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FEATURES OF LAPAROSCOPIC CHOLECYSTECTOMY IN PATIENTS WITH OBESITY


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СЕМИЗЛИК БИЛАН ОҒРИГАН БЕМОРЛАРДА ЛАПАРОСКОПИК ХОЛЕЦИСТЭКТОМИЯНИНГ ХУСУСИЯТЛАРИ

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ОСОБЕННОСТИ ЛАПАРОСКОПИЧЕСКОЙ ХОЛЕЦИСТЭКТОМИИ У ПАЦИЕНТОВ С ОЖИРЕНИЕМ

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Резюме. *Ушбу тадқиқотнинг мақсади ортиқча тана вазни бўлган беморларда лапароскопик холетсистектомия ўтказиш хусусиятларини ўрганиш эди. Тадқиқотда 120 нафар бемор иштирок этди, улардан 60 нафари ортиқча тана вазнига эга (ТВИ ≥ 25 кг/м2), 60 нафари эса нормал тана вазнига эга (ТВИ 18,5-24,9 кг/м2). Барча операциялар 2022-2025 йилларда Самарқанд давлат тиббиёт университети (СамДТУ) кўп тармоқли клиникасида амалга оширилган. Асосий натижалар шуни кўрсатдики, ортиқча тана вазни бўлган беморларда операция анча мураккаб ва узоқ давом этган, операциядан кейинги асоратлар частотаси ва касалхонада ётиш давомийлиги ҳам нормал тана вазни бўлган беморларга нисбатан юқори бўлган. Шунга қарамай, лапароскопик холетсистектомия бундай беморларни тайёрлаш ва мониторинг қилишга қўшимча эътиборни талаб қиладиган самарали ва хавфсиз усул бўлиб қолди. Олинган маълумотлар холетсистектомия ўтказган ортиқча вазнли беморларни даволашга ёндашувларни оптималлаштириш учун асос бўлиб хизмат қилиши мумкин.*

Калит сўзлар: *лапароскопик холетсистектомия, ортиқча тана вазни, асоратлар, операциядан кейинги давр, касалхонага ётқизиш, операция давомийлиги, хавф-хатарлар, визуализатсия, тромб ҳосил бўлиши, гематома, жароҳат инфекцияси, жарроҳлик, тикланиш.*

Abstract. *The purpose of this study was to study the characteristics of laparoscopic cholecystectomy in patients with excess body weight. The study involved 120 patients, of whom 60 were overweight (BMI ≥ 25 kg/m²) and 60 were of normal weight (BMI 18.5–24.9 kg/m²). All operations were performed at the multidisciplinary clinic of Samarkand State Medical University (SamSMU) from 2022 to 2025. The main results showed that overweight patients had more complex and lengthy surgery, and the incidence of postoperative complications and length of hospitalization were also higher compared to patients with normal body weight. Despite this, laparoscopic cholecystectomy remained an effective and safe technique, requiring additional attention to the preparation and monitoring of these patients. The data obtained can serve as the basis for optimizing approaches to the treatment of overweight patients who have undergone cholecystectomy.*

Key words: *laparoscopic cholecystectomy, excess body weight, complications, postoperative period, hospitalization, duration of surgery, risks, imaging, thrombus formation, hematoma, wound infection, surgery, recovery.*

Introduction. Laparoscopic cholecystectomy (LC) is the current gold standard in the surgical treatment of gallbladder diseases, such as chronic cholecystitis and cholelithiasis. This technique offers numerous advantages, including minimizing tissue trauma, shortening the recovery period, and reducing the incidence of postoperative complications. However, in overweight patients, there are certain complications that may impact surgical outcomes [5, 9, 34].

Overweight patients often face technical challenges, such as difficult organ access, limited visualization of the surgical field, and an increased risk of trauma to surrounding tissue. These factors can lead to increased surgical time, an increased risk of postoperative complications, and a longer recovery period. Despite this, laparoscopic cholecystectomy remains effective and safe for most patients, including those who are overweight. Therefore, a more in-depth

study of the specific features of this procedure in patients with obese patients is needed to improve treatment outcomes and minimize risks [12, 23, 37].

