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SIMULTANEOUS SURGERIES IN BARIATRIC SURGERY (LITERATURE REVIEW)

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Based on the available publications, the article presents an analysis of the studies on the simultaneous implementation of cholecystectomy, ventral and paraesophageal hernia repair during a bariatric intervention. If there is a clinical picture of chronic calculous cholecystitis, simultaneous cholecystectomy is justified and does not lead to a significant increase in the number of complications. In the case of asymptomatic gallstones, the optimal tactics remains controversial, both a surgical treatment and observation are possible. In the absence of gallstone disease, all patients after the surgical correction of the excess weight are prescribed ursodeoxycholic acid, while performing preventive cholecystectomy is not recommended. A simultaneous ventral hernia repair is justified only for small defects (< 10 cm) of the anterior abdominal wall. If a paraesophageal hernia is detected in patients with morbid obesity, bariatric surgery may be combined with crurorаphy.

Keywords: *simultaneous operation, cholelithiasis, cholecystectomy, longitudinal resection of the stomach, gastro-bypass surgery, ventral hernia, hernia paraesophageal.*

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BACKGROUND

It is well known that in 20–30% of patients hospitalized in surgical departments, several diseases are detected that require surgical intervention. Usually, simultaneous, or combined, simultaneous, surgeries slightly increase the severity of the patient's condition in the early postoperative period, however, it is psychologically easier to tolerate in comparison with staged treatment, providing a shorter period of disability and the time spent in the hospital, and also reduces the total cost of treatment by 40–50% [1].

However, in bariatric surgery, not everything is so simple. First, this group of patients initially has a high comorbidity, which complicates the course of the perioperative period. Secondly, the excess amount of fatty tissue provides technical difficulties during the surgery and wound complications after. Third, the negative energy balance in the postoperative period, which is the goal of bariatric surgery, additionally complicates the patient's recovery in the event of an expansion of the volume of intervention. That is why simultaneous surgery can pose a potential threat to a patient with morbid obesity. It is well known that performing technically complex and extensive interventions simultaneously with bariatric surgeries is not recommended [2, 3], but there are situations when simultaneous interventions in bariatrics are justified and effective.

SIMULTANEOUS INTERVENTIONS IN BARIATRIA

Simultaneous cholecystectomy

Cholecystolithiasis in patients with morbid obesity occurs 5 times more often than in people with normal body weight [4].

According to S. Amstutz et al. [5], 17% of patients with morbid obesity already have a history of cholecystectomy and another 22% have indications for it. However, even with the initial absence of calculi in the gallbladder after bariatric surgery, they appear in 15–75% of patients. Thus, in the study by A. Csendes et al. [6] 34 (43%) out of 86 patients who underwent longitudinal gastric resection developed calculi in the gallbladder during 10 years of follow-up.

M. Altieri et al. [7] based on a study of data on 2098 patients from the New York State Bariatric Registry showed that the risk of cholecystectomy in the next 5 years after surgery is 9.1–9.9%, while in 30–50% of cases the gallbladder is removed by urgent and urgent indications.

The formation of calculi in the gallbladder is a multifactorial process. Previously, it was suggested that the main mechanism for the development of chronic cholecystitis after gastric bypass surgery is a violation of the evacuation capacity of the gallbladder, which in turn develops as a result of crossing the branches of the vagus nerve and a decrease in cholecystokinin production due to the lack of food intake into the duodenum [8]. However, the incidence of gallstone disease after longitudinal resection of the stomach and gastric bypass does not differ, which indicates an insignificant effect of these mechanisms. With rapid weight loss, cholesterol is released from tissue depots and its increased secretion along with bile. In addition, weight loss and negative energy balance are associated with increased secretion of mucin and calcium by the gallbladder, as well as with an increase in the content of prostaglandins and arachidonic acid in bile [9].

It is impossible to assess the predisposition to the development of gallstone disease. The study by M. Alimoğulları and H. Buluş [10] did not reveal any predictors of the formation of gallstones after bariatric intervention, except for previous dyslipidemia.

According to V. Wanjura et al. [11], who used data from the Swedish National Register of Obesity Surgery in the study, cholecystectomy in patients after gastric bypass surgery is accompanied by 2 times more postoperative complications and 4 times more resurgeries than in obese patients before bariatric interventions. In the case of the development of choledocholithiasis after gastric bypass, in most cases of further endoscopic retrograde lithoextraction, preliminary external stomy of the disconnected part of the stomach with an open or laparoscopic approach is required which is associated with an additional risk of complications [12].

