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Bariatric Surgery in Outpatient Regime: Evidence of feasibility and proposals for implementation

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Abstract

In Spain, 16.5% of adult men and 15.5% of women are obese. The healthcare cost attributable to obesity and its comorbidities represents 7% of total healthcare expenditure. In 2021, 11,581 procedures were carried out in Spain and the waiting time for bariatric surgery is currently more than 13 months and an estimated total of approximately 11,000 patients are on waiting lists. Bariatric surgery is the only treatment that has been shown to effectively control morbid obesity and its comorbidities in the long term in most patients. Laparoscopic Sleeve gastrectomy (SG) and Roux-en-Y gastric by-pass (BPG) are the most common bariatric surgical techniques worldwide. Given their reproducibility, low operative time, and low morbidity and mortality in experienced teams, they are ideal candidates for standardization in outpatient surgery. The possibility to perform outpatient surgery in bariatric patients is related to careful patient selection, experienced, high-volume centers whit low morbidity and mortality and an effective network of outpatient care. In this paper, we propose criteria for the implementation of this circuit based on the published evidence and the protocol agreed upon at the Hospital Universitario de Bellvitge.

Keywords:

- Sleeve gastrectomy
- By-pass surgery
- Outpatient surgery
- Ambulatory bariatric surgery
- ERAS

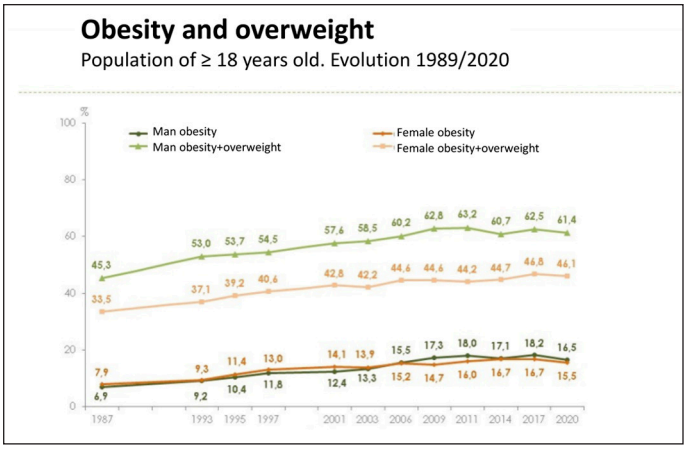
Introduction:

According to the European Health Survey in Spain (EESE) of 2020, 16.5% of all adult men and 15.5% of women are obese[1]. See Fig1.

In Spain, health costs attributable to obesity and its comorbidities reach approximately €2,880 million per year, representing 7% of the country's total health expenditure[2]. This is because the costs of managing individuals suffering from obesity can be up to three times higher than those of people with an optimal weight[3]. Specifically, obesity results in an increase of 20% in health expenditure per capita, considering the increase of 68% in pharmaceutical expenditure [4.5].

Bariatric surgery is the only treatment found to be effective in the long term control of morbid obesity and its comorbidities for most patients[6]. Its estimated impact on life expectancy is approximately 6 years of benefit for non-diabetic patients and 9 years for diabetics, and it is associated with a substantial improvement in quality of life[7.8]. Furthermore, it is associated with a significant reduction in health expenditure[9]. This evidence has resulted in a substantial increase in the number of bariatric surgeries performed worldwide and specifically in Spain. According to data from

Figure 1.
Results of the European Health Survey in Spain



Taken from the National Statistical Institute (INE). European Health Survey in Spain EESE. 2020.

the statistical portal of the Spanish Ministry of Health and Consumer Affairs, 11,581 procedures were performed in 2021[10]. However, these figures appear to be insufficient. Currently in Spain, the average waiting time for bariatric surgery is over 13 months and there are approximately 11,000 patients on waiting lists for this surgery[11]. And this situation has most likely to have worsened since the COVID-19 pandemic. Given the surgical waiting lists and the prevalence of obesity, we assume that there is a need to promote outpatient surgery in selected patients, to minimize the clinical and economic impact of obesity in a local context. Over the past two decades, thanks to advances in the effective use of minimally invasive surgery, hospital stays in bariatric surgery have been considerably reduced, from 2 – 5 days to 1 – 2 days on average[12]. Outpatient surgery has been proposed as a promising option, given the long and successful journey in several procedures of general and digestive surgery such as cholecystectomy[13,14].

