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An Individualized Approach and Clinical Outcomes of Laparoscopic Sleeve Gastrectomy: A Single-Center Experience in Uzbekistan

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Abstract Background: Obesity represents a major global health crisis, contributing significantly to morbidity and mortality [6]. Laparoscopic Sleeve Gastrectomy (LSG) is widely practiced as a primary bariatric surgery option [1,2]. Objective: To assess the efficacy of LSG with a focus on individualized surgical planning to improve outcomes and minimize complications. Methods: This retrospective observational study involved 80 patients who underwent LSG in 2023. Preoperative preparation included consultations with multidisciplinary specialists [3]. Surgical planning was enhanced by software tools for optimal trocar placement and patient positioning [9]. Results: The average hospital stay was 3 ± 1 days. Excess weight loss (EWL) after one year averaged 72.7%. No major complications were reported [4,5]. The triple-balloon bougie reduced reflux esophagitis (55.7% to 21.9%) and eliminated stenosis [8,9]. ALT and AST normalized postoperatively [2,3]. Conclusion: An individualized approach in LSG significantly enhances safety and efficacy.

Keywords Laparoscopic sleeve gastrectomy, Obesity, Individualized surgery, Bariatric complications, Metabolic outcomes

1. Introduction

Obesity has emerged as one of the most pressing global public health concerns, with the World Health Organization (WHO) reporting that as of 2022, more than 2.5 billion adults worldwide were overweight and over 890 million were classified as obese [6]. The burden of obesity is shifting significantly towards low- and middle-income countries, where urban populations are particularly affected [6,7].

Elevated body mass index (BMI) is a recognized risk factor for non-communicable diseases such as cardiovascular disease, type 2 diabetes mellitus, certain cancers, and musculoskeletal disorders [2,3]. The WHO attributes approximately 5 million annual adult deaths to high BMI, many of which are preventable with timely intervention [6].

Laparoscopic Sleeve Gastrectomy (LSG) has become a widely accepted bariatric surgery technique, favored for its relative simplicity, safety profile, and efficacy in achieving significant weight loss [1,2,8]. In LSG, approximately 60–70% of the stomach is removed along the greater curvature, resulting in a tubular gastric conduit, leading to reduced gastric capacity and hormonal changes that promote satiety and insulin sensitivity [2,8,9].

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Despite its advantages, LSG can lead to complications including bleeding, leakage, stenosis, and gastroesophageal reflux [4,5,9]. The variability in patient anatomy and comorbidities necessitates individualized planning. Techniques like personalized trocar placement, software-guided patient positioning, and optimal bougie selection may improve outcomes [3,4,8].

This study evaluates clinical outcomes of LSG performed with an individualized approach, based on anthropometric and intraoperative planning tools, in a single center in Uzbekistan.

2. Materials and Methods

This retrospective, single-center study included 80 adult patients who underwent LSG at the multidisciplinary clinic of the Tashkent Medical Academy in 2023. Inclusion criteria were BMI ≥32.5 kg/m² and resistance to conservative treatment [1,3].

Preoperative evaluation included endocrinologic, cardiologic, and anesthesiologic assessments [3,4]. Laboratory investigations —CBC, liver enzymes (ALT, AST), glucose, HbA1c, and lipid panel—were obtained [2].

All procedures were performed laparoscopically under general anesthesia using a five-trocar technique. Software-guided algorithms for trocar positioning accounted for anthropometric data, enhancing surgical ergonomics [9]. The stomach was mobilized along the greater curvature using

LigaSure. A 36-Fr triple-balloon orogastric bougie was used for calibration [8,9].

The resection began 2–3 cm from the pylorus and extended to the angle of His, preserving its anatomy. Linear staplers (Echelon Flex) were used, and the staple line was reinforced by continuous seroserous sutures (Vicryl 2-0) [8]. Leak testing was performed intraoperatively [4,5].

Postoperative management included early ambulation, proton pump inhibitors, and gradual reintroduction of diet. Follow-up was conducted at 1, 6, and 12 months to monitor weight, metabolic parameters, and complications [2,3,5].

Primary outcomes: operative time, blood loss, hospital stay, and complications.

Secondary outcomes: EWL, BMI change, metabolic improvement, and precision of software-guided planning [9].

