Gastric sleeve resection as same-day surgery – what affects the discharge time?

Abstract:

Background: Sleeve gastrectomy (SG), with its short operating time, is possible to perform as same-day surgery, with the most common reason for requiring overnight hospital stay being post-operative nausea and vomiting.

Objective: To demonstrate the feasibility and safety of SG as same-day surgery with regards to complication rate. Additionally, the study aimed to evaluate factors determining the duration of hospital stay, such as type of anesthesia, time of procedure, degree of post-operative nausea and pain, American Society of Anesthesiologists (ASA) score or previous abdominal surgery.

Setting: Non-academic primary referral center.

Method: A sub-study of a single-center, double blind, randomized controlled trial. Patients included in this study underwent SG and were randomized into one of the two types of anesthesia; Total intravenous anesthesia (TIVA) with propofol, or desflurane. Primary endpoint was the number of patients discharged the same day as surgery. Secondary endpoints were unplanned telephone calls, readmission rate and complication rate. Time of procedure was registered by the staff at the operation theatre. Visual analogue scales (VAS) score estimating patients’ intensity of pain and nausea were completed at the post-operative (PO) unit, surgical ward, and 24-48 hours post-operatively.

Results: Ninety-three patients were included in the study. Fifty-nine (63%) were discharged the same day as surgery (32 desflurane and 27 TIVA), 30 patients (32%) were discharged one day later.
day following surgery, and four patients (4%) were discharged after more than two days (15 desflurane and 19 TIVA). The most common reasons for prolonged stay were pain, nausea and fatigue. Statistical analyses showed no association between day of discharge and the type of anesthesia, time of the procedure, degree of postoperative nausea and vomiting (PONV), pain intensity, ASA score, or previous abdominal surgery.

Conclusion: Same-day surgery is feasible and safe in terms of low complication rate. The type of anesthesia, time of procedure, degree of PONV and pain, ASA score and previous abdominal surgery does not appear to affect length of hospital stay.

Keywords: SG, obesity, VAS, anesthesia, desflurane, Total intravenous anesthesia, bariatric surgery, outpatient surgery, ambulatory surgery
Introduction:

Surgical procedures which allow the patient to return home within 12 hours post-surgery may be described as “Same-day”, “outpatient” or “ambulatory” surgery.

Same-day discharge reduces the risk of hospital acquired infections, is cost effective and improves accessibility to bariatric surgery [1]. Moreover, there is a large body of evidence indicating high satisfaction rates among patients who are discharged the same day as gastric banding (GB) (76%) [2], laparoscopic Roux-en-Y gastric bypass (LRYGB) (84%) [3] and sleeve gastrectomy (SG) (92-98%) [4-8].

LRYGB is the most widely applied type of bariatric surgery in Norway, however, SG has shown increased popularity over the last years [9]. The SG procedure is reported to be a relatively fast procedure with 100 minutes as mean operative time [10]. At our department, the mean operative time is 35 minutes.

As the number of procedures increases, many health centers are currently performing bariatric surgery as a same-day surgery.

Most of the evidence available on SG as same-day surgery is based on retrospective reviews [11-13]. The aim of our study was to demonstrate the feasibility of SG as a same-day surgery and to determine factors influencing the duration of hospital stay, such as type of anesthesia, time of procedure, degree of post-operative nausea and vomiting (PONV) and pain, American Society of Anesthesiologists (ASA) score or previous abdominal surgery affects the hospital stay.
Patients and methods

Study design

This study is a sub-analysis of a single-center, double blind, randomized controlled trial (RCT) that included all patients undergoing bariatric surgery at the Østfold hospital, in the period 2016-2017 [14]. Patients included in the RCT operated with either LRYGB or SG were randomized to receive intravenous anesthesia (TIVA) with propofol, or desflurane. This subanalysis includes only the subgroup of patients who underwent SG. A study flow chart is outlined in figure 1.

The study was approved by the Regional Ethics Committee, and a written informed consent was acquired from all patients.

