DOI: 10.21608/ASJS.2023.285750

Port Sharing Vs. Only Sleeve Ports for Concomitant Laparoscopic Sleeve Gastrectomy and Cholecystectomy

Ahmed M. Farag, MD; Ehab Mohammed Ali Fadl, MD; Mohamed Abdel Wahed, MD
Department of General Surgery, Faculty of Medicine, Ain Shams University, Egypt

Background: Conventional trocar placement of combined operations are different, and this may cause visual and procedural difficulties. Combined laparoscopic resections improve rapid recovery, cosmoses and avoid multiple hospital admissions. Some reports on concomitant laparoscopic operations necessitates insertion of extra ports and others not.

Patients and methods: This is a randomized controlled trial involved 78 obese patients with cholecystolithiasis admitted to Ain Shams University Hospitals and Family Hospitals. Computer based randomization were used for randomization into 2 groups, Group A (39 patients) we did port-sharing technique for LC and LSG. Group B (39 patients) underwent LC and LSG from the conventional Sleeve 4 ports distribution.

Results: There was a statistically highly significant difference between both groups as regard mean operative time with longer mean operative time among group 2 cases. Although sleeve operative time was statistically insignificant between both groups cholecystectomy time was statistically significant. However, there was statistically significant difference between both groups as regard insertion of extra ports due to failure to achieve critical view of safety which is also statistically significant. No patients required conversion to laparotomy in both groups. There is no statistically significant difference between both groups according to other operative or post-operative data.

Conclusion: Port sharing technique for both LC and LSG is easier, faster and preferred than using only sleeve ports for both procedures that may cause visual and procedural difficulties with shorter operative time for both procedures and with no need to insert extra ports.

Key words: Port sharing, combined, critical view and cholecystectomy.

Introduction/ Review

The incidence of cholelithiasis is 45% in obese patients .The prevalence is nearly twofold higher by histologic examination after LC.[1]

Prevalence of complications like cholecystitis, obstructive jaundice, and pancreatitis is also higher.[2]

combined laparoscopic resections can reduce postoperative pain, promote rapid recovery, improve cosmesis, and avoid multiple hospital admissions for secondary surgeries.[3-5]

Some reports on concomitant laparoscopic operations necessitates insertion of extra ports and others not.[3-5]

Although no clear data or reports about concomitant LC with LSG in Egypt, reports shows that concomitant LC and LSG is not common in Japan and USA (Only 2% of patients in USA undergoing LSG and concomitant LC).[6,7]

Studies found that concomitant LC and LSG is safe with no higher risks of complications than LSG alone.[7]

Others reported that although increased operative time for combined procedures hospital stay or complication rates did not increased.[6,8,9]

LC during LSG is a good option for obese patients with cholelithiasis. No serious complications were encountered.[10]

Conventional trocar placement of combined operations are different, and this may cause visual and procedural difficulties. Some reports show that using separate ports for each intervention is preferred, others reported that using one port distribution for multiple interventions is preferred, others reported that doing interventions in separate operations is safer and preferred.[11-13]

Aim/ Objectives

The aim of our study is to compare between port sharing concomitant laparoscopic cholecystectomy and sleeve gastrectomy with sharing of their ports and concomitant laparoscopic sleeve gastrectomy and cholecystectomy from only conventional ports of sleeve gastrectomy.

Patients and methods

This is a randomized controlled trial (RCT) involved 78 obese patients with cholecystolithiasis admitted to Ain Shams University Hospitals and Family Hospitals (all patients met the inclusion criteria in the study duration started from January 2020 till June 2021 were included). Patients were randomized into 2 groups by computer based randomization, Group A (39 patients) port-sharing technique for LC followed by LSG was done, using the LSG trocar arrangement and one additional trocar. Group B (39 patients) laparoscopic cholecystectomy followed by sleeve gastrectomy from the conventional Sleeve gastrectomy 4 ports distribution with a liver retractor.

