

Factors affecting length of stay in bariatric surgery in a UK institution

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Abstract

BACKGROUND: Within a finite resource-limited national health service, a significant proportion of the cost of bariatric surgery is dependent on the length of stay of inpatients. This study was designed to investigate the factors that influence the length of post-operative stay in these patients. In particular, the effect of four common factors were explored in two bariatric procedures. **METHODS:** This is a retrospective study examining the length of stay in patients who underwent a laparoscopic sleeve gastrectomy (SG) and a laparoscopic Roux-En-Y gastric bypass (RNY) between July 2015 and February 2018 by a single surgeon. The significance of four factors were assessed: BMI, ASA grade, a diagnosis of diabetes and the day of the week the operation occurred. **RESULTS:** Median length of stay for SG patients was 2 [2,3] days. This was unaffected by our factors examined. Median length of stay for RNY was 2 [2,3] days. This was unaffected by ASA grade or a pre-existing diagnosis of diabetes. Day of the week and BMI significantly affected length of stay for RNY patients. Patients operated on a Friday stayed on average one day longer ($p=0.002$). Patients with a BMI over 60 stayed on average 2 days more ($p=0.008$). **CONCLUSION:** To optimise costs in the health service, more attention should be placed on when RNY and SG procedures are performed during the week. This is especially relevant when dealing with patients with high BMIs.

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The significance of four factors were assessed: BMI, ASA grade, a diagnosis of diabetes and the day of the week the operation occurred.

RESULTS:

Median length of stay for SG patients was 2 [2,3] days. This was unaffected by our factors examined.

Median length of stay for RNY was 2 [2,3] days. This was unaffected by ASA grade or a pre-existing diagnosis of diabetes. Day of the week and BMI significantly affected length of stay for RNY patients. Patients operated on a Friday stayed on average one day longer ($p=0.002$). Patients with a BMI over 60 stayed on average 2 days more ($p=0.008$).

CONCLUSION:

To optimise costs in the health service, more attention should be placed on when RNY and SG procedures are performed during the week. This is especially relevant when dealing with patients with high BMIs.

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Introduction

Laparoscopic sleeve gastrectomy (SG) and laparoscopic Roux-En-Y gastric bypass (RNY) are first line in the surgical treatment of morbid obesity in the UK. Their low rates of postoperative morbidity and mortality is well documented in the literature. In addition, an increased emphasis on enhanced recovery after surgery (ERAS) has led to a reduction in hospital length of stay and associated nosocomial complications.⁽¹⁾

ERAS protocols are already well established in other surgical specialities, but have yet to be implemented effectively in bariatric surgery on a regional or national scale. Meta-analytical studies have found them to result in a reduced length of stay but no overall significant effect on mortality or morbidity of bariatric patients.⁽²⁾ Despite this increased emphasis on ERAS, length of stay still represents a significant portion of the cost of bariatric surgery; with each additional day accumulating approximately £225 in bed costs. In addition, increased length of stay leads to additional risks of: venous thromboembolism, hospital acquired infections, prescription errors, falls/fractures, re-admission and cancelation of other services due to insufficient hospital beds⁽³⁾.

Multiple factors are thought to affect length of hospital stay in these groups of patients. A diagnosis of diabetes, decreased functional status, and additional procedures performed alongside the case have all shown to result in an increased length of stay⁽⁴⁾. A larger BMI is inherently associated with greater risk and studies have shown a BMI of greater than 50 to significantly delay discharge. It is important to also consider that a combination of patient-specific factors and operative factors can influence length of stay⁽⁵⁾.

An increased emphasis on establishing a 7-day NHS is well known, and this creates a pressure to discharge patients who do not necessarily need to be in hospital. In fact, studies have shown that early discharges,

particularly on day 1 post op, do not lead to increased readmission and complications rate in these patients. It stands to reason that patients should be optimally discharged regardless of which day of the week it is⁽⁶⁾.

