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How soon do we achieve glycemic control after bariatric surgery? A comparative study among laparoscopic sleeve gastrectomy, mini gastric bypass, and diverted sleeve gastrectomy with ileal transposition

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Background

Type 2 diabetes mellitus became a global problem during recent decades, and unfortunately medical treatment fails to provide adequate control in many obese diabetics.

We aimed to perform a prospective comparative cohort study to investigate how soon patients achieve glycemic control after three different surgical options [sleeve gastrectomy (SG), mini-gastric bypass (MGB), diverted sleeve gastrectomy with ileal transposition (DSIT)] within the first 30 days postoperatively.

Methods

Medical charts of 251 obese, type 2 diabetic patients with a mean age of 52.84±8.52 were used to assess daily changes in weight and plasma glucose levels. Patients had a mean diabetic duration of 13.09±7.54 years, mean HbA1c of 8.82±1.58%, and a mean BMI of 36.04±5.76 kg/m². Surgery types consisted of SG (n=49), MGB (n=93) and DSIT (n=109). Primary end point was the day of mean fasting plasma glucose levels reaching below 126 mg/dl within 30 days after surgery.

Results

In the morning of surgery, mean fasting plasma glucose levels was 177.63±51.3 mg/dl, while on the 30th day, it was 131.35±28.7 mg/dl (p<0.05). According to the type of surgery, SG group did not achieve a mean plasma glucose level<126 mg/dl within the first 30 days, postoperatively. Mean plasma glucose level reaching < 126 mg/dl was achieved on day 29 for DSIT (124.36±20.21 mg/dl) and on day 30 for MGB (123.61±22.51 mg/dl).

Table 1: Type of medications used in all groups before surgery

Medication	DSIT (n= 109)	SG (n= 49)	MGB (n= 93)
OAD only	21 (19.2%)	28 (57.1%)	17 (18.3%)
Insulin only	17 (15.6%)	4 (8.2%)	9 (9.7%)
OAD + insulin	71(65.2%)	17 (34.7%)	67 (72%)

DSIT = Diverted sleeve gastrectomy with ileal transposition; SG = Sleeve gastrectomy; MGB = Mini-gastric bypass.

80.8% of patients in DSIT, 42.9% of patients in SG, and 81.7% of patients in MGB group were using insulin with/without oral antidiabetics (OAD) (p<0.001 for SG vs. MGB and DSIT, p=0.426 for DSIT vs. MGB). Note: 1 patient in the DSIT, and 4 patients in the MGB group were using OAD + insulin + GLP-1 analogue (Liraglutide).

Conclusion

We observed differences in glycemic control following different types of surgery within the first 30 postoperative days. Patients in the SG group did not achieve a mean plasma glucose level<126 mg/dl. Mean fasting plasma glucose levels<126 mg/dl were achieved on day 29 for DSIT and on day 30 for the MGB. Multivariate logistic regression analysis identified preoperative BMI and postprandial C-peptide level as independent predictors of postoperative glycemic control in the DSIT group.

