

Postoperative Reduced Oral Feeding Can Increase Readmission Post Bariatric Surgery

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ABSTRACT

Objectives: Laparoscopic bariatric techniques and improved postoperative recovery regimens have reduced hospital stay; some patients continue to have prolonged admission for various reasons. This paper explores Objectives: whether postoperative oral feeding is a potential risk factor for lengthened hospitalization and readmission.

Methods: A prospective, double blinded, randomized investigation of 250 postoperative patients at King Hussein Hospital, King Hussein Medical City, Amman, Jordan, during the period March 2019-September 2021. Subjects (155 women and 95 men, aged 31-49, with an average of 36 years) were managed for morbid obesity, and were assigned to laparoscopic sleeve gastrectomy (LSG) or laparoscopic Roux-en-Y gastric bypass (LRYGB) groups. Subjects with perioperative hazards and previous bariatric techniques were ruled out. Early oral feeding with light hospital diet on the first day after surgery and full hospital diet in the second day after surgery were encouraged included subjects with hospital admission (3 days) and group II included subjects with (>3 days) readmission spanned 30days after surgery. Univariate and multivariate logistic regression were used to evaluate effect induced parameters on lengthened hospital admission and readmissions.

Results: The average period of hospitalization was 3 (2–4) days of hospital admission(HD), more days were recorded in 75/250 (30%) subjects: 40/150 (26.7%) LSG, and 35/100 (35%) LRYGB (P < 0.005). Reduced postoperative oral feeding lengthened hospitalization, and increased readmission risk. Readmission incidence was 6% (15/250 readmissions): 6/150 (4%) LSG, and 9/100 (9%) LRYGB (P > 0.05).

Conclusion: Reduced oral feeding is a risk factor for lengthened hospitalization and readmission.

Keywords: Bariatric; Readmission; oral feeding.

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Introduction

Bariatric surgery is the most efficient method for patients with obesity to attain substantial long-standing weight reduction, and it is correlated with a reduction of obesity-induced co-diseases. Laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass (LRYGB) are used for bariatric surgery in morbid obesity cases, with decreased risk for morbidity after surgery compared to alternative surgical techniques ⁽¹⁾.

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Although postoperative improved recovery regimens, minimized morbidity ⁽²⁾, some subjects do not meet discharge criteria and remain hospitalized longer than expected for such surgical patients. Lower .HD is correlated with a higher incidence of readmission, as well as increased costs for health systems and service users ⁽³⁾.

There is a strong link between perioperative hazards and lengthened HD. Risk factors for lengthened HD and readmission should be determined to anticipate subjects who could need more hospital period admission. Although bariatric techniques are safe, a small proportion of patients have a major side event during the first postoperative month resulting in costly hospital readmissions. Readmission rates for bariatric surgery patients range between 0.6% to 11.3% in various contexts. In 2008, the US National Quality Forum identified hospital readmission as a central concern in the assessment of hospital performance ⁽⁴⁾. It is important to identify factors anticipating readmission in order to improve patient outcomes and decrease health system costs.

The goal of this investigation is to determine risk factors for lengthened HD and unscheduled readmission for postoperative patients after uncomplicated bariatric surgery.

Methods

This prospective, double-blinded, randomized investigation included 250 subjects assigned for bariatric surgery, after obtaining written informed consent from all participants and obtaining approval from the local ethical research board review committee of the Jordanian Royal Medical Services. Subjects were assigned to LSG or LRYGB groups. They were aged 31-49 years with an average age of 36. They included 155 women and 95 men who received surgery at King Hussein Hospital, King Hussein Medical City, Amman, Jordan, during the period March 2019-September 2021 (**Table I**).

Table I: Demographic characteristics.

Variable	N (%)
Total study group	250 (100)
Female	155 (62)
Male	95 (38)
Average age(yrs.)range	36(31-49)
Average BMI(kg/m ²)	47.2(45.1-49.3)

Included patients underwent bariatric surgery if their body mass index was more than 35 kg/m² and they did not have co-morbidities (as per IFSO-EC and EASO guidelines) ⁽⁴⁾. Subjects with perioperative hazards and previous bariatric techniques were ruled out from participating in this study.