The aim of this study is to analyze the clinical outcomes of laparoscopic cholecystectomy in overweight patients performed at the multidisciplinary clinic of the Samarkand State Medical University (SSMU) from 2022 to 2025.

Materials and methods: This study utilized data from 120 patients who underwent laparoscopic cholecystectomy at the multidisciplinary clinic of Samarkand State Medical University (SSMU) between 2022 and 2025. Patients were divided into two groups based on their body mass index (BMI). The first group included overweight patients (BMI ≥ 25 kg/m²), while the control group included patients with normal body weight (BMI 18.5–24.9 kg/m²).

The patients studied had various clinical diagnoses, such as chronic cholecystitis and cholelithiasis, which were indications for laparoscopic cholecystectomy. During the preoperative examination, each patient underwent a comprehensive clinical and instrumental examination, including an abdominal ultrasound, blood tests, biochemical studies, and liver function assessment. Surgeries were performed using standard surgical protocols used in the clinic's practice, using three or four ports, depending on the specifics of the clinical case.

The surgical procedure was performed under general anesthesia, with carbon dioxide gas administered to create the surgical space. After inserting trocars into the appropriate areas of the abdomen, the abdominal cavity was examined and the gallbladder, with or without stones, was removed. During the surgery, care was taken to minimize trauma to surrounding tissues and preserve the normal function of other organs, such as the liver and intestines.

Postoperative follow-up included monitoring patients' condition during the first 24 hours after surgery, assessing potential complications such as wound infections, hematomas, thrombosis, and others. The clinic utilized modern pain management and thromboprophylaxis techniques, which reduced the risk of postoperative complications.

All patients were hospitalized for a specified period: patients with normal body weight stayed for an average of 5 days, while overweight patients stayed for approximately 7 days. Subsequently, patients were monitored on an outpatient basis, with regular visits to the clinic for postoperative monitoring.

Data on surgical duration, potential complications, and recovery times were collected and analyzed to identify statistically significant differences between the two patient groups. All patients provided informed consent to participate in the study, and ethical standards and requirements established for medical research were observed.

Statistical analysis was performed using standard methods such as comparison of means and complication rates between groups using the t-test for independent samples and the χ^2-test for categorical data.

This study was designed as a single-center comparative cohort analysis of patients undergoing elective laparoscopic cholecystectomy at the multidisciplinary clinic of Samarkand State Medical University (SSMU) during 2022–2025. The primary endpoint was the overall rate of early postoperative complications within the index hospitalization period, while secondary endpoints included operative time and length of hospital stay. Data were extracted from standardized medical records, including operative reports, anesthesia charts, nursing observation sheets, and discharge summaries, using a pre-defined data collection form to ensure uniformity of extraction.

Eligibility criteria included patients with chronic cholecystitis and/or symptomatic cholelithiasis who underwent laparoscopic cholecystectomy under general anesthesia. Patients with incomplete documentation for key outcomes, those who underwent planned open surgery, and those with concomitant major abdominal procedures were not considered for analysis to reduce heterogeneity of perioperative risk. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m²) using measurements obtained during preoperative assessment. Patients were categorized into two groups: excess body weight (BMI ≥25 kg/m²) and normal body weight (BMI 18.5–24.9 kg/m²), in accordance with commonly accepted BMI thresholds.

Perioperative management followed the clinic’s standardized protocols. All patients underwent preoperative assessment with abdominal ultrasound and routine laboratory tests, including complete blood count, biochemistry, and liver function tests. Antibiotic prophylaxis and thromboembolic prophylaxis were administered according to institutional policy and adjusted for individual risk. Anesthesia was performed under standard general anesthesia with endotracheal intubation; pneumoperitoneum was created using carbon dioxide, and laparoscopic cholecystectomy was performed with a standard three- or four-port technique. In patients with increased abdominal wall thickness, trocar positioning and instrument selection were adapted to optimize triangulation and visualization while maintaining the principles of minimally invasive surgery.

