UNDERGOING GASTRIC BYPASS ROUX-EN-Y WITHOUT RING BY LAPAROSCOPY FOR THE TREATMENT OF MORBID OBESITY IN A REFERENCE CENTER IN BELEM¹.

AVALIAÇÃO PULMONAR PRÉ E PÓS-OPERATÓRIA EM PACIENTES SUBMETIDOS À CIRURGIA DO BYPASS GÁSTRICO EM Y DE ROUX SEM ANEL POR VIA LAPAROSCÓPICA PARA O TRATAMENTO DA OBESIDADE MÓRBIDA EM UM CENTRO DE REFERÊNCIA, EM BELÉM DO PARÁ.

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SUMMARY

Objective: to evaluate pulmonary function using forced expiratory volume in one second (FEV1) and forced expiratory flow maximum (FEFmáx) in individuals with morbid obesity undergoing gastric bypass Roux limb without ring, laparoscopic, conducted by the team of surgeons Procto Gastro Clinic. **Methods:** prospective Description Inductive Method, a sample of 30 patients with BMI ≥ 35 kg/m² with comorbidities or ≥ 40 kg/m² with or without comorbidities, undergoing surgical treatment of morbid obesity by gastric bypass technique, performed by the team Surgical Clinic Procto Gastro in Belém do Pará, from August 2008 to July 2009 and also underwent pulmonary function, FEV1 and second FEFmáx, preoperatively and 2nd, 12th and 45th postoperative (PO). **Results:** the sex and age, the distribution was 10 males (33.33%) and 20 females (66.66%), aged between 22 and 61 years, averaging 38.3 years. The preoperative BMI ranged from 35 kg/m² to 52.87 kg/m² with a mean of 42.87 kg/m². The most prevalent comorbidities were hypertension (56.7%), dyslipidemia (53.3%) and diabetes mellitus (16.7%), present in 23 patients (76.66%). The assessment of FEV1 and FEFmáx the 2nd postoperative day showed that there was a decrease in all patients ($p = 0.006$, $p = 0.001$, respectively), except one patient who remained with the same values in relation to pre-operative in the 12th PO, most patients recovered values of FEV1 and FEFmáx, being equal to or better than the pre-operatively ($p = 0.797$, $p = 0.834$, respectively), excluding two patients, and the 45th postoperative day, all patients recovered values FEV1 and FEFmáx, being equal to or better than the pre-operatively ($p = 0.05$, $p = 0.123$, respectively), except one man who had not yet reached preoperative values. In the material there was a case of pulmonary atelectasis associated with fistula in the prepyloric. There were no complications in other patients. **Conclusion:** the survey showed a fall in FEV1 and FEFmáx the second postoperative day in all cases, even with the use of respiratory therapy and / or inhalation, and recovery breathing seen in checking the 12th PO to be higher compared to preoperative.

KEY-WORDS: Morbid obesity, gastric bypass, pulmonary function.

INTRODUCTION

Obesity is a disease with high mortality, universal distribution and increasing prevalence in the world, reaching epidemic proportions and is a major public health problems of modern society. Estimation of

obesity in the world is 250 million (7% of world population), and the United States

(U.S.), the prevalence of obesity (BMI > 30kg/m²) in adult women is around 33.4%, in men and 27.5%. In Brazil, according to the 1997 national survey, the prevalence

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was 12.4% for women and 7.0% for men. Surgery for gastric bypass Roux-en-Y surgical technique is considered the gold standard of bariatric surgery. But like any surgical procedure is not without complications, which tend to occur more frequently when the surgical team is in the learning curve. The gastric bypass can be performed through conventional or laparoscopic, the latter being the currently preferred method¹. There are several factors that affect the respiratory function of obese patients, due to the inefficiency of the respiratory muscles, muscle strength is reduced compared to the no obese. It is therefore expected that any significant change is more intense in morbidly obese. Studies have shown that morbidly obese patients are more susceptible to pulmonary complications from anesthesia and by the upper abdominal surgery when compared to obese people in general, is expected, therefore, a higher incidence of pulmonary complications².

Therefore, such considerations underlie the relevance of the proposed study, which aims to evaluate the effects of gastric bypass surgery Roux-en-Y Laparoscopic no ring on pulmonary function in patients with morbid obesity, and detect possible respiratory complications in the post surgery.

