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Bariatric surgery: is admission to the intensive care unit necessary?

Cirurgia bariátrica: existe necessidade de internação em unidade de terapia intensiva?

ABSTRACT

Objective: The purpose of this study was to determine the place of stay at postoperative and to verify medical-surgical complications that would justify admission to the intensive care unit, including death.

Methods: Cross-over, prospective, open study that evaluated 120 patients who were submitted to primary bariatric surgery by video laparoscopy from May 2007 to April 2008 in a tertiary hospital. The Aldrete Kroulik index was used for release from the post-anesthesia recovery room and to define where the patient should be routinely referred for postoperative.

Results: Among the 120 patients, 83 were women and 37 men with a mean age ranging from 35.4 ± 10.5 years (18 to 66 years), body mass index 45.6 ± 10.5 . The time between

hospital admission and start of surgery was 140.7 ± 81.8 minutes, surgery time was 105 ± 28.6 minutes, time of post-anesthesia recovery room was between 125 ± 38 minutes and length of hospital stay was 47.7 ± 12.4 hours, with 100% of the patients walking in 24 hours. The Aldrete and Kroulik index in the post-anesthesia recovery room achieved scores of 10 to 120 minutes in all patients, with a 100% survival.

Conclusion: Using the Aldrete and Kroulik index in the post-anesthesia of gastric bypass by video laparoscopy in primary bariatric surgery, no patient was admitted in intensive care unit and no major complication was observed.

Keywords: Bariatric surgery; Gastroplasty; Obesity/surgery; Obesity, morbid/surgery; Postoperative care / Postoperative period

INTRODUCTION

Worldwide over a million people are overweight or obese⁽¹⁾ and of late this pathology has reached epidemic proportions.^(2,3)

Treatment of obesity with improvement in the way of life and quality of the diet, as well as treatment with drugs often are disappointing and with recurrence. In such cases surgical treatment is required and bariatric surgery has been increasingly used in the last years.^(2,4,5)

Although, in general, primary bariatric surgery is well tolerated, its association with postoperative complication is well known, occasionally requiring elective or emergency intensive care^(2,5,6-8) In literature, few studies describe management of the obese patient in the intensive care unit (ICU). Obesity was not included in the predictive variables of clinical outcome in the prognostic indices, Acute Physiological and Chronic Health Evaluation II and III (APACHE II and III) or Simplified Acute Physiology Score (SAPS).⁽⁷⁾

Studies reporting indications for admission to ICU at postoperative of bariatric surgery and its prevalence are scarce. There is no standardized algorithm for elective admission to the ICU or semi-intensive unit at bariatric postoperative. The decision is based on discussion among the assisting medical team according to the patient's respiratory restrictions or some surgical complication.^(2,9)

Stay in the ICU increases hospital costs,⁽²⁾ further, indication for admission in the ICU should be carefully considered, as the number of ICU beds is small for the great demand in public and private services.

A cross over study was carried out to determine the place of referral at postoperative of primary bariatric surgery, assessing the clinical-surgical complications that would justify admission in a semi-intensive care unit and/ or ICU healthcare professionals involved, time of surgery, length of stay in the recovery room at post-anesthesia (PARR), early walking time at postoperative, length of hospital stay and mortality.

METHODS

The survey was first approved by the Research with Human Beings Ethics Committee of the Universidade Federal de Sergipe/UFS (CAAE-0050.0.107.000-07 as the hospital does not have a Research Ethics Committee. Patients signed an informed term of consent.