Inclusion criteria

We included obese male or female patients with asymptomatic or symptomatic cholecystolithiasis aging from 18 to 60 years with BMI more than 35 or more than 30 with comorbidities.

Exclusion criteria

We excluded from the study patients with previous abdominal or bariatric surgeries, when laparoscopic procedure is converted to open surgery, acute cholecystities or previous attack of it (As we may consider separate intervention for both procedures).

Technique

Operative technique of Laparoscopic sleeve gastrectomy: The patient was positioned in French position .Pneumoperitoneum was established at 11 or 14mmHg using Visiport. Other ports are placed under direct visualization as required according to establish feasible and comfortable ergonomics.

In group 1 we start cholecystectomy from the conventional port of cholecystectomy followed by sleeve gastrectomy.

Pneumoperitoneum was created using a Visiport™ in the midline in the supra umbilical region, trocars were inserted in the epigastric region, right lateral abdomen (Anterior axillary line), right upper abdomen (Mid clavicular line), left upper abdomen (Mid clavicular line), and left lateral abdomen(anterior axillary line) **(Fig. 1).**

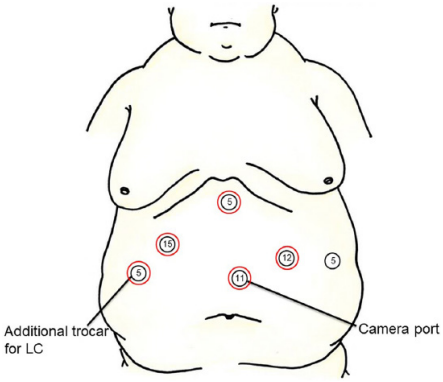


Fig 1: Diagram showing port sharing technique (Ports distribution for both cholecystectomy and sleeve gastrectomy).

The LC was performed first after achieving critical view of safety. Trocar in the epigastrium was replaced with a liver retractor (Nathanson hook liver retractor, Automated Medical Products Corp, Edison, NJ, USA) in the different direction to retract the left lobe of the liver **(Figs. 2,3).** After completing LSG, resected stomach and the gall bladder were retrieved through the right upper abdominal port (Mid-clavicular line) **(Figs. 2,3).**

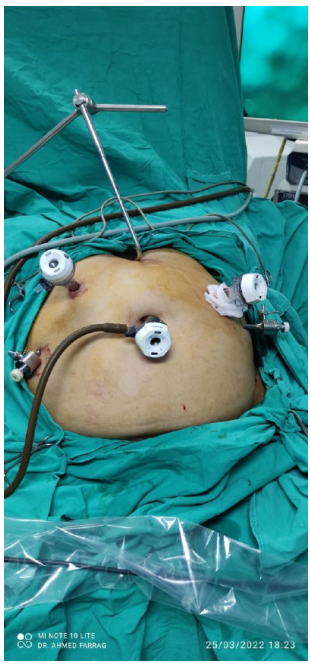
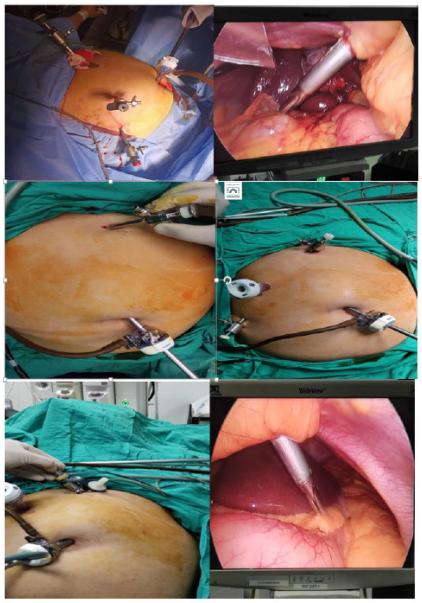


Fig 2: Port sharing technique (Ports distribution for both cholecystectomy and sleeve gastrectomy).



