The Impact of Bariatric Surgery In Cancer Risk and Its Treatment

Rami Lutfi, MD FACS FASMBS DABOM

Clinical Professor of Surgery; Chicago Medical School

President and CEO Chicago Institute of Advanced Surgery

Disclosures:

- Consultant:
  - Medtronic
  - Johnson&Johnson
  - Gore
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  - ConMed
- Educational Grant:
  - Gore
- Medical Advisor:
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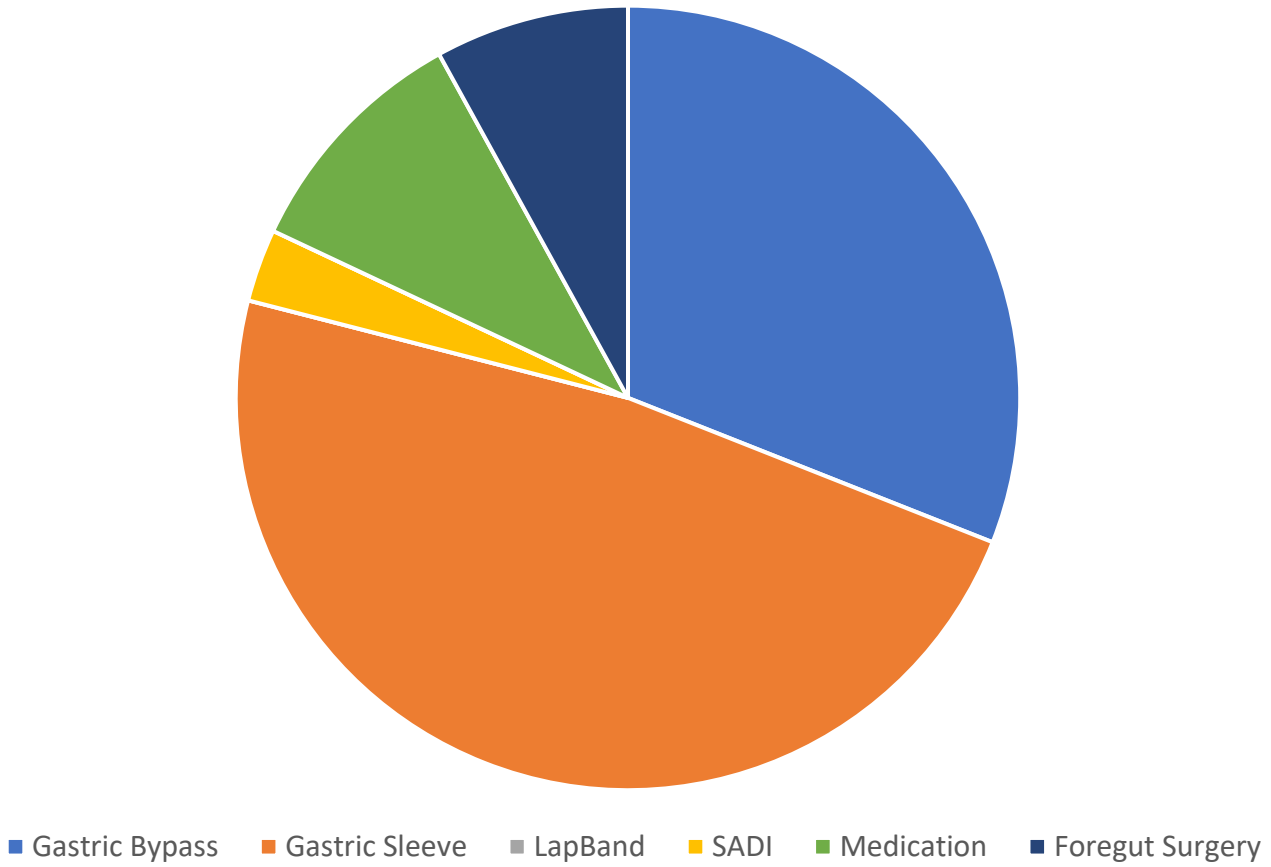
My Practice Today



Adiposity and cancer at major anatomical sites: umbrella review of the literature

Maria Kyrgiou,[1,2] Ilkka Kalliala,[1] Georgios Markozannes,[3] Marc J Gunter,[4] Evangelos Paraskevaidis,[5] Hani Gabra,[1,2] Pierre Martin-Hirsch,[6,7] Konstantinos K Tsilidis[3,8]

[1]Department of Surgery and Cancer, Institute of Reproductive and Developmental Biology, Faculty of Medicine, Imperial College London, London W12 0NN, UK
[2]West London Gynaecological Cancer Centre, Queen Charlotte's and Chelsea Hospital, Hammersmith Hospital, Imperial Healthcare NHS Trust, London, UK
[3]Department of Hygiene and Epidemiology, University of Ioannina School of Medicine, Ioannina, Greece
[4]Section of Nutrition and Metabolism, International Agency for Research on Cancer, Lyon, France
[5]Department of Obstetrics and Gynaecology, University of Ioannina, Ioannina, Greece
[6]Department of Gynaecologic Oncology, Lancashire Teaching Hospitals, Preston, UK
[7]Department of Biophysics, University of Lancaster, Lancaster, UK
[8]Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London UK

Correspondence to: M Kyrgiou
m.kyrgiou@imperial.ac.uk

Additional material is published online only. To view please visit the journal online.

Cite this as: *BMJ* 2017;356:j477
http://dx.doi.org/10.1136/bmj.j477

Accepted: 24 January 2017

ABSTRACT

OBJECTIVE

To evaluate the strength and validity of the evidence for the association between adiposity and risk of developing or dying from cancer.

DESIGN

Umbrella review of systematic reviews and meta-analyses.

DATA SOURCES

PubMed, Embase, Cochrane Database of Systematic Reviews, and manual screening of retrieved references.

ELIGIBILITY CRITERIA

Systematic reviews or meta-analyses of observational studies that evaluated the association between indices of adiposity and risk of developing or dying from cancer.

DATA SYNTHESIS

Primary analysis focused on cohort studies exploring associations for continuous measures of adiposity. The evidence was graded into strong, highly suggestive, suggestive, or weak after applying criteria that included the statistical significance of the random effects summary estimate and of the largest study in a meta-analysis, the number of cancer cases, heterogeneity between studies, 95% prediction intervals, small study effects, excess significance bias, and sensitivity analysis with credibility ceilings.

RESULTS

204 meta-analyses investigated associations between seven indices of adiposity and developing or dying from 36 primary cancers and their subtypes. Of the 95 meta-analyses that included cohort studies and used a continuous scale to measure adiposity, only 12 (13%) associations for nine cancers were supported by strong evidence. An increase in body mass index was associated with a higher risk of developing oesophageal adenocarcinoma; colon and rectal cancer in men; biliary tract system and pancreatic cancer; endometrial cancer in premenopausal women; kidney cancer; and multiple myeloma. Weight gain and waist to hip circumference ratio were associated with higher risks of postmenopausal breast cancer in women who have never used hormone replacement therapy and endometrial cancer, respectively. The increase in the risk of developing cancer for every 5 kg/m^2 increase in body mass index ranged from 9% (relative risk 1.09, 95% confidence interval 1.06 to 1.13) for rectal cancer among men to 56% (1.56, 1.34 to 1.81) for biliary tract system cancer. The risk of postmenopausal breast cancer among women who have never used HRT increased by 11% for each 5 kg of weight gain in adulthood (1.11, 1.09 to 1.13), and the risk of endometrial cancer increased by 21% for each 0.1 increase in waist to hip ratio (1.21, 1.13 to 1.29). Five additional associations were supported by strong evidence when categorical measures of adiposity were included: weight gain with colorectal cancer; body mass index with gallbladder, gastric cardia, and ovarian cancer; and multiple myeloma mortality.

CONCLUSIONS

Although the association of adiposity with cancer risk has been extensively studied, associations for only 11 cancers (oesophageal adenocarcinoma, multiple myeloma, and cancers of the gastric cardia, colon, rectum, biliary tract system, pancreas, breast, endometrium, ovary, and kidney) were supported by strong evidence. Other associations could be genuine, but substantial uncertainty remains. Obesity is becoming one of the biggest problems in public health; evidence on the strength of the associated risks may allow finer selection of those at higher risk of cancer, who could be targeted for personalised prevention strategies.

Table 1 | Summary of evidence grading for meta-analyses associating continuous measures of obesity and risk of cancer—cohort studies only. Risk refers to cancer incidence unless otherwise stated

Evidence	Criteria used	Decreased risk	Increased risk
Strong (n=12)	P<10^{-6}*; >1000 cases; P<0.05 of largest study in meta-analysis; I^2 <50%; no small study effect†; prediction interval excludes null value; no excess significance bias‡; survive 10% credibility ceiling	None	Oesophageal adenocarcinoma (BMI); colon cancer, men (BMI); rectal cancer, men (BMI); biliary tract system cancer§ (BMI); pancreatic cancer (BMI); postmenopausal breast cancer, never HRT use (WG); endometrial cancer (WHR); premenopausal endometrial cancer (BMI); kidney cancer, men and women (BMI); multiple myeloma, overall and women (BMI)
Highly suggestive (n=17)	P<10^{-6}*; > largest stu		er cancer (BMI); (BMI, BMI in young etrial cancer (BMI); ll (BMI); kidney cancer (BMI)
Suggestive (n=23)	P<10^{-3}*; >		all (WG); colon cancer (WHR MI); pancreatic cancer ulthood); prostate cancer ; non-Hodgkin's lymphoma
Weak (n=19)	P<0.05*		; melanoma, men (BMI); dometrial cancer, never HRT , ever HRT use (BMI and WG); ght per 5 kg); ostate cancer, advanced e for prostate specific lymphoma mortality (BMI);

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(per 10 cm); WG=weight gain

point estimate of the largest

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The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 23, 2007 VOL. 357 NO. 8

Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects

Lars Sjöström, M.D., Ph.D., Kristina Narbro, Ph.D., C. David Sjöström, M.D., Ph.D., Kristjan Karason, M.D., Ph.D., Bo Larsson, M.D., Ph.D., Hans Wedel, Ph.D., Ted Lystig, Ph.D., Marianne Sullivan, Ph.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Calle Bengtsson, M.D., Ph.D., Sven Dahlgren, M.D., Ph.D., Anders Gummesson, M.D., Peter Jacobson, M.D., Ph.D., Jan Karlsson, Ph.D., Anna-Karin Lindroos, Ph.D., Hans Lönroth, M.D., Ph.D., Ingmar Näslund, M.D., Ph.D., Torsten Olbers, M.D., Ph.D., Kaj Stenlöf, M.D., Ph.D., Jarl Torgerson, M.D., Ph.D., Göran Ågren, M.D., and Lena M.S. Carlsson, M.D., Ph.D., for the Swedish Obese Subjects Study

ABSTRACT

BACKGROUND

Obesity is associated with increased mortality. Weight loss improves cardiovascular risk factors, but no prospective interventional studies have reported whether weight loss decreases overall mortality. In fact, many observational studies suggest that weight reduction is associated with increased mortality.

