Unsuspected Cirrhosis Discovered During Elective Obesity Operations

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Objective: To determine the incidence and outcome of cirrhosis encountered unexpectedly during gastric bariatric operations.

Design: A cohort study.

Setting: A tertiary care center.

Patients: One hundred twenty-five patients in whom cirrhosis was discovered during gastric bariatric operations. Cirrhosis may have been caused by severe obesity in 93 (74%) of the patients.

Interventions: A questionnaire survey of bariatric surgeons worldwide, including one of us (R.E.B.).

Results: One hundred twenty-six (52%) of the 243 surgeons responded to the survey. Planned bariatric operations were performed in 91 (73%) of the cases. Seventeen (14%) of the remaining cases were closed after the discovery of cirrhosis. There were no intraoperative deaths. However, the perioperative mortality rate was 4% and there were 7 late deaths, 6 due to complications of liver disease. Eleven other patients are described as alive with progressive hepatic dysfunction. The remaining 50 patients are “alive and well.” The survey also included opinion questions. Regarding the appropriate operation to perform after discovering cirrhosis, 40% replied “perform liver biopsy only and close”; the remaining 60% would perform a bariatric procedure. Regarding bariatric operations that can be safely performed in patients with cirrhosis, 59% would perform banded gastroplasty, 39% would perform standard Roux-en-Y gastric bypass, 5% would perform biliopancreatic bypass, and 27% would perform none of the above.

Conclusion: Although operative mortality is higher in cirrhotic vs other bariatric patients, most surveyed surgeons believe that gastric restrictive operations can be performed safely in this group of patients.

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RESULTS

In the 1960s and 1970s, a liver biopsy was routinely performed in conjunction with jejunoileal bypass operations performed for the treatment of morbid obesity. The histologic incidence of fatty liver in those patients ranged from 60% to 90%. In the same reports, a few patients were found to have more advanced stages of liver disease characterized by infiltration with inflammatory cells, Mallory bodies, centrilobular necrosis, and fibrosis. These reports provide the first evidence of the possible association between severe obesity and cirrhosis.

During the past 14 years, one of us (R.E.B.) unexpectedly discovered cirrhosis in 8 patients during elective operations performed for the treatment of morbid obesity. The planned bariatric procedure was performed in each case. After one of those patients died of complications resulting from hepatic failure, the medical literature was reviewed in an attempt to learn whether other surgeons had encountered similar problems after performing elective bariatric operations in patients with cirrhosis. Remarkably, there is no information in the literature on the outcome of gastric bariatric operations in this group of patients.

This article has 2 goals. The first goal is to present the results of a questionnaire that was mailed to 243 bariatric surgeons worldwide to determine the course of patients in whom cirrhosis was unexpectedly discovered during elective bariatric operations. The second goal is to present a more detailed description of the experience that one of us (R.E.B.) had with 8 such patients.

One hundred twenty-six (52%) of the 243 surgeons, including one of us (R.E.B.), responded to the survey. The 126 respondents had collectively performed 86 500 bariatric operations in patients in whom cirrhosis was discovered during elective bariatric procedures. However, the perioperative mortality rate was 4% and there were 7 late deaths, 6 due to complications of liver disease. Eleven other patients are described as alive with progressive hepatic dysfunction. The remaining 50 patients are “alive and well.” The survey also included opinion questions. Regarding the appropriate operation to perform after discovering cirrhosis, 40% replied “perform liver biopsy only and close”; the remaining 60% would perform a bariatric procedure. Regarding bariatric operations that can be safely performed in patients with cirrhosis, 59% would perform banded gastroplasty, 39% would perform standard Roux-en-Y gastric bypass, 5% would perform biliopancreatic bypass, and 27% would perform none of the above.

Conclusion: Although operative mortality is higher in cirrhotic vs other bariatric patients, most surveyed surgeons believe that gastric restrictive operations can be performed safely in this group of patients.
PATIENTS AND METHODS

A questionnaire regarding the frequency of discovering cirrhosis during elective bariatric operations was mailed to 243 surgeons worldwide. The primary goals of this survey were to determine the frequency of discovering cirrhosis unexpectedly during elective bariatric operations and to learn how these cases were managed by the surgeon. We also wanted to learn how the presence of cirrhosis influenced the short- and long-term outcome in this group of patients.

The questionnaire also included 3 opinion questions that were answered by 105 (83%) of the 126 respondents. Surgeons were asked which bariatric operations are appropriate to perform after unexpectedly discovering cirrhosis and which procedures could be safely performed in patients with known cirrhosis and in patients in whom cirrhosis was unexpectedly discovered.