The survey was carried out at Hospital São Lucas, Aracaju-SE, Brazil. It is a tertiary, private hospital with 180 beds and 12 ICU beds. Study design was cross sectional, prospective, open and included patients referred and submitted to primary bariatric surgery performed by the Comprehensive Gastroenterology and Obesity Service (GOS) between May 2007 and April 2008. Indication of surgery for treatment of obesity and the herein definitions used follow the World Health Organization and Health Ministry criteria: body mass index (BMI) above 40 kg/m² or BMI above 35 kg/m² associated with comorbidities of difficult clinical control such as: sleep apnea, diabetes mellitus type 2, arterial hypertension, dyslipidemia, difficulty in walking, coronary disease, lower limbs venous or lymphatic obstruction, pulmonary hypotension and obesity cardiomyopathy. Persons under 18 years of age and patients who did not want to participate in the survey were excluded. All patients were previously assessed and released as outpatients for primary bariatric surgery by the surgery team (surgeon and anesthetist) and endocrinologist with some patients assessed by specialists (cardiologist, lung special-

ist, etc.) when necessary. Nutrition and psychology services of GOS carried out preparation and orientation of the pre- and postoperative for all patients. Bearers of BMI \geq 60 kg/m² were oriented to lose at least 5% of their weight before surgery. Diet with calorie restrictions on the days before surgery and liquid diet during three days prior to surgery was given to all patients. The time between hospital admission, onset of surgery (induction, anesthesia) time of surgery and time of stay in the PARR were established in minutes, while time of hospital stay was established in hours.

Midazolam, 15 mg orally was given as pre-anesthesia medication in the bed on admission to the surgery room, minutes before surgery. Surgical anesthetic risk was established by the *American Society of Anesthesiologists* (ASA) with a I to V classification. Peripheral venous access was the elected administration route. Continuous monitoring comprised electrocardiography, non invasive arterial pressure, pulse oximetry, body temperature, capnometry and capnography. Surgery was performed under general anesthesia, using for induction fentanyl 0.1 to 0.2 mcg / kg, a single dose of clonidine 1 to 2 mg / kg and propofol 5 mcg / ml of blood concentration by infusion pump and for maintenance of anesthesia propofol 2 to 3 mcg / ml of blood concentration and fentanyl 0.1 to 0.2 mcg / kg every hour, if necessary. Cisatracurium 0.01 to 0.02 mg / Kg / hour was used for muscle relaxation. Morphine sulphate 10 mg intramuscular and ondansetron 4mg venous were administered at the end of surgery.

During surgery, patients were positioned in dorsal, horizontal decubitus and secured on the table by a strap at hip level. At onset of the surgery, patients were positioned with the head at a 30° slope until end of the surgery. Surgical procedure was performed by video laparoscopy using the gastric bypass technique.

Antimicrobial prophylaxis was performed with a single dose of intravenous ampicillin associated to sulbactam (3 g) and for venous thromboembolism prophylaxis (40mg) of subcutaneous enoxaparina was used and begun in the daycare service, one day before surgery and another dose (40mg) at anesthesia induction. Enoxaparina 40mg subcutaneous daily was maintained during hospital stay and at home after hospital discharge until the 15th day, for 15 days total time of pharmacological prophylaxis with enoxaparina. In patients with a previously reported thromboembolic disease, a 30 day pharmacological prophylaxis was pre-established. Use of elastic stockings on the lower limbs, early walking at postoperative as soon as possible and incentive to walk

often after discharge were standardized.

Anesthesia was discontinued at the time of pneumoperitoneum disinsufflation and skin suture. Tracheal extubation was carried out in the surgery room with the patient awake, with coughing reflex present and capnography and pulse oximetry parameters within normality.

Next, the patient was forwarded to PARR with follow-up of the anesthesia team and monitoring with continued electrocardiography, non invasive arterial pressure and pulse oximetry. Upon admission to PARR and every 30, 60, 120 and 180 minutes, Aldrete e Kroulik⁽¹⁰⁾ measurements were taken (Chart 1). Ventilatory support was established using low and /or high flow oxygen therapy, non invasive mechanical ventilation and invasive mechanical ventilation. Length of stay in PARR was verified in minutes.