METHODS

The prospective, controlled Swedish Obese Subjects study involved 4047 obese subjects. Of these subjects, 2010 underwent bariatric surgery (surgery group) and 2037 received conventional treatment (matched control group). We report on overall mortality during an average of 10.9 years of follow-up. At the time of the analysis (November 1, 2005), vital status was known for all but three subjects (follow-up rate, 99.9%).

RESULTS

The average weight change in control subjects was less than ±2% during the period of up to 15 years during which weights were recorded. Maximum weight losses in the surgical subgroups were observed after 1 to 2 years: gastric bypass, 32%; vertical-banded gastroplasty, 25%; and banding, 20%. After 10 years, the weight losses from baseline were stabilized at 25%, 16%, and 14%, respectively. There were 129 deaths in the control group and 101 deaths in the surgery group. The unadjusted overall hazard ratio was 0.76 in the surgery group (P=0.04), as compared with the control group, and the hazard ratio adjusted for sex, age, and risk factors was 0.71 (P=0.01). The most common causes of death were myocardial infarction (control group, 25 subjects; surgery group, 13 subjects) and cancer (control group, 47; surgery group, 29).

CONCLUSIONS

Bariatric surgery for severe obesity is associated with long-term weight loss and decreased overall mortality.

From the Institutes of Medicine (L.S., K.N., K.K., T.L., M.S., B.C., A.G., P.J., J.K., K.S., L.M.S.C.), Anesthesiology (C.D.S., B.L.), Surgery (H.L., T.O.), and Primary Health Care (C. Bengtsson), Sahlgrenska Academy, Gothenburg University, Gothenburg; Nordic School of Public Health, Gothenburg (H.W.); Börjegatan 10B, Uppsala (S.D.); Department of Surgery, University Hospital, Örebro (I.N., G.Å.); and Department of Medicine, Northern Älvsborg Hospital, Trollhättan (J.T.) — all in Sweden; Pennington Biomedical Research Center, Louisiana State University System, Baton Rouge (L.S., C. Bouchard); and Medical Research Council Human Nutrition Research, Elsie Widdowson Laboratory, Cambridge University, Cambridge, United Kingdom (A.-K.L.). Address reprint requests to Dr. L. Sjöström at the Swedish Obese Subjects Secretariat, Vita stråket 15, Sahlgrenska University Hospital, S-413 45 Gothenburg, Sweden, or at lars.sjostrom@medfak.gu.se.

N Engl J Med 2007;357:741-52.

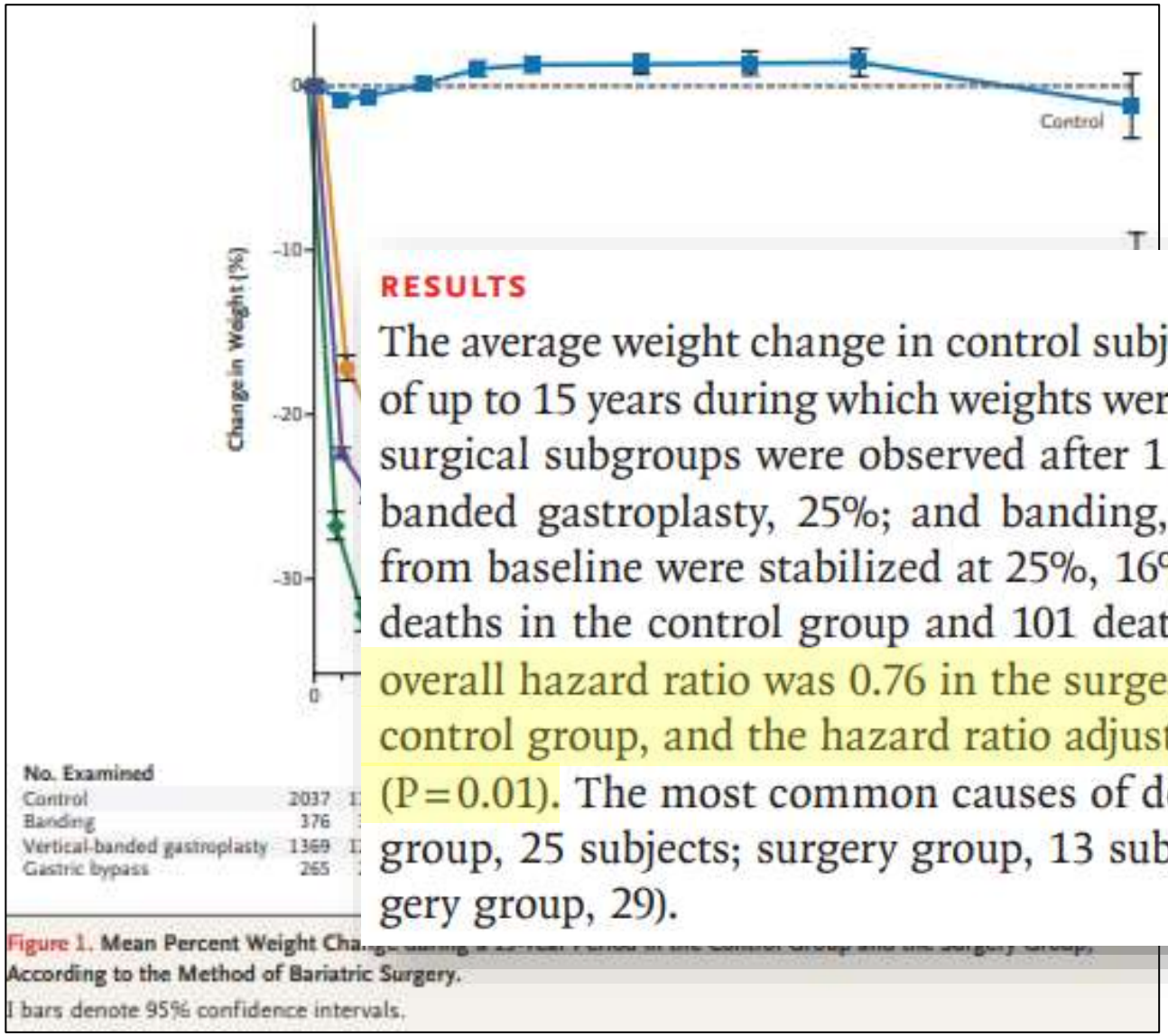
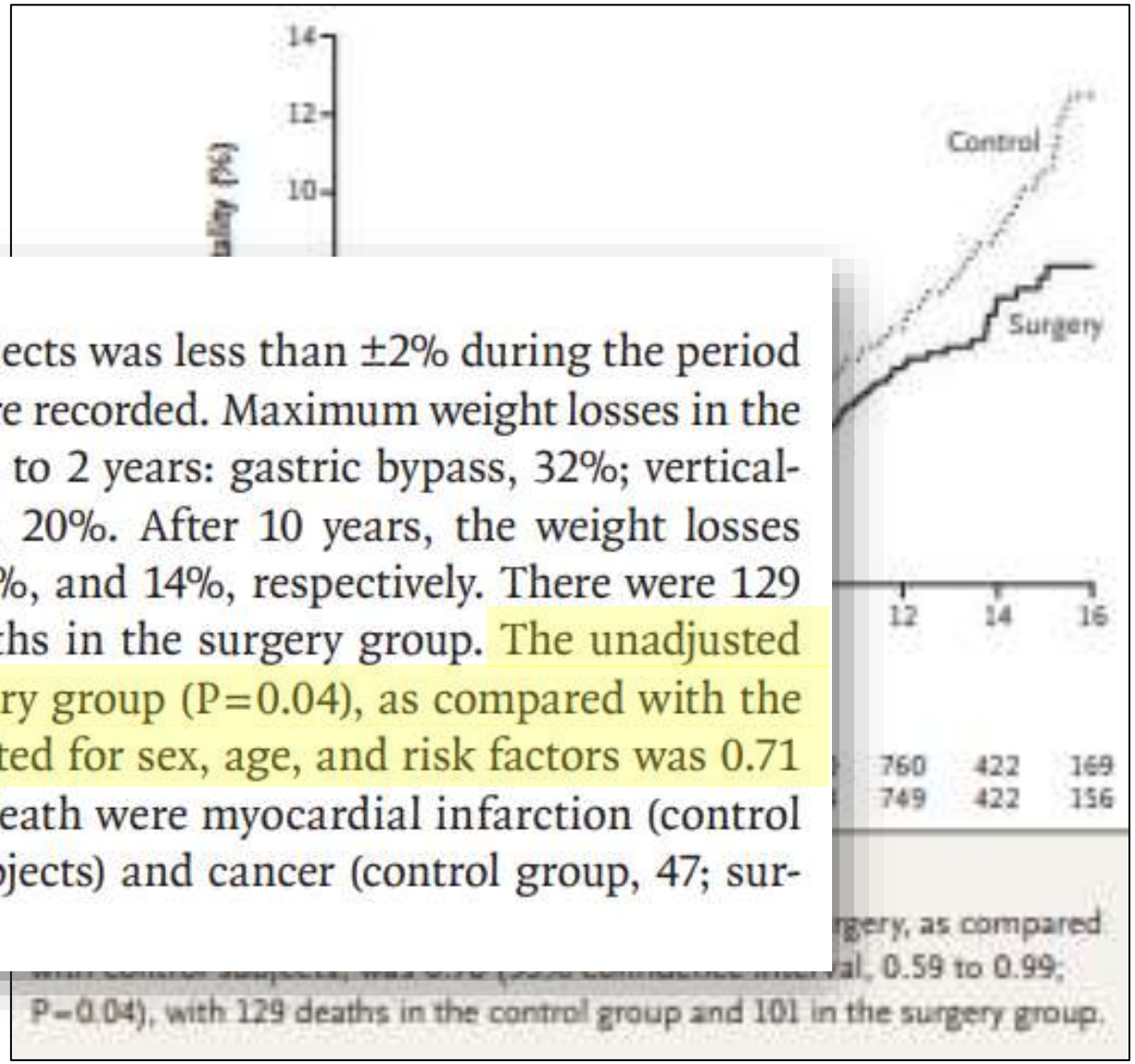


Figure 1. Mean Percent Weight Cha... According to the Method of Bariatric Surgery.

I bars denote 95% confidence intervals.