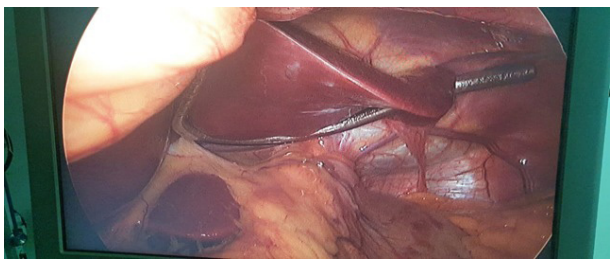


Fig 3: Sequence of insertion of ports for port sharing technique.

In group 2 we start with cholecystectomy followed by sleeve gastrectomy from only sleeve ports **(Fig. 4).**

Fig 4: Pneumoperitoneum and 4 ports inserted with a liver retractor.

we perform sleeve gastrectomy after cholecystectomy from only the conventional ports of sleeve gastrectomy and a liver retractor (Pneumoperitoneum was created using a Visiport™ in the midline in the supra umbilical region, trocars were inserted in the epigastric region for insersion of a liver retractor, , right upper abdomen (Mid clavicular line), left upper abdomen (Mid clavicular line), and left lateral abdomen(Anterior axillary line) and one 5-mm trocar at left lateral abdomen anterior axillary line, actually longer devices was often needed to reach the surgical site for both procedures in this group.

All surgeries were performed by the same well trained experienced surgical team and we compare in our study between both groups as regard personal and medical characteristics , operative data (Operative time, failure to achieve critical view of safety, need to insert extra ports, intra-operative complications) and post-operative data (Hospital stay, drained fluids, port site infection and post-operative pain). Same anelgesics type, dose and duration offered to both groups . Pain scores were evaluated by qualified well trained residents for Post-operative pain scores. We recorded on visual analogue scale (VAS score), with 0 being the least possible score and 10 the highest possible score. Post-operative pain was classified as, No pain (VAS score 0), Mild pain (VAS score 1-3), Moderate pain (VAS score 4-6) and Severe pain (VAS score >6).

Results

78 obese patients with cholecystolithiasis underwent cholecystectomy and sleeve gastrectomy , Patients were randomized into 2 groups by computer based randomization, Group A (39 patients) port-sharing technique for LC followed by LSG was done, using the LSG trocar arrangement and one additional trocar. Group B (39 patients) laparoscopic cholecystectomy followed by sleeve gastrectomy from the conventional Sleeve gastrectomy 4 ports distribution with a liver retractor.

There was no significant difference between both groups as regard personal (Demographic data) and medical characteristics (Comorbidities and obesity related comorbidities and gall bladder disease symptoms). Of a total of 78 patients treated, all had cholelithiasis. all of these patients subsequently underwent CC-LSG, in group 1 39 patients were managed with port sharing technique for LC and LSG . 17 of them had asymptomatic gall bladder disease and 22 patients had symptomatic gall bladder disease. The mean age of patients was 35.03 years, with 15 males (38.5%) and 24 females (61.5%). The mean body weight and BMI were 135.87 kg and 48.29 kg/m2, respectively. 5 patients had type 2 diabetes mellitus, 7 patients had hypertension, 2 patients had both, and 2 patients had obstructive sleep apnea. In Group 2 39 patients were managed with concomitant LC and LSG from only sleeve ports distribution with a liver retractor. 20 of them had asymptomatic gall bladder disease and 19 patients had symptomatic gall bladder disease. The mean age of patients was 35.59 years, with 15 males (38.5%) and 24 females (61.5%). The mean body weight and BMI were 129.49 kg and 45.38 kg/m2, respectively. 6 patients had type 2 diabetes mellitus, 1 patients had hypertension, 2 patients had both, and 1 patient had obstructive sleep apnea **(Table 1).**