Subjects were managed in terms of multimodal postoperative improved recovery regimen ^(1,2,5). Early feeding was encouraged after surgery. Balanced intravenous fluid (IV) (less than 2.5 L on the day of operation) was encouraged in cases of vomiting, inadequate oral feeding (less than 0.5L, 6 hrs. postoperatively) or inadequate diuresis (less than 0.5 L of urine, 6 hrs. postoperatively). Early feeding

with light hospital diet on the first day after surgery and full hospital diet the second day after surgery were encouraged.

On admission, all subjects were briefed on the proposed HD of 3 days. Discharge criteria included oral diet tolerance (solid food and drinking minimum of 1.5 L), no requirement for IV, and balanced diuresis. Postoperative oral feeding as a potential risk factor of lengthened HD and readmission was determined in subjects with no hazards. HD included from the day of admission to the day of discharge. Subjects were divided into two groups: group I, with hospital admission less or equal to the proposed HD (less than or equal to 3 days); and group II, with subjects with a lengthened HD (3 days or more). Readmission was monitored for those readmitted after discharge during 30 days following surgery.

Student's t or Mann-Whitney's test were used for quantitative parameters, and χ^2 was used for qualitative parameters. Univariate and multivariate logistic regression were used to evaluate effect induced parameters on lengthened hospital admission and readmissions. A P value of less than 0.05 was considered statistically significant.

Table II Study group analysis.

Bariatric surgery	LSG	LRYGB	
No.	150	100	
Hospitalization more than 3 days	40	35	0.01
Hospitalization less than 3 days	110	65	
Readmission (N)	6	9	0.000

Results

The average HD was 3 days, ranging from 2-4. Average HD of more than 3 days was recorded for 75/250 (30%) subjects, of whom 40/150 had received LSG (26.7%), and 35/100 had received LRYGB (35%) ($P < 0.005$). Factors lengthening HD were investigated in univariate logistic regression. BMI more than 49.30 kg/m^2 , LRYGB, increased volume of infused fluids during and after surgery, low oral fluid intake, and diuresis after surgery were highly associated with the risk of lengthened HD, These factors were investigated in multivariate logistic regression (**Table III**).

Reduced oral feeding and increased IV infused on the day of surgery were found to lengthen HD. The readmission incidence was 6% (15/250 readmissions), of whom 6/150 subjects had received LSG (4%), and 9/100 had received LRYGB (9%) ($P > 0.05$) (Table IV). Univariate logistic regression showed an impact of volume infused fluids during and after surgery, oral feeding after surgery and lengthened HD (more than 3 days) on the risk of hospital readmission (**Table III**). Multivariate logistic regression demonstrated an effect of reduced oral feeding on the day of surgery on the risk of hospital readmission (**Table III**).

Table III: Univariate and multivariate logistic regression of hospitalization duration.

	Factor	Beta	P (Univariate)	P (multivariate)
Subject	Gender	0.016	0.889	0.350
	Age	-0.08	0.570	
	BMI (more or less than 49.30 kg/m ²)	-0.140	0.002	
Bariatric surgery	Type	0.135	0.001	0.278
	Surgical duration (more or less than 165 min.)	0.228	0.002	0.115
	Fluid volume infused during surgery	-0.140	0.000	0.08
	Oral feeding on day of operation	0.500	0.025	0.003
	Oral feeding on day 1		<0.005	
	Oral feeding on day 2		<0.005	
	Oral feeding on day 3		>0.05	
	Nausea and vomiting		<0.05	

Table IV: Readmissions analysis.

	LSG	LRYGB
Operation site hernia	1 (0.7%)	2 (2%)
Cholecystitis	1 (0.7%)	2 (2%)
Gastroesophageal reflux disease	2 (1.3%)	
Fever of undetermined origin	1 (0.7%)	
Chronic diarrhea	1 (0.7%)	
Suspected ileus		
Perforated gastric ulcer		1 (1%)
GI bleeding		2 (2%)
Perianal abscess		1 (1%)
Lower abdomen pain		1 (1%)
Overall	6/150 (4%)	9/100 (9%)

Table V: Univariate and multivariate logistic regression of factors of hospital readmission.