Chart 1 - Aldrete and Kroulik Index

Assessment items	Condition	Grade
Muscle activity	moves 4 extremities	2
	moves 2 extremities	1
	moves 0 extremities	0
Breathing	deep, copugh	2
	Limited, dyspnea	1
	apnea	0
Consciousness	fully awake	2
	Awakens when called	1
	Does not respond to call	0
Circulation (AP)	± 20 % of pre-anesthesia level	2
	± 20 % to 49 % of pre-anesthesia level	1
	± 50 % of pre-anesthesia level	0
SpO ₂	maintains SpO ₂ > 92% in ambient air	2
	maintains SpO ₂ > 90% with O ₂	1
	maintains SpO ₂ < 90% with O ₂	0

SpO₂ – peripheral oxygen saturation; AP – arterial pressure.

Patients were released from PARR when the Aldrete and Kroulik¹ index reached a total of 10 points (scale from 0 to 10). After discharge from PARR, monitoring of vital signs (non invasive arterial pressure, body temperature, heart and respiratory rates) was measured at the place of stay upon patient's arrival and every 6 hours.

Postoperative prescription was standardized with venous hydration, 1 g intravenous (iv) dipyron every 6 hours, non-steroid hormone anti-inflammatory (Parecoxib) 40mg iv per day, ondanstron 4mg iv every

8 hours, pantopropazol 40 mg iv per day and ipratropium bromide by aerosol 0.250 mg every six hours. Nalbuphine hydrochloride 20mg IV was used in case of no pain relief with standardized drugs.

Hypertensive patients, with pneumopathy and diabetes were controlled with protocols prescribed in daycare by their physicians during pre-operative assessment. Liquid diet was released in the first 24 hours of postoperative. Respiratory and motor physiotherapy were carried out twice a day.

Time period from onset of early walking after surgery was assessed and defined by the healthcare professional that made one or more visits during patients stay. Verification was made of the clinical and/or surgical complications at intra and postoperative and re-operation that would justify admission to semi-intensive units or ICU, that occurred until the 30th day of surgery. Patients were discharged, as soon as they had abdominal function and accepted the prescribed diet. They accomplished their time of post surgery recovery at home and follow-up in the daycare with fortnightly visits until the 30th postoperative day.

Statistical analysis of obtained data was stored in a standardized database using the software Excel, version 2003, transferred to the program Statistical Package for Social Sciences (SPSS), version 13 and analyzed, Quantitative variables were described in mean and standard deviation and the categorical by simple and relative frequencies.

RESULTS

The sample studied comprised 120 patients, 83 women and 37 men, with a mean age of 35.4 ± 10.5 years (18 to 66 years), with 12.5% (15) over 50 years of age. The mean BMI was of 45.6 ± 5.1 (35 to 67). The group of grade III obese was 88.4% (106) with 1.6% (2) patients with a BMI ≥ 60 Kg / m². Comorbidities were found in 85.83 % (103), with 16.0% (19) of patients with one comorbidity, 25.0 % (30) with two and 44.4% (54) patients with three or more comorbidities. Among comorbidities 51.2% (61) were bearers of arterial hypertension, hepatic steatosis 45.0% (54), arthropathy 15% (18), 11.3% (13) diabetes, 7.5 % (9) obstructive sleep apnea syndrome (OSAS) and other comorbidities (dyslipidemia, gastroesophageal reflux disease, asthma, anxiety, depression and hypothyroidism) 13.33 % (16). Regarding risk of surgery by the ASA, 55.8% (67) had ASA II and 44.2% (53) ASA III (Table 1).

Primary bariatric surgery by videolaparoscopy with the gastric bypass technique was performed in 100% (120) of the patients. Table 2 summarized mean time between hospital admission and onset of surgery, time of surgery, length of stay in PARR and time of walking after surgery. Table 3 summarizes peripheral oxygen saturation (SpO₂), ventilation support and the Aldrete and Kroulik index in PARR. In PARR, 100% of pa-

Table 1 – Demographic, anthropometric characteristics aracterísticas demográficas, antropométricas, comorbidity and American Society of Anesthesiologists