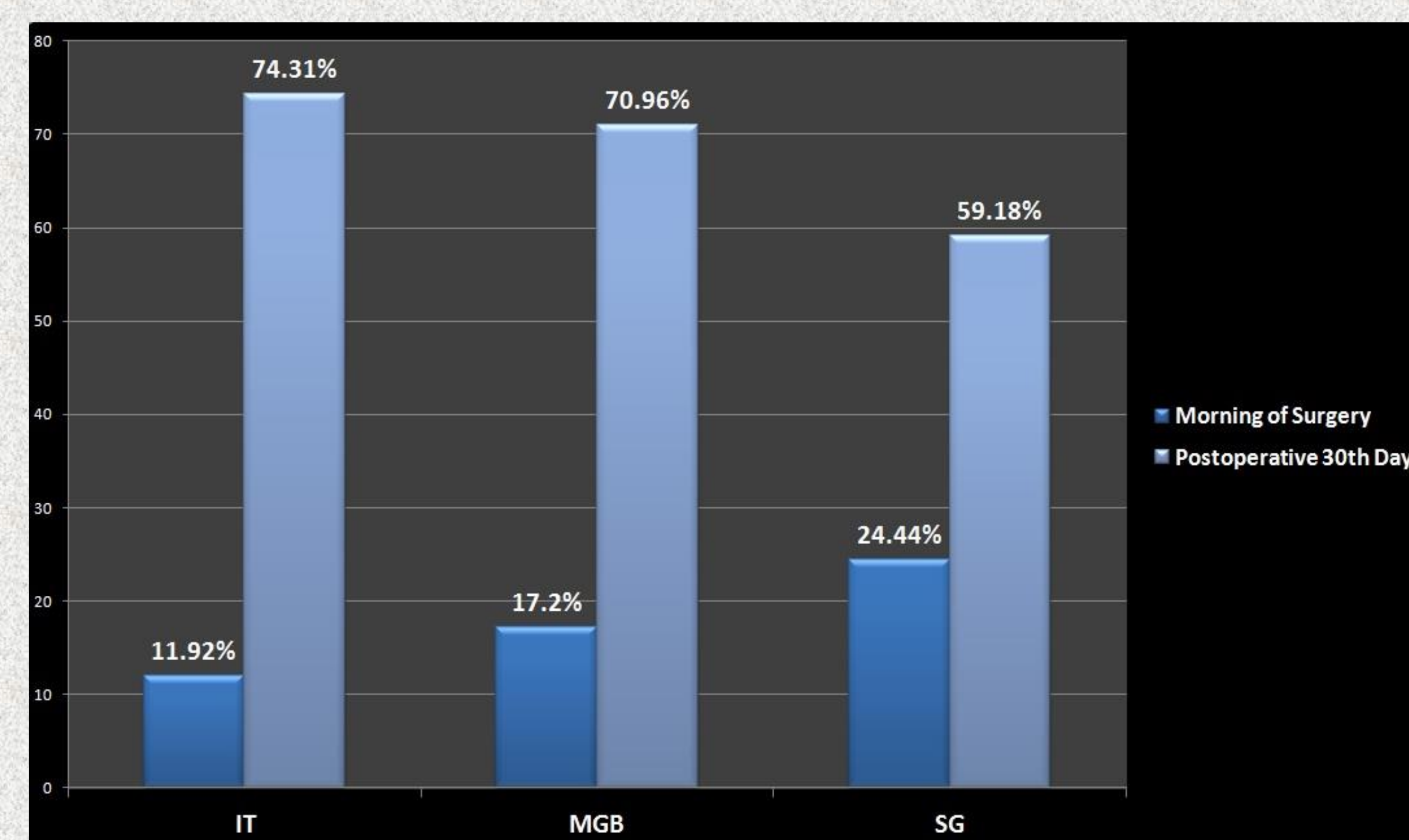


Figure 1: Percentage of patients who achieved normoglycemia (blood glucose level ≤ 126 mg/dL) with different surgical modalities. Patients treated by DSIT had the highest rate of glycemic improvement, followed by MGB and SG.