In connection with such a wide spread of cholelithiasis and a number of difficulties in its surgical treatment after previous bariatric surgeries, some authors speak about the need to perform simultaneous cholecystectomy for all patients (even in the absence of stones in the gallbladder for prophylactic purposes) [4]. However, the opinion was quickly formed that the risks of such an approach, in all likelihood, outweigh the benefits, and therefore are unjustified. Thus, the number of simultaneous cholecystectomies performed in the United States during gastric bypass surgery decreased from 26.3% in 2001 to 3.7% in 2008 [13].

According to the systematized literary search carried out by I. Doulamis et al. [14] with 13,765 patients included in the analysis, the incidence of anastomotic leakage after simultaneous cholecystectomy and gastric bypass was 8.7%, while only after gastric bypass it was 2.5%. We found 16 original studies [5, 15–29], in which the immediate results of gastric bypass alone and simultaneous cholecystectomy with gastric bypass were compared (Table 1).

Thus, only in the work of G. Hamad et al [20]

Table 1

Comparison of treatment results after gastric bypass surgery and gastric bypass surgery with simultaneous cholecystectomy

No.	Study	Year	GBS, *n*	GS + CE, *n*	Complications, %
1	Fuller W. et al [15]	2003	135	9	n/d
2	Tarantino I. et al [16]	2000–2006	140	134	Not differed
3	Amstutz S.et al [5]	2003–2008	64	26	Not differed
4	Caruana J.et al [17]	2000–2003	125	98	n/d
5	CoupayeM.et al [18]	2004–2013	117	37	n/d
6	D'Hondt M. et al [19]	2003–2009	625	16	n/d
7	Hamad G. et al [20]	1997–2001	462	94	8,6/19,1
8	Karadeniz M. et al [21]	2006–2011	46	6	n/d
9	Kim J. et al [22]	1995–2006	329	109	Not differed
10	Portenier D. et al [23]	2000–2005	984	73	Not differed
11	Scott D. et al [24]	2001–2002	129	21	n/d
12	Taylor J. et al [25]	n/d	412	80	Not differed
13	Tucker O. et al [26]	2000–2006	1,590	123	Not differed
14	Villegas L. et al [27]	1999–2002	151	40	n/d
15	Moon R. et al [28]	2009–2011	367	36	n/d
16	Lee J. et al [29]	2009–2014	349	27	Not differed

Note. GBS — gastric bypass surgery, CE — cholecystectomy; *n* — number of patients, n/d — no data.

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recorded a greater number of complications in simultaneous surgeries.

In studies [18, 28–31] devoted to a comparative assessment of the results of treatment of only longitudinal gastric resection and in the case of simultaneous cholecystectomy, no differences in the number of complications were obtained in any of the studies (Table 2).

When analyzing the data from patient registers, there were either no differences in the level of complications, or there was a slight but significant increase with simultaneous cholecystectomy (Table 3) [11, 13, 32–35].

Thus, on the basis of the available data, it is impossible to unequivocally speak about the increase in the number of complications after simultaneous chole-

Table 2

Comparison of treatment results for longitudinal gastric resection only and longitudinal gastric resection with simultaneous cholecystectomy

No.	Study	Year	LGR	LGR+CE	Complications
1	Coupaye M. et al [18]	2004–2013	43	12	n/d
2	Raziel A. et al [30]	2006–2014	2,383	180	Not differed
3	Sioka E. et al [31]	2006–2011	129	9	Not differed
4	Moon R. et al [28]	2009–2011	115	16	n/d
5	Lee J. et al [29]	2009–2014	226	11	Not differed

Note. LGR — longitudinal gastric resection, CE — cholecystectomy; *n* — number of patients, n/d — no data.

Table 3

Data from patient registries on the number of complications in bariatric interventions in combination with simultaneous cholecystectomy

No.	Study	Patients, *n*	Simultaneous surgeries, *n*	Complications	Year	Registry
Gastric bypass surgery + cholecystectomy						
1	Clapp B. et al [32]	127,286	3,422	Insignificant	2015–2017	Metabolic and Bariatric Surgery Accreditation Quality Initiative Program (MBSAQIP) database
2	Wanjura V. et al [11]	35,930	168	The frequency of deviations in the postoperative period is higher with simultaneous surgery — 17.2 versus 8.4%	2007–2013	Swedish Register for Cholecystectomy and Endoscopic Retrograde Cholangio-pancreatography и Scandinavian Obesity Surgery Registry (SOReg; 36 098 patients)
3	Weiss A. et al [33]	134,584	21,022	Insignificant	1995–2009	The California Office of Statewide Health Planning and Development longitudinal database 1995–2009
4	Dorman R. et al [34]	32,946	1,731	6.6 versus 4.9, significant	2005–2009	American College of Surgeons National Surgical Quality Improvement Program Database
5	Worni M. et al [13]	70,287	6,402	6.22 versus 5.06, significant	2001–2008	Nation wide In patient Sample
Longitudinal gastric resection + cholecystectomy						
1	Clapp B. et al [32]	327,237	6,729	The frequency of resurgeries was significantly increased — from 3.5 to 4.4%	2015–2017	Metabolic and Bariatric Surgery Accreditation Quality Initiative Program (MBSAQIP) database
2	Dakour-Aridi H. et al [35]	21,137	422	5.7 vs 4.0% no statistical significance	2010–2013	American College of Surgeons National Surgical Quality Improvement Program database 2010 to 2013