Vertical gastrectomy (GV) and Roux gastric Y bypass (GPG) by laparoscopy are the most common bariatric surgical techniques, accounting for 55.4% and 29.3% of all procedures performed worldwide[15]. Given their reproducibility, low surgical time and low morbidity and mortality in experienced teams, they are the ideal candidates for standardization in outpatient surgery in selected patients[16-19].

The objective of this document is to provide a guide of recommendations for the implementation of a major outpatient bariatric surgery circuit, based on a review of published scientific evidence and the protocol of the University Hospital of Bellvitge. We will consider the indications, key points of preoperative preparation, perioperative checklist and postoperative follow-up of patients undergoing bariatric surgery on an outpatient basis.

Re-entries (Table 1):

1. **Center Requirements:**

The following are the minimum center requirements to implement a bariatric surgery CMA circuit:

- A high volume center accredited as a reference in the treatment of obesity and associated metabolic pathologies
- Multidisciplinary experience in managing morbidly obese patients
- Multidisciplinary committee for the assessment and preoperative optimization of patients
- Availability of at home hospital support service for patient follow-up after discharge.

2. **Patient indications:**

2A. Inclusion criteria:

- Patients meeting the criteria for inclusion in Bariatric Surgery according to the hospital protocol
- Aged 18 to 65
- BMI between 35 and 50 kg/m2
- Absence of previous laparotomy surgeries
- Cooperative patient, who understands and accepts pre- and post-operative instructions
- Patient Environment:
  - o Resides in the area of influence of the hospital's home support service
  - o At home accompaniment with a valid caregiver
  - o Accessible via telephone 24h/day
- Referred for restrictive bariatric surgery (vertical gastrectomy type) or mixed surgery (gastric by-pass type)
- Low or moderately low anesthetic risk: ASA I and II, or ASA III stable during the 3 months prior to surgery, at the discretion of the anesthesiologist.

2.B Exclusion criteria:

- Patients presenting one or more of the exclusion criteria for bariatric surgery according to the center's protocol.
- Obstructive sleep apnea syndrome (OSAS)
- BMI >50 kg/m2
- High anesthetic risk: Unstable ASA III or ASA IV
- Allergy to latex or NSAIDs

- Epilepsy
- A history of pulmonary thromboembolism or deep venous thrombosis
- Untreatable coagulopathy
- Liver cirrhosis
- Indication of hypoabsorptive surgery (duodenal crossover type)
- Resides outside the area of influence of the hospital's home support service
- Patients without valid at home caregiver support
- Anesthesia contraindications

3. **Perioperative circuit:**

3A. Preoperative:

- Multidisciplinary assessment (endocrinology, pulmonology, psychiatry, dietetics, surgery, anesthesiology) for patient optimization;
- Preoperative respiratory physiotherapy;
- Optimization of treatment of comorbidities (good glycemia control, blood pressure control, abstention from smoking, etc.);
- Information on the patient with preoperative visits with nurse and nutrition manager to be informed of the process, the importance of early recovery and the objectives.
- Explanation of the procedure and early discharge with ADH, review of criteria and acceptance by the patient and caregiver.

3B. Intraoperative:

Basic anesthetic monitoring and intraoperative analgesia protocol:

- Electrocardiogram
- Pulse oximetry
- Non-invasive blood pressure (proper cuff size)
- Hypnosis level monitoring: BIS/ entropy / others
- Monitoring Neuromuscular block (target method) TNM / TOF-Watch / Others
- Prevention of nausea and vomiting (decrease in opioid use, low insufflation of CO2, intraoperative dexamethasone administration 12mg/ iv)
- Omeprazole 40mg iv single dose
- Pain prevention:
  - Intravenous: Paracetamol 1 g iv and dexketoprofen 50 mg iv
  - Locoregional techniques to control pain, by infiltration with local anesthesia of trocar incisions (2-3 cc of ropivacaine at 0.375% or bupivacaine 0.5% + mepivacaine 2%) or blockage of the abdominal transverse plane (TAP).
- Prevention of thromboembolism: Intermittent pneumatic compression stockings
- Prevention of hypothermia: Thermal blanket