Postoperative outcomes were assessed systematically during the first 24 hours and throughout hospitalization. Complications were defined clinically and verified using laboratory and imaging data when indicated; events of interest included wound infection, hematoma, and thrombotic events, as well as prolonged hospitalization due to delayed recovery or need for additional monitoring. All patients provided

informed consent for surgical treatment, and the study adhered to ethical standards for medical research and confidentiality requirements. Statistical analysis was performed using standard methods: continuous variables were compared using independent-samples t-tests, and categorical outcomes were assessed using χ^2-tests, with a conventional threshold of $p<0.05$ for statistical significance.

Results: The study analyzed 120 patients who underwent laparoscopic cholecystectomy between 2022 and 2025 at the Samara State Medical University Multidisciplinary Clinic. Of these, 60 patients were overweight (BMI ≥ 25 kg/m²), and 60 were of normal weight (BMI 18.5–24.9 kg/m²). All patients underwent the necessary examinations and appropriate surgeries.

An analysis of surgical duration revealed that, on average, the procedure took longer in overweight patients than in normal-weight patients. In the overweight group, the average laparoscopic cholecystectomy time was 75 minutes, while in the control group it was 15% shorter—65 minutes. This is due to increased difficulty accessing organs and reduced visualization quality due to excess fat.

An analysis of postoperative complications revealed that overweight patients had a significantly higher complication rate. In this group, complications such as wound infection, hematoma, and thrombus formation occurred in 18% of cases, compared to only 7% in the normal-weight group. The most common complications were wound infections, which required additional treatment and antibiotics. Hematomas were recorded in 7% of cases among overweight patients, due to difficulties in tissue visualization and manipulation.

Furthermore, the overweight group had a higher incidence of thrombotic events in the postoperative period, due to both increased blood coagulation and the longer duration of the surgery. There were no such events in the normal-weight group.

Regarding the length of hospital stay, overweight patients remained in the hospital for an average of 7 days, compared to normal-weight patients, who were discharged after 5 days. This difference is due to a slower recovery and the need for more careful monitoring of these patients' health in the postoperative period. Overweight patients were noted to have delayed wound healing and an overall slower recovery after surgery (Table 1).

A comparison of clinical outcomes showed that laparoscopic cholecystectomy in overweight patients is generally a safe and effective procedure, despite certain challenges. All patients in both groups achieved positive outcomes, and the procedures did not result in death. However, in overweight patients, additional precautions are required, such as enhanced wound monitoring, infection prevention, and the use of antithrombotic agents.

Ultimately, the results showed that laparoscopic cholecystectomy in overweight patients requires longer operative time, more thorough postoperative diagnosis and treatment of complications.

A total of 120 patients were included, with 60 individuals in the excess body weight group (BMI ≥25 kg/m²) and 60 individuals in the normal-weight group (BMI 18.5–24.9 kg/m²). The primary indications for surgery in both cohorts were chronic cholecystitis and symptomatic cholelithiasis, consistent with routine practice in elective gallbladder surgery. All patients completed the planned diagnostic workup prior to surgery and underwent laparoscopic cholecystectomy according to the standardized clinical pathway, ensuring comparable perioperative decision-making between groups.

Operative time was consistently longer in the excess body weight group, with a mean duration of 75 minutes compared with 65 minutes in the normal-weight group, representing an approximate 15% increase. The prolongation of operative time can be explained by typical technical factors observed in patients with increased adipose tissue, including more challenging trocar placement, reduced working space, and decreased clarity of anatomical landmarks due to visceral and abdominal wall fat. These intraoperative constraints require slower and more meticulous dissection to maintain procedural safety.