There was a highly significant difference between both groups as regard mean overall operative time with longer mean duration among group 2 gases (112.8 ±13.1 min versus 124.87±15.21 min) (Cholecystectomy time was statistically significant between both groups (41.62±8.22 min in group 1 versus 47.23±11.47 in group 2). As regard sleeve time, it was statistically insignificant between both groups (71.21±11.08 min in group 1 versus 74.74±9.52 in group 2). There was statistically significant difference between both groups as regard insertion of extra ports due to failure to achieve critical view of safety which is also statistically significant between both groups (No cases in group 1 versus 6 cases in group 2). No patients required conversion to laparotomy in both groups. However, no statistically significant difference between both groups was found as regard other operative data.in group 1, One patient suffered from postoperative bleeding due to severe adhesions and inflammation, who was managed conservatively without blood transfusion or surgical intervention with follow up CBC and Pelviabdominal U/S. one case of Iatrogenic gall bladder injury was happened in group 1 due to adhesions and inflammation .

In group 2, two patients with bleeding one of them due to severe GB inflammation and adhesions with the omentum and the other case due to iatrogenic liver injury during introduction of clip applier from left side, which was managed conservatively without blood transfusion or surgical intervention. 4 patients had iatrogenic gall bladder injury due to difficult gall bladder grasping with difficult traction due to difficult ergonomics. Very minimal bile leak was happened in 1 case in which bile comes out in drain 200cc per day for two weeks which was managed conservatively and decreased gradually and stopped abruptly after 2 weeks which confirmed by U\S and MRCP that showed leak at duct clipping site and showed no leak in follow up MRCP and U/S **(Table 2).**

There was no significant difference between both groups as regard post-operative data.

In port sharing group (Group1) As regard postoperative data, 8 patients had surgical port site infection in the form of infected seroma of the extraction port sites which were all managed conservatively with regular dressing and. All patients were discharged from hospital without an extended hospital stay. Mean Postoperative pain (VAS score) was 3.18 ± 0.76. in all cases of the group there was no need to insert extra ports **(Table 3).**

In only sleeve ports (Group 2) As regard postoperative data, 6 patients had surgical port site infection in the form of infected seroma of the extraction port sites which were all managed conservatively with regular dressing. All patients were discharged from hospital without an extended hospital stay except 3 cases, the one with conservative management of bile leak discharged after 2 weeks and two bleeding cases discharged after 2 days with follow up CBC and Pelviabdominal U/S for the 3 cases. Mean Postoperative pain (VAS score) was 3.03± 0.81. **(Table 3).**

Table 1: Comparison between the 2 study groups as regard personal and medical characteristics

		Group				P	Sig
		Group 1		Group 2			
		Mean	±SD	Mean	±SD		
Age		35.03	10.53	35.59	12.18	0.827*	NS
Weight		135.87	19.96	129.49	19.07	0.153*	NS
Height		1.68	.09	1.69	.08	0.693*	NS
BMI		48.29	7.56	45.38	5.73	0.059*	NS
Sex	Male	15	38.5%	15	38.5%	1.0**	NS
	Female	24	61.5%	24	61.5%		
Comorbidities	Negative	23	59.0%	29	74.4%	0.150**	NS
	Positive	16	41.0%	10	25.6%		
Obesity related comorbidities	None	23	59.0%	29	74.4%	0.467**	NS
	Hypertension	7	17.9%	6	15.4%		
	D.M.	5	12.8%	1	2.6%		
	Hypertension& D.M.	2	5.1%	2	5.1%		
	Obstructive sleep apnea.	2	5.1%	1	2.6%		
Gall bladder disease	Asymptomatic	17	43.6%	20	51.3%	0.49**	NS
	Symptomatic	22	56.4%	19	48.7%		

*Student t test. **Chi-Square Tests.