Preoperative assessment:

All patients received preoperative consultations with a nurse, physician, dietician and the surgeon. During the consultations, a complete medical history was obtained, and a physical examination was performed. Patients were requested to have a preoperative low-calorie diet of 1000 kcal/day for three weeks prior to the surgery as a low caloric diet prior to surgery reduces the liver volume and increases accessibility to the upper abdominal compartment during surgery [15, 16]. During the preoperative consultation, patients were informed about the study and that they would be encouraged to be discharged the same day as surgery. All patients were required to have a support person available during the first night after surgery.

The treatment of obesity follows national guidelines in Norway. The patient must be motivated and able to comply to a long-term treatment course.
Inclusion criteria:

Indication for surgery are: 1- BMI 35–40 kg/m² with obesity-related diseases which can be significantly improved or cured with weight reduction; 2- BMI ≥40 kg/m²; or 3- when conservative treatment effects are not achieved despite multidisciplinary treatment including consultations with physician, psychologist, nutritionist and physiotherapist.

Exclusion criteria:

Contraindications to surgery include serious medical conditions that increase the risk of surgery such as end-stage lung disease, severe heart failure, unstable coronary artery disease, active cancer diagnosis/treatment, cirrhosis with portal hypertension, uncontrolled drug or alcohol addiction, and severely impaired intellectual capacity. In addition, serious mental health problems were considered a contraindication to bariatric surgery. All patients undergoing bariatric surgery were over the age of 18 years old.

A description of the randomization process is explained in detail in a previous publication [14].

Pre-operatively, patients were administrated a standard regimen of antibiotics and thrombosis prophylaxis with low-molecular-weight heparin. All patients were pre-medicated with glycopyron (an anticholinergic agent) (0.2 mg) intravenous (IV), metoclopramide (20 mg) IV, sodium citrate (30 ml) IV, and dexamethasone (16 mg) IV. Fentanyl was given to all patients as an induction. In patients randomized to TIVA, propofol and remifentanil were administered throughout the surgery. In patients randomized to gas anesthesia, propofol and remifentanil were administered for induction, and remifentanil/desflurane was used for continuation. Muscle relaxant was used routinely during surgery. Tracheal intubation was facilitated using lidocaine spray in the trachea pre-intubation.
Surgical technique

All patients were operated with the SG technique. It was performed laparoscopically by experienced bariatric surgeons. Our patients are operated with standard technique by using 5 trocars, two 5 mm in diameter, 2 x 12 mm and one 15 mm. Calibration of the stomach is applied with a 32 French bougie. Resection of the stomach started 4 cm from the pylorus with 2 x 45 mm Endo GIATM Tri-Staple™ Technology, purple magazine. Then continued with 60 mm beige magazines, reaching the His angle. Some metal clips were used to stop minor bleedings along the resected curvature. The specimen is removed through the 15 mm trocar opening. Local anesthesia is used in the skin lesions, and the lesions are closed with metal clips.

Postoperative follow-up

After surgery, the patients were transported to the post-operative unit for observation of vital signs and for treatment of nausea and/or pain. Nausea was treated with ondansetron 4mg IV or metoclopramide 20 mg IV. For pain, IV ketobemidone was provided. Patients were also given 3-5-liter oxygen via nasal cannula expect from those who were prescribed continuous positive airway pressure (CPAP) pre-operatively.

As soon as the patient was stable, he or she was encouraged to take water orally; and one hour later the patient was required to use a Positive Expiratory Pressure (PEP) device for 3x10 repetitions in a sitting position. After one hour, they received thromboprophylaxis with low-molecular-weight heparin (2 hours post-operatively). Following this, as the patients were transferred to the surgical ward, the personnel at the post-operative unit measured
their intensity of pain and nausea using VAS scales. At the surgical ward they were encouraged to be in as much physical activity as possible by taking small walks. If the patient was not able to be in any physical activity, they were encouraged to use the PEP device (3x10 times) regularly to prevent respiratory complications.

**Discharge criteria post-surgery**

The following factors were evaluated before the patient could be discharged:

1- The patient’s mental state with regards to the remaining effects of anesthetic and pain medications, such as headache, dizziness and faintness.