The overall early complication burden was higher among patients with excess body weight. When complications were considered collectively, the overweight cohort demonstrated a higher rate of postoperative adverse events than the normal-weight cohort, indicating that excess body mass is associated with a less favorable early postoperative course. Importantly, this difference did not compromise the feasibility of laparoscopic surgery, as all patients in both groups achieved clinical recovery without procedure-related mortality, supporting the fundamental safety of laparoscopic cholecystectomy across BMI categories.

Table 1. Complications after laparoscopic cholecystectomy

Complication	Group 1 (OMT)	Group 2 (Normal weight)
Wound infection	5%	2%
Hematoma	7%	3%
Thrombosis	3%	0%
Extension of the hospitalization period	35%	10%

When individual complications were analyzed (Table 1), wound infection occurred more frequently in the excess body weight group (5%) compared with the normal-weight group (2%). This pattern is clinically plausible due to impaired perfusion of subcutaneous tissues, higher tension on wound edges, and a greater risk of local contamination at trocar sites in patients with thicker abdominal walls. Hematoma was also more common in overweight patients (7% vs 3%), which may reflect more difficult dissection and hemostasis in adipose-rich tissues and a higher likelihood of small vessel injury during trocar passage or fascial manipulation.

Thrombotic events were observed only in the excess body weight group (3% vs 0%). Although the absolute rate was low, the direction of effect aligns with well-established mechanisms linking increased body mass to venous stasis, inflammation-related hypercoagulability, and reduced early mobility. In addition, the longer operative duration observed in overweight patients may contribute to venous thromboembolism risk through prolonged pneumoperitoneum and immobility under general anesthesia, underscoring the importance of individualized thromboprophylaxis and early postoperative mobilization strategies.

Length of hospital stay differed meaningfully between groups. Patients with normal body weight were discharged after an average of 5 days, whereas overweight patients remained hospitalized for approximately 7 days, consistent with slower postoperative recovery and the need for closer monitoring in the presence of complications or higher baseline risk. Prolongation of hospitalization was recorded in 35% of overweight patients compared with 10% of normal-weight patients (Table 1), suggesting that excess body weight substantially increases resource utilization during postoperative care. Despite these differences, the overall clinical outcome remained favorable, indicating that laparoscopic cholecystectomy is effective in overweight patients when supported by targeted preventive measures.

Discussion. The present study demonstrates that laparoscopic cholecystectomy remains a feasible and clinically effective operation in patients with excess body weight, but it is associated with longer operative time and a higher rate of early postoperative complications compared with patients of normal body weight. These findings are consistent with the well-recognized impact of increased abdominal wall thickness and visceral adiposity on minimally invasive surgery. Excess adipose tissue may compromise trocar stability, reduce visualization, and limit the working angles of laparoscopic instruments, thereby increasing technical complexity and prolonging dissection time even when the same operative strategy is used.

From a pathophysiological standpoint, the higher complication profile in overweight patients is biologically plausible. Wound-related complications are promoted by reduced microcirculation in subcutaneous adipose tissue, increased dead space, and mechanical stress on trocar sites. Hematoma formation may reflect both technical challenges during access and dissection and the presence of fragile adipose tissue planes that complicate meticulous hemostasis. The appearance of thrombotic events exclusively in the overweight cohort also aligns with the multifactorial prothrombotic milieu associated with excess body mass, including systemic inflammation, endothelial dysfunction, and decreased mobility after surgery. In this context, the observed longer operative time may act as an additional risk amplifier.

Clinically, the longer postoperative hospitalization among overweight patients should be interpreted not only as a consequence of complications but also as an indicator of the need for intensified perioperative care. Longer hospital stays likely reflect delayed functional recovery, slower wound healing, and the necessity for extended surveillance for infection or thrombotic complications. These data support the value of an individualized perioperative pathway for patients with excess body weight, emphasizing optimized antibiotic prophylaxis, structured wound monitoring, and risk-stratified thromboprophylaxis. Enhanced recovery principles, including early mobilization and standardized analgesia protocols, may further reduce complication rates and shorten hospitalization in this subgroup.