Table 2: Comparison between the 2 study groups as regard operative time and operative data

		Group				P	Sig
		Group 1		Group 2			
		Mean	±SD	Mean	±SD		
Operative time (min)		112.82	13.13	124.87	15.21	0.0001‡	HS
Cholecystectomy time		41.62	8.22	47.23	11.47	0.015‡	S
Sleeve time		71.21	11.08	74.74	9.52	0.134‡	NS
Failure to achieve critical view of safety	Negative	39	100.0%	33	84.6%	0.025**	S
	Positive	0	0.0%	6	15.4%		
Iatrogenic gall bladder injury	Negative	38	97.4%	35	89.7%	0.358**	NS
	Positive	1	2.6%	4	10.3%		
Insertion of extra ports	Negative	39	100.0%	33	84.6%	0.025**	S
	Positive	0	0.0%	6	15.4%		
Conversion to open surgery	Negative	39	100.0%	39	100.0%	N/A	N/A
	Positive	0	0.0%	0	0.0%		
Bleeding	Negative	38	97.4%	37	94.9%	1.0**	NS
	Positive	1	2.6%	2	5.1%		
Bile leak	Negative	39	100.0%	38	97.4%	1.0**	NS
	Positive	0	0.0%	1	2.6%		

‡Student t test. **Fisher exact test. "" faliure to achieve critical view of safety (Faliure to access structures in Callot's triangle).

Table 3: Comparison between the 2 study groups as regard post-operative data

		Group				P	Sig
		Group 1		Group 2			
		Mean	±SD	Mean	±SD		
Postoperative pain (VAS score)		3.18	.76	3.03	.81	0.389‡	NS
Hospital stay (days)	One day	39	100.0%	36	92.3%	0.240**	NS
	More than 1 day	0	0.0%	3	7.7%		
Port site wound infection	Negative	31	79.5%	33	84.6%	0.555*	NS
	Positive	8	20.5%	6	15.4%		

‡Student t test. *Chi-Square Tests. **Fisher exact test.

Discussion

We aim from our work to compare between port sharing laparoscopic cholecystectomy and sleeve gastrectomy from separate ports of both procedures with sharing of the epigastric port of cholecystectomy to be a liver retractor in sleeve gastrectomy in contrast to concomitant sleeve gastrectomy and cholecystectomy from only the conventional ports of sleeve gastrectomy.

Conventional trocar placement of combined operations are different, and this may cause visual difficulties and procedural difficulties due to difficult ergonomics , there is no reason to behave difficultly for LSG or cholecystectomy or at any operation.[11-13] So, we aimed in our study to assess difficulty to achieve critical view of safety in cholecystectomy and failure to achieve it as one of the measures to assess the procedural difficulty in both ports distribution between both groups.

Combined laparoscopic interventions reduce postoperative pain, promote rapid recovery, improve cosmesis, and avoid multiple hospital admissions for secondary surgeries.[3,4]

So, we consider in our study doing both procedures in the same operation. Our scope is to compare between different port arrangements for both procedures to optimize the outcomes and facilitate the procedures to be done at ease without any difficulties.

In contrast, some reports reported that combined procedures whatever the ports distribution may carry hazards of increasing operative time with higher risk of complications. In contrast to that other reports found that no hazards or complications or prolonged hospital stay from doing both interventions in the same operation.[14-16]

This is agreed with what reported by Barakat et al that LC during LSG is feasible through the same ports, safe, and not associated with neither increased morbidity nor prolonged hospital stay period. It is better offered for morbidly obese patients with proven GB disease weather they are symptomatic or not to avoid future complications.[17]

Others not agree with this concept owing to prolonged operative time, prolonged hospitalization, and increased risk of both surgical and anesthetic complications. A more selective widely accepted approach is to perform CC exclusively for symptomatic morbidly obese patients with proven GB pathology on preoperative imaging.[18]

In our study, in group 1 (Port sharing group), we performed combined LC and LSG without any difficulty or increase in operative parameters but actually facilitates achieving critical view of safety with comfortable ergonomics ,adequate visualization and easy traction and counter traction with no need to use longer instruments or graspers.

We had to insert one extra one port in 6 cases of group 2 due to failure to achieve critical view of safety with no need to insert extra ports in group 1. There was statistically significant difference between both groups as regard insertion of extra ports due to failure to achieve critical view of safety which is also statistically significant (No cases in group 1 versus 6 cases in group 2). No patients required conversion to laparotomy in both groups.

