Dietary intake, nutritional status and energy metabolism in adolescents with severe obesity - Effects of gastric bypass surgery

Akademisk avhandling
som för avläggande av medicine doktorsexamen vid Sahlgrenska Akademin vid Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Academicum, Medicinareberget 3, Göteborgs universitet, Göteborg,
torsdagen den 26 november 2020, kl. 13:00

av
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Fakultetsopponent:
Professor Emeritus Finn Rasmussen
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Avhandlingen baseras på följande delarbeten

I. Henfridsson P, Laurenius A, Wallengren O, Gronowitz E, Dahlgren J, Flodmark CE, Marcus C, Olbers T, Ellegård L. Five-year changes in dietary intake and body composition in adolescents with severe obesity undergoing laparoscopic Roux-en-Y gastric bypass surgery. Surg Obes Relat Dis 2019; 15: 51-58.

II. Henfridsson P, Laurenius A, Wallengren O, Beamish AJ, Dahlgren J, Flodmark CE, Marcus C, Olbers T, Gronowitz E, Ellegård L. Micronutrient intake and biochemistry in adolescents adherent or nonadherent to supplements 5 years after Roux-en-Y gastric bypass surgery. Surg Obes Relat Dis 2019; 15: 1494-1502.

III. Henfridsson P, Wallengren O, Laurenius A, Dahlgren J, Flodmark CE, Marcus C, Gronowitz E, Olbers T, Ellegård L. Energy Expenditure assessed with Doubly Labeled Water five years after gastric bypass surgery or non-surgical treatment in young adults, and evaluation of Diet History Interview. In manuscript.

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR MEDICIN

Dietary intake, nutritional status and energy metabolism in adolescents with severe obesity - Effects of gastric bypass surgery

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Abstract

Roux-en-Y gastric bypass is an effective obesity treatment in adults and is becoming established in adolescents. Information is scarce on long-term changes in dietary intake, nutritional status and energy metabolism in adolescents undergoing gastric bypass. The overall aim of this thesis is to study these phenomena, to help improve treatment protocols (which currently are based on adult patients). The aim is also to evaluate the accuracy of the dietary assessment method, diet history interview, against the gold standard method, doubly labeled water, in this population.

Eighty-five adolescents (67% girls, mean age 16.5 years, mean BMI 45.5 kg/m^2) were followed in a longitudinal cohort study and assessed pre-surgically and at one, two and five years after gastric bypass surgery (paper I, II, and III). They completed diet history interviews (paper I, II, and III), including a form on adherence to prescribed supplementation (paper II), in addition, assessments on body composition (paper I and III), biochemistry (paper II), and energy expenditure (paper III). Eighty-one matched adolescents receiving conventional medical nutrition therapy for obesity, served as a non-surgical control group, and were assessed at five years (paper I, II and III). The accuracy of the diet history interviews is evaluated in comparison to doubly labeled water (paper III).

Weight was decreased by 28% at five years following surgery while controls had gained 13%. Energy intake decreased (from preoperative 2558 kcal/day) by 34, 22 and 10% after one, two and five years. Dietary energy density decreased initially (at one year) but was no longer different at two years. Adherence to prescribed supplementation ranged between 44-61% through five years. Adhering to supplements was associated with more favorable biochemistry. By five years biochemistry showed a decrease in ferritin and hemoglobin and 61% had iron deficiency. Among females with iron deficiency, most did not adhere to supplementation, and 59% of these had anemia. A high prevalence of vitamin D insufficiency pre-surgery lasted through five years, and 80% of adolescents' nonadherent to supplementation had insufficiency at five years. Assessment of muscle mass showed better preservation in males and a protein intake ≥60 g/day was associated with preserved muscle mass. At five years adolescents who had undergone surgery and non-surgical controls had similar fat-free mass, total energy expenditure and resting energy expenditure. There was no association between reported energy intake from the diet history interviews and total energy expenditure measured with doubly labeled water in all adolescents. There was, however, a positive correlation in the surgically treated adolescents.

Energy intake and dietary energy density might be important factors, in weight loss following gastric bypass surgery in adolescents. Adequate protein intake could possibly facilitate preservation of muscle mass following surgery. Results support current recommendations; on monitoring of micronutrient intake and biochemistry in all patients following gastric bypass surgery; higher (>800 IU/20 µg) preventive supplementation of vitamin D; and iron in both sexes. Despite large difference in weight and similar fat-free mass, five years after gastric bypass surgery or conventional medical nutrition therapy, total energy expenditure and resting energy expenditure was similar between the groups. The diet history interview did not capture total energy expenditure in young adults with obesity or severe obesity.

Keywords: Roux-en-Y gastric bypass, metabolic bariatric surgery, adolescents, dietary assessment, body composition, micronutrient intake, medication adherence, vitamin deficiencies, energy intake, energy expenditure, doubly labeled water
ISBN 978-91-629-8009-050-6 (PRINT)
ISBN 978-91-629-8009-051-3 (PDF)
E-version: http://hdl.handle.net/2077/63284