One of us (R.E.B.) has performed 580 operations for the treatment of morbid obesity during the past 14 years. Gross evidence of micronodular cirrhosis was discovered unexpectedly during 8 (1.4%) of those procedures. None of these patients had clinical manifestations of liver disease prior to the operation. The preoperative results from ultrasonography of the gallbladder did not suggest cirrhosis in any patient. Histologic evaluation of core biopsy specimens confirmed the clinical diagnosis of cirrhosis in each case. Each patient was then queried in detail regarding alcohol and other drug use, exposure to hepatotoxins, and other potential causes of progressive liver disease. Serologic testing for hepatitis was also performed. The demographic features of these 8 patients are given in Table 1. Five patients were superobese (body mass index [obtained by dividing the weight, given in kilograms, by the height, given in meters, squared] >50). Five of the 8 patients had diabetes, whereas 3 had increased serum levels of triglycerides, total cholesterol, or both preoperatively.

Four patients had an elevation of 1 or more serum liver enzymes prior to the operation. There were no intraoperative deaths. There were 4 deaths in the perioperative period (within the first 30 days), including one patient whose operation was aborted because of “technical difficulties.” Two perioperative deaths were caused by overwhelming sepsis, and 2 resulted from fulminant hepatic failure. One of the 2 cases of early hepatic failure was caused by severe metabolic derangements as a consequence of an ascitic fluid leak. There were no major complications in the 17 patients in whom the planned procedure was not performed after discovering cirrhosis. Six of the 7 late deaths resulted from liver failure. The remaining patient died of myocardial infarction. The abuse of alcohol and other drugs was cited as the cause of late hepatic failure in 3 patients. Among the patients available for follow-up, 11 (15%) are alive with progressing liver disease, whereas the remaining 50 (70%) are described as “alive and well.”

The 2 opinion questions regarding the safety of performing various bariatric operations in patients with cirrhosis were answered by 85% of the respondents. Fifty-nine percent would perform a banded gastroplasty, whereas 40% would perform a Roux-en-Y gastric bypass. Only 5% of the surgeons would perform a biliopancreatic bypass. However, almost 30% would perform none of the above, which assumes that they would back out of a planned bariatric operation if cirrhosis was unexpectedly encountered. Identical responses were obtained to the question regarding which procedures are appropriate to perform when cirrhosis is unexpectedly discovered during an elective bariatric operation.

Table 2 provides the outcome of operations that were performed in the 8 patients treated by one of us (R.E.B.). Seven of the 8 had a modification of RYGB. The remaining patient (patient 7), who had reversal of a jejunoileal bypass for metabolic complications, chose not to have a concomitant gastric restrictive procedure. Intraoperative blood loss was within the generally expected range in all but one patient (patient 4) who had conversion of a failed horizontal gastroplasty to RYGB. Five of the 8 cases of cirrhosis may have been caused by severe obesity.

There was one major perioperative complication that was fatal. An ascitic fluid leak developed in patient 4 through her midline incision on the sixth postoperative day. Bedside exploration of the wound under sterile conditions showed leakage of ascitic fluid around several sutures. However, the midline fascia was intact. Because the volume of drainage was 200 mL or less, her ascites was treated with diuretics on an outpatient basis under the direct supervision of her mother who is a registered nurse. However, she was readmitted in a stuporous state approximately 1 week after discharge from the hospital. Blood studies obtained at admission disclosed profound hypotension, hyperkalemia, and notable deterioration of her liver function test results. She died of fulminant hepatic failure and hepatorenal syndrome on the 30th postoperative day. The mean follow-up in the 7 remaining patients is 3.7 years (range, 10 months to 8 years). Two (patients 1 and 3) of these 7 patients had late postoperative complications. Both subsequently died of problems unrelated to their initial complications. Patient 1 was described as a reformed alcoholic at the time of the RYGB. At 3 months postoperatively, he had a left transmetatarsal amputation for complications related to diabetes. Unfortu-
nately, he resumed drinking approximately 2 years postoperatively and died of congestive heart failure 4 years later. Bleeding from a marginal ulcer developed in patient 3 approximately 6 weeks postoperatively. He was hospitalized but did not require transfusion. Fulminant hepatic failure developed in this patient 9 months later. At that time, he had a weight loss of almost 90 kg and had returned to his full-time job as a city bus driver.

