

Preoperative Weight Loss with a Very-Low-Energy Diet: Quantitation of Changes in Liver and Abdominal Fat by Serial Imaging

Colles SL, Dixon JB, Marks P, Strauss BJ, O'Brien PE.
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Introduction:

- Nonalcoholic fatty liver disease (NAFLD), characterized predominantly by steatosis (infiltration of liver cells with fat), and nonalcoholic steatohepatitis (NASH) with additional lobular inflammation and fibrosis are strongly related to obesity and metabolic and inflammatory features of the metabolic syndrome.
- An enlarged fatty liver can increase surgical risk and complexity in patients undergoing upper abdominal laparoscopic surgery.
- Hepatomegaly has been cited as the most common cause for conversion to an open procedure from laparoscopic Roux-en-Y gastric bypass (RYGBP) or laparoscopic adjustable gastric band (LAGB) placement.
- A very low energy diet (VLED <800 calories/day) can result in substantial, rapid weight loss before obesity surgery to minimize risk and difficulty by reducing liver size and abdominal adiposity.
- The objective of this study was to investigate the efficacy and acceptability of a preoperative VLED.

Inclusion Criteria:

- 37 morbidly obese patients were selected to undergo a 12-week VLED (OPTIFAST® Australia) intervention before LAGB placement.
- Men or women 18-60 years with body weight ≤ 155 kg (upper weight limit of the radiologic equipment).
- Stable weight (± 5 kg) over the previous 3 months.
- BMI ≥ 40 for men and ≥ 50 for women.

Exclusion Criteria:

- Medical contraindications included severe hepatic disease, advancing renal disease, and unstable cardiac disease.
- High-risk alcohol intake (> 7 drinks/day or > 43 drinks/week for men and > 5 drinks/day or > 29 drinks/week for women).

Interventions:

- 12-week dietary intervention of 3 shakes/day providing 456 kcal, 52 g protein, 7 g fat, and 45 g carbohydrate plus the recommended daily intake of vitamins, minerals, and trace elements.
- Inclusion of up to 2 cups of low starch vegetables (approx. 200 calories) was allowed to provide a total energy intake of 456–680 kcal/day.
- VLED requirements were outlined by a dietitian before starting the diet; patients attended nutrition counseling every 2 weeks.
- Diet adherence was not used to assess suitability for LAGB surgery and poor compliance was not a contraindication to surgery.
- Changes in liver volume were assessed by an abdominal CT scan at baseline and at the end of the 12-week VLED.
- The following measurements were taken at baseline and every 2 weeks: weight, height, neck circumference, waist circumference, hip circumference, seated blood pressure.
- Baseline and 12-week metabolic panels included: liver function tests, fasting glucose, plasma glucose, plasma insulin, glycated hemoglobin A1c, total cholesterol, LDL and HDL cholesterol, triglycerides, and C-reactive protein.

Results:

- 32 of 37 patients (86%) completed the 12-week protocol (19 men 13 women).
- At completion VLED, all baseline descriptive characteristics for the 32 patients decreased significantly.
- Body weight decreased by 14.8 ± 7.2 kg, BMI by 5.0 ± 2.4 , liver volume by 0.56 ± 0.50 L, visceral adipose tissue (VAT) by 61.2 ± 52.1 cm², and subcutaneous adipose (SAT) by 78.7 ± 50.1 cm².
- The total decrease in liver size was 28.7% (neither age nor sex predicted the extent of the tissue reduction).
- An immediate decrease in liver volume took place; 80% of the reduction occurred between weeks 0 and 2 ($p < 0.001$).
- Most biochemical measures improved by the completion of the study; no deterioration in any clinical condition was observed.
- There were no conversions to an open procedure, no major perioperative complications, and no prolonged hospital stays.

Conclusion:

- Severely obese patients, who were compliant with a 12-week VLED, safely and effectively achieved significant reductions in body weight, liver volume, VAT, and SAT.
- These improvements were likely to diminish the degree of surgical difficulty and the risk of liver trauma and blood loss.
- Most of the reduction in liver size occurred in the first 2 weeks of weight loss with a VLED.
- Reduction in VAT and weight was more consistent over the 12-week period.
- The VLED was an acceptable means of preoperative weight loss and there were no unfavorable anthropometric, biochemical, or clinical outcomes.

Study summary prepared by Nestlé Health Science.

The complete study can be accessed at:

<https://academic.oup.com/ajcn/article/84/2/304/4649456>