

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

- 1 Goodnight SH Jr, Harris WS, Connor WE, Illingworth DR. Polyunsaturated fatty acids, hyperlipidemia, and thrombosis. *Arteriosclerosis* 1982;2:87-113.
- 2 Kannel WB, Wolf PA, Castelli WP, D'Agostino RB. Fibrinogen and risk of cardiovascular disease. The Framingham study. *JAMA* 1987;258:1183-6.
- 3 Clauss A. Gerinnungsphysiologische Schnellmethode zur Bestimmung des Fibrinogens. *Acta Haematol (Basel)* 1957;17:237-46.
- 4 Sanders TAB, Vickers M, Haines AP. Effect on blood lipids and haemostasis of a supplement of cod-liver oil, rich in eicosapentaenoic and docosahexaenoic acids, in healthy young men. *Clin Sci* 1981;61:317-24.
- 5 Sperling RI, Robin J-L, Kylander KA, *et al*. The effects of N-3 polyunsaturated fatty acids on the generation of platelet-activating factor-acether by human monocytes. *J Immunol* 1987;139: 4186-91.

(Accepted 16 March 1988)

Obesity and postoperative complications of abdominal operation

John S Garrow, Eva J Hastings, Alan G Cox, William R S North, Maureen Gibson, Thelma M Thomas, T W Meade

Division of Clinical Sciences, MRC Clinical Research Centre, Harrow, Middlesex HA1 3UJ
John S Garrow, MD, scientific staff

MRC Epidemiology and Medical Care Unit, Northwick Park Hospital, Harrow, Middlesex HA1 3UJ
Eva J Hastings, SRN, nurse
William R S North, PHD, scientific staff
Maureen Gibson, SRN, nurse (Ms Gibson has since died)
Thelma M Thomas, MRCP, scientific staff
T W Meade, DM, director

Division of Surgery, Northwick Park Hospital, Harrow, Middlesex HA1 3UJ
Alan G Cox, MD, consultant surgeon

Correspondence to: Dr Meade.

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 suprailliac 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.

- 1 Harman EM, Block AJ. Why does weight loss improve the respiratory insufficiency of obesity? *Chest* 1986;90:153-4.
- 2 Kozol RA, Fromm D, Ackerman NB, Chung R. Wound closure in obese patients. *Surg Gynecol Obstet* 1986;162:442-4.

(Accepted 28 March 1988)

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