Ohta et al. reported that 6 to 7 ports are usually required to be inserted to do concomitant laparoscopic interventions and reported that a total of 7 ports are usually needed for concomitant LC with LSG [10]. In contrast to that Barakat et al, reported that they performed CC through the same four ports of LSG without the need for additional trocar insertion either for LSG or CC.[17]

There was no significant difference between both groups as regard personal and medical characteristics, there was a statistically highly significant difference between both groups as regard mean operative time with longer mean duration among group 2 gases (124.87±15.21 min versus 112.8 ±13.1 min). although cholecystectomy time was statistically significant between both groups (41.62±8.22 min in group 1 versus 47.23±11.47 in group 2 , sleeve time was statistically insignificant between both groups (71.21±11.08 min in group 1 versus 74.74±9.52 in group 2).

In contrast to that, barakat et al reported that regarding the operative time for the LC and LSG, the mean operative time for both was 76.82±17.22 min (Range, 65–120 min) they performed CC through the same four ports of LSG without the need for additional trocar insertion either for

LSG or CC, and this is attributed to their experience in three-port LSG,[17] but in contrast to that we needed to insert additional trocar in 6 cases in group 2 (Only sleeve ports group) and this was statistically significant in our study.

Raziel et al. reported prolonged operative time that is attributed to CC by 35 min with no effect on hospitalization. Also, Coşkun et al. reported prolonged operative time for cholecystectomy by 49.1±27.9 min (Range, 15–110 min), whereas no effect on hospitalization. Another study reported a mean cholecystectomy time of 47.72±7.87 min (Range, 34–62 min).[8,9,19]

There was no significant difference between both groups as regard post-operative data. 4 patients with gall bladder injury during grasping due to difficult grasping due to difficult traction and difficult ergonomics (Versus 1 in group 1 due to severe inflammation and adhesions) but this is statistically insignificant.

There is no statistically significant difference between both groups according to post-operative hospital stay. All patients of both groups were discharged from hospital without an extended hospital stay except 3 cases of group 2, the one with conservative management of bile leak discharged after 2 weeks (Detected by MRCP after surgery when bile comes out in drain 200cc per day for two weeks which was managed conservatively and stopped abruptly after 2 weeks which confirmed with U\S and MRCP) and the two bleeding cases discharged after 2 days with follow up CBC and Pelviabdominal U/S.

Barakat et al reported that LC during LSG is feasible through the same ports, safe, and not associated with neither increased morbidity nor prolonged hospital stay period which is agreed with our study that no statistically significant difference in morbidities or hospital stay between both groups .

Mean postoperative pain (VAS score) was 3.03± 0.81 (Versus 3.18 ± 0.76 in group 1), which is statistically insignificant . Same anelgesics type,dose and duration were offered for both groups.

This agreed with barakat et al who reported that Assessment of 24-h postoperative pain using VAS revealed a mean score of 3.65±1.42 for concomitant LC and LSG.[17]

Conclusion

Port sharing technique for both LC and LSG is easier, faster and preferred than using only sleeve ports for both procedures that may cause visual and procedural difficulties with shorter operative time for both procedures and with no need to insert extra ports.