1.1 OBJECTIVES

1.1.1 General Objective

Assess lung function pre-and postoperative second forced expiratory volume in one second (FEV1) and Forced Expiratory Flow maximum (FEFm_{ax}), morbidly obese individuals undergoing bariatric surgery by the technique of gastric bypass Roux-en-Y without a ring, by laparoscopy, surgeons operated by staff of the PROCTOGASTRO

CLINIC in Belém.

1.1.2 Specific Objectives

Distribution of patients by:

- Sex and age;
- Body Mass Index (BMI) before surgery;
- Comorbidities;
- Classification of respiratory disorders pre-and postoperatively.
- Correlate any changes in lung function with:
 - Respiratory therapy and / or inhalation, postoperative;
 - Respiratory complications in the postoperative period.

METHOD

2.1 METHOD

The survey underwent inductive method of study Prospective Description³ because he worked with a selected sample, proposing to describe and understand a reality (pulmonary function changes) without the worry of accepting or refuting a hypothesis established in advance, being performed gathering data prospectively from the surgical indication, primary source (obtained directly from patients) and secondary (obtained from medical records and interviews with members of the team).

2.2 PLACE OF STUDY

The study was conducted at procto Gastroenterology, located in the city of Belem, in Para State.

2.3 STUDY POPULATION

The survey consisted of 30 patients diagnosed with morbid obesity, a BMI \geq 35 kg/m² with comorbidities or BMI \geq 40 kg/m² with or without comorbidities who underwent bariatric surgery by the technique of the type of Y gastric bypass Roux without a ring, laparoscopically, the

surgical team procto Gastro Clinic.

2.4 PERIOD OF RESEARCH

Patient selection, preoperative evaluation, surgical procedure and postoperative follow-up was monitored between August 2008 and July 2009.

2.5 CRITERIA FOR INCLUSION

We included all patients with morbid obesity with BMI ≥ 35 kg/m² with comorbidities or BMI ≥ 40 kg/m² with or without comorbidities, of both sexes aged between 18 and 65 years without surgical contraindications, submitted to surgical technique of gastric bypass Roux-en-Y without ring for laparoscopic bariatric surgery team procto Gastro Clinic, from August 2008 to June 2009.

2.6 EXCLUSION CRITERIA

- Were excluded from the analysis: All patients who refused to sign the waiver of informed consent (IC);
- Patients who did not fit the criteria of indication for bariatric surgery recommended by the Brazilian Society for Bariatric Surgery and Metabolic (SBCBM) and Federal Council of Medicine (CFM);
- Patients with a BMI outside the range established;
- Patients aged outside the range established;
- Patients who underwent different surgical technique or means of access than the one proposed in this study;
- Patients who underwent an anesthetic technique than the one proposed in this study;
- Patients who developed any respiratory disease diagnosed preoperatively;
- Patients during the study were unable to evaluate at least one of the parameters

- present in the forms of data collection;
- Patients who for some reason had dropped out, or data collection;
- Patients with the flu during the measurement of lung function.

2.9 DATA COLLECTION AND STATISTICAL CRITERIA

The acquisition of epidemiological data and evaluation of pulmonary function in morbidly obese patients undergoing surgery of gastric bypass for the surgical team at the Clinic procto Gastro was performed both pre-operatively (day of surgery) and postoperatively (2, 12 and 45 days postoperatively), which was used for specific protocols. They were applied individually to 30 patients, and to complement all the information, were also affected medical chart review and interviews with patients and professional staff members responsible for monitoring them.

The data were analyzed in Minitab Software 14.0. We performed a descriptive analysis of data aimed at the average and standard deviation and minimum and maximum values. Statistical analysis itself was performed using the Student t test that is appropriate for interpretation when the study presents the sample size less than 30 and with a normal distribution that expresses the existence of significant differences between two means. The authors accepted a level of 95%, ie, $Z = 1.96$. For analysis of the variables described in the specific objectives we used the correlation of the percentage found in tables of frequency distributions.

2.7 VARIABLES ANALYZED

We controlled for the variables in this study as follows:

A)Sex

B)Age

C)pre-surgical BMI

D) A history of diseases: We included the following comorbidities: diabetes mellitus, hypertension and dyslipidemia.

E) Evaluation of respiratory function parameters

The measurement of FEV1 and FEF_{máx} was accomplished through the use of portable expiratory flow meter Peak Pro 6 Koko brand Ferraris ® (USA), and the maneuvers performed according to each parameter.