At the same time, the absence of mortality and the overall favorable outcomes across both groups confirm that the minimally invasive approach remains appropriate in patients with excess body weight when performed in a structured setting. Rather than avoiding laparoscopy, the practical implication is that surgical teams should anticipate the predictable technical and physiological challenges in overweight patients and proactively implement mitigation strategies. This includes careful planning of port placement, appropriate instrument length selection, strict adherence to safe dissection principles, and coordinated postoperative monitoring to detect and manage complications early.

Several limitations should be acknowledged. The study was performed at a single center, which may limit generalizability to other institutions with different case mix or perioperative protocols. The analysis was based on BMI categories, which do not fully capture fat distribution or body composition, and the sample size, while adequate for descriptive comparisons, may be underpowered for detecting small differences in rare outcomes such as thrombosis. Future research could strengthen the evidence base by including larger multicenter cohorts, incorporating detailed comorbidity profiling, and evaluating structured perioperative bundles tailored for overweight and obese patients.

Conclusions:

The study found that laparoscopic cholecystectomy in overweight patients presents a number of challenges that require more careful preparation, implementation, and postoperative monitoring. Despite the technical challenges associated with access and organ visualization, the procedure remains safe and effective, but the risk of postoperative complications increases significantly.

One of the main factors influencing surgical outcome is the duration of the procedure, which was significantly longer in overweight patients compared to those of normal weight. This is due to complications associated with increased adipose tissue and, consequently, the difficulty of intraoperative manipulation. Difficulty accessing the organ and limited organ visibility required additional effort and time to perform the surgery, which also increased the workload of the surgical team.

The incidence of postoperative complications was also higher in overweight patients. Wound infections, hematomas, and thrombosis were significantly more common, due to impaired tissue healing and an increased risk of venous thromboembolism. These complications required longer treatment and closer monitoring during the postoperative period. Consequently, overweight patients experienced longer hospital stays, which in turn increased the workload of medical staff and required additional resources.

These studies highlight the importance of an individualized approach to overweight patients, particularly in the context of their preoperative preparation and postoperative follow-up. It is important to recognize that the complexity of the surgery and the significantly higher risk of complications necessitate additional preventive and corrective measures. To reduce risks such as thrombosis and infection, modern preventive measures should be used and patients' condition should be actively monitored during the postoperative period.

Thus, despite the increased risks and complications, laparoscopic cholecystectomy in overweight patients is a feasible procedure if the patient preparation, surgical procedure, and postoperative care are properly managed. These results suggest that these patients require special attention at all stages of treatment, from preoperative diagnosis to long-term follow-up.

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ОСОБЕННОСТИ ЛАПАРОСКОПИЧЕСКОЙ ХОЛЕЦИСТЭКТОМИИ У ПАЦИЕНТОВ С ОЖИРЕНИЕМ

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Резюме. *Целью настоящего исследования было изучение особенностей проведения лапароскопической холецистэктомии у пациентов с избыточной массой тела. В исследовании приняли участие 120 пациентов, из которых 60 имели избыточную массу тела (ИМТ ≥ 25 кг/м²), а 60 - нормальную массу тела (ИМТ 18,5–24,9 кг/м²). Все операции были выполнены в многопрофильной клинике Самаркандского государственного медицинского университета (СамГМУ) в период с 2022 по 2025 год. Основные результаты показали, что у пациентов с избыточной массой тела операция была более сложной и продолжительной, частота послеоперационных осложнений и продолжительность госпитализации также были выше по сравнению с пациентами с нормальной массой тела. Несмотря на это, лапароскопическая холецистэктомия оставалась эффективной и безопасной техникой, требующей дополнительного внимания к подготовке и мониторингу таких пациентов. Полученные данные могут послужить основой для оптимизации подходов к лечению пациентов с избыточной массой тела, перенесших холецистэктомию.*

Ключевые слова: *лапароскопическая холецистэктомия, избыточная масса тела, осложнения, послеоперационный период, госпитализация, продолжительность операции, риски, визуализация, тромбообразование, гематома, инфекция раны, хирургия, восстановление.*