

Post-operative nausea and vomiting in bariatric patients undergoing laparoscopic sleeve gastrectomy



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Background

Studies have shown the incidence of postoperative nausea and vomiting (PONV) in patients undergoing bariatric surgeries was very high in spite of pharmacological prophylaxis or adjustment of anesthetics. Nevertheless, evidence has indicated goal-directed fluid therapy (GDFT) improves outcomes including PONV in major abdominal surgeries. The aim of our study is to investigate the effect of GDFT on reducing the incidence of PONV in patients undergoing laparoscopic sleeve gastrectomy (LSG).

Material and Methods

Patient's enrollment:

1. BMI>40, or BMI >35 with metabolic syndromes
2. NPO for 8 hours
3. Exclusion criteria were age <20 or >65 years-old, or comorbid with major organs' dysfunction

Participants were randomized to 3 groups: control group, GDFT-HES (GH) group and GDFT-Lactate Ringer (GL) group.

Study protocol:

An non-invasive hemodynamic monitor (ClearSight™) was applied in GDFT groups for evaluation of stroke volume variation (SVV), and the strategy of intraoperative fluid management for GDFT groups was followed as the flow-chart below.

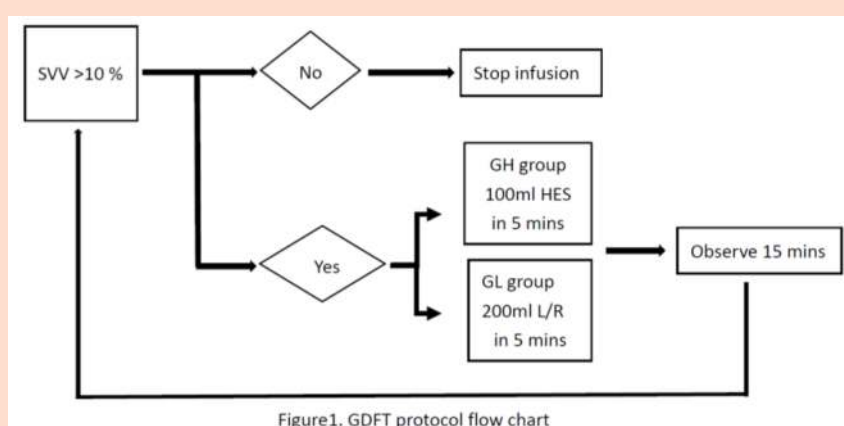


Figure 1. GDFT protocol flow chart

For control group, the total infused volume was lean body mass-based 4-2-1 rule for 8h fluid deficit plus Lactate Ringer 4 ml/kg/h during the surgical period. PONV was evaluated by a standardized questionnaire at 0min, 30min, 1h, 24h and 48h after the surgery with numeric rating score from 0 to 10.

Results

Variables	GL	GH	Control	p-value
N	13	18	16	
Demographics, mean (sd)				
Male, n (%)	7 (53.85)	11 (61.11)	9 (56.25)	0.915
Age (years)	32.54 (7.02)	33.56 (7.66)	28.69 (6.76)	0.136
BMI (kg/m ²)	40.59 (6.34)	42.56 (5.16)	41.16 (5.21)	0.588
Weight (kg)	117.25 (21.82)	120.63 (20.89)	118.65 (21.92)	0.908
LBM (kg)	66.74 (12.30)	60.92 (10.21)	67.06 (14.16)	0.274
Comorbidities, n (%)				
HTN	7 (53.85)	8 (44.44)	4 (25.0)	0.263
DM	2 (15.38)	8 (44.44)	4 (25.0)	0.206
Hyperlipidemia	6 (46.15)	14 (77.78)	14 (87.5)	0.052
OSA	1 (7.69)	1 (5.56)	3 (18.75)	0.499
Surgery conditions				
ASA, n (%)				0.031
2	0 (0)	4 (22.22)	0 (0)	
3	13 (100)	14 (77.78)	16 (100)	
PONV score, n (%)				
1	3 (23.08)	5 (27.78)	6 (37.50)	0.536
2	6 (46.15)	6 (33.33)	2 (12.50)	
3	4 (30.77)	6 (33.33)	6 (37.50)	
4	0 (0)	1 (5.56)	2 (12.50)	
Vasopressor use, n (%)	7 (53.85)	4 (22.22)	6 (37.50)	0.193
Total surgical time (minutes), mean (sd)	184.15 (33.38)	191.89 (22.87)	187.25 (26.38)	0.730
Total fluid (ml), mean (sd)	1602.31 (368.88)	883.33 (222.29)	1687.56 (286.22)	<0.001
Post-operation medication, mean (sd)				
Analgesics use, n (%)	12 (92.31)	17 (94.44)	15 (93.75)	1.000
Antiemetic prescription, n (%)	3 (23.08)	8 (44.44)	2 (12.50)	0.112