Factor		Beta	P (Univariate)	P (multivariate)
Subject	Gender	-0.002	0.901	0.750
	Age (more or less than 47 yrs.)	-0.087	0.758	
	BMI (more or less than 49.30 kg/m ²)	-0.105	0.582	
Bariatric surgery	Type	0.111	0.113	
	Surgical duration (more or less than 165 min.)	-0.432	0.000	
	Fluid volume infused during surgery	0.331	0.02	
After surgery	Oral feeding on day of operation	0.500	0.000	0.001
	Oral feeding on day 1	0.015	0.930	0.289
	Oral feeding on day 2	0.012	0.959	0.966
	Oral feeding on day 3	0.014	0.943	0.970
	Nausea and vomiting	0.101	0.200	0.350
	Lengthened hospitalization duration (more or less than 3 days)	0.09	0.357	0.555

Discussion

The goal of this study (as well as the healthcare services provided to participants as postoperative patients) was to recognize risk factors of lengthened HD. We tried to discharge the subjects as soon as they gained complete functional recovery. With every 100 ml of oral feeding on day of operation, the risk for lengthened HD was reduced by 23% ⁽⁶⁾. Increased oral feeding on day of operation was a protective factor reducing risk of readmission 0.54 times ⁽⁶⁾. The period of admission differs between bariatric institutes because of discrepancies in perioperative and discharge criteria. A study of LRYGB reported that the average period of hospitalization was 2 days, whereas 26% of subjects needed or more ⁽⁷⁾. 48% of bariatric subjects were discharged by day 1 after surgery, 85% by day 2, and 96% by day 3 ⁽⁸⁾. HD of more than 3 days is generally considered lengthened (as in this study) ⁽⁹⁻¹¹⁾.

Bariatric techniques are performed as a fast-track surgery with more therapeutic actions during one-day hospital admission (12). Hospital admission was scheduled for 3 days, and subjects followed the unit criteria for discharge (comparison between various bariatric units is difficult due to qualitative discrepancies). The total readmission incidence following bariatric surgery was 5.7% (9), and total 30-day readmission incidence following LSG or LRYGB was 5.1% (13). Readmission incidences following these two techniques vary widely, between 1.87 and 14.16% (8,14,15). Most previous studies reported more frequent readmissions following LRYGB in comparison to LSG (13-16), but other data suggest more frequent readmissions following LSG (9). In our investigation, the total readmission incidence was approximately 6%. Factors correlated with lengthened period of hospitalization included age, increased BMI, male gender, comorbidities, and surgical duration ^(8,17). None of the demographic factors were significantly associated with HD risk. A previous study found that demographic factors were not associated with longer admission following gastric by-pass ⁽⁷⁾. In this investigation, LRYGB was not significantly associated with lengthened HD compared to LSG, affirming previous research ⁽¹⁸⁾. Many

studies found that longer surgical duration was correlated with increased risk of lengthened HD ^(7-8,10), but the multivariate analysis in our investigation showed that it actually reduced this risk. The volume of IV infused during laparoscopic bariatric surgery significantly affects HD, with lower volumes being correlated with HD ⁽⁶⁾. Subjects in our investigation who needed increased IV during surgery were more liable to longer admission, but not in the multivariate study. In this investigation, reduced oral feeding after surgery on the day of operation was highly correlated with lengthened HD.

There are important associations between some patient-related factors and increased risk of readmission ^(11,13,16,17). Previous studies have found that managing subjects with improved recovery is linked to moderately reduced risk of postoperative readmissions ^(2,5,19,21), and that BMI is not an anticipator of readmission ^(16,20), while readmissions are higher following LRYGB compared to LSG ⁽¹³⁾. Subjects who had LRYGB experienced 60% more risk of readmission in the 30-day after surgery than those who had LSG, while surgical duration increased risk of readmission ⁽¹⁶⁾. In this investigation, multivariate study demonstrated that the independent impact of oral feeding on the day of operation is correlated with readmission risk. One of the most frequent causes of readmission following bariatric surgery is nausea/vomiting (12.95%) ⁽¹⁵⁾, and the reduced volume of oral feeding is a risk factor of readmission. In subjects with HD of more than 3 days, the risk of readmission was more than in one-day admission ^(8,9). Longer HD was an anticipator of readmission ⁽⁶⁾. In this investigation, subjects with lengthened HD (more than 3 days) were more likely to be readmitted than with subjects with HD of less than 3 days only in the univariate study. The factors increasing the risk of readmission are correlated with first 1-2 days following the surgery.

Conclusion

Reduced oral feeding and requirement of high intravenous fluid infusion on the day of operation are potential risk factors of lengthened HD. More oral feeding on the day of operation is correlated with less risk for readmission.

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