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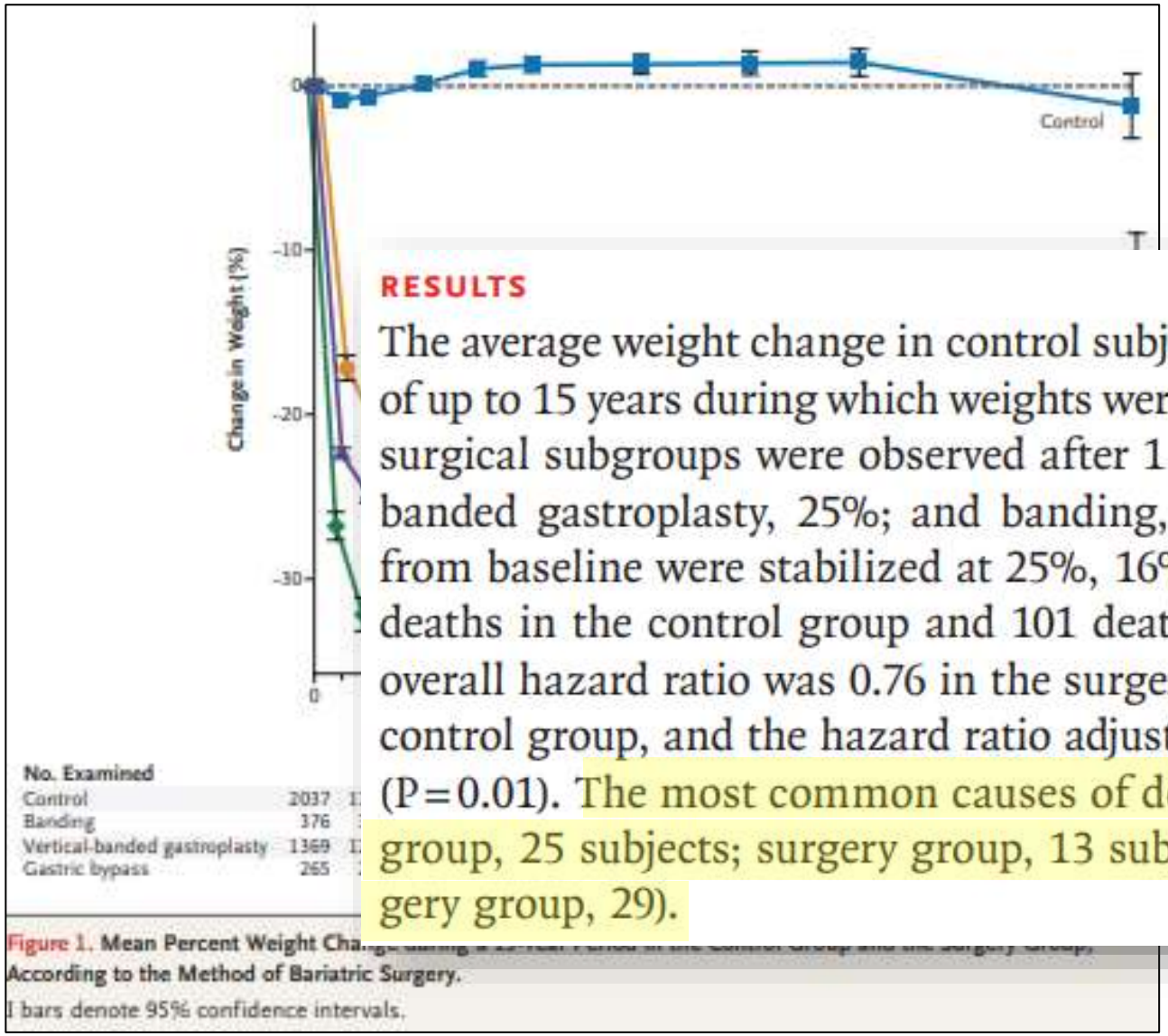

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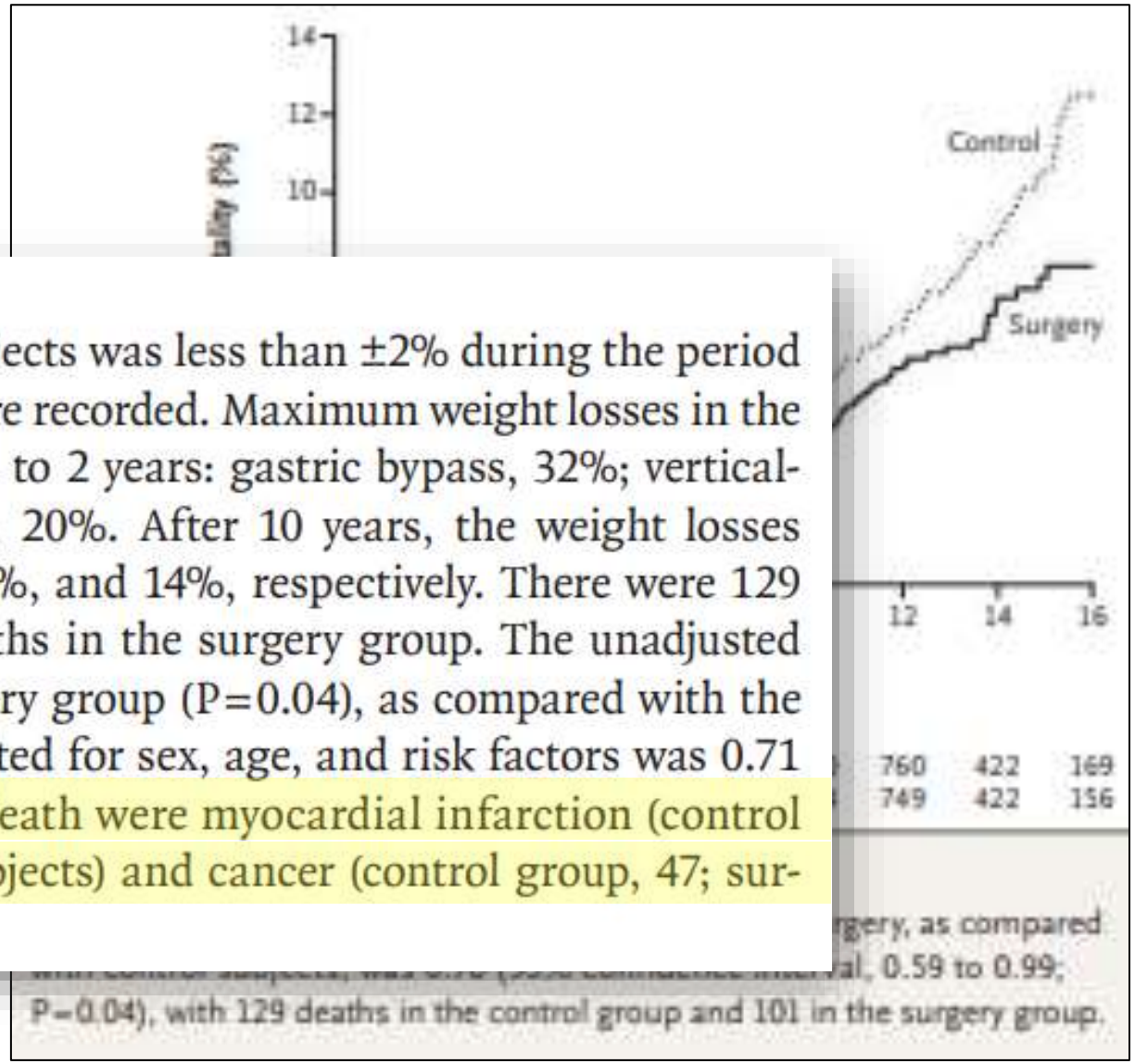

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Effects of bariatric surgery on cancer incidence in obese patients in Sweden (Swedish Obese Subjects Study): a prospective, controlled intervention trial

Lars Sjöström, Anders Gummesson, C David Sjöström, Kristina Narbro, Markku Peltonen, Hans Wedel, Calle Bengtsson, Claude Bouchard, Björn Carlsson, Sven Dahlgren, Peter Jacobson, Kristjan Karason, Jan Karlsson, Bo Larsson, Anna-Karin Lindroos, Hans Lönroth, Ingmar Näslund, Torsten Olbers, Kaj Stenlöf, Jarl Torgerson, Lena M S Carlsson, for the Swedish Obese Subjects Study

Summary

Background Obesity is a risk factor for cancer. Intentional weight loss in the obese might protect against malignancy, but evidence is limited. To our knowledge, the Swedish Obese Subjects (SOS) study is the first intervention trial in the obese population to provide prospective, controlled cancer-incidence data.

Methods The SOS study started in 1987 and involved 2010 obese patients (body-mass index [BMI] ≥34 kg/m² in men, and ≥38 kg/m² in women) who underwent bariatric surgery and 2037 contemporaneously matched obese controls, who received conventional treatment. While the main endpoint of SOS was overall mortality, the main outcome of this exploratory report was cancer incidence until Dec 31, 2005. Cancer follow-up rate was 99·9% and the median follow-up time was 10·9 years (range 0–18·1 years).

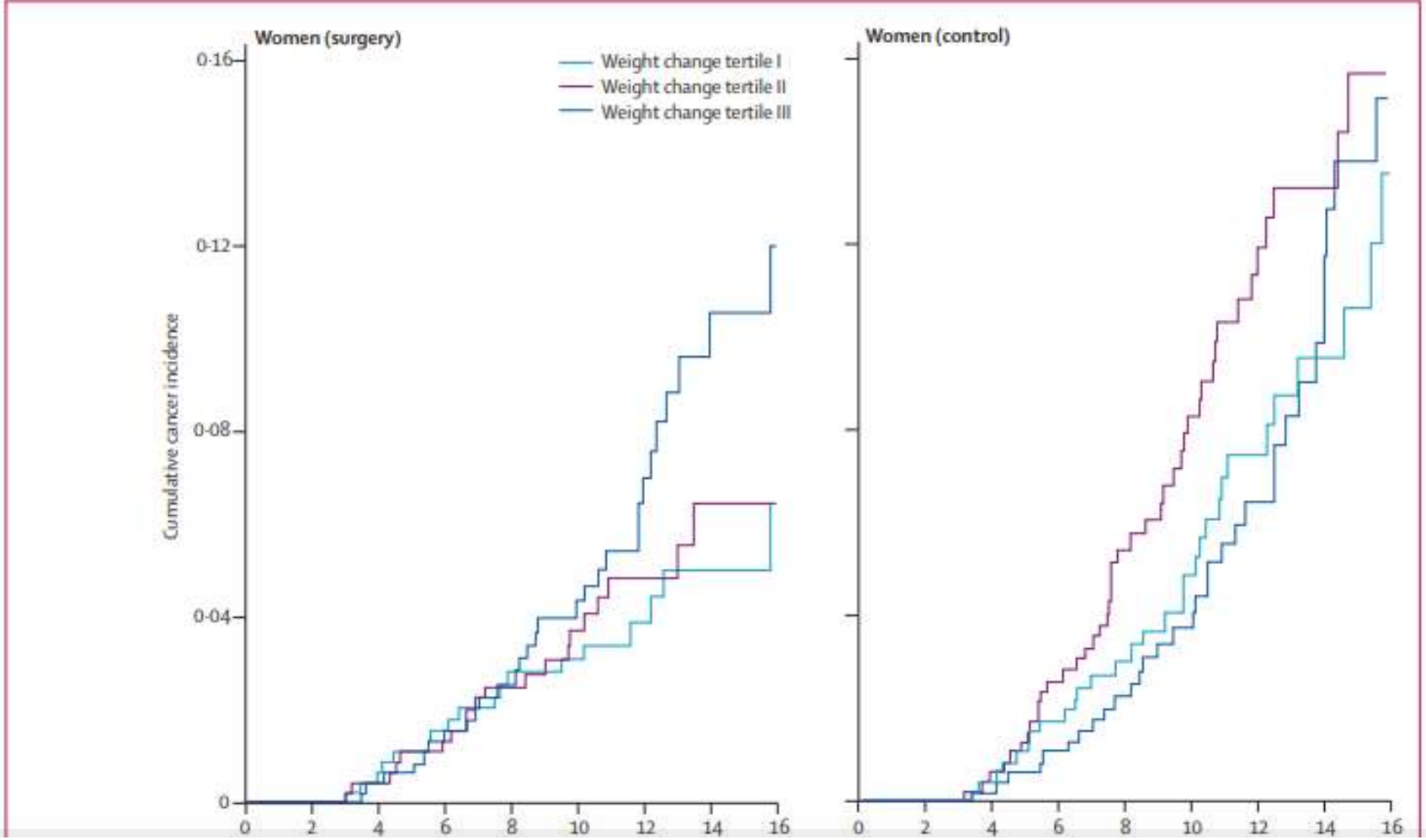
Lancet Oncol 2009; 10: 653–62

Published Online June 24, 2009 DOI:10.1016/S1470-2045(09)70159-7

See Reflection and Reaction page 640

The Institutes of Medicine (Prof L Sjöström MD, A Gummesson MD,

he unadjusted cumulative fatal plus non-fatal cancer incidence from the start of the intervention by sex in surgically treated obese indiv
ontrol individuals



Interpretation Bariatric surgery was associated with reduced cancer incidence in obese women but not in obese men.