Surgical details:

- Care in patient placement in the operating room to reduce possible postoperative postural pain;
- Staple line reinforcement to reduce the risk of bleeding;
- Careful hemostasis;
- Working with low insufflation pressures (<12mmHg if possible);
- Aspiration of all residual CO2 at the end of surgery;
- Do not leave drainage if there are no intraoperative complications.
- Surgical time less than 120 minutes

3C. Postoperative:

Day 0 (Surgery Day):

- Patient reception in the post-surgical resuscitation (recovery) area:
- Constant control;
- recovery discharge assessment using the Aldrette scale (Table 2). 13 points are needed for a high score.
- Analgesia and antiemetics:
- IV Suerotherapy (2L)
- Paracetamo1 g + dexketoprofen 50 mg /8h (or metamizole 2 g/8h)
- Rescue: Morphine 4 mg sc/4-6h if needed (or tramadol 50-100 mg /8h)
- Ondansetron 4mg iv single dose or droperidol 5mg iv before discharge
- Patient reception in the major outpatient surgery area:
- Constant control (TA, FC, FR, T, saturation) every 4 hours.
- Seating and ambulation (early mobilization at 4 hours post-surgery)
- Initiation of the water diet in the 4 hours post-surgery.
- Evaluation of surgical dressings.
- Assessment of drainage debit if it is a carrier.
- Pain control (EVA ladder)
- Control of nausea and vomiting.

Discharge from home 8 hours following the end of the surgical intervention, with the patient's agreement and once the discharge criteria have been met according to the assessment made by the surgery and at home hospitalization services. In the case of intraoperative complication the patient will be admitted.

Patients must attain more than 9 points of the post-anesthetic discharge index (Table 3) in order to be discharged.

In addition to the general patient discharge criteria under the CMA regimen, these specific procedures require an adequate liquid diet tolerance. Prior to discharge it should be ensured that the patient can ingest and tolerate fluids with no incidents. The patient may be discharged by the surgical department after assessment of at home hospitalization with abdominal drainage and/or peripheral venous route if required.

Day 1:

- Visit of the home hospitalization service on the first post-operative day

· Diet tolerance monitoring on 1st postoperative day.
· Constant control (BP, heart rate, respiratory frequency, Temperature, Saturation)
· Surgical wound care.
· Peripheral removal.
· Assessment of drainage debit and its withdrawal if it is a carrier.
· Demand proper implementation of the antithrombosis protocol (heparin)
· Pain control (EVA scale) – oral analgesia.

- Analgesia and antiemetics:

· Acetaminophen 1 g/8 hours + ibuprofen 600 mg/8hours (or metamizole 575-1150 mg/8hours)
· Rescue: Tramadol 50-100 mg /8hours

Day 2-3:

Visit home by support services on second and third postoperative day

· Progression of diet on day 2
· Take vital signs
· Health education provided.

Warning signs for patient referral to the emergency room:

· Tachycardia
· Fever >38ºC
· Nausea or vomiting that does ease with antiemetics
· Hypotension
· Desaturation
· Pain that does ease with analgesia IV

In obese patients, clinical semiology is essential to detect possible complications and treat them in a timely manner. The presence of tachycardia and poor control of sudden abdominal pain requires us to rule out serious complications.

Checklist of compliance with the perioperative circuit of ambulatory surgery under the CMA regimen (Table 4).

Discussion

Why without admission?