For the measurement of FEV1 and FEF_{máx} first patients were trained to use the portable Koko Peak Pro 6 ® brand Ferraris (USA) in accordance with the procedures recommended by the manufacturer to measure with this device, ie during the test should be standing erect, holding the phone with his right hand, pressing the start button and then inhaling deeply the air, then placing the nozzle of the disposable device in the mouth with his lips firmly attached to the nozzle, then immediately performed forced expiratory maneuver, releasing as much air accumulated during forced inspiration, taking care not to tilt the head nor the body forward and not to loosen their lips, for there to be the correct measure of lung function parameters (FEV1 and FEF_{máx}). All patients were free to practice the maneuvers taught and later measurements were made 3 of FEV1 and FEF_{máx}, the largest value considered for the annotation of data collection protocols.

E.2) Classification of preoperative pulmonary function, according to the classification of the Brazilian Society of Thoracic Association (BTA) (Pereira, 2001). The preoperative pulmonary function was classified as normal, mild disturbance, moderate disorder and serious disorder, not being applied in this study the classification restrictive disorder, obstructive, or mixed, as the appliance Koko Peak Pro 6 ® brand Ferraris (USA) do not allows measurement of forced vital capacity (FVC).

ETHICAL ASPECTS

This project took into consideration the basic ethical principles of the guidelines and rules for research involving human subjects.

Was submitted to the Ethics Committee in Research with Humans of the University Hospital João de Barros Barreto, affiliated to the National Committee of Ethics in Research (CONEP), according to resolution 196/96 of the National Health Council and its complementary, being approved on August 11, 2008, as protocol n ° 2262/08, avoiding risks to generate third and still pass the reliability that the proposed research.

All patients in this study read, understood and agreed with the standards included in the Term of Informed Consent (Appendix A). To validate the ethical issue has ensured the privacy of information, which were analyzed only by the research group cited.

RESULTS

TABLE I: Distribution according to age and BMI of patients who underwent gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons from procto Gastro Clinic, from August/2008 to June/2009, Belem / PA .

Variables	Mean	SD	Minimum	Quartile1	Median	Quartile3	Quartile3
Age	38,3	10,34	22	29	37,5	46,75	61
BMI	42,87	5,45	35	37,83	42,26	47,22	52,87

Source: Protocol-specific data collection

BMI: Body Mass Index

TABLE II: Distribution according to gender and comorbidity of patients who underwent gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons from procto Gastro Clinic, from August/2008 to June/2009, Belem / PA .

Comorbidities	SEX					
	Male n=10	%	Female n=20	%	n=30	%
Hipertension	7	70,0	10	50,0	17	56,7
Dyslipidemia	6	60,0	10	50,0	16	53,3
Diabetes	1	10,0	4	20,0	5	16,7
Withoutcomorbidities	1	10,0	6	30,0	7	23,3

Source: Protocol-specific data collection.

n: number of patients studied.

TABLE III - Statistical analysis of preoperative and postoperative values of forced expiratory volume in one second (FEV1) in patients who underwent gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons at the Clinic procto Gastro the period of August/2008 to June/2009, Belem / PA.

Comparison of FEV1	P value

	Valor de <i>p</i>	
PRE x D2	0,006	**
PRE x D12	0,797	ns
PRE x D45	0,05	ns
D2 x D12	< 0,0001	**
D2 x D45	< 0,0001	**
D12 x D45	0,05	ns

Source: Protocol-specific data collection.