Weight change tertile (mean, min, max kg)	n	HR (95% CI)	p
I (−17·0, −23·5 to 4·1)	465	1·00 (–)	–
II (−28·5, −33·9 to −23·6)	471	1·20 (0·64 to 2·26)	0·57
III (−42·8, −111·2 to −33·9)	473	1·67 (0·92 to 3·01)	0·091

Weight change tertile (mean, min, max kg)	n	HR (95% CI)	p
I (5·7, 1·9 to 21·3)	472	1·00 (–)	–
II (0·2, −1·8 to 1·9)	476	1·45 (0·91 to 2·32)	0·12
III (−8·0, −61·4 to −1·8)	474	0·97 (0·59 to 1·59)	0·90

Figure 4: Unadjusted cumulative incidence of fatal plus non-fatal cancer from start of year 4 and onwards, stratified by weight-change tertiles (kg) during the first year

ORIGINAL ARTICLE

Long-Term Mortality after Gastric Bypass Surgery

Ted D. Adams, Ph.D., M.P.H., Richard E. Gress, M.A., Sherman C. Smith, M.D., R. Chad Halverson, M.D., Steven C. Simper, M.D., Wayne D. Rosamond, Ph.D., Michael J. LaMonte, Ph.D., M.P.H., Antoinette M. Stroup, Ph.D., and Steven C. Hunt, Ph.D.

BACKGROUND

Although gastric bypass surgery accounts for 80% of bariatric surgery in the United States, only limited long-term data are available on mortality among patients who have undergone this procedure as compared with severely obese persons from a general population.

METHODS

In this retrospective cohort study, we determined the long-term mortality (from 1984 to 2002) among 9949 patients who had undergone gastric bypass surgery and 9628 severely obese persons who applied for driver's licenses. From these subjects, 7925 surgical patients and 7925 severely obese control subjects were matched for age, sex, and body-mass index. We determined the rates of death from any cause and from specific causes with the use of the National Death Index.

RESULTS

During a mean follow-up of 7.1 years, adjusted long-term mortality from any cause in the surgery group decreased by 40%, as compared with that in the control group (37.6 vs. 57.1 deaths per 10,000 person-years, P<0.001); cause-specific mortality in the surgery group decreased by 56% for coronary artery disease (2.6 vs. 5.9 per 10,000 person-years, P=0.006), by 92% for diabetes (0.4 vs. 3.4 per 10,000 person-years, P=0.005), and by 60% for cancer (5.5 vs. 13.3 per 10,000 person-years, P<0.001). However, rates of death not caused by disease, such as accidents and suicide, were 58% higher in the surgery group than in the control group (11.1 vs. 6.4 per 10,000 person-years, P=0.04).

CONCLUSIONS

Long-term total mortality after gastric bypass surgery was significantly reduced, particularly deaths from diabetes, heart disease, and cancer. However, the rate of death from causes other than disease was higher in the surgery group than in the control group.

Cancer Incidence and Mortality After Gastric Bypass Surgery

Ted D. Adams[1,2], Antoinette M. Stroup[3], Richard E. Gress[1], Kenneth F. Adams[4], Eugenia E. Calle[5], Sherman C. Smith[6], R. Chad Halverson[6], Steven C. Simper[6], Paul N. Hopkins[1] and Steven C. Hunt[1]

Despite weight loss recommendations to prevent cancer, cancer outcome studies after intentional weight loss are limited. Recently, reduced cancer mortality following bariatric surgery has been reported. This study tested whether reduced cancer mortality following gastric bypass was due to decreased incidence. Cancer incidence and mortality data through 2007 from the Utah Cancer Registry (UCR) were compared between 6,596 Utah patients who had gastric bypass (1984–2002) and 9,442 severely obese persons who had applied for Utah Driver's Licenses (1984–2002). Study outcomes included incidence, case-fatality, and mortality for cancer by site and stage at diagnosis of all gastric bypass patients, compared to nonoperated severely obese controls. Follow-up was over a 24-year period (mean 12.5 years). Total cancer incidence was significantly lower in the surgical group compared to controls (hazard ratio (HR) = 0.76; confidence interval (CI) 95%, 0.65–0.89; $P = 0.0006$). Lower incidence in surgery patients vs. controls was primarily due to decreased incidence of cancer diagnosed at regional or distant stages. Cancer mortality was 46% lower in the surgery group compared to controls (HR = 0.54; CI 95%, 0.37–0.78; $P = 0.001$). Although the apparent protective effect of surgery on risk of developing cancer was limited to cancers likely known to be obesity related, the inverse association for mortality was seen for all cancers. Significant reduction in total cancer mortality in gastric bypass patients compared with severely obese controls was associated with decreased incidence, primarily among subjects with advanced cancers. These findings suggest gastric bypass results in lower cancer risk, presumably related to weight loss, supporting recommendations for reducing weight to lower cancer risk.

Obesity (2009) **17,** 796–802. doi:10.1038/oby.2008.610

Table 2 Cancer incidence[a] and hazard ratios in the study groups (1984–2002) for common cancer sites, cancers by sex, obesity-related cancers, and nonobesity-related cancers

	Surgery *N* = 6,596		Control *N* = 9,442			
Cancer site[b]	Number of cases	Rates/1,000 person years	Number of cases	Rates/1,000 person years	Hazard ratio[c] (95% CI)	*P* value
All cancers	254	3.13	477	4.28	0.76 (0.65–0.89)	0.0006

Table 5 Hazard ratios for mortality according to cancer groups

	Deaths		Hazard ratios for cancer deaths[a]	
	Surgery group *N* = 6,596	Control group *N* = 9,442	Surgery vs. control groups	
Cancer site	*N* (rates/1,000 person years)	*N* (rates/1,000 person years)	Hazard ratio (95% CI)	*P* value*
All cancers: males and females combined	41 (0.50)	107 (0.94)	0.54 (0.37–0.78)	0.001
All cancers: males only	10 (0.12)	24 (0.21)	0.70 (0.34–1.48)	0.35
All cancers: females only	31 (0.38)	83 (0.73)	0.38 (0.23–0.64)	0.0003
Obesity-related cancers[b]	20 (0.24)	55 (0.48)	0.54 (0.32–0.90)	0.02
Nonobesity-related cancers[c]	21 (0.25)	52 (0.46)	0.53 (0.31–0.91)	0.02

JAMA | Original Investigation

Association of Bariatric Surgery With Cancer Risk and Mortality in Adults With Obesity

Ali Aminian, MD; Rickesha Wilson, MD; Abbas Al-Kurd, MD; Chao Tu, MS; Alex Milinovich, BA; Matthew Kroh, MD; Raul J. Rosenthal, MD; Stacy A. Brethauer, MD; Philip R. Schauer, MD; Michael W. Kattan, PhD; Justin C. Brown, PhD; Nathan A. Berger, MD; Jame Abraham, MD; Steven E. Nissen, MD

IMPORTANCE Obesity increases the incidence and mortality from some types of cancer, but it remains uncertain whether intentional weight loss can decrease this risk.

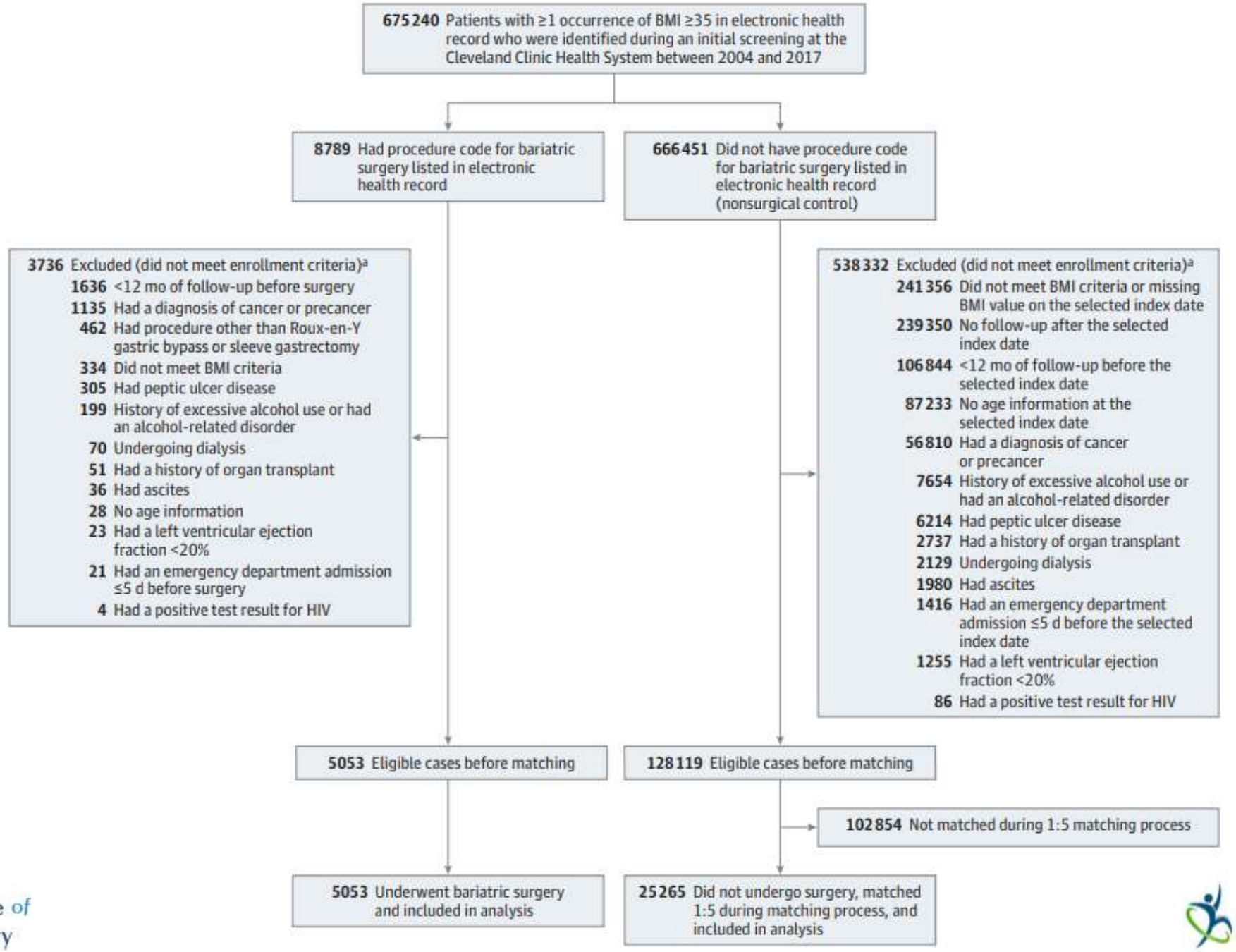
OBJECTIVE To investigate whether bariatric surgery is associated with lower cancer risk and mortality in patients with obesity.

