

Impact of obesity on surgical outcomes of laparoscopic distal pancreatectomy: A Norwegian single-center study

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Background. Obesity is known as a risk factor for intra- and postoperative complications in pancreatic operation. However, the operative outcomes in obese patients undergoing laparoscopic distal pancreatectomy remain unclear.

Methods. A total number of 423 patients underwent laparoscopic distal pancreatectomy at Oslo University Hospital-Rikshospitalet from April 1997 to December 2015. Patients were categorized into 3 groups based on the body mass index: normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obese (≥ 30 kg/m²). After excluding underweight patients, 402 patients were enrolled in this study.

Results. Obese patients had significantly longer operative time and increased blood loss compared with overweight and normal weight patients (190 [61–480] minutes vs 158 [56–520] minutes vs 153 [29–374] minutes, $P = .009$ and 200 [0–2,800] mL vs 50 [0–6250] mL vs 90 [0–2,000] mL, $P = .01$, respectively). A multiple linear regression analysis identified obesity as predictive of prolonged operative time and increased blood loss during laparoscopic distal pancreatectomy. The rates of clinically relevant pancreatic fistula and severe complications (\geq grade III by Accordion classification) were comparable in the 3 groups ($P = .23$ and $P = .37$, respectively). A multivariate logistic regression model did not demonstrate an association between obesity and postoperative morbidity ($P = .09$). The duration of hospital stay was comparable in the 3 groups ($P = .13$).

Conclusion. In spite of longer operative time and greater blood loss, laparoscopic distal pancreatectomy in obese patients is associated with satisfactory postoperative outcomes, similar to those in normal weight and overweight patients. Hence, laparoscopic distal pancreatectomy should be equally considered both in obese and nonobese patients. (Surgery 2016;■:■-■.)

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RECENT DATA DEMONSTRATE that a mean percentage of 37.5% of the world population is considered obese and overweight, including more than 400 million adults with ≥ 30 kg/m² body mass index (BMI).^{1,2} Obesity is a well-known cause of multiple

comorbidities, such as cardiovascular diseases, diabetes mellitus, hypertension, and metabolic syndrome. At the same time, obesity is presumably associated with an increased risk of complications after operation.^{3,4}

However, the real impact of BMI on short-term outcomes after pancreatic resections remains unclear due to a scarce literature in this area. Although some studies found an increased rate of postoperative complications in obese patients undergoing pancreatectomy,^{5,6} others reported on outcomes comparable with those in the nonobese group.⁷⁻⁹ However, these studies are either merely focused on pancreatoduodenectomy (PD) or

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include a heterogeneous cohort with different types of pancreatic resection. Some studies report an increased rate of postoperative complications in patients with BMI ≥ 25 kg/m² after open distal pancreatectomy (ODP).^{10,11} Nevertheless, data remain limited regarding the outcomes of distal pancreatectomy in obese patients.

A recent meta-analysis found that laparoscopic distal pancreatectomy (LDP) is advantageous over open distal pancreatectomy in terms of intra- and postoperative outcomes, including estimated intraoperative blood loss, rate of blood transfusion, time to first oral intake, surgical site infections and hospital stay.^{12,13} Today, with an increasing application of laparoscopic operation for benign and malignant lesions in the body and tail of the pancreas, the results of LDP in obese patients are of great interest.

The aim of this study was to assess the short-term operative outcomes after LDP in obese patients and compare with those in the normal weight and overweight patients.

MATERIAL AND METHODS

From April 1997 to December 2015, 423 consecutive patients underwent LDP for benign and malignant lesions in the body and tail of the pancreas at Oslo University Hospital-Rikshospitalet, a tertiary referral center in Norway. The preoperative workup, operative technique, and postoperative management for these patients at our institution have been described previously.¹⁴⁻¹⁶ In this time period, OPD was applied in a very small number of highly selected patients ($n = 14$), mainly due to necessity of major vascular reconstruction.

Data analysis was performed after a retrospective review of a prospectively collected database. Patient demographics, clinical presentation, and intra- and postoperative outcomes were included in the analysis. The study was approved by the Institutional Data Protection Officer.

Based on World Health Organization definitions and preoperative BMI scores, all patients were categorized into 3 groups: those with normal weight (BMI = 18.5–24.9 kg/m²), overweight (BMI = 25–29.9 kg/m²), and obese (BMI ≥ 30 kg/m²). Underweight patients, represented by a small number of cases (4.9%), were excluded from further analysis. The groups were compared in terms of preoperative data as well as intra- and postoperative outcomes.

Standard and extended LDP are defined according to the consensus criteria set by the

International Study Group of Pancreatic Surgery.¹⁷ The unified criteria for grading perioperative adverse events were applied.¹⁸ Intraoperative unfavorable incidents were assessed using the revision of Satava approach to grade operative error, and postoperative complications were graded in agreement with the Accordion classification.¹⁸⁻²¹ Postoperative complication grade \geq III (ie, requiring radiologic or endoscopic intervention or reoperation) was defined as severe. Pancreatic fistula (PF) was defined and graded according to criteria set by the International Study Group on Pancreatic Fistula.²² Grades B and C PF were considered clinically relevant. The 90-days-from-operation definition was used when the readmissions and mortality after LDP were reported.²³

Continuous data are represented as a median (interquartile range) or mean (standard deviation), whereas categorical data are expressed as a number (percentage). The χ^2 test or Fisher exact test were used to compare frequencies. The Kruskal-Wallis test was applied for comparison of not-normally distributed variables, whereas the analysis of variance was used for normally distributed, continuous variables. In case of significant differences, the post hoc test was applied to verify the differences. The impact of BMI on intraoperative outcomes and postoperative complications was assessed using stepwise multiple linear regression and multivariate logistic regression analyses, respectively.

RESULTS

After the exclusion of patients who were underweight, a total of 402 patients were included in this study. Preoperative data and demographics of these patients are presented in Table I. Expectedly, the patients with normal weight ($n = 191$), overweight ($n = 155$), and obese ($n = 56$) were significantly different from each other in terms of BMI ($P = .001$). However, they were comparable in terms of age, sex, and presence of previous abdominal operation. Comorbidities more often were observed in obese patients, but the difference was not statistically significant ($P = .08$). The mean total number of comorbidities was comparable among the groups ($P = .12$). Although the groups were similar in terms of the rates of cardiovascular and chronic obstructive pulmonary diseases, obese patients had a significantly greater rate of hypertension and diabetes mellitus (39.3% vs 27.1% vs 19.4%, $P = .008$, and 26.8% vs 12.9% vs 10.5%, $P = .007$, respectively). The distribution of the ASA scores was not significantly different ($P = .08$).

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