cystectomy and bariatric intervention. However, in our opinion, given the sufficient qualifications of the surgeon and the preserved general somatic status, the patient, asymultated cholecystectomy and bariatric intervention seem to be a fairly safe surgical approach.

Currently, most surgeons prefer medical, but not surgical, prevention of calculous cholecystitis after bariatric intervention. Literary search in the MEDLINE network (search query: «bariatricsurgery», «ursodeoxycholicacid») found 13 studies [36–48] on the use of ursodeoxycholic acid after bariatric surgery (Table 4). In all studies, a decrease in the incidence of calculi in the gallbladder was noted when using prophylactic dosages of the drug. Such data, in our opinion, convincingly prove that in the absence of cholelithiasis, simultaneous cholecystectomy is not justified, and the use of ursodeoxycholic acid preparations in the postoperative period will be the best prevention strategy.

In asymptomatic stone bearing, the question of the need for surgical treatment remains controversial. On the one hand, rapid weight loss can aggravate the course of gallstone disease and lead to the development of complications. On the other hand, conservative treatment by a competent gastroenterologist with periodic examination is as effective a tactic as the surgical treatment itself. According to O. Pinedaet al [49], out of 30 patients with morbid obesity and asymptomatic cholecystolithiasis, only two required cholecystectomy within 12 months of follow-up after bariatric surgery. In a study by A. Della Penna et al [50], in 61 out of 704 patients undergoing bariatric surgery, during the preoperative examination, asymptomatic calculi in the gallbladder were revealed. All of these patients were prescribed ursodeoxycholic acid. Within 6 months after surgery, no changes were recorded in 59 patients, 1 patient had a single episode of biliary colic and another required laparoscopic cholecystectomy for acute cholecystitis [50].

Based on the results of the presented studies, the following conclusions can be drawn. The treatment of gallstone disease in patients with morbid obesity is extremely relevant. In the presence of a clinical picture of chronic calculous cholecystitis, simultaneous cholecystectomy seems to be justified and does not lead to a significant increase in the number of complications. In asymptomatic stone bearing, the optimal tactics remain controversial: both surgical treatment and observation are possible. In the absence of signs of gallstone disease, all patients after surgical correction of excess weight are shown to receive ursodeoxycholic acid. Prophylactic cholecystectomy in this category of patients is unjustified.

Simultaneous ventral hernia repair

An analysis of the register of the US National Program for the Improvement of the Quality of Surgical Care showed that almost 60% of patients operated on for ventral hernias had a body mass index > 30 kg / m^2 [51]. The attending physician of a patient with morbid obesity and hernia of the anterior abdominal wall is faced with a choice: in what sequence should the surgeries be performed? There are three options: 1) operate the hernia first, 2) perform bariatric surgery first, and 3) perform bariatric surgery and hernia surgery at the same time. Most surgeons use an individual approach based on the clinical situation (body mass in-

Table 4

Prophylactic use of ursodeoxycholic acid

No.	Study, year	The incidence of cholelithiasis after bariatric surgery	
		Ursodeoxycholic acid, %	Follow up / placebo, %
1	Sakran N. et al, 2020 [36]	23.9	45.7
2	Pizza F. et al, 2020 [37]	4.2	25.2
3	Vural A. et al, 2020 [38]	10	33
4	Şen O. et al, 2020 [39]	10.5	37.5
5	Talha A. et al, 2019 [40]	6.5	22
6	Coupaye M. et al, 2019 [41]	3.5	28
7	Machado F. et al, 2019 [42]	1.4	26
8	Coupaye M. et al, 2017 [43]	10.4	22.6
9	Abdallah E. et al, 2016 [44]	0	5
10	Adams L. et al, 2015 [45]	14.3	44.8
11	Miller K. et al, 2003 [46]	9.2	28.9
12	Sugerman H. et al, 1995 [47]	6.8	32.1
13	Williams C. et al, 1993 [48]	18.2	26.2