DESIGN, SETTING, AND PARTICIPANTS In the SPLENDID (Surgical Procedures and Long-term Effectiveness in Neoplastic Disease Incidence and Death) matched cohort study, adult patients with a body mass index of 35 or greater who underwent bariatric surgery at a US health system between 2004 and 2017 were included. Patients who underwent bariatric surgery were matched 1:5 to patients who did not undergo surgery for their obesity, resulting in a total of 30 318 patients. Follow-up ended in February 2021.

EXPOSURES Bariatric surgery (n = 5053), including Roux-en-Y gastric bypass and sleeve gastrectomy, vs nonsurgical care (n = 25 265).

MAIN OUTCOMES AND MEASURES Multivariable Cox regression analysis estimated time to incident obesity-associated cancer (a composite of 13 cancer types as the primary end point) and cancer-related mortality.

Figure 1. Identification of Eligible Patients and Development of Cohorts in the SPLENDID Study



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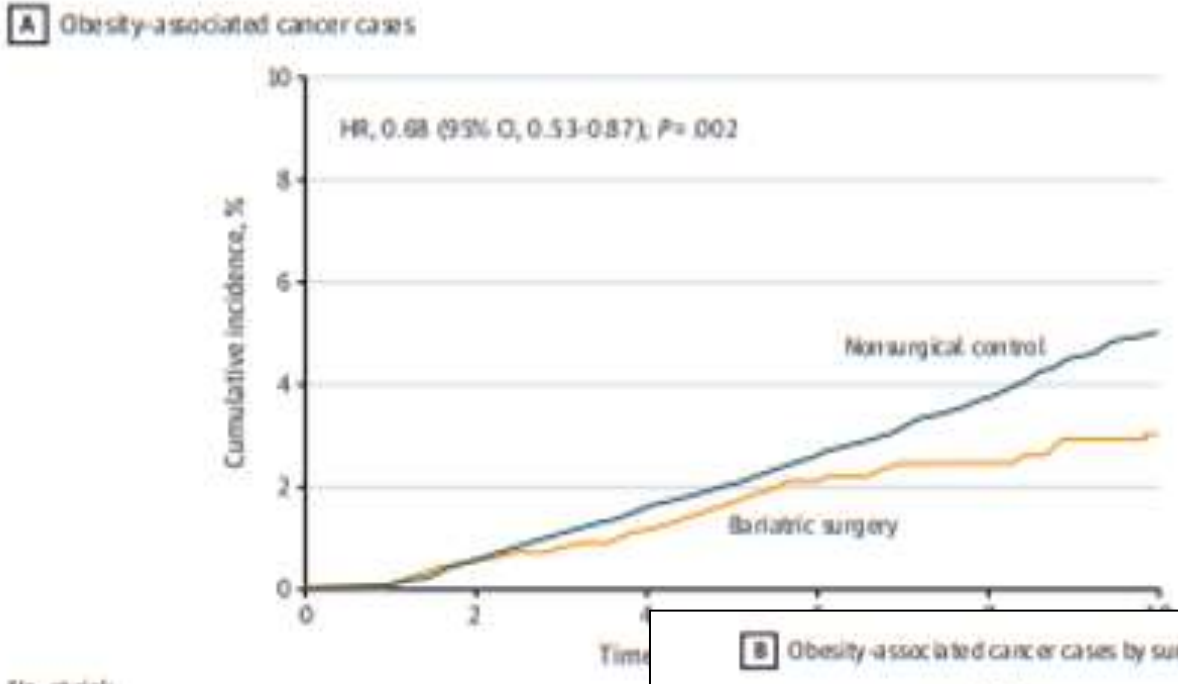