2- Normal mobility without the use of a walking aid.

3- Degree of pain below 5 on the VAS-score.

4- Oral intake of water

5- Degree of nausea and vomiting not exceeding 3 on the nausea VAS scale.

6- Elimination of urine and gas before discharge.

All patients were informed about medication use such as; low-molecular-weight heparin, antiemetics, analgesics and PPI before discharge. The most essential information was the 24-hour service number at the hospital which the patient could call in case of increasing pain, nausea, fatigue, malaise or with any other questions to the surgeon.

The patients are always contacted by the nurse post-operative day one (POD1), before 12pm. In case of readmission, the Classification of Surgical Complications, Clavien-Dindo, was used [17].
**Study outcomes**

The primary endpoint for the study was the proportion of patients discharged the same day as surgery. Secondary outcomes were unplanned telephone calls, readmission rate and complication rate. We studied the association between patient-related and operation-related factors and duration of post-operative stay. Patient-related factors included body mass index (BMI), weight, type of anesthesia, ASA score, previous abdominal surgery, obesity-related comorbidities such as sleep apnea, hypothyreodism, diabetes type 2, psychiatric disorders, fibromyalgia (see Table 1). Operation-related factors included: type of anesthesia, time of procedure, duration of anesthesia, degree of PONV and pain (see Table 2). Time of procedure was registered by the staff at the operation theatre, VAS score estimating patients’ intensity of pain and nausea were completed at the post-operative unit, recovery room (surgical ward), and 24-48 hours post-operatively. ASA score was evaluated by the anesthesiologist at the hospital.

**Statistics:**

This study includes a subgroup of patient operated with SG that were included in the previously reported RCT [14]. Continuous data were expressed by mean and standard deviation (SD) and compared using student’s t-test and categorical data were expressed by number and proportion and compared using chi-square test or Fisher mid-P test (due to small proportions). P-values < 0.05 were considered statistically significant. In order to determine factors influencing the duration of hospital stay a multivariable analysis was performed including variable with p-value <0.2 in the univariate analysis. Statistical analyses were performed with IBM SPSS, version 22.
Results

Patient characteristics are shown in Table 1. In total, 93 patients were included in the study. Fifty-nine patients (63%) were discharged the same day as surgery, 31 patients (33%) stayed until POD1, whilst four patients (4%) stayed in hospital for ≥ two days. Mean age (SD) was 40±11 years for those discharged same day, and 45±13 years for the delayed discharge group (Table 2). Female:male ratio was 3:1. Mean BMI (SD) was 43±7 kg/m² for the patients discharged the same day as surgery and 42±7 kg/m² for the delayed discharge group. The differences between the groups are listed in Table 1.

Forty-seven patients (51%) received TIVA and 46 patients (49%) received desflurane (gas) anesthesia, see study flow chart figure 1. Eighteen of the 47 patients (38%) were discharged POD1 in TIVA vs 13 of the 46 patients (28%) in desflurane group (p=0.280).

In the univariate analyses performed, younger age was found to be associated with same-day discharge. A trend towards an association between the duration of anesthesia and length of stay was found (p=0.057).

The mean operating time for the group of patients who were discharged the same day as surgery was 32±10 minutes, and 36±15 for the group with delayed discharge. Mean anesthesia time was 48±9 minutes, and 54±17, respectively. Mean time of awakening was 7±5 minutes and 8±6 minutes. There was no significant difference in the groups of discharge and ASA score (p=0.868) or previous abdominal surgery (p=0.912).

However, the multivariate analysis performed showed no association between any of the studied factors and duration of hospital stay. Further factors are listed in Table 1 and Table 2.
The most common reasons for prolonged hospital stay were pain (n=10), nausea (n=9) and fatigue (n=8). All reasons are listed in Figure 1. No significant difference was found in the time variables. Mean (SD) VAS score for pain leaving the recovery room was 2±2 for both groups (the same-day discharge group and delayed discharge group). Mean (SD) VAS score for nausea leaving the recovery room was 1±2 and 2±3 respectively, with no significant difference found.