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dex, the presence of concomitant diseases, characteristics of the hernia), the possibility of hernia repair by laparoscopic access and the patient's desire. One of the first studies on this issue reported on 85 patients with ventral hernias (mainly umbilical) who underwent gastric bypass surgery: 59 patients underwent plastic surgery with local tissues, 12 — allohernioplasty with mesh implants; In 14 patients, surgical treatment of hernia was postponed. For 26 months of follow-up, 5 (36%) patients from the delayed treatment group developed small bowel obstruction due to hernia infringement. Of the patients who underwent plastic surgery with their own tissues, a relapse was noted in 22% of cases, while there were no relapses during plastic surgery with a mesh implant [52]. This work shows that the best choice for a patient with morbid obesity and ventral hernia is a simultaneous mesh implant surgery. However, many authors still express doubts about this in connection with the theoretical danger of infection of the mesh implant, since during bariatric intervention, the lumen of the gastrointestinal tract is opened. In the largest study by K. Spaniolas et al [53], based on the study of data from the American registry (17,117 patients, 503 of whom underwent simultaneous hernioplasty), it was concluded that there was a slight increase in the incidence of local surgical infections (1.65 times) in the absence of an increase in the incidence serious postoperative complications and mortality. There are no prospective and randomized studies on the safety of simultaneous hernia repair, and the available data are based on the selected patient population. In our opinion, patients with large defects of the abdominal wall (> 10 cm), extensive adhesive intestinal adhesions, inflammatory skin changes are contraindicated in such simultaneous interventions. For these patients, staged surgery with initial bariatric intervention may be the best choice. This recommendation was consolidated in 2018 in the consensus clinical guidelines of the American Herniological Society and the American Society for Metabolic and Bariatric Surgery [54].

Performing hernioplasty before bariatric surgery makes no sense, because it is well known that obesity is a significant contributor to unsatisfactory hernioplasty results.

Simultaneous paraesophageal hernia repair

In patients with morbid obesity, symptoms of gastroesophageal reflux disease (GERD) are present in 50–70% of cases, and paraesophageal hernia is present in 20–52% of cases [55, 56]. An increased gradient of abdominal-thoracic pressure contributes to the prevalence of these diseases, and weight loss is one of the main areas of conservative treatment for GERD. While fundoplication is recognized as the best surgical solution for reflux in the general population, its results in morbid obese individuals are controversial. Gastric bypass surgery leads to a significant improvement in the course of GERD: in 80–97% of patients, symptoms disappear completely, and in most other cases, they are controlled by taking proton pump inhibitors [57]. It is believed that the effect of longitudinal gastric resection in this regard is somewhat worse, and performing only fundoplication in obese patients is associated with negative results. And if the symptoms of GERD in themselves do not require expansion of the volume during bariatric surgery, then a paraesophageal hernia is considered an indication for its plastic, especially during longitudinal resection of the stomach. According to the US national registry, out of 76,343 gastric bypass and longitudinal gastrectomy in 5958 (7.80%) cases, hiatal hernia repair was performed simultaneously, while no increase in the number of complications and mortality was noted [58]. The choice of the option of bariatric surgery in the presence of a paraesophageal hernia is still not strictly regulated; there are many reports on a successful series of simultaneous longitudinal gastric resections and paraesophageal hernia repair [59]. In this case, as a rule, the results of a relatively short follow-up of the patient are presented — in most cases, up to 2 years. M. Daviset al [60] presented the results of observation of 28 patients who underwent longitudinal gastrectomy with paraesophageal hernia repair. Despite the fact that in the first year a complete regression of symptoms was observed in all patients, after 27 months in two of them the symptoms of GERD were so severe that gastric bypass surgery was required. Most authors believe that in the presence of symptoms of GERD and paraesophageal hernia, it is most advisable to perform a simultaneous intervention — hernia repair and gastric bypass surgery, since in this case the His angle is preserved and the likelihood of recurrence is less likely.

In 2013, a team of doctors from Montpellier (France) led by surgeon D. Nocca [61] proposed the Sleeve Nissen technique for hiatal hernia to prevent reflux esophagitis after longitudinal gastrectomy. The essence of the technique consists in performing crurarаphy, Nissen fundoplication, followed by longitudinal resection of the stomach from its antrum to the formed cuff. However, the bariatric and metabolic efficacy, complication rates and long-term results of this surgery are still to be studied.

CONCLUSION

Thus, simultaneous bariatric surgery should be performed for limited indications by surgeons with sufficient experience and appropriate qualifications. It is justified to perform simultaneously with longitudinal gastric resection or gastric bypass cholecystectomy in the presence of a clinical picture of chronic calculous cholecystitis, a small (<10 cm) ventral hernia and paraesophageal hernia. Other simultaneous surgeries should be treated with great caution and performed only by the decision of the council.

ADDITIONAL INFORMATION

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AUTHOR CONTRIBUTIONS

The authors made an equal contribution to the search and analytical work and the preparation of the article, read and approved the final version before publication.

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