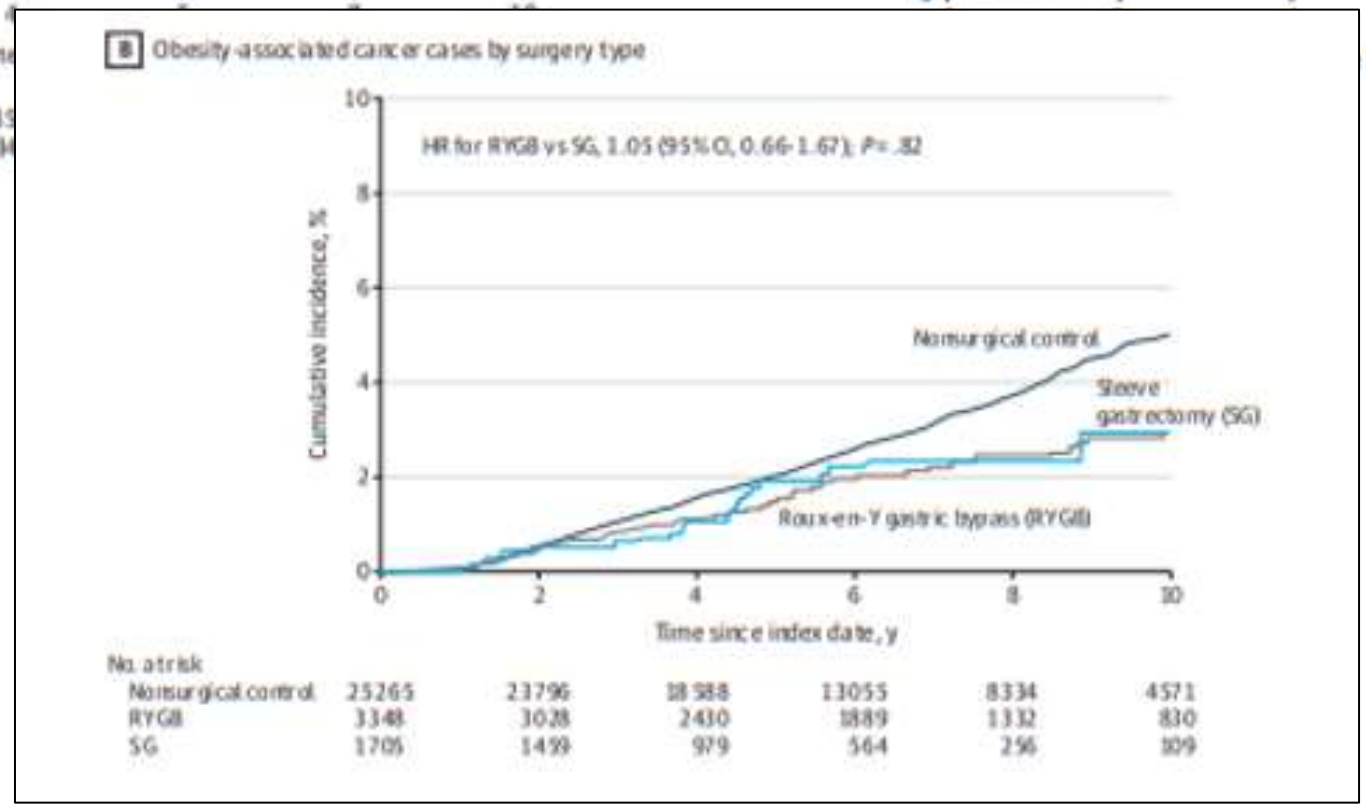

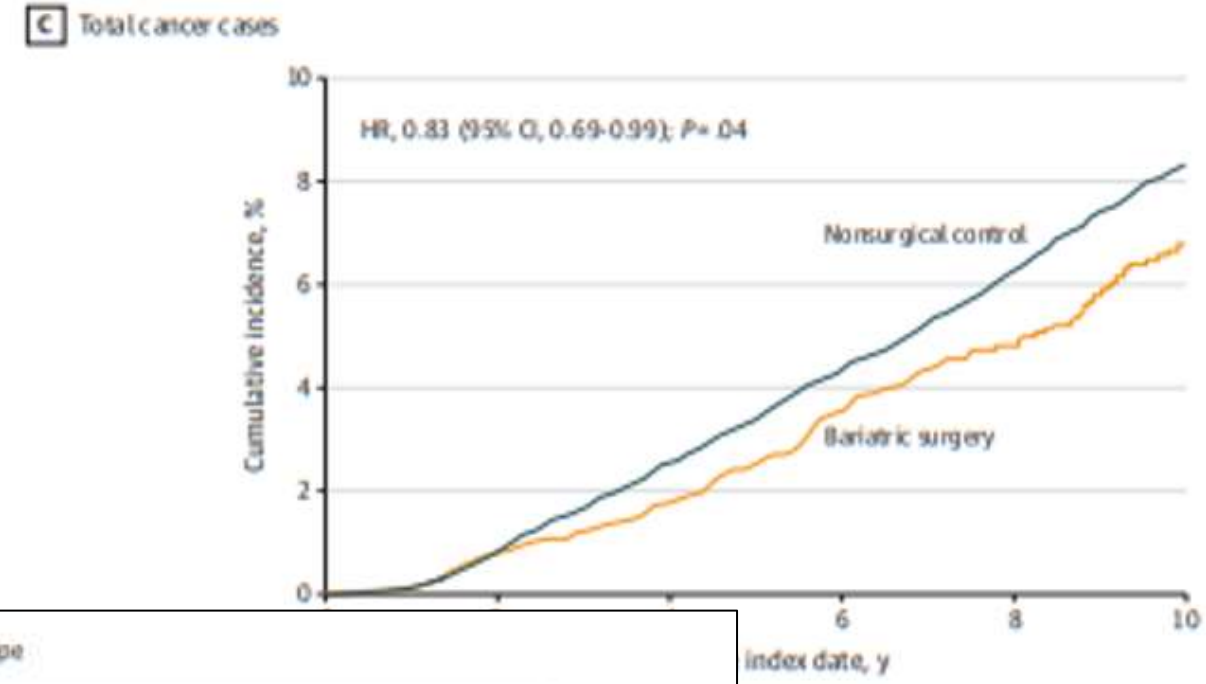

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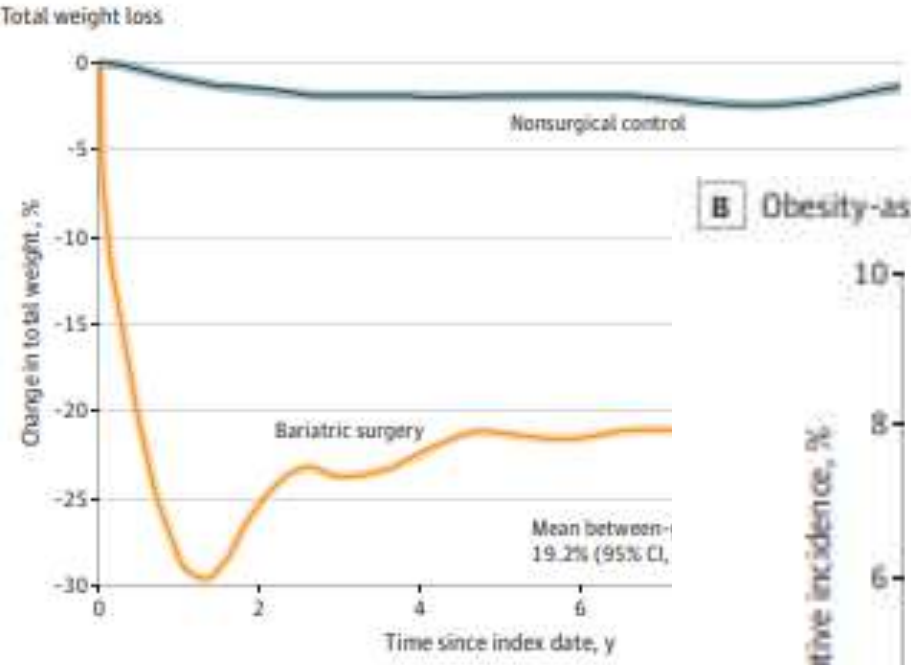
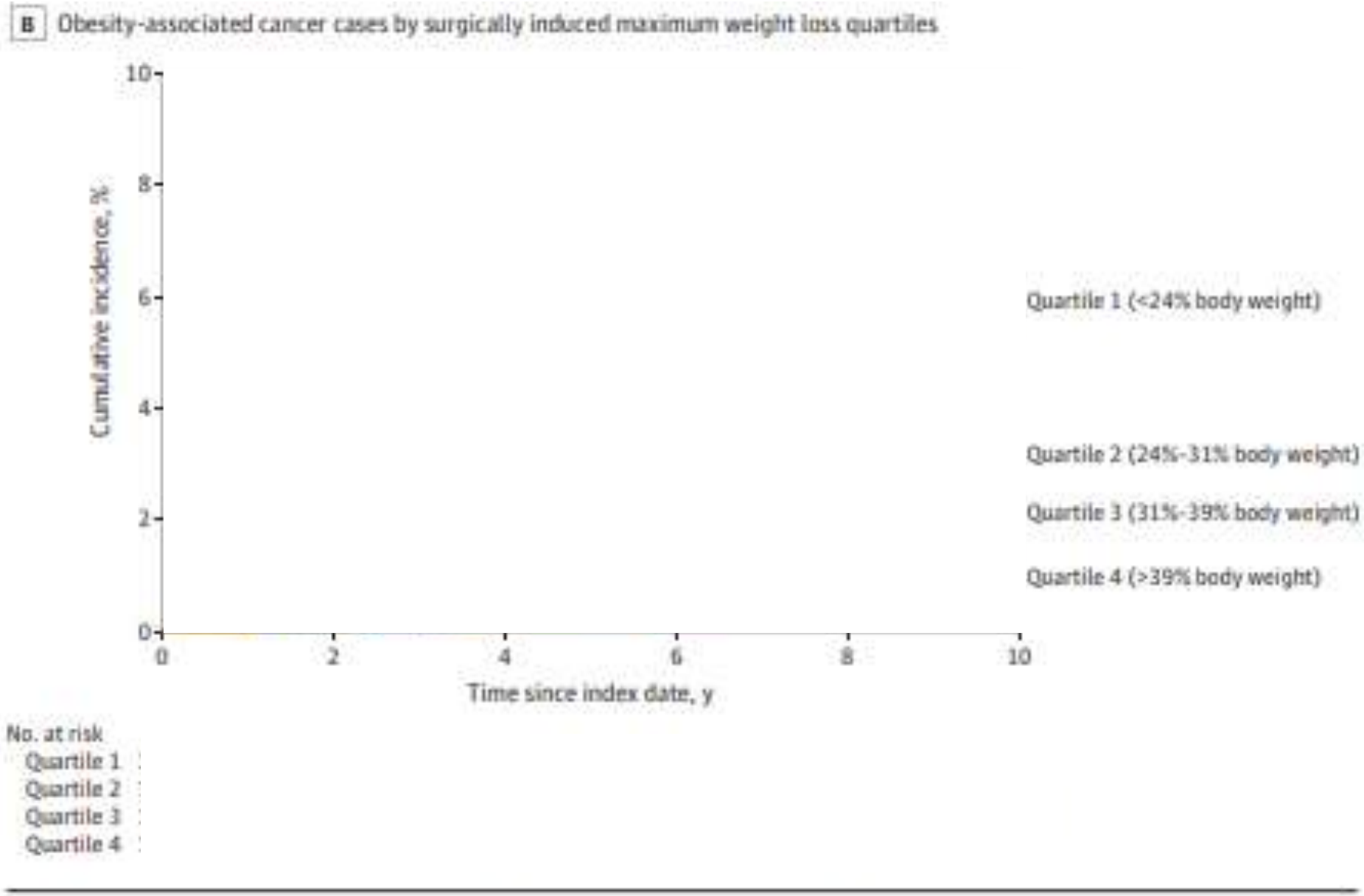
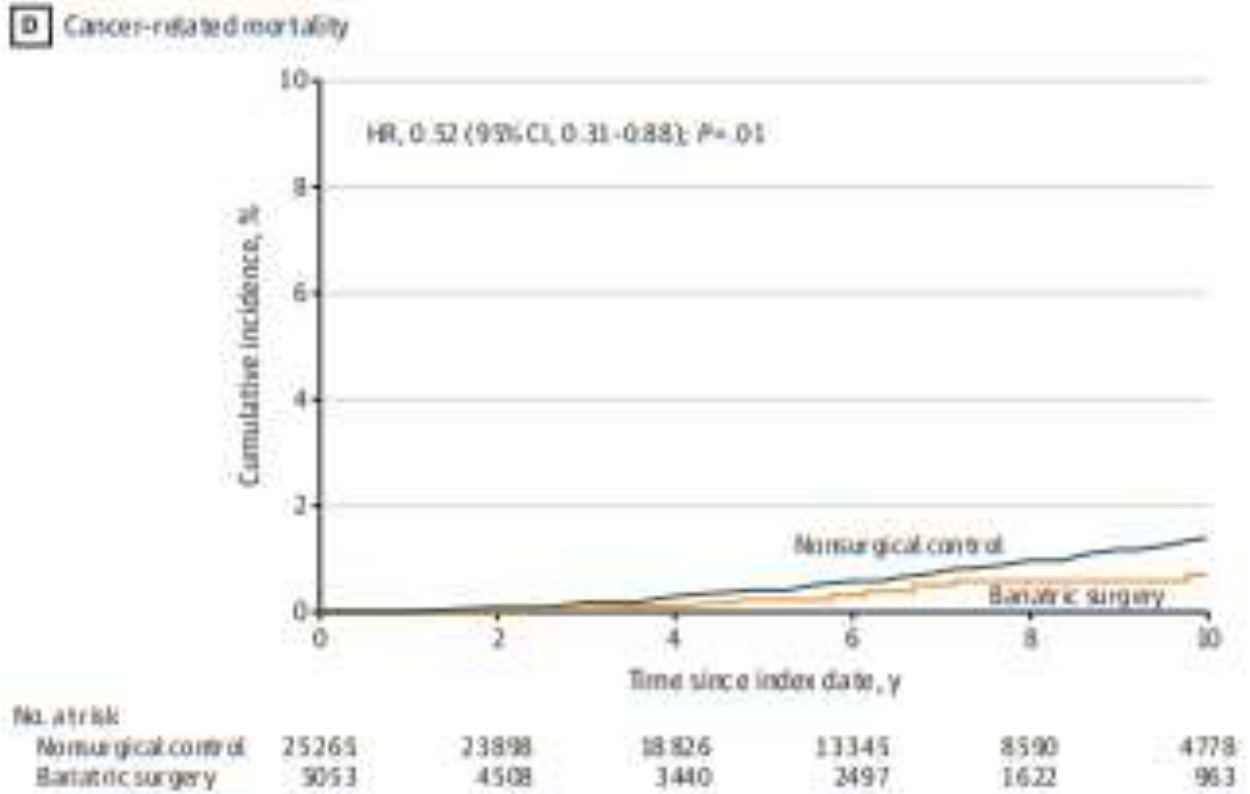




group. B, The data are Kaplan-Meier estimates for incidence of obesity-associated cancer types by the quartile of maximum (the largest) weight loss in the bariatric surgery group ($P < .001$ from log-rank test).

The findings suggest that weight loss in the bariatric surgery group was associated with lower risk of incident cancer cases in a dose-dependent response.



CONCLUSIONS AND RELEVANCE Among adults with obesity, bariatric surgery compared with no surgery was associated with a significantly lower incidence of obesity-associated cancer and cancer-related mortality.

Impact of Obesity on Oncological Surgery and Survival

- Obesity increases perioperative morbidity after oncological resections

- Long term outcome is not affected the same

Contents lists available at ScienceDirect

Gynecologic Oncology

journal homepage: www.elsevier.com/locate/ygyno

Impact of obesity on surgical and oncologic outcomes in ovarian cancer

Amanika Kumar [a], Jamie N. Bakkum-Gamez [a], Amy L. Weaver [b], Michaela E. McGree [b], William A. Cliby [a,*]

[a] Department of Obstetrics and Gynecology, Division of Gynecologic Surgery, Mayo Clinic, Rochester, MN, United States
[b] Division of Biomedical Statistics and Informatics, Mayo Clinic, Rochester, MN, United States

Conclusions. BMI ≥40.0 kg/m² is an independent predictor of severe 30-day postoperative morbidity and 90-day mortality after PDS for EOC—information useful in preoperative counseling. BMI does not appear to impact long-term oncologic outcomes including residual disease at PDS, although we had limited power at the extremes of BMI. BMI may be an important factor to consider in risk-adjustment models and reimbursement strategies.

Article history:
Received 8 June 2014
Accepted 30 July 2014
Available online 7 August 2014

Keywords:
Ovarian cancer
Obesity
Overall survival
Disease-free survival

Objectives. The aim of this study is to determine the impact of obesity on surgical and oncologic outcomes after primary debulking surgery (PDS) in advanced epithelial ovarian cancer (EOC).

Methods. Women with stage IIIC/IV EOC who underwent PDS with curative intent between 1/2/2003 and 12/30/2011 were included. Patient characteristics, intraoperative and postoperative outcomes, recurrence and status were abstracted. Complications were graded according to the 4-point Accordion classification. For analyses, patients were divided into three groups according to body mass index (BMI): group 1—BMI <25.0 kg/m²; group 2—BMI 25.0–39.9 kg/m²; and group 3—BMI ≥40.0 kg/m².