Characteristics	Result (N =120)
Age (years)	35.4 ± 10.5 (18 – 66)
Gender	
Male	37 (30.8)
Female	83 (69.2)
Obesity grade	
Grade III	106 (88.4)
Grade II	14 (11.6)
BMI	45.6 ± 5.1 (35- 67)
Comorbidity	103 (85.83)
Hypertense	61 (51.2)
Hepatic steatosis	54 (45.0)
Arthropathy	18 (15.0)
Diabetics	13 (11.3)
OSAS	9 (7.5)
Others*	16 (13.33)
ASA	
ASA II	67 (55.8)
ASA III	53 (44.2)

BMI: Body Mass Index; OSAS – Obstructive sleep apnea syndrome; ASA - *American Society of Anesthesiologists*. *Others – dyslipidemia, gastroesophageal reflux disease, asthma, anxiety, depression and hypothyroidism. Values expressed in mean ± standard deviation (minimum and maximum) or number of cases (%).

Table 2 – Characteristics of times of admission-surgery, surgery, post-anesthesia recovery room, hospital and early walking

Characteristics	Results (N = 120)
Time between admission and onset of surgery (minutes)	140.7 ± 81.8 (45.5–184)
Time of surgery (minutes)	105 ± 28.6 (80–120)
Time in the PARR (minutes)	125 ± 38 (68–150)
Time of hospital stay (hours)	47.7 ± 12.4 (43–48)
Time of walking after surgery	
Up to 12 hours	47 (39.2)
Up to 24 hours	120 (100)

PARR - post-anesthesia recovery room. Values expressed in mean ± standard deviation (minimum and maximum) or number of cases (%).

Table 3 – Characteristics of peripheral oxygen saturation, ventilatory support and Aldrete and Kroulik index in the post-anesthesia recovery room

Characteristics	Resultado (N = 120)
SpO ₂	96.2 ± 6.4 (89-100)
Ventilatory support	
Low flow oxygen therapy	120 (100)
Place of postoperative stay	
Room	120 (100)
Aldrete and Kroulik Index	
Time 0 minutes	8.6 ± 0.7 (6-10)
Time 30 minutes	8.8 ± 0.7 (7-10)
Time 60 minutes	9.6 ± 0.6 (7-10)
Time 120 minutes	10 ± 0.1 (9-10)

SpO₂ – peripheral oxygen saturation; PARR- post-anesthesia recovery room Values expressed in mean ± standard deviation (minimum and maximum) or number of cases (%).

tients received low flow oxygen therapy (≤ 5 liters /minute) with mean SpO₂ by pulse oximetry of $95.5 \pm 2.9\%$ (89 to 100). None of the patients required invasive or not invasive mechanical ventilation in PARR. Oxygen therapy was withdrawn after 120 minutes when maintenance of SpO₂ $\geq 92\%$ was observed. Aldrete and Kroulik index with a total score of 10 points and clinical stability of patients by monitoring of vital signs and clinical reassessment by the anesthetist was checked. Considering these parameters, patients were moved to their room with stable clinical parameters.

The healthcare professionals who followed-up postoperative were the physiotherapist with one or more visits in 100% of cases, with two sessions per day, psychologists in 40% (48) and nutritionist in 10.8% (13). Physiotherapists performed respiratory, motor physiotherapy, encouraged and assisted in walking to all patients, in the room and corridors of the wing. Only four patients, 3.33% (4) requested presence of the on duty clinical physician for simple events such as abdominal distension, abdominal pain and sleeping troubles. Only one patient in PARR who had already used non invasive ventilation (NIV) at home, had it in the room under guidance of the physiotherapy service.

No clinical or surgical complications were found at intra and postoperative until the 30th day, that would justify admission in the ICU for any of the patients. Oxygen therapy was not used nor pulse oximetry in the room. Physiotherapy service measured pulse oximetry during the two daily sessions, and SpO₂ below 92 % was not detected. Early walking was encouraged and carried out as soon as the patient felt well enough and

capable, with 100% of them walking in the first 24 hours, of these 39.2% (47) walked in the first 12 hours in the room.