The economic reasoning is clear. As mentioned in the introduction, surgery without hospital admission may potentially ease the growing waiting lists that already present challenges to the healthcare system. Now there is an additional question: **Does it make sense? Is it safe?**

The retrospective evidence to respond to these questions does not fall short: a recent analysis of the U.S. Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) registry analyzed the results of 7,825 patients who underwent VG and were discharged on the same day, comparing them with hospitalized patients through the propensity-score-matching method. It was found that the outpatient regimen did not increase the risk of fistula (0.56% vs. 0.40%; p = 0.133), bleeding (0.38% vs. 0.56%; p = 0.414), reintervention (1.15% vs. 0.31%; p = 0.066) or complications (0.81% vs. 1.01%; p = 0.397), with no cases of mortality [22]. The same group analyzed 2156 patients undergoing outpatient BPG and compared them with similar patients admitted in the same period. No differences were found in overall morbidity (11.3% vs. 10.2%; p = 0.08), severe morbidity (3.1% vs. 1.2%; p = 0.81), reinterventions (1.4% vs. 3%; p= 0.42), readmissions (4.8% vs. 4.8%; p=.0.89) and mortality (0.04% vs. 0.09%; p=.0.53) [23]. Another Canadian study based on a series of 914 patients undergoing surgery on an outpatient basis (60 GV and 854 BPG) revealed that only 3% of patients required readmission to a hospital facility, mainly for post-operative bleeding, with no cases of mortality in any of the same [24]. In 2023, a systematic review and meta-analysis of observational studies was published, including 5,000 patients and revealing a 99% success rate for the outpatient VG program, with 4% readmissions, an overall morbidity of 4%, 1% reinterventions and 0% mortality, and a total of 65% of patients. These results are comparable to those of hospitalization programs [25]. In addition to these satisfactory safety results, a French prospective study found that 82% of patients undergoing bariatric surgery without admission were satisfied with the perioperative circuit [26].

As for randomized evidence, two studies have been published to date. The DAYSLEEVE trial randomized 1,544 patients (777 cases of outpatient VG and 777 with admission). No cases

of surgical reintervention or mortality were found in either group and only 18 patients (2.3%) in the outpatient group required admission to control pain or nausea[27]. The Dutch PEACH study, whose main result was a variable composed of morbidity and mortality, also found no differences between groups[28].

Thus, VG and BPG appear to be safe techniques on an outpatient basis if practiced in reference centers, having low morbidity and mortality rates and an effective home-based follow-up circuit for early detection and response to complications. In addition to the hospital center and surgical technique, adequate patient selection is key: Patients with BMI > 50 kg/m2 are exposed to a higher rate of postoperative complications and hospital readmissions, so they do not appear to be good candidates for outpatient surgery circuits[29]. Patients with sleep apnea or non-compensated medical conditions do not appear to be good candidates, especially those suffering from heart or kidney disease, taking anticoagulants or having a history of venous thrombosis[23,27,29].

At the University Hospital of Bellvitge, 650 GV and 446 BPG have been operated on by laparoscopy over the past 7 years, finding overall complication rates of 6.6% and 11.2% respectively, a serious complication rate of 1.8% and 3.5% and no cases of postoperative mortality. Excluding patients who are not potential candidates for surgery without admission (BMI >50 kg/m2, previous laparotomies, sleep apnea, cirrhosis, coagulopathy and uncompensated medical diseases), the percentage of serious complications is limited to 0.7% for GV and 1.03% for BPG. Currently these patients are admitted only one night after surgery; in most cases they are operated on in the afternoon, discharged from the hospital before 10 in the morning, resulting in admissions lasting much less than 24 hours.

Why laparoscopy?

Although the laparoscopic approach remains the most common for bariatric surgery, the robotic option is currently experiencing a rapid progression. It is considered that robotic surgery is especially suitable for the circuit without admission, since it results in less postoperative pain and a lower risk of complications. However, except for its proven advantages in prostate surgery (reducing the rate of sexual impotence and urinary incontinence) and gynecological surgery (where it is associated with a lower risk of conversion to open surgery), robotic surgery has not been currently associated with less postoperative pain or any other objective clinical benefits over laparoscopy [30].