Results. Of the 620 patients included in the study, 36.6%, 56.9%, and 6.5% were in weight groups 1, 2, and 3, respectively.

Weight group 3 was an independent predictor of severe complications after adjusting for confounders (adjusted odds ratio (95% CI): 2.93 (1.38, 6.20) for group 3 vs. group 2). Weight group was not associated with differences in residual disease ($p = 0.80$). The 90-day mortality rates were 11.9%, 6.7%, and 15.7%, respectively, in weight group 1, 2, and 3 ($p = 0.049$ unadjusted, $p = 0.01$ adjusted). There was no difference in OS ($p = 0.52$) or PFS ($p = 0.23$) between weight groups.

Conclusions. BMI ≥40.0 kg/m² is an independent predictor of severe 30-day postoperative morbidity and 90-day mortality after PDS for EOC—information useful in preoperative counseling. BMI does not appear to impact long-term oncologic outcomes including residual disease at PDS, although we had limited power at the extremes of BMI. BMI may be an important factor to consider in risk-adjustment models and reimbursement strategies.

Influence of morbid obesity on surgical outcomes in robotic assisted gnecologic surgery

A. Eddib[1], N. Jain[2], M. Aalto[1], A. Danakas[1], M. Erk[1], C. Michalik[3], D. Marchetti[4], V. Krovi[1], P. Singhal[4]. [1]*University at Buffalo, Buffalo, NY,* [2]*University of Rochester, Department of Neurosciences, Rochester, NY,* [3]*Kaleida Health, Millard Fillmore Suburban Hospital, Williamsville, NY,* [4]*University at Buffalo, Gynecologic Oncology Associates of Western New York, Buffalo, NY.*

Objective: To estimate the impact of body mass index (BMI) on surgical outcomes in patients undergoing robotic assisted gynecologic surgery (RAGS).

Methods: A prospective cohort data analysis of a consecutive series of patients on a Gynecologic Oncology service. BM
abstracted from the medical charts of all pat
hysterectomy. Data on estimated blood loss (
time, length of hospital stay, and complication

Results: Two hundred and nine patients u
tions. Types of procedures were Hystere
adnexal excision, and hysterectomies wi
Sixty-seven patients who were classified a
>35) were compared with 142 patients wh
35. For patients with a BMI 35 , the mean BM
(P<0.05), mean age was 48.7 and 49.8 yea
operative time was 231 and 266 minutes (P
and 135 minutes (P=0.1), closing time (fro
fascia closure) was 31 and 45 minutes(P<0.05), EBL was 75.8 and 82.6 ml (P=0.65), Hb drop was 1.6 and 1.3 (P=0.13), and mean length of stay was 1.47 and 1.40 days (0.61), respectively. No statistically significant difference was noted between the 2 groups and EBL, Hb drop, LOS, or complications. The only statistically significant difference was seen in procedure time, which was attributed to a difference in fascial closing times, and not actual console time. There were no peri-operative mortalities. Morbidity occurred in 11 patients (5%). In the morbidly obese group there were 3 complications (4%): one aspiration, one re-exploration for bowel obstruction and one conversion for adhesions. In the BMI less than 35 group there were 8 complications (5%): one vag cuff dehiscence, one cystotomy, one ureteral injury, 2 vaginal cuff abscesses, 2 blood transfusions, and one conversion for adhesions.

Conclusions: Morbid obesity does not appear to be associated with an increased risk of morbidity in patients undergoing RAGS. It is associated with increased procedure time, but appears to be mainly due to longer closing times. The robot offered an ideal approach allowing minimally invasive surgery in these technically challenging patients with no significant increase in morbidity.

doi:10.1016/j.ygyno.2011.12.298

Ann Surg Oncol (2009) 16:2565–2569
DOI 10.1245/s10434-009-0573-7

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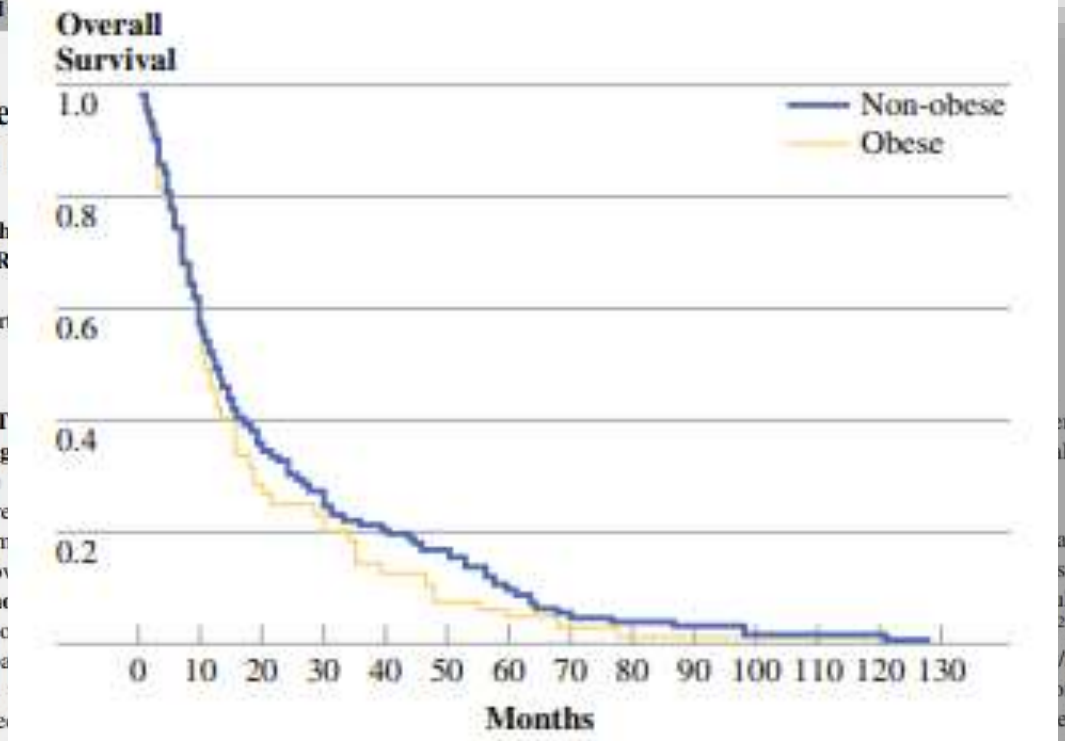

FIG. 1 Overall survival of the obese and nonobese patients with pancreatic adenocarcinoma

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Conclusion. Obese patients had a higher rate and greater severity of postoperative complications, with increased operative blood loss. However, obese patients did not demonstrate any significant difference in specific oncologic factors or survival. These data suggest an equivalent biologic effect of obesity on pancreatic cancer survival.

Ann Surg Oncol (2013) 20:780–787
DOI 10.1245/s10434-012-2653-3

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SURGICAL ONCOLOGY
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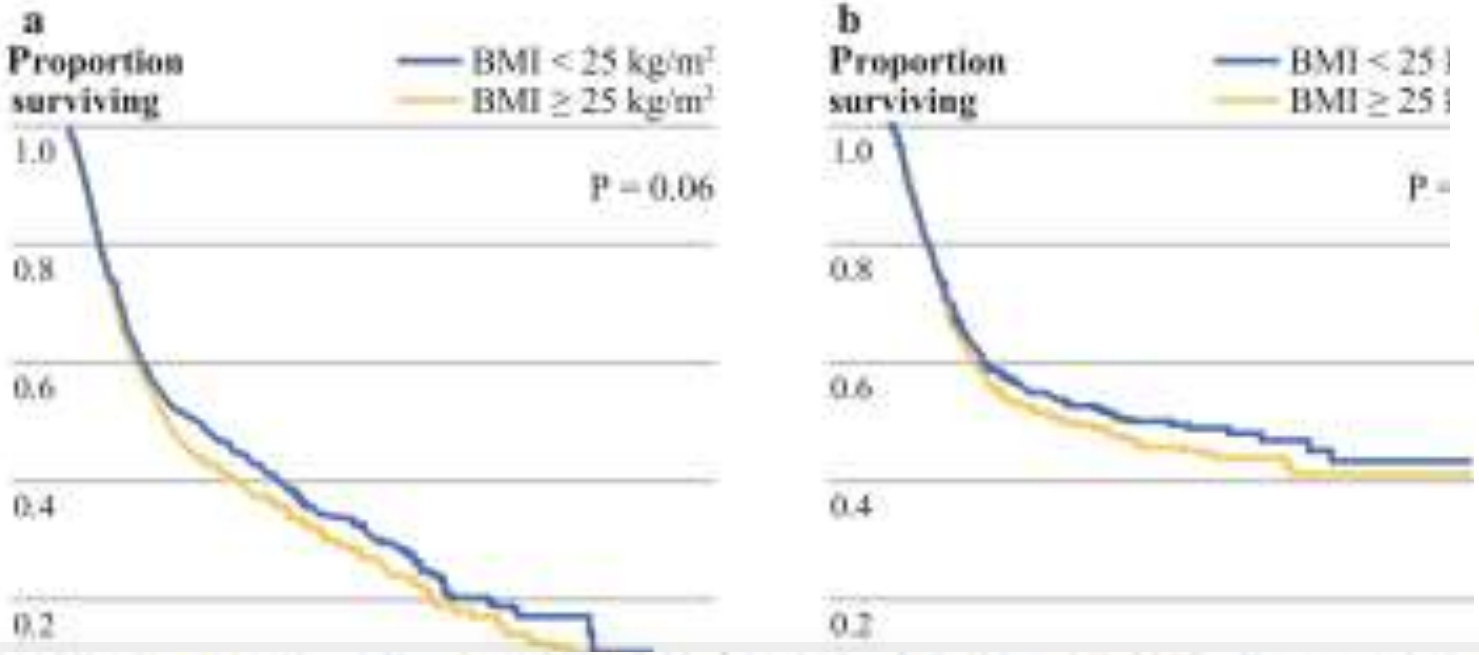
ORIGINAL ARTICLE – GASTROINTESTINAL ONCOLOGY

Impact of Obesity on Perioperative Complications and Long-term Survival of Patients with Gastric Cancer

Kai A. Bickenbach, MD[1], Brian Denton, MS[2], Mithat Gonen, PhD[2], Murray F. Brennan, MD[1], Daniel G. Coit, MD[1], and Vivian E. Strong, MD[1]



Conclusions. Increased BMI is a predictor of increased postoperative complications, including anastomotic leak, but it is not a predictor of survival in gastric cancer.