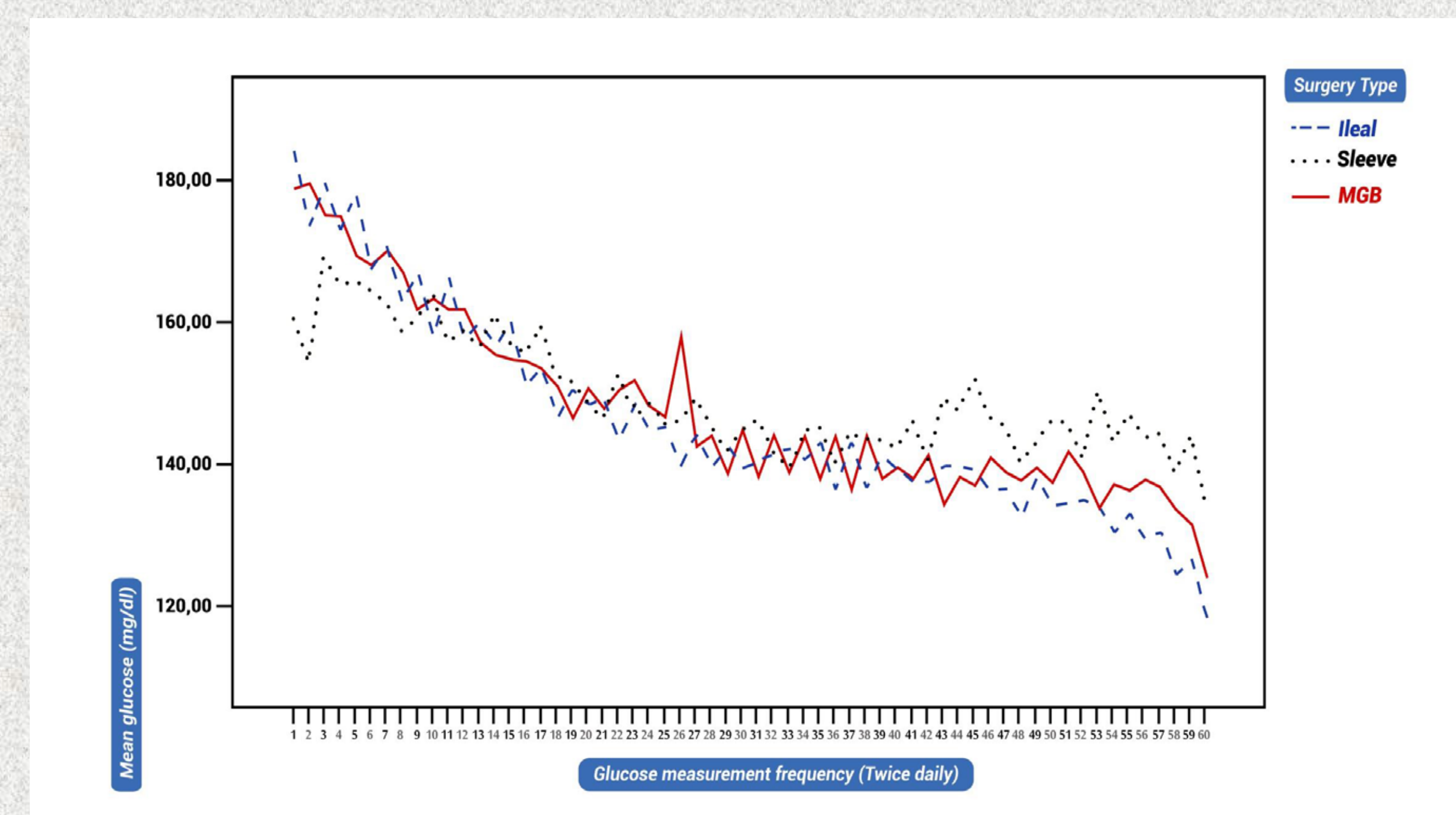


Figure 2: Graphical demonstration of blood glucose levels in all groups. Duplicate measures per day were obtained in all groups. Glucose levels were significantly lower in the SG compared to DSIT and MGB groups (SG, 161.82 ± 44.2 mg/dL; DSIT, 183.97 ± 47.39 mg/dL; MGB, 178.52 ± 57.58 mg/dL) on postoperative Day 1. Starting from day 27, DSIT and MGB groups experienced significantly lower glucose levels compared to the SG group. Within the first 30 days, the DSIT and MGB groups had mean glucose levels <126 mg/dL. Group effect: p=0.828; Time effect: p<0.001; Group x Time effect: p<0.001. Repeated measures ANOVA.

Keywords

Bariatric surgery; glycemic control; sleeve gastrectomy; mini-gastric bypass; diverted sleeve gastrectomy with ileal transposition.