**COMMENT**

**FATTY LIVER AND OBESITY**

Although it has been recognized for many years that obesity and glucose intolerance contribute to fatty liver, the clinicopathologic disorder named nonalcoholic steatohepatitis has only been well characterized in the last few years. Although it is similar histologically to liver disease that complicates jejunoileal bypass, the precise mechanism of hepatic injury remains unknown. The histologic features range from fatty liver to steatohepatitis with hepatocellular degeneration, Mallory bodies, and neutrophilic infiltration to central sclerosis and eventually to fibrosis and cirrhosis. Although elevated liver function test results are relatively common in obese patients, there is a surprisingly poor correlation between serum liver function test abnormalities and hepatic histopathologic features in obese patients. In reporting the results of a 5-year MEDLARS survey that determined the nature and incidence of hepatic histopathologic features in morbidly obese patients, Andersen and Gluud concluded that some abnormality in hepatic histopathologic features “can be expected” in morbidly obese patients but cirrhosis “is a rare finding, and evidence of obesity as the only pathogenetic factor is lacking.” More recently, other investigators have presented convincing evidence of the progression of hepatic histopathologic features over time in patients with nonalcoholic steatohepatitis. Although the long-term prognosis of patients with nonalcoholic steatohepatitis is largely unknown, survival probability is notably greater than in patients with alcoholic steatohepatitis.

Table 3 summarizes data from several reports of liver biopsies that were performed during gastric bariatric operations. Several investigators have reported correlations between progression of hepatic histopathologic features and various demographic and clinical variables. Gianetta et al and Klain et al independently reported a positive correlation between the degree of steatosis and increased age, magnitude of obesity, and duration of obesity. Silverman et al and Marceau et al independently reported a significant correlation between progression of hepatic histopathologic features and impaired glycemic status. In the series by Marceau et al, the degree of steatosis was more severe in men and correlated with waist-hip ratio in both sexes. In women, the magnitude of steatosis correlated with age and excess weight. The degree of steatosis also correlated with increased se-
The 11 patients with cirrhosis in the series by Marceau et al. were significantly older and heavier and had worse liver function test results than the remaining 540 patients. One of the 11 patients with cirrhosis died of pancreatitis during the perioperative period. Another patient had reversal of the biliopancreatic bypass (BPB) due to deteriorating liver function at 3 years postoperatively and died of liver failure 4 years later. The remaining 9 patients are alive and apparently well, with a mean follow-up of 3 years. Liver function test results in these patients are generally improved. The 7 severely obese patients with cirrhosis in the present report were also older and heavier than the remaining 573 patients in the series of patients seen by one of us (R.E.B.). The incidence of diabetes (71%) in the group with cirrhosis was more than 5 times higher than that of the remaining patients.

Table 4 summarizes the results of postoperative liver biopsies performed in 3 large series of bariatric surgical patients. In the series by Gianetta et al., liver biopsies were routinely performed at 1 and 4 months postoperatively, then annually thereafter. Although a transitory increase in steatosis was noted during the first 4 months, fatty infiltration gradually disappeared during the ensuing 12 to 18 months following operation. A second liver biopsy was performed during subsequent abdominal operations in 15% of the patients described by Silverman et al. The degree of steatosis in subsequent biopsy specimens varied inversely with the length of time after RYGB. Perisinusoidal fibrosis was notably reduced in second biopsy specimens, with complete resolution of fibrosis noted in 88% of the cases that were graded as slight and one third of the cases graded as marked in the initial biopsy specimen. A second liver biopsy was performed in 41 (7.4%) of the 551 patients studied by Marceau et al. Histologic features from the second liver biopsy specimen showed improvement in the degree of steatosis in all but 1 patient, with resolution of steatosis in 23 (56%) of the second biopsy specimens. A second liver biopsy was performed in 3 of the 11 patients with cirrhosis; the biopsy specimen showed improvement in steatosis and fibrosis in each case. Remarkably, fibrosis had disappeared completely in one patient. This degree of improvement in hepatic histopathologic features seems particularly remarkable when considering that weight loss associated with BPB results primarily from malabsorption rather than restriction of oral intake. However, the distribution of fibrosis can be patchy in the liver. Hence, it is possible that the improvement or resolution of fibrosis noted in these postoperative specimens resulted from the sampling error inherent in the evaluation of a tiny fraction of a large solid organ.