FIG. 2 Overall survival by disease stage. **a** Stage I. **b** Stage II. **c** Stage II. **d** Stage IV

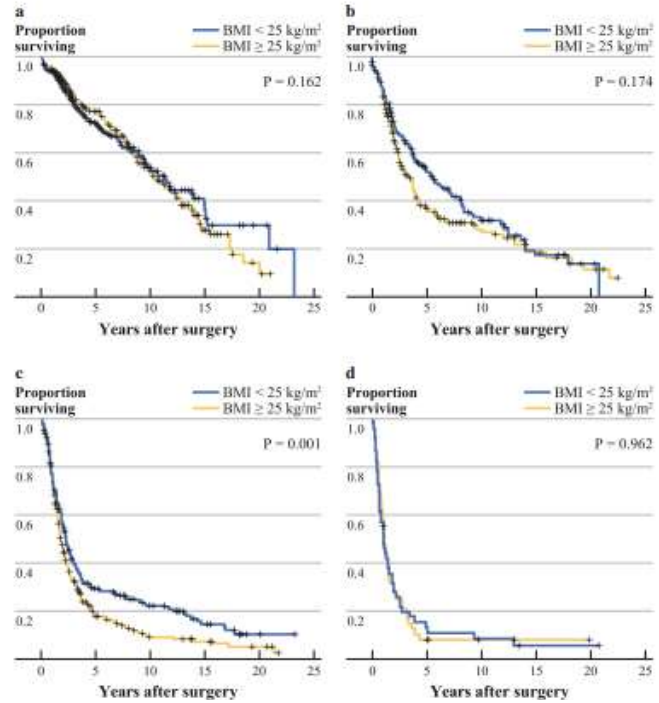
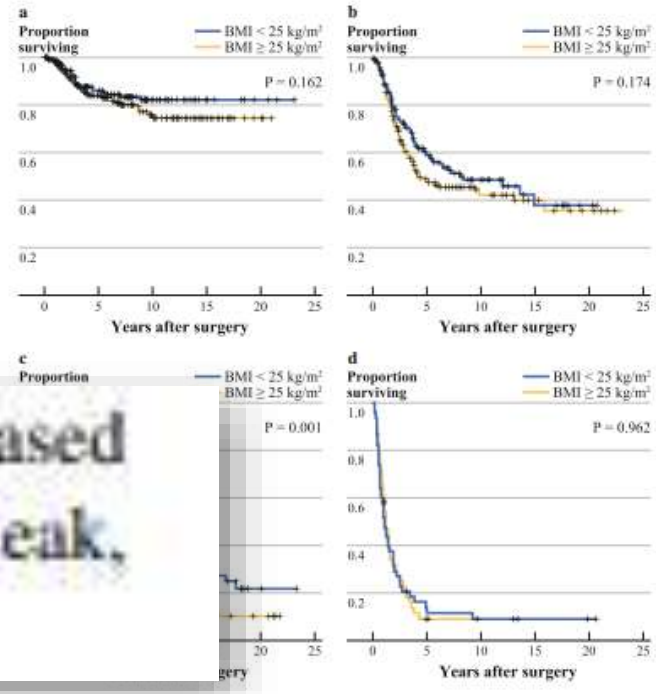


FIG. 3 Disease-specific survival by disease stage. **a** Stage I. **b** Stage II. **c** Stage III. **d** Stage IV



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The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Original Research Article

Body composition is associated with operative and oncologic outcomes in the management of retroperitoneal and trunk soft tissue sarcoma

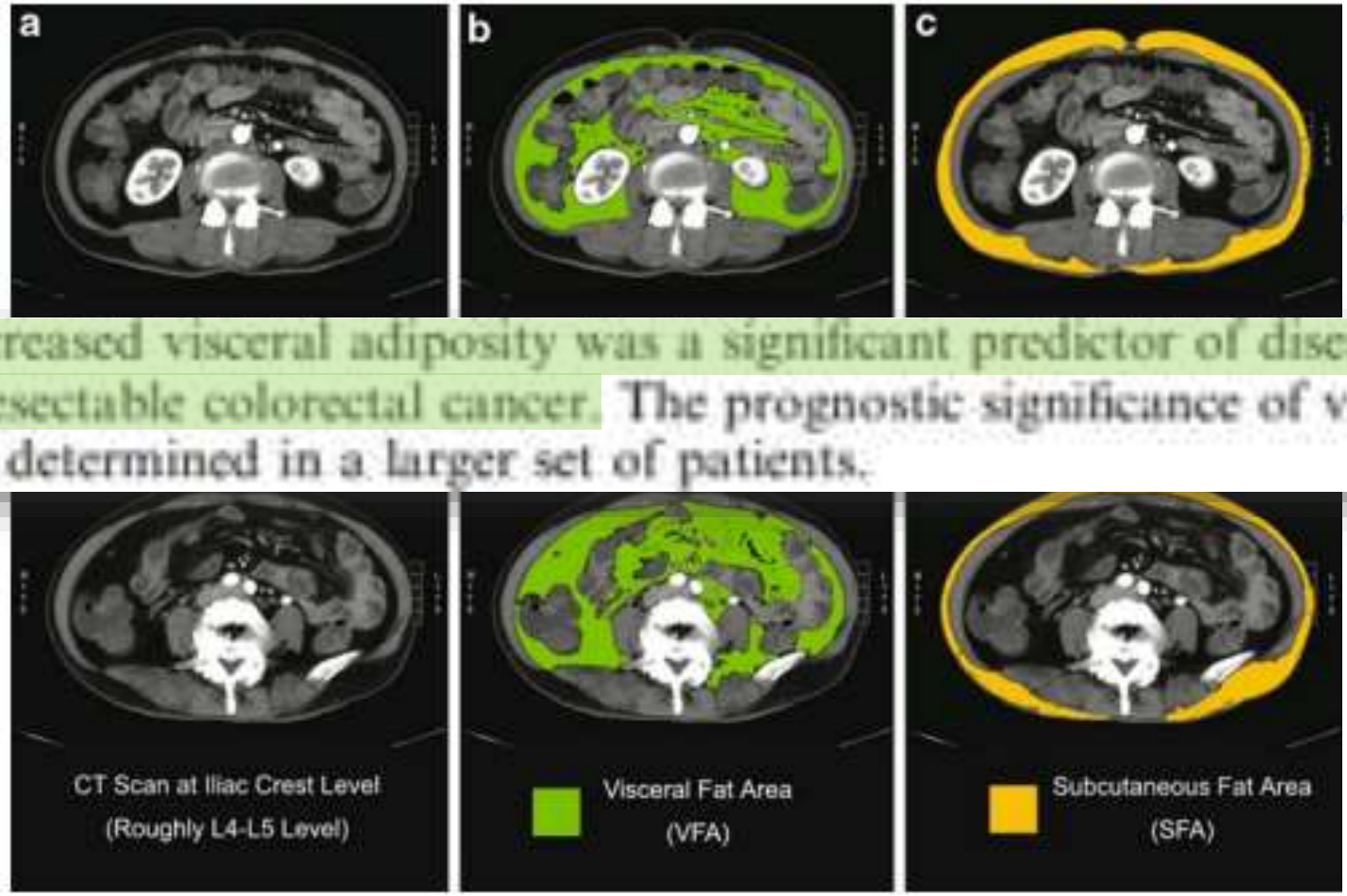
Ellen A. Boyle, Jessie A. Elliott*, Tom V. McIntyre, Melissa E. Barnes, Noel E. Donlon, Muhammad Umair, Amy E. Gillis, Paul F. Ridgway

Conclusion: Visceral obesity is common in retroperitoneal and trunk sarcoma, and measures of adiposity are associated with adverse operative, but not oncologic outcomes. Myosteatosis is independently associated with postoperative morbidity and adverse oncologic outcomes. Body composition may represent a marker of risk among patients with retroperitoneal and trunk sarcoma.

27 June 2021
Accepted 3 August 2021

Keywords:
Surgical oncology
Nutrition
Sarcoma
Sarcopenia
Body composition

with retroperitoneal and trunk sarcoma, and assess impact on operative and oncologic outcomes.
Methods: Consecutive patients undergoing treatment with curative intent from 2009 to 2019 were studied. Subcutaneous fat area and visceral fat areas, intramuscular adipose, lean body mass and fat mass were determined at diagnosis by CT at L3. Univariable and multivariable linear, logistic and Cox proportional hazards regression were performed.
Results: 95 patients (43.2% retroperitoneal, 48.4% trunk, 46.3% multivisceral resection) were studied. Visceral obesity was evident in 47.4%. Postoperative morbidity occurred in 25.9%, with preoperative radiotherapy (OR10.53 [95% CI 1.08–102.39], $P = 0.042$) and fat mass (OR1.41 [1.12–1.79], $P = 0.004$) independently predictive on multivariable analysis, while intramuscular adipose independently predicted inpatient LOS ($P < 0.001$), wound infection ($P = 0.024$, OR1.20 [1.02–1.40]) and major postoperative morbidity ($P = 0.027$, OR1.15 [1.02–1.31]). Increasing fat mass, subcutaneous fat area and intramuscular adipose were associated with greater tumor size (all $P < 0.01$), while intramuscular adipose predicted disease progression during neoadjuvant therapy ($P = 0.024$), and independently predicted disease specific survival (DSS) ($P = 0.005$, HR1.11 [1.03–1.20]) and overall survival (OS) on multivariable analysis ($P < 0.001$, HR1.19 [1.08–1.31]).
Conclusion: Visceral obesity is common in retroperitoneal and trunk sarcoma, and measures of adiposity are associated with adverse operative, but not oncologic outcomes. Myosteatosis is independently associated with postoperative morbidity and adverse oncologic outcomes. Body composition may represent a marker of risk among patients with retroperitoneal and trunk sarcoma.



Conclusion: Increased visceral adiposity was a significant predictor of disease-free survival in patients with resectable colorectal cancer. The prognostic significance of visceral adiposity should further be determined in a larger set of patients.

Results: The overweight group showed a borderline decrease in cumulative disease-free survival compared to the normal-weight group ($P = 0.064$). Patients with high VFA/SFA ratio (more than 50 percentiles) had significantly lower cumulative disease-free survival rate compared to patients with low VFA/SFA ratio ($P = 0.008$). BMI and visceral adiposity showed no influence on overall survival of patients.

Conclusion: Increased visceral adiposity was a significant predictor of disease-free survival in patients with resectable colorectal cancer. The prognostic significance of visceral adiposity should further be determined in a larger set of patients.

Key Words: Colorectal cancer—Prognosis—Obesity—Visceral obesity—Recurrence.

Conclusion:

- Obesity increases the risks of many cancers
- Obesity increases perioperative risks of oncological surgery
- Obesity may negatively impact survival after oncological surgery

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- Obesity may negatively impact survival after oncological surgery
- Weight loss decreases incidence of obesity related cancers
  - This effect is mostly in women
  - Weight loss must be significant to reach protective effect (≥20% TBWL)
  - The impact seems to be dose dependent
- Weight loss decreases mortality from some cancers

Conclusion:

- Obesity increases the risks of many cancers
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- Obesity may negatively impact survival after oncological surgery
- Weight loss decreases incidence of obesity related cancers
  - This effect is mostly in women
  - Weight loss must be significant to reach protective effect (≥20% TBWL)
  - The impact seems to be dose dependent
- Weight loss decreases mortality from some cancers
  - **Bariatric Surgery should be considered for prevention of selected cancers in selected patients' group**