Given the finite resources available in the National Health Service, the aim of this study was to determine the extent that four common factors: day of the week the operation occurred, BMI, ASA grade and a pre-operative diagnosis of diabetes, influences the length of post-operative stay in two common bariatric procedures – SG and RNY.

Methods

A retrospective study utilising data from the National Bariatric Surgery Register was performed. Ethical approval for the study was obtained via the local review board. Inclusion criteria was all patients who underwent either only a laparoscopic sleeve gastrectomy or a Roux-en-Y bypass between July 2015 and February 2018. All surgeries were performed by a single senior bariatric surgeon (SR) at a single site (King's College Hospital, London) to reduce bias. Any patients who had immediate complications intra- or peri-operatively were excluded from the study such as bleeding or those requiring additional intra-operative procedures. Six such patients were excluded. A total of 230 patients (112 Sleeve Gastrectomies and 118 Gastric Bypasses) were identified for the study.

All patients were managed according to the department surgical protocol. The principles of this protocol are:

1. Pre-operative counselling and patient education
2. Antithrombotic prophylaxis (Dalteparin 5,000 units, OD <100kg, BD >100kg)
3. Laparoscopic surgery
4. Balanced intravenous fluid therapy
5. Early mobilisation

Post-operative length of stay was defined as the number of 24 hour periods from completion of the operation to the day of discharge. Discharge criteria was:

1. Patient tolerating free fluids
2. Healing surgical wounds with no evidence of infection/dehiscence
3. Afebrile
4. Pain controlled with oral analgesia
5. No requirement for intravenous support
6. Balanced diuresis
7. Mobility allowing for completion of required daily activities

Data was collected using Microsoft Excel (Microsoft ® Excel for Mac, Version 15.28. Redmond, Washington, United States). All data was collected by healthcare professionals and was anonymised. The significance of: BMI, ASA grade, a diagnosis of diabetes and the day of the week the operation occurred, on post-operative stay was evaluated using Kruskal Wallis analysis. Post hoc analysis was done with Mann-Whitney testing. Statistics was performed using SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, New York: IBM Corp.) The threshold for statistical significance was 0.05.

Results

The median length of stay following a SG was 2 [2,3], this was unaffected by: operation day (P=0.245) **Table 1** , ASA grade (p=0.143), a pre-operative diagnosis of diabetes (p=0.805) and BMI (P=0.345) **Table 2** . There was nil peri-operative mortality.

The median length of stay following a RNY was 2[2,3], this was unaffected by: ASA grade (p=0.952) or the patient being diabetic (P=0.366). However, day of the week significantly increased length of stay (**Table 3**) with patients who underwent a RNY on Friday staying on average 1 day more compared (p=0.002). Patient's with a BMI >60 who underwent a RNY stayed an average of 2 days more than patients with a BMI between 30 and 59.9 (P=0.008) (**Table 4**).

Readmission rates (30 and 60-day) were similar between the two operations. 30-day readmission rates were 6 SG patients and 7 RNY patients. 60-day readmission rates were 6 and 9 respectively.

Discussion:

The median length of stay for either a SG or a RNY surgery was 2 days. Length of stay in patients undergoing a laparoscopic sleeve gastrectomy was unaffected by the day of the week the operation occurred or the BMI, ASA grade and diabetic status of the patient. However, in patients who underwent a Roux-en-Y gastric bypass, being operated on a Friday or having a BMI > 60 resulted in an increased length of stay of 1 and 2 days respectively.

Readmission following a laparoscopic sleeve gastrectomy and Roux-en-y gastric by-pass occurred in 13 (6%) of patients within 30 days and 15 (7%) of patients within 60 days. The commonest reasons for readmission were pain and vomiting. These rates are consistent with the literature.⁽⁷⁾

The association between extremes of BMI (either very high or very low) and post-operative complication rates has previously been described in the literature.^(8, 9) In our study, we found that patient with a BMI >60 had an increased post-operative length of stay independent of other factors measured. These patients are likely to have excessive subcutaneous fat around wound sites, which is known to contribute to impaired wound healing due to increased oxidative stress⁽¹⁰⁾. A higher BMI may be associated with a technically difficult surgery or a surgery which involves a longer operating time and therefore more complications relating to anaesthesia. Data on the reason for increased length of stay was not recorded during this study.