3. Results

Of the 80 patients included in the study, 64 (80%) were female and 16 (20%) were male. The mean age was 41.6 ± 12.3 years. Based on BMI distribution: - 12 patients (15%) had a BMI of 32.5–35 kg/m ²- 28 patients (35%) had a BMI of 36–40 kg/m ²- 40 patients (50%) had a BMI >40 kg/m ² Common comorbidities included: - Arterial hypertension: 66 patients (82.5%) - Dyslipidemia: 62 patients (77.5%) - Impaired glucose tolerance: 31 patients (38.8%) - Chronic venous insufficiency: 48 patients (60%) - Gallstone disease: 18 patients (22.5%) - Ventral hernias: 9 patients (11.3%) - Musculoskeletal disorders: 33 patients (41.3%) [1,6]. The mean operative time was: - 61 ±9.5 min for patients with BMI 32.5–35 - 72 ± 11.3 min for BMI 36–40 - 94 ± 12 min for BMI >40 Intraoperative blood loss was ≤100 ml in all cases: - ≤50 ml: 73 patients (91.3%) - 51–100 ml: 7 patients (8.7%).

No patient required blood transfusion or conversion to open surgery. Mean hospital stay was 3 ±1 days. No serious complications such as leak, sepsis, or thromboembolism occurred [5,9]. Minor complications included: - Nausea/ vomiting: 11 patients (13.8%) - Transient fever <37.5 ℃: 4 patients (5%) The mean baseline weight was 136.2 ±16.7 kg. At 6 months, average weight loss was 36.7 ± 6.4 kg; at 12 months, 52.1 ± 7.0 kg. Mean EWL at one year was 72.7% [1,4,8]. Glycemic parameters improved significantly: - Fasting glucose: from 5.7 ± 0.3 mmol/L to 4.5 ± 0.3 mmol/L - HbA1c: from 5.4 ±0.2% to 5.0 ±0.2%.

Liver enzymes normalized in most patients: - ALT reduced from 39.2 ±4.9 IU/L to 25.5 ±4.8 IU/L - AST from 38.4 ±6.1 IU/L to 29.0 ±5.3 IU/L Dyslipidemia resolved in all cases by the 12-month follow-up. Software-assisted trocar planning and patient positioning eliminated the need for trocar repositioning. Use of the triple-balloon bougie was associated with reduced reflux esophagitis (from 55.7% to 21.9%) and 0% incidence of stenosis [8,9].

4. Discussion

Our findings confirm that laparoscopic sleeve gastrectomy (LSG) is a safe and effective procedure for the treatment of obesity, particularly when enhanced by a personalized surgical strategy [1,2,8]. The incorporation of patient-specific trocar placement and intraoperative positioning algorithms allowed for improved surgical ergonomics and minimized intraoperative bleeding, with no case exceeding 100 ml blood loss [9].

The overall complication rate in our study was notably low. The absence of staple line leakage, wound infection, or thromboembolic events is likely attributable to careful preoperative screening, experienced surgical technique, and diligent postoperative care. These outcomes compare favorably with complication rates reported in previous studies, where early leakages can reach up to 5%, and stenosis up to 10% [4,5,9].

The use of a triple-balloon orogastric bougie significantly reduced postoperative reflux esophagitis, a complication frequently associated with LSG. Our observed decline in prevalence—from 55.7% preoperatively to 21.9% postoperatively—supports prior evidence that gastric calibration can influence esophageal function. Notably, the stenosis rate was 0%, emphasizing the importance of sleeve diameter and fundal preservation in technique. The metabolic improvements were also significant. Fasting glucose and HbA1c levels decreased across the cohort, suggesting improvement in insulin sensitivity. Dyslipidemia resolution in all affected patients further confirms the procedure's impact on cardiovascular risk mitigation. Although the study was limited to a single center and lacked a control group, the uniformity in surgical technique and consistent follow-up protocols strengthen the internal validity of the results. Longer-term studies are needed to assess weight regain, nutritional deficiencies, and long-term quality of life outcomes [3,5,7].

5. Conclusions

Laparoscopic sleeve gastrectomy, when performed with an individualized surgical approach, provides excellent clinical outcomes and minimal complication rates in the short-term postoperative period. The use of digital tools for optimal trocar placement and patient positioning, along with the triple-balloon bougie, contributed significantly to reducing the incidence of reflux esophagitis and eliminating stenosis. These results affirm that an individualized, data-driven approach enhances both the safety and efficacy of bariatric surgery [8,9]. Further multicenter, long-term studies are warranted to validate these findings and to evaluate their sustainability over time [2,3,5,8].

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