DISCUSSION

The significant growth of the obese population, even in developed countries⁽¹¹⁾ led to an increase of hospital admissions due to obese related pathology in semi-intensive care and ICU.⁽⁵⁾ Estimated prevalence of obesity in ICU rests upon the studied population ranging from 5.4% in trauma ICU, 17.1% at heart surgery postoperative and about 25% in clinical or surgical ICU.⁽¹²⁾

Because of the growing number of indications and performance of bariatric surgeries, more obese patients are being admitted to the ICU.⁽⁵⁾ Sometimes, complications at the intra and postoperative of primary bariatric surgery or even presence of severe comorbidities may require intensive care, elective or emergency,⁽²⁾ however there are few studies establishing prevalence or cause of indication for admission to the ICU at postoperative of bariatric surgery.⁽⁵⁾

Currently, place of stay in the first 48 hours of postoperative of bariatric surgery remains controversial in literature and the decision to admit to the ICU relies upon discussion and good sense of the assisting medical team according to the clinical limitation of the patient or even because of some surgical complication.^(2,9)

Among factors predisposing to admission in the ICU are mentioned: male gender, age ≥ 50 years BMI ≥ 60 Kg/m², diabetes mellitus, OSAS, cardiopathies, venous difficulty and complications in the intra or immediate postoperative^(5,9) mainly due to respiratory complications such as pneumonia, thromboembolic disease, respiratory failure requiring mechanical ventilation and to a lesser extent, respiratory arrest.^(2,9,13)

Postoperative complications and stay in the ICU increase hospital costs.⁽²⁾ The opposite is also true, fewer complications reduce hospital stay and therefore lessen hospital costs.⁽¹⁴⁾

Some studies reported a range of 5 to 24% of patients submitted to bariatric surgery who required ICU for more than 24 hours.^(2,9,13,15,16)

Bariatric surgery by videolaparoscopy showed better results when compared to open surgery, with shorter length of stay in PARR and hospital in addition to less time with venous catheter, with a statistical significance.⁽¹⁴⁾ All our patients were operated by videolaparoscopy. Mean time of surgery in our study was 105.0 ± 28.6 minutes, compatible with literature, with a mean time

of 120 minutes^(17,18) and our length of hospital stay was only 47.7 ± 12.4 hours, much shorter than that in literature, which ranged from an average of 2.3 to 10 days.^(18,19)

The Aldrete and Kroulik⁽¹⁰⁾ index used as a routine by anesthetists at immediate postoperative reached a total score of 10 points in all our patients after 120 minutes in PARR, allowing release of all patients to the room in the wing. The Aldrete and Kroulik⁽¹⁰⁾ index analyzes five items whose replies are scored from zero to two. A total of eight to ten points in the Aldrete and Kroulik index permits safe discharge of patients from PARR to the ward (Chart 1).

During the first 24 hours of postoperative major complications take place, requiring closer attention to monitoring of the clinical parameters. In the room, vital signs of our patients remained stable, and the standardized medical prescribed by the surgical team for postoperative was maintained, with monitoring performed properly by the nursing team.

Obesity is the most important isolated risk factor for thromboembolic disease.^(5,20) Prevalence of pulmonary thromboembolism (PTE) in bariatric surgery is low, from 0 to 4.78% according to the used prophylaxis,^(2,5,16,19) however, it is the most common cause of death at the postoperative and an independent factor of mortality in bariatric surgery.⁽⁵⁾

Review of literature reports that more than 95% of papers presented cite some prophylaxis for the thromboembolic disease at postoperative of bariatric surgery, by means of early walking, use of elastic stockings, air bags and low molecular weight heparin (LMWH).⁽⁵⁾

At postoperative, obese present difficult early mobilization. Immobility increases risk of adverse thromboembolic events, especially in surgeries of the upper abdomen.⁽¹⁴⁾ On the other hand, early walking reduces the risk of pulmonary thromboembolism and other respiratory problems at postoperative affording and improving lung expansion, minimizing and reverting atelectasias formed by the prolonged decubitus in the bed.⁽⁵⁾

Patients in the ICU, even if their clinical conditions allow, have difficulty with early walking, due to limitation of the physical space in most of these units, lack of standardization and encouragement by the healthcare professional working there.