Specifically in bariatric surgery, comparative studies of robotic and laparoscopic surgery reveal heterogeneous results: a large recent retrospective study from the U.S. Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) registry analyzed a total of 269.923 patients undergoing GV (n = 190,494) and BPG (n = 79,429) [31]. Surgical time was longer in robotic surgery, both for VG (102.58 ± 46 vs. 73.38 ± 36 minutes; P < 0.001) and for BPG (158.29 ± 65 vs. 120.17 ± 56 minutes; P < 0.001). In the GV cohort (12,877 paired cases), the robotic approach had a similar global morbidity but a lower bleeding risk (0.16% vs. 0.43%; P < 0.001). Similarly, for the BPG cohort (5780 paired cases), robotic surgery was associated with lower blood transfusion requirements (0.64% vs. 1.16%; P = .0.004), with no differences in the other results. The same group analyzed 17,012 patients undergoing revisional surgery, with inverse findings as compared to the primary surgery: Robotic surgery was associated with higher overall morbidity (6.7% vs 4.5%; adjusted odds ratio 1.51; P < 0.01), longer surgical time (P < 0.01) and a longer stay (P < 0.01) [32]. A meta-analysis from 2021 including 30 comparative studies, with a total of 7,239 robotic and 203,181 laparoscopic bariatric surgeries, suggesting that robotic surgery was associated with longer surgical time, having similar rates of blood loss, overall complications, bleeding, fistulas and reinterventions [33]. Another recent meta-analysis of revisional surgery including six comparative studies with 29,890 patients (2459 in the robotic group) found no advantages associated with the robotic approach or postoperative complications (RR 1,070, 95%CI 0.930-1.231, p = .0.950), conversions to open surgery (RR 1.339, 95%CI 0.736-2.438, p = .0.339), no time of stay (MDS – 0.041, 95%CI – 0.420-0.337, p = 0.831 [34].

Given its higher cost and surgical time, and its limited availability, robotic surgery in our center tends to be reserved for hypo-absorptive, revisional or especially complex surgeries. Once the surgical team's learning curve has been overcome, it does not appear to be reasonable to use the robot for simple primary GV and BPG, which are precisely the ideal candidates for surgery without admission.

Conclusions

Outpatient bariatric surgery is a safe practice in selected patients and at accredited and experienced centers, having low morbidity and mortality rates and an effective home follow-up circuit. We propose some criteria for the implementation of this circuit based on the published evidence and the protocol agreed upon at the University Hospital of Bellvitge.

Tables

Table 1: Checklist of center and patients' requirements for CMA in bariatric surgery:

CMA in bariatric surgery: Checklist of center and patient requirements	
Center requirements	**FULFILLS**
Accredited high volume center	
Multidisciplinary experience in the management of patients with morbid obesity	
Multidisciplinary committee for the preoperative assessment and optimization of patients	
Availability of hospital support service at home	
Patients' inclusion criteria	**FULFILLS**
GV or BPG candidate according to the center's protocol	
IMC < 50 kg /m2	
Age 18-65 years old	
ASA I, II o III compensated >3 months (anaesthesiologist criteria)	
Patient accompanied by a responsible adult with available telephone	
Address within the hospital's home hospitalization area of influence	
Understand and participate in the decision of surgery and CMA circuit	
Patients' exclusion criteria	**FULFILLS**
Candidate for hypoabsorptive or revisional surgery according to the center's protocol	
IMC >50 kg/m2	
ASA III not compensated (anaesthesiologist criteria) or ASA IV	
Obstructive sleep apnea	
Epilepsy	
Allergy to latex or NSAIDs	
History of PE or DVT	
Cirrhosis, coagulopathy, non-suspended anticoagulant or antiplatelet treatment	
Previous laparotomy	
Rejects surgery and the CMA circuit	
Address outside the area of influence of home hospitalization	

Table 2: Aldrette's recovery discharge assessment scale:

Category	Items	Points
Motor activity	Ability to move all 4 extremities spontaneously or in response to orders	2
	Ability to move 2 extremities spontaneously or in response to orders	1
	Inability to move at least 1 extremity spontaneously or in response to orders	0
Breathing	Ability to breathe deeply and cough frequently	2
	Dyspnea or limited breathing	1
	No response	0
Circulation	Blood pressure = 20% of preanesthetic level	2
	Blood pressure between 20 and 49%% of preanesthetic level	1
	Blood pressure = 50% of preanesthetic level	0
Consciousness	Fully awake	2
	Responds when called	1
	No response	0
Color	Pink	2
	Pale	1
	Cyanotic	0

Taken from Aldrete JA. The post-anesthesia recovery score revisited. J Clin Anesth. 1995;7:89-91 [20].

