Weight gain after laparoscopic cholecystectomy

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Abstract
Introduction Laparoscopic cholecystectomy (LC) relieves symptomatic cholelithiasis (SC) but may facilitate post-operative gluttony.
Aim To examine changes in body mass index (BMI) and general health of a cohort of patients three years after uncomplicated LC for SC.
Methods Patients were studied three years after uncomplicated LC and compared to age- and gender-matched controls who had undergone non-biliary surgery.
Results Forty-two patients and 42 controls were studied. The mean age of the patients was 55 years (range 29–82) versus 54 years (25–82) for controls. Patients undergoing LC increased their mean BMI by 1.8kg/m². Females were particularly likely to gain weight (mean change in BMI=+2.1), with no significant difference being found between premenopausal and postmenopausal women. Of the 24 LC patients who claimed to continue their low fat diet, the mean BMI changed from 27.6 to 29.6kg/m². The mean BMI of the 17 people who claimed regular exercise changed less markedly (+1.4) than those who admitted infrequent exercise (+2.1).
Conclusion Selection for LC may identify patients at risk of continuing or resumed aetiological contributors to obesity. Follow-up long after the surgery may therefore be necessary to facilitate additional healthcare interventions.

Introduction
Gallstones are the most common disorder of the biliary system and an increasingly frequent cause of ill health and hospital admission. Since the adoption of the laparoscopic approach for cholecystectomy, it has become the most commonly performed major abdominal procedure in the world, being especially advocated for the relief of symptomatic cholelithiasis in obese patients. It is associated with excellent short- and long-term outcomes with a minimum of morbidity and is the treatment of choice in the minds of both the general public and health professionals alike.1,2 After age and gender, poor dietary habits and obesity are important risk factors for biliary calculus formation.3,4 Symptomatic patients are usually advised to adhere to a low fat dietary regimen while more definitive intervention is scheduled. The successful and permanent relief of symptoms by cholecystectomy however allows patients to resume their prior eating habits. Indeed they are often encouraged to do so. This may facilitate gluttony.
The aim of this study is to assess the progress of a cohort of patients long after undergoing uneventful LC in order to determine their propensity for weight gain.

Methods
Study groups
Patients were invited to attend a general surgical outpatients clinic for review three years after uncomplicated LC. An equal number of age- and gender-matched patients who had undergone non-biliary (NB) surgery at a similar time with a similar hospital stay were recalled as controls. Of these, 30 had surgery for varicose veins and the remainder had elective inguinal herniorrhaphy. An initial postal invitation was followed by telephone contact and patients were given a choice of dates and times at which they could attend.

Exclusion criteria
Patients were excluded from the study if they had been pregnant or suffered an injury or illness that led to prolonged disruption of their usual daily activities during the three year study period.

Study protocol
Patients were weighed and measured and their BMI was then calculated using the formula — weight in kilograms/height in metres squared. Over any three-year period, the BMI is expected to change only marginally (see Figure 1). This was compared with their preoperative values from their hospital notes. They were also asked to complete a detailed dietary questionnaire prepared by a senior dietician and a survey of daily activities and exercise habits.

Statistical analysis
ANOVA statistical testing was used to compare the changes in the mean BMI before and after the scheduled operation.

Results
Eighty-four patients (56%) participated in the study with an equal number of patients from each group attending. The mean age of the patients undergoing LC was 55.7 years (range 29–82) versus 53.8 years (range 25–82) for controls while the male:female ratio was 10:32 for the LC group and 15:27 for the control group.
The demographics of each group at the time of their initial surgery are shown in Table 1. Regular medication usage in the interval between surgery and follow-up was similar between both groups. Two females in the LC group were taking the oral contraceptive pill as compared to three in the control group while a single patient in the control group was receiving depot formulation of contraception. Two patients undergoing LC were taking hormonal replacement therapy for menopausal symptoms. Nine patients undergoing biliary surgery were being treated for hypertension as opposed to seven of those undergoing non-biliary operations. Three patients in each group were taking statin medication regularly. Twenty-four patients undergoing LC were not working outside of the home, seven were retired. Of 28 controls, 10 were retired.

Overall, patients undergoing LC increased their mean BMI by 1.8 kg/m² in the three years after their operation with female patients in this group being particularly likely to gain weight (change in BMI = 2.1). This trend was similar in both pre- (n=10) and postmenopausal women (n=22) with the former group increasing their mean BMI from 27.2 kg/m² preoperatively to 28.5 kg/m² postoperatively (1.3) while the latter gained on average 2.1 kg/m² (27.7 kg/m² vs 29.9 kg/m²). However, the BMI of patients undergoing non-biliary surgery was essentially unchanged three years after operation (28.4 vs 28.3) (see Table 2).

Of the 24 LC patients who claimed to have continued their preoperatively advised low fat diet postoperatively, the mean BMI changed from 27.6 to 29.6 kg/m² with the greatest weight change being found in females (+1.8) as opposed to males (+0.6). The mean BMI of the 17 people who claimed regular exercise changed less markedly from 26.7 to 28 than those who admitted infrequent exercise (which changed from 29.3 to 31.5). Again, females tended to gain the greater amount of weight over the study period (see Table 3).

**Discussion**

This study demonstrates the propensity for patients undergoing LC to gain significant weight over a relatively short period of time and suggests that perioperative counselling should take this into account. While the changes in weight may appear slight when portrayed in terms of BMI, if a constant height is assumed over a three-year period, a difference of 2.1 kg/m² over a three-year period corresponds to net gain of 5 kgs. Although not proven in this study, we believe the tendency towards increasing BMI reflects a return to the dietary habits that contributed to their development of SC and, hence, their selection for operative intervention.

Metabolic and hormonal factors may theoretically play a role in differing patterns of weight gain found in those undergoing biliary as opposed to non-biliary surgery. A review of the literature suggests that this is unlikely. Post-cholecystectomy patients tend to have reduced enterohepatic circulating bile acids, a greater intraluminal osmotic load in the small intestine and a greater amount of bile acids reaching the colon. There is also a tendency towards increased bowel transit times and diarrhoea. Although the overall effect may not be pronounced as previously believed, these effects would favour weight loss.

Although similar results have previously been reported, current standard post-operative advice is to encourage patients to return to their prior eating habits as they are cured of their symptoms. The tendency towards obesity after LC needs to be taken into account in studies of the long-term efficacy. The development or persistence of symptoms such as constipation, excessive flatus, flatulent dyspepsia and heartburn may reflect

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**Table 1. Preoperative demographics of patients**

<table>
<thead>
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<th>Group</th>
<th>No attending</th>
<th>Mean age in years (range)</th>
<th>Body mass index (kg/m²)</th>
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<tbody>
<tr>
<td></td>
<td>Overall</td>
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<td>NB</td>
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<tr>
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