In our survey, permanence in the room, with the family members and larger physical accommodations warranting walking as early and as often as possible. This reduces the severe side effects of prolonged rest in the bed, such as thromboembolic disease and atele-

lactasias, decreases lung expansion and intestinal peristalsis, also difficulties for performance of physiological activities (urinate and defecate) in addition to affecting self-esteem. The physiotherapy service has an important participation in the early walking of our patients, contributing to avert these complications.

Our patients walked early, with 100% of cases walking in the first 24 hours and of these 39.2% (47) in the first 12 hours (Table 2). It is noteworthy that early walking is the main goal to prevent thromboembolic disease. No data were found in literature on how long, after bariatric surgery, these patients began walking and it is cited and advised that walking starts as soon as possible.

Time from hospital admission to onset of surgery of our patients was very short 140.7 ± 81.8 minutes, and also on this subject no data were found in literature. Carrying out early surgery, soon after admission is a conduct that avoids these obese resting in bed to aid prophylaxis for thromboembolic disease.

Mortality rates at postoperative of bariatric surgery are variable, ranging from 0 to 2.9%^(2,6,14) and is more prevalent in bearers of PTE, patients admitted to the ICU and those requiring reoperation.^(12,19,21)

In our survey there was no mortality, nor any event of thromboembolism, furthermore, no admission to the ICU. Only one patient required reoperation and was admitted to a room; other simple surgical complications (seromas, hematomas, partial dehiscence of the suture, phlebitis) were controlled at daycare level. In our casuistry, use of a prophylaxis protocol for prevention of thromboembolic disease (not pharmacological and pharmacological) and of other respiratory complications was essential for absence of mortality.

Participation of the multidisciplinary team carrying out a careful preoperative at daycare level associated to good working conditions in the institution, ensured successful hospital treatment of these patients in the rooms and may have contributed to a significant decrease of length of hospital stay and therefore, decrease of hospital costs.

CONCLUSION

By using the Aldrete and Kroulik index in PARR of gastric bypass by videolaparoscopy in primary bariatric surgery, none of the patients was admitted to the ICU and no major complication was observed.

RESUMO

Objetivos: Determinar o local de internação no pós-operatório de cirurgia bariátrica primária e verificar as complicações clínicas-cirúrgicas que justificassem internação em unidade de terapia intensiva, inclusive morte.

Métodos: Estudo transversal, prospectivo, aberto, sendo avaliados 120 pacientes submetidos à cirurgia bariátrica primária por videolaparoscopia no período de maio de 2007 a abril de 2008 em um hospital terciário. Utilizou-se o índice de Aldrete e Kroulik para liberação da sala de recuperação pós-anestésica e definição do local de encaminhamento no pós-operatório.

Resultados: Entre os 120 pacientes, havia 83 mulheres e 37 homens, com média de idade $35,4 \pm 10,5$ anos (18 a 66 anos), índice de massa corpórea médio $45,6 \pm 10,5$. O tempo entre admissão hospitalar e início da cirurgia foi de $140,7 \pm 81,8$ minutos, o tempo cirúrgico $105,0 \pm 28,6$ minutos, o tempo de permanência na sala de recuperação pós-anestésica foi $125,0 \pm 38,0$ minutos e tempo de internação hospitalar $47,7 \pm 12,4$ horas, com 100% dos pacientes deambulando em 24 horas. O índice de Aldrete e Kroulik da sala de recuperação pós-anestésica alcançou pontuação de 10 com 120 minutos em todos os pacientes, com sobrevida de 100%.

Conclusão: Com o uso do índice Aldrete e Kroulik na sala de recuperação pós-anestésica de bypass gástrico por videolaparoscopia em cirurgia bariátrica primária, nenhum paciente foi internado em unidade de terapia intensiva e nenhuma complicação maior foi observada.

Descritores: Cirurgia bariátrica; Gastroplastia; Obesidade/cirurgia; Obesidade mórbida/cirurgia; Cuidados pós-operatórios; Período pós-operatório

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