Table 3: Postanesthetic index for discharge to home (Postanesthesia discharge score system):

Criterion	Features	Score
Vital signs	TA and pulse + 20% of basal	2
	TA and pulse 20-40% of the basal	1
	TA and pulse > 40% of baseline	0
Level of activities	Firm walking, without dizziness or similar to the basal	2
	He needs help	1
	Unable to walk	0
Nausea/ vomiting	Minimum: treated effectively with oral medication	2
	Moderate: treated effectively with iv medication	1
	Severe: Persists despite treatment	0
Pain	Minimum	2
	Moderate	1
	Serious	0
Bleeding	Minimum: No change of dressings required	2
	Moderate: Less than two changes of dressings	1
	Severe: More than three changes of dressings	0

Taken from: Chung et al. Chung, F., Chan, V. W., & ONG, D. (1995). A post-anesthetic discharge scoring system for home readiness after ambulatory surgery. Journal of Clinical Anesthesia [21].

Table 4: Checklist of compliance with the perioperative circuit of ambulatory surgery under the CMA regimen:

CMA in bariatric surgery:	
Checklist of peri-operative circuit	
Preoperative	**CUMPLE**
RECOMMENDATION	**COMPLIES**
Multidisciplinary assessment (Endocrinology, Pulmonology, Psychiatry, Dietetics, Surgery, anesthesiology) for patient optimization	
Pre-operative respiratory physiotherapy	
Optimization of comorbidity treatment (good glycemia control, blood pressure control, abstention smoking habit, etc.)	
Information of the patient with preoperative visits with nurse manager and nutritional to be aware of the process, the importance of early recovery and the objectives	
Intraoperative	
Basic anesthetic monitoring and intraoperative analgesia protocol	**CUMPLE**
RECOMMENDATION	**COMPLIES**
Electrocardiogram	
Pulse oximetry	
Non-invasive blood pressure (proper size cuff)	
Hypnosis level monitoring: BIS/ entropy / others	
Monitoring Neuromuscular block (target method) TNM / TOF-Watch / Others	
Dexamethasone 8 mg IV	
Paracetamol 1 g IV	
Dexketoprofen 50 mg IV	
Locoregional techniques to control pain (assess according to the conditions of each patient):	
Before the incision (or after surgery):	
Infiltration of trocar insertion points (2-3 cc of 0.2% ropivacaine or 0.25% bupivacaine)	
TAP	
During surgery: Lidocaine IV	
Intermittent pneumatic compression stockings	
Thermal blanket	
Surgical details:	**CUMPLE**
RECOMMENDATION	**IT COMPLIES**
Care in the patient's placement in the operating room to reduce possible postoperative postural pain	
Staple line reinforcement to reduce the risk of bleeding	
Careful hemostasis	
Working with low insufflation pressures (<12mmHg if possible)	
Aspiration of all residual CO2 at the end of surgery	
Do not leave drainage if there are no intraoperative complications	
Local anesthesia in surgical wounds to reduce postoperative pain	
Postoperative:	**CUMPLE**
RECOMMENDATION	**COMPLIES**
Analgesia and antiemetics IV oral use first day	
Dexamethasone 8 mg (single dose)	
Paracetamol 1 g + dexketoprofen 50 mg /8h (or metamizole 2 g/8h)	
Rescue: Morphine 4 mg sc/4-6h as needed (or tramadol 50-100 mg /8h)	
Primperan oral sun 1mg/8h	
Ondansetron 4mg/8h	
Analgesia and antiemetics oral use second day	
Acetaminophen 1 g/ 8 hours + ibuprofen 600 mg/8h (or metamizole 575-1150 mg/8h)	
Rescue: Tramadol 50-100 mg /8h as needed	

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