provided by the amount of cod liver oil used (20 ml/day). Our findings confirm those of Kannel *et al* that smoking is associated with increased plasma fibrinogen concentrations.²

We have no data elucidating the mechanism of action of fish oils on plasma fibrinogen. Studies are in progress to investigate whether there might be direct or indirect effects of long chain n-3 fatty acids on hepatocyte fibrinogen production. In line with this, we speculate to what extent supplementation with long chain n-3 fatty acids may fine tune monocyte macrophages to modulate their hepatocyte stimulating activities, as it is well known that n-3 polyunsaturated fatty acids affect pro-

duction of monocyte effector molecules—for example, platelet activating factors acether.⁵

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Obesity and postoperative complications of abdominal operation

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Although severely obese patients do present special problems at operation,^{1,2} it is not clear whether moderate obesity significantly increases the incidence of postoperative complications and, if so, whether preoperative weight loss reduces the risk. We therefore carried out a prospective study to see whether moderate obesity was associated with increased postoperative morbidity.

Patients, methods, and results

Given that about 15% of patients are obese and that the incidence of a particular complication is about 25% in non-obese patients, a total of 500 patients would give an 80% chance of detecting an increase in incidence of 15% or more—that is, an incidence of 40% or more in obese patients. Over five years we recruited 473 patients (176 men and 297 women) of whom 31 men (18%) and 42 women (14%) were obese according to a prespecified definition of a Quetelet index (weight/height²) of 27 or more for men and 30 or more for women. Apart from a few eligible patients who could not be included for various reasons, those recruited formed a consecutive series.

Of the 473 patients, 369 (78%) had cholecystectomy, 54 (11%) vagotomy, 21 (4%) gastrectomy, and 29 (6%) small or large bowel resections (initially, only patients having cholecystectomy were included.) Preoperatively, patients were weighed, their height was recorded and skinfold thickness measured with

Holtain calipers at triceps, subscapular, and suprailiac sites. At operation the depth of subcutaneous fat was measured by the surgeon. Patients were then seen on the second, fourth, and sixth postoperative days and reviewed at an outpatient visit six weeks after operation. Sepsis of the wound and drain site was divided into three categories of severity: serous discharge, superficial infection (stitch abscess), and discharge of pus. Other possible complications included deep vein thrombosis, pulmonary embolism, chest and urinary infections, and unexplained fever.

Complete details were available for 469 of the 473 patients. The table shows that there was a significant excess of wound sepsis in the obese of both sexes, being possibly more noticeable in the women. The incidence of wound sepsis was 25% (98/396) in non-obese and 43% (31/73) in obese patients, an increase of 18% (95% confidence interval 5% to 30%) in obese patients. (In those who had a cholecystectomy the difference was confined to women.) Similar results were obtained with skinfold thicknesses. No differences with obesity were found in the incidence of deep vein thrombosis and pulmonary embolism, chest and urinary tract infections, unexplained fever, or other complications reported at the outpatient visit. Seven patients, one of whom was obese, died within six weeks after operation.

Comment

We found an increased risk of postoperative morbidity in obese patients only for the occurrence of wound infection. If knowledge of a patient's obesity had resulted in a tendency to overreport complications in obese patients, a difference in complications other than wound sepsis would also be expected.

Despite the increase in wound infection in obese patients we conclude that the degree of increased morbidity associated with moderate obesity is so small that it would not be practicable to study the benefit of planned preoperative weight loss in moderately obese patients and that probably little is to be gained in attempting preoperative weight loss in this group of patients.

We thank colleagues at Northwick Park for permission to include their patients in the study.

Incidence of wound sepsis in 469 patients. Values are numbers (percentages) of patients

	Men		Women		Total	
	Not obese (n=144)	Obese (n=31)	Not obese (n=252)	Obese (n=42)	Not obese (n=396)	obese (n=73)
Well healed	98 (68)	19 (61)	200 (79)	23 (55)	298 (75)	42 (58)
Serous discharge	36 (25)	5 (16)	35 (14)	12 (29)	71 (18)	17 (23)
Stitch abscess	1 (1)	2 (7)	3 (1)	1 (2)	4 (1)	3 (4)
Pus discharge	9 (6)	5 (16)	14 (6)	6 (14)	23 (6)	11 (15)

Men: $\chi^2=9.08$, df=3, p=0.028.

Women: $\chi^2=12.14$, df=3, p=0.007.

Both sexes: $\chi^2=14.87$, df=3, p=0.002.

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