Table 1. Descriptive statistics in the GL, GH, and Control groups. The patient characteristics among three groups were similar. The intra-op infused volume in GH group was much less compared with either GL or control group. ($p < 0.001$) Abbreviation: LBM, lean body mass; HTN, hypertension; DM, diabetes mellitus; OSA, obstructive sleep apnea; ASA, American Society of Anesthesiologists Classification. (*Bold text of p-value indicates a statistically significant difference with a p-value less than 0.05.)

Variables	GL	GH	Control	p-value
	Median (IQR)			
PONV assessed after operation (score)				
0 minute	0 (0, 5)	0 (0, 4)	1.5 (0, 6.5)	0.577
30 minutes	0 (0, 2)	3 (0, 5)	1.5 (0, 4.5)	0.192
1 hour	0 (0, 0)	3 (0, 4)	1 (0, 3)	0.203
24 hours	0 (0, 0)	3 (1, 4)	0 (0, 2.5)	0.003
48 hours	0 (0, 0)	0 (0, 0)	0 (0, 0)	0.367

Table 2. PONV score assessment after operation 0min, 30min, 1h, 24h, and 48h among GL, GH, and Control groups. Among these 3 groups, no significant difference in PONV score was observed at all time points except post-operative 24h.

Group	GL	GH	Control	p-value
GL	-	0.001	0.196	
GH	0.001	-	0.036	
Control	0.196	0.036	-	

Table 3. Detail analysis following table 2 among GL, GH, and control group in PONV score assessed at post-op 24h. The data showed there was no difference between GL and control group. However, PONV score was higher in GH group compared with either GL or control group.

Discussion

Surprisingly, there was no difference in intra-op infused volume between GL group and control group, thus no difference in the incidence of PONV was observed at all time points. It was speculated that LSG is a relatively hemodynamically-stable surgery without massive hemorrhage or intravascular volume shifting. The surgical duration is usually 2 to 3 hours by an experienced surgeon. The diversity of intra-op volume status will not present between GDFT and weight-based fluid strategy. It is to be noticed, on the basis of GDFT, participants in GH group were more subjected to PONV at post-op 24h compared with those in GL group. Hydroxyethyl starch (HES) had been reported the effect of degradation of endothelial glycocalyx and increase of intestinal capillary permeability. We hypothesize intra-op HES infusion would lead to disturbance of intestinal peristalsis and increase the incidence of PONV following intestinal edema caused by intestinal endothelial damage.

Summary

There is no significant benefit using GDFT to decrease PONV with intra-op crystalloid infusion by using the fluid strategies in our study protocol. Modification of GDFT parameters will be needed to determine its effect in this surgical population. In addition, PONV rate will be higher with intra-op colloid infusion for GDFT during LSG because of potential pathologic jeopardy in vascular endothelium of gastrointestinal tract. Further investigation should be carried out to elucidate the mechanism.