** Significant at 1%

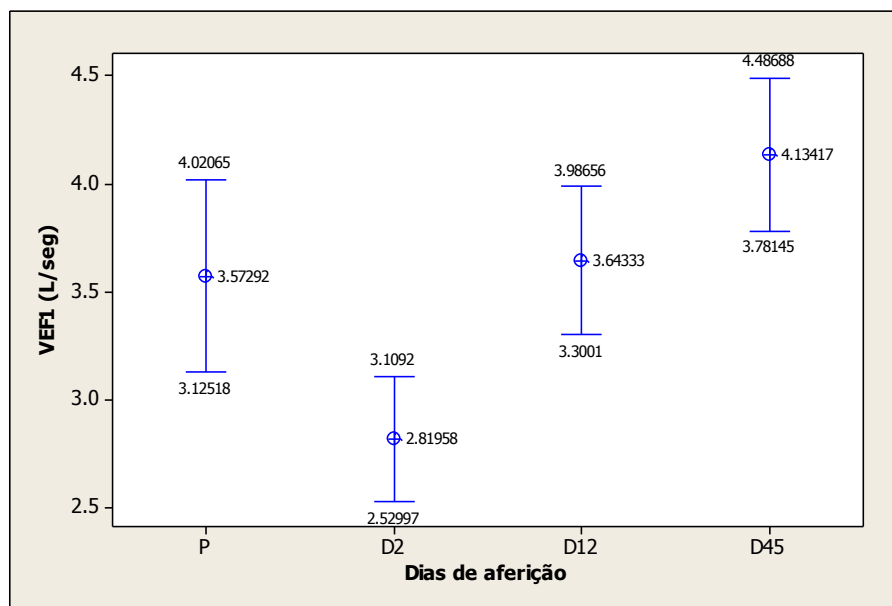
ns: not significant

PRE = preoperative

D2 = second postoperative day

D12 = 12th day after surgery

D45 = 45th day after surgery



Source: Protocol-specific data collection.

FEV1: forced expiratory volume in 1 second, measured in liters per second

P = pre-operative

D2 = second postoperative day

D12 = 12th day after surgery

D45 = 45th day after surgery

GRAPH1: Pattern of changing values of Forced Expiratory Volume in one second (FEV1) in patients undergoing gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons from procto Gastro Clinic, between August/2008 to June 2009, Belem / PA.

TABLE 4 - Statistical analysis of preoperative and postoperative values of forced expiratory flow maximum (FEF_{máx}) of patients who underwent gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons from procto Gastro Clinic in the period of August/2008 to June/2009, Belem / PA.

Comparison of FEF_{máx}		
P value		
<i>Valor de p</i>		
PRE x D2	0,001	**
PRE x D12	0,834	ns
PRE x D45	0,123	ns
D2 x D12	< 0,0001	**
D2 x D45	< 0,0001	**
D12 x D45	0,05	ns

Source: Protocol-specific data collection.

** Significant at 1%

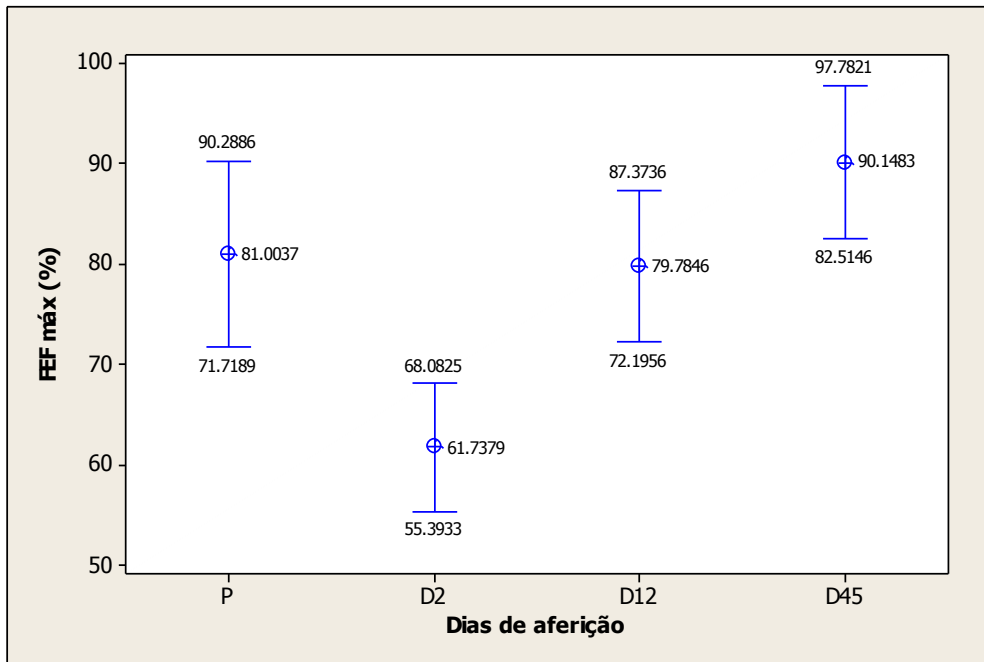
ns: not significant

PRE = preoperative

D2 = second postoperative day

D12 = 12th day after surgery

D45 = 45th day after surgery



Source: Protocol-specific data collection
 FEFmáx: Forced expiratory flow maximum, measured in percent
 P = pre-operative
 D2 = second postoperative day
 D12 = 12th day after surgery
 D45 = 45th day after surgery