References

1. Shiffman ML, Sugerman HJ, Kellum JM, et al: Gallstone formation after rapid weight loss: A prospective study in patients undergoing gastric bypass surgery for treatment of morbid obesity. ***Am J Gastroenterol.*** 1991; 86(8): 1000–1005.
2. Torgerson JS, Lindroos AK, Näslund I, et al: Gallstones, gallbladder disease, and pancreatitis: cross-sectional and 2-year data from the Swedish Obese Subjects (SOS) and SOS reference studies. ***Am J Gastroenterol***. 2003; 98(5): 1032–1041.
3. Hiratsuka T, Ohta M, Sonoda K, et al: Simultaneous operation of laparoscopy-assisted distal gastrectomy with laparoscopic cholecystectomy. ***Hepatogastroenterol.*** 2007; 54: 1645–1647.
4. Matsui H, Okamoto Y, Ishii A, et al: Laparoscopy-assisted combined resection for synchronous gastric and colorectal cancer: Report of three cases. ***Surg Today.*** 2009; 39: 434–439.
5. Kim HJ, Choi GS, Park JS, et al: Simultaneous laparoscopic multi-organ resection combined with colorectal cancer: Comparison with non-combined surgery. ***World J Gastroenterol.*** 2012; 18: 806–813.
6. Wood SG, Kumar SB, Dewey E, et al: Safety of concomitant cholecystectomy with laparoscopic sleeve gastrectomy and gastric bypass: A MBSAQIP analysis. ***Surg Obes Relat Dis.*** 2019; 15: 864–8470.
7. Dakour-Aridi HN, El-Rayess HM, Abou-Abbass H, et al: Safety of concomitant cholecystectomy at the time of laparoscopic sleeve gastrectomy: Analysis of the American College of Surgeons National Surgical Quality Improvement Program database. ***Surg Obes Relat Dis.*** 2017; 13: 934–942.
8. Coskun H, Hasbahceci M, Bozkurt S, et al: Is concomitant cholecystectomy with laparoscopic sleeve gastrectomy safe? ***Turk J Gastroenterol.*** 2014; 25: 624–627.
9. Raziel A, Sakran N, Szold A, et al: Concomitant cholecystectomy during laparoscopic sleeve gastrectomy. ***Surg Endosc.*** 2015; 29: 2789–2793.
10. Ohta, M., Tada, K., Endo, Y. et al: Port-sharing techniques for laparoscopic cholecystectomy and sleeve gastrectomy. ***Surg Today.*** 2021; 51: 1996–1999.
11. Pavlidis TE, Marakis GN, Ballas K, et al: Risk factors influencing conversion of laparoscopic to open cholecystectomy. ***J Laparoendosc Adv Surg Tech A.*** 2007; 17(4): 414–418.
12. Aziz H, Pandit V, Joseph B, et al: Age and obesity are independent predictors of bile duct injuries in patients undergoing laparoscopic cholecystectomy. ***World J Surg.*** 2015; 39(7): 1804–1808.
13. Raigani S, Fiedler AG, et al: The management of asymptomatic (silent) gallstones. In: Cameron

A, editor. Current surgical therapy. Twelfth ed. Philadelphia, ***PA: Elsevier.*** 2017:427–429.

14. Wood SG, Kumar SB, Dewey E, et al: Safety of concomitant cholecystectomy with laparoscopic sleeve gastrectomy and gastric bypass: A MBSAQIP analysis. ***Surg Obes Relat Dis.*** 2019; 15(6): 864-870.

15. Dakour-Aridi HN, El-Rayess HM, Abou-Abbass H, Abu-Gheida I, et al: Safety of concomitant cholecystectomy at the time of laparoscopic sleeve gastrectomy: analysis of the American College of Surgeons National Surgical Quality Improvement Program database. ***Surg Obes Relat Dis.*** 2017; 13(6): 934-941.

16. Coşkun H, Hasbahçeci M, Bozkurt S, et al: Is concomitant cholecystectomy with laparoscopic sleeve gastrectomy safe? ***Turk J Gastroenterol.*** 2014; 25(6): 624-627.

17. Hosam B, El-Sherpiny W, Mohamed G, et al: Concomitant cholecystectomy during laparoscopic sleeve gastrectomy through the same four ports feasibility and early results The Egyptian Journal of Surgery. 2021; 40(2): 509-514.

18. Warschkow R, Tarantino I, Ukegjini K, et al: Concomitant cholecystectomy during laparoscopic roux-en-y gastric bypass in obese patients is not justified: ***A meta-analysis Obes Surg.*** 2013; 23: 397–407.

19. Sabry AA, Alkarmouty AF: Cholecystectomy during laparoscopic sleeve gastrectomy in morbidly obese patients Int ***J Adv Res.*** 2018; 6: 1042–1045.