VALIDITY OF QUESTIONNAIRE RESPONSES

The questionnaire, which was mailed to 243 surgeons, was designed to provide specific information regarding the incidence and outcome of cirrhosis in bariatric surgical patients. The response rate of 52% should provide information that is representative of typical practicing bariatric surgeons. The mean of almost 700 cases per surgeon attests to the experience of this group. There were no apparent demographic differences between the surgeons who responded to the survey and the nonresponders. Questions regarding incidence, cause, and perioperative mortality in these patients were answered by all respondents. Questions regarding the type of operation performed and the opinion questions were answered by approximately 85% of the participants. However, a substantial number of surgeons who had not recognized cirrhosis in their practice answered the opinion questions. More than half of this subgroup did not recommend performing the planned bariatric operation on discovering cirrhosis. Conversely, questions regarding long-term outcome were answered by only approximately half of the respondents.
suggesting that a substantial number of these patients may have been unavailable for follow-up.

It is surprising that less than half of the respondents unexpectedly discovered cirrhosis during elective bariatric operations. However, considerable discrepancy in the incidence of fibrosis and cirrhosis reported in several large series of bariatric patients has been shown (Table 3). It is also surprising that a liver biopsy was not performed in 13% of the 125 patients with cirrhosis described in the survey. Although purely restrictive operations are not expected to result in the progression of liver pathologic features, it would seem prudent to confirm a serious unexpected finding such as cirrhosis during any elective operation. Less than 10% of the respondents used malabsorptive operations such as BPB as the primary treatment for morbid obesity. This factor likely contributed to the negative consensus opinion toward performing malabsorptive procedures in patients with cirrhosis. There was no indication that surgeons would change or “downgrade” from a malabsorptive to a purely restrictive operation in patients with cirrhosis. However, this specific question was not included in the survey. The fact that 70% of the survey patients were described as alive and well postoperatively is consistent with the relatively benign prognosis of nonalcoholic steatohepatitis.10,11

SAFETY OF PERFORMING BARIATRIC OPERATIONS IN PATIENTS WITH CIRRHOSIS

Late hepatic failure was a primary reason for the treatment of jejunoileal bypass as the treatment for severe obesity. In 1981, Hocking et al1 reported that hepatic histopathologic features progressed in 44% of the patients who underwent a follow-up liver biopsy between 1 and 5 years after jejunoileal bypass. New histologic findings of cirrhosis were noted in 30% of these patients. Although there was one death from hepatic failure in the series by Marceau et al15 and in the present series, it is unclear whether liver failure in either case was caused by the operation. The high rate of improvement in hepatic histopathologic features in the series by Gianetta et al12 and Marceau et al suggests that BPB is more beneficial than harmful to the liver. There is no hard evidence that BPB or other “distal” modifications of gastric bypass have a deleterious effect on the liver. Although there is virtually no published information on the outcome of bariatric operations in patients with cirrhosis, the risks associated with performing other major abdominal operations in patients with cirrhosis are considerably greater than the risks in patients with normal liver function. In several reports, operative mortality ranged from 8% to 67% in patients with cirrhosis undergoing unspecified major abdominal operations. Several investigators have identified risk factors associated with cirrhosis that were predictive of perioperative death. These include poor general nutritional status, presence of ascites, elevated prothrombin time, and operative blood loss of 1000 mL or more. These risk factors are applicable to elective bariatric operations. Patient 4 in the series by one of us (R.E.B.) who died 30 days postoperatively had 2 of these risk factors, including a small amount of ascites that was not apparent on physical examination and an operative blood loss of approximately 3000 mL. In retrospect, it would have been prudent to abort the planned RYGB in this patient once the ascites was recognized.

The questionnaire results and the experience of one of us (R.E.B.) strongly suggest that the early and late mortality rates of patients with cirrhosis who undergo elective bariatric operations are considerably greater than those of other bariatric surgical patients. This increased risk must be offset by the potential benefit of substantial weight loss in this group of patients. The available data show that steatosis and fibrosis can be ameliorated or resolved with surgically induced weight loss. Procedures such as BPB that produce malabsorption seem to be as effective in this regard as those that induce weight loss primarily by restriction of oral intake.

The incidence of unexpectedly discovering cirrhosis during bariatric operations is low, ranging from 0% to 6% in large clinical series. However, the operative mortality is 5 times higher in patients with cirrhosis vs bariatric patients who do not have cirrhosis. Despite the higher risk, most bariatric surgeons believe that gastric restrictive procedures can be safely performed in patients with cirrhosis. Conversely, only a few respondents would perform malabsorptive procedures in patients with cirrhosis. Although the question of whether severe obesity alone can cause cirrhosis remains controversial, there is accumulating evidence that the steatohepatitis associated with obesity may progress to cirrhosis in a few of these patients.

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REFERENCES