Decreased functional status has been associated with an increased length of stay in patients undergoing bariatric procedures.⁽¹¹⁾ Our study, using ASA grades as a marker of functional status found no such association. A limitation in our study certainly is the potential for a type I error, due to there being very few number of patients in ASA grades I and II due to the natural cohort of the selected patient population. There does exist more accurate measures of functional status- disability indexes, ability to performed a pre-determined task such as climb a specific number of stairs.⁽¹²⁾ These could have proven more beneficial in this study.

Bariatric surgery has been shown to be beneficial in patients with metabolic syndrome, particularly in in their glycaemic control.⁽¹³⁾ In fact, RYGB has been shown to attenuate the clinical effects of DM to a larger extent than just medical management.⁽¹⁴⁾ This is in large part due to the amount of weight lost. Post-op optimization of their diabetic control can naturally add to their length of stay. Our study did not find this to be true however. Our study was limited in this regard as only a diagnosis of diabetes was established, whereas data on glycaemic control pre-and post op would have been of huge benefit.

In our study, we found that patients who underwent a Roux-en-Y gastric bypass on a Friday ended up staying a day longer than those operated on another day. There are a multitude of factors to explain this: Weekend discharges at this institution were led by the specialist registrars (SpR) of varying experience levels and exposure to bariatric surgery. On retrospect, it was discovered that many were unfamiliar with the specific discharge criteria for bariatric patients. This leads to a reluctance to discharge patients over the weekend. Therefore, patients operated on a Friday inevitably end up staying an extra day to be reviewed by a bariatric consultant during the weekday rather than being discharged over the weekend.

The complex nature of bariatric patients requires a multi-disciplinary team approach to achieve holistic care. This is not limited to bariatric surgeons, anaesthetists, specialist nurses, psychologists, psychiatrists, endocrinologists, radiologists, metabolic physicians, pharmacists, physiotherapy and occupational therapy teams.⁽¹⁵⁾ All of these services are not readily available over the weekend and could account for the delay in discharge.

Patient confidence was also a key contributor to going home on a weekday compared to the weekend. Being a central London teaching hospital means that logistical reasons involving transportation home over the weekend could decrease patient's confidence in successfully going home. Follow-up at home is also only arranged during the weekdays, and thus patients are much more reluctant to go home over the weekend knowing that they could potentially be left without support at home until the Monday.

What was interesting was that our study found that patients undergoing a sleeve gastrectomy all had a similar length of hospital stay irrespective of their BMI or what day of the week they were operated on. The 30-day complication rates are greater with the bypass surgery when compared to the sleeve gastrectomy, with primary complications including infections and haemorrhage.⁽¹⁶⁾ This creates a natural tendency to be overly cautious with these group of patients over the weekend when ward cover is limited and could account for our findings.

Our study examines a single surgeon's operating lists over a 3-year period. A potential selectability bias could exist in picking more complicated patients for a list where there is more staffing to cover for any complications. This could skew the significance of our operating day outcomes.

Identifying some of the issues raised in our study raises the possibility for multiple future avenues: A stricter protocol can be created to easily facilitate weekend discharges in particular. To help identify why some weekend bariatric discharges are delayed, a survey can be created and distributed to junior registrars with the aim of increasing their confidence in managing these patients post-op and in identifying when they are appropriate and safe for discharge. Examining glycaemic control can help better identify diabetes plays a role in the length of stay of these patients. 6 monthly follow-up rates is naturally where this study could be headed to determine whether length of stay had any significant outcome on long-term outcomes.

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