

# Bariatric Surgery Leads to Bone Density Decrease

*'We can really do a lot for these patients by just making sure we minimize their risk of falling.'*

BY SHERRY BOSCHERT  
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SAN FRANCISCO — Weight loss after bariatric surgery induces a drop in bone mineral density and increases the risk for falls and fractures, but it's unclear whether most of these changes are clinically significant, Dr. Brian N. Sabowitz said.

The sparse data that exist tend to look at relative changes. They don't give absolute numbers that might show whether a patient's new bone density or fracture risk after weight loss from bariatric surgery is any higher than bone density or fracture risk in someone who already is at the target weight that the surgical patient eventually achieves, he said at the annual meeting of the International Society for Clinical Densitometry.

Obese people are likely to have vitamin D deficiency, which has been associated with an increased risk of fracture, noted Dr. Sabowitz, founder of a weight-loss clinic that performs bariatric surgery in Lake Havasu City, Ariz., where he also was a patient to undergo his own Roux-en-Y gastric bypass. In addition, Dr. Sabowitz is medical director of an osteoporosis center in Lake Havasu City.

Fifteen of 18 patients he saw in January 2008 for consults before bariatric surgery had deficient vitamin D levels. A prospective, controlled study in 2007 of 19 obese and 19 nonobese patients found serum levels of vitamin D were 60% lower in the

obese group than in the controls. When they were exposed to UV radiation, obese patients absorbed half as much vitamin D, probably because the fat-soluble vitamin was being sequestered in adipose tissue instead of reaching the bloodstream, the study showed.

Physiologic changes from bariatric surgery—whether gastric banding or gastric bypass surgery—make it more difficult for micronutrients to be absorbed. One study of 21 women found that 36% of ingested calcium entered the bloodstream before gastric bypass surgery, which reduced calcium absorption to 24%.

Bariatric surgery also can lead to deficiencies in levels of vitamin B<sub>12</sub>, folate, thiamine, and iron.

"This can all add up to weakness, ataxia, falling, and fractures. A lot of the nutritional deficiencies that can occur with this surgery can increase fracture risk by increasing the risk of falling," Dr. Sabowitz said.

Getting a baseline bone density measurement in an obese patient before bariatric surgery can be difficult, and fat may alter the scan results. For densitometry of the femoral neck, be sure to move the fat panus out of the way, he advised.



If nothing else, get scans of the bilateral forearms to have some baseline measurement.