**Post-discharge contacts and readmissions**

Ten patients contacted the surgeon on-call following discharge due to pain (n=5), dysphagia (n=1), obstipation (n=2), and general questions regarding food and drink (n=2). Of these consultations, 6 (6.5%) were referred to the emergency department at the hospital for further examination. Three patients were sent home same day after examination at the emergency department and three patients were admitted to hospital. Two of the three patients admitted were from the same-day discharge group. One was diagnosed with gastric leak, the second had dysphagia, and the third was admitted due to obstipation was discharged at POD1. In addition to the mentioned complications, two of the four patients with delayed discharge after surgery were admitted to hospital for further follow-up due to abdominal pain and clinical shock-like condition, with no cause found on computer tomography (CT) of the abdomen for the first patient and stabilization and observation for the second patient. The patient diagnosed with gastric leak was admitted to hospital four days after discharge.

Post-operative complications (within 30 days postoperatively), were classified by Clavien-Dindo; Four patients were classified as score I which of one had dysphagia, two had
obstipation and one had a clinical shock like condition which was stabilized with fluids and observation. One patient had a score of IIIa, in need of CT of abdomen due to abdominal pain with no findings. One patient had a score of III, had gastric leak. There were no postoperative deaths. There was no significant difference in complication rate in patients being discharged the day of surgery (n=2) and prolonged discharge (=4), p=0.113. There was no significant difference in complication rate in the TIVA (n=4) /desflurane(n=2) groups.

**Discussion**

Our study is a prospective study which investigated patients operated for SG in a primary referral center including those discharged the same day as surgery, and those admitted to hospital following the operation. This allowed us to investigate the feasibility and safety of SG as same-day surgery in terms of complication rate. We have also explored patient-related and operation-related factors that could have affected the length of hospital stay in relation to SG as same-day surgery. Same-day surgery in the gastrointestinal field has been applied for years [18]. Cholecystectomy, inguinal hernia repair, fundoplication surgery are some of the surgeries which are done as same-day surgery with good results, both worldwide and at our department [19, 20]. Bariatric surgery has also been performed in same-day settings, but with careful patient selection, accepting only patients with minimal surgical risk [6, 7, 11, 13].

In this study, we found that the most common reasons of prolonged stay were pain (n=10), nausea (n=9), and fatigue (n=8). However, we found no association between type of anesthesia, vomiting, pain and day of discharge. All factors in the univariate analysis with p-values <0.2 were adjusted for in the multivariable model, to tease out the relative impact of factors as age, hypothyroidism, sleep apnea, duration of surgery and duration of anesthesia.

No significant relationship between the factors mentioned above and same-day discharge
were found.

The readmission rates after SG being performed as same-day surgery are found to be between 0.6% and 8.5%, and the reoperation rates are 0.6% to 3% [4, 6-8, 11-13]. In the present study, the readmission rate was 6.5% and the one re-operation was due to gastric leak. Although most of the studies mentioned above concluded that it is safe to discharge the same day after SG surgery, one study reported the opposite. Inaba et al. compared patients discharged the same day after SG with patients discharged at POD1 and found higher overall morbidity, readmission rate and reoperation rate for patients discharged the day of surgery [12]. In a study of unanticipated admission to hospital after same-day surgery, one reason was predicted to be post-operative vomiting and type of anesthesia used [21]. Several studies have been conducted to compare different anesthetic approaches in obese patients undergoing bariatric surgery, however there is no clear consensus as to which approach should be recommended for this group of patients. Juvin et al. showed faster postoperative recovery after desflurane compared with propofol and Isoflurane, but only 36 patients were included in the study [22]. Another small study (n=40 patients) which randomized patients to TIVA or gas anesthesia showed no significant difference in postoperative recovery [23]. No such association was found in our main RCT [14].

Conclusions

In conclusion, same-day surgery appears to be feasible and safe in terms of low complication rate. We failed to identify any factor whether patient-related or operation-related that had influence on the duration of hospital stay.
Reference list