GRAPH 2: Pattern of changing values of Forced Expiratory Flow maximum (FEFmáx) of patients undergoing gastric bypass Roux-en-Y Laparoscopic without ring, the team of surgeons from procto Gastro Clinic in the period from June to August/2008 / 2009, Belem / PA.

DISCUSSION

Surgical treatment is well established as the most effective method for weight loss and control of comorbidities in the long term in patients with morbid obesity⁴. Several techniques can be used, but the technique is considered the gold standard gastric bypass Roux-en-Y, by laparoscopy, which was the technique used in the patients. According to the literature, obesity is more common in females, mainly affecting the age group of young adults^{5,6,7}, which is consistent with that observed among our patients that 66.66% were female and mean age was 38.3 years. Regarding comorbidities, the literature shows that obesity predisposes to the emergence of various diseases such as

hypertension, diabetes, dyslipidemia, osteoarthritis, among others. This finding was also observed in our patients where 76.66% had at least one comorbidity. Regarding comorbidities, according to the literature are the most prevalent hypertension, dyslipidemia and diabetes^{6,7,8,9}. This is in agreement with the findings in this study that the most prevalent comorbidities were hypertension in 56.7% of patients, followed by 53.3% and dyslipidemia in diabetes mellitus in 16.7%.

Regarding the profile of the patients preoperatively for the presence of respiratory disorders, we found that most patients did not have respiratory disorders,

according to some studies¹⁰. However, there are studies showing that is already expected a restrictive ventilatory defect in obese patients in the preoperative phase, due to the accumulation of abdominal fat and peritorácica, which generate a limitation in lung compliance¹¹, thus explaining the presence of 4 patients with mild respiratory disorder in the preoperative period. All patients in this study received a standardized low-calorie diet preoperative started four days before surgery with the goal of producing an acute loss of weight since the weight loss in short time mobilizes mainly visceral fat, facilitating the surgical manipulation of the viscera and intra-abdominal anatomical structures, reducing the anesthetic-surgical^{1,12}. This was observed in this study, since individuals with the highest percentage of weight loss with diet had lower preoperative anesthetic and surgical time. As for the behavior of lung function in the second postoperative day, all patients in the study showed a statistically significant reduction in lung function through the analysis of FEV1 and FEFmáx, which is consistent with other studies in the literature^{11,13}. The recovery of pulmonary function (FEV1 and FEFmáx) was present at the 12th postoperative day, when patients had FEV1 and FEFmáx higher than the second postoperative day. This could be explained by the duration of postoperative diaphragmatic paralysis in surgery involving the manipulation of the upper abdomen to be approximately two weeks, this time it would take place the recovery of lung function¹³. On the 45th postoperative day the patients showed higher values for lung function compared to preoperative period, although this improvement was not statistically significant. Was not observed in the

CONCLUSION

In this study, considering the results obtained, it was concluded that:

literature with similar period of evaluation of lung function so we could compare these results.

Regarding the influence or not of respiratory therapy in the postoperative behavior of lung function, note that most studies show that the therapy is beneficial and improves lung function¹⁴. However, this research was no difference in lung function ($p > 0.05$) between the group that underwent physiotherapy and inhalation, and which held only inhalation. Perhaps, this reality is due to the fact that the number of physiotherapy sessions was lower than that advocated in the literature². Another reason for this difference could be that the time of initiation of therapy have been different between the patients or the fact that the sample was insufficient to show significant difference. The division into groups was not pre-established methodology in this study but allowed the chance of failure of the routine postoperative in some patients, the hospital where they were interned.

Regarding the influence of preoperative BMI in the behavior of pulmonary function was observed that all patients except one showed improvement in lung function on the 45th postoperative day compared with preoperative values, although this difference was not statistically significant. Thus we can say that weight loss improves lung function, which is consistent with studies showing that BMI is inversely proportional to the ability of lung expansion¹¹.

In this study only one patient (3%), females showed a mild respiratory disorder in the postoperative period. This patient developed a fistula from the gastric pouch was reoperated with good outcome. In this study there were no deaths.

Obesity affected mainly females, ranging in age from young adults, with the majority of

patients undergoing surgical treatment was with a BMI above 40 kg/m². Comorbidities were present in most patients, the most prevalent were: hypertension, dyslipidemia and a lower percentage in diabetes mellitus. Most patients had no respiratory disorders in the preoperative period. Weight loss surgery was associated with a reduction in anesthetic and surgical time. There was a decrease in pulmonary function in the second postoperative day in all cases, even with the use of inhaled or not associated with respiratory therapy, and returns to normal at 12th day. On the 45th day after surgery, all patients had lung function values superior to the

preoperative period. Regardless of preoperative BMI, all patients showed improvement in FEV1 and FEFmáx observed on the 45th day after surgery compared to preoperative. Despite the decline in lung function in all patients on the second day after surgery, there was only one case of pulmonary atelectasis associated with fistula in the gastrojejunal anastomosis in a female patient. Measurement of FEV1 and FEFmáx this patient on postoperative day 2 showed the largest percentage fall in FEV1 and FEFmáx observed among all patients were analyzed in relation to the preoperative period.

RESUMO

AValiação Pulmonar Pré e Pós-Operatória em Pacientes Submetidos à Cirurgia do Bypass Gástrico em Y de Roux sem Anel por Via Laparoscópica para o Tratamento da Obesidade Mórbida em um Centro de Referência, em Belém do Pará.

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Objetivo: avaliar a função pulmonar utilizando o Volume Expiratório Forçado no 1º segundo (VEF1) e o Fluxo Expiratório Forçado máximo (FEFmáx) de indivíduos obesos mórbidos submetidos ao bypass gástrico em Y de Roux sem anel, por via laparoscópica, realizado pela equipe de cirurgias da Clínica ProctoGastro. **Método:** método Indutivo Descritivo Prospectivo, com amostra de 30 pacientes com IMC ≥ 35 Kg/m² com comorbidades ou ≥ 40 Kg/m² com ou sem comorbidades, submetidos ao tratamento cirúrgico da obesidade mórbida pela técnica do bypass gástrico, realizado pela equipe cirúrgica da Clínica ProctoGastro, em Belém do Pará, no período de agosto de 2008 a julho de 2009, e também submetidos a avaliação da função pulmonar, segundo VEF1 e FEFmáx, no pré-operatório e no 2º, 12º e 45º pós-operatório (PO). **Resultados:** segundo o sexo e faixa etária, a distribuição foi de 10 pacientes do sexo masculino (33,33%) e 20 do sexo feminino (66,66%), com idades entre 22 e 61 anos, com média de 38,3 anos. O IMC pré-cirúrgico variou de 35 Kg/m² a 52,87 Kg/m², com média de 42,87 Kg/m². As comorbidades mais prevalentes foram hipertensão arterial (56,7%), dislipidemia (53,3%) e diabetes mellitus (16,7%), presentes em 23 pacientes (76,66%). A avaliação do VEF1 e FEFmáx no 2º dia pós-operatório mostrou que houve decréscimo em todos os pacientes ($p = 0,006$, $p = 0,001$, respectivamente), exceto uma paciente que permaneceu com os mesmos valores em relação ao pré-operatório; no 12º PO, a maioria dos pacientes recuperou os valores de VEF1 e FEFmáx, sendo iguais ou superiores aos do pré-operatório ($p=0,797$, $p=0,834$, respectivamente), excluindo dois pacientes; e no 45º PO, todos os pacientes recuperaram os valores de VEF1 e FEFmáx, sendo iguais ou superiores aos do pré-operatório ($p=0,05$, $p=0,123$, respectivamente), exceto um homem que ainda não havia atingido valores pré-operatórios. No

material houve um caso de atelectasia pulmonar associada à fístula na anastomose gastrojejunal. Não houve complicação nos demais pacientes. **Conclusão:** a pesquisa mostrou uma queda de VEF1 e FEFmáx no 2º PO em todos os casos, mesmo com a utilização de fisioterapia respiratória e/ou inalação, e a recuperação respiratória vista na aferição do 12º PO com valores superiores em relação ao pré-operatório.

PALAVRAS-CHAVES: Obesidade mórbida, bypass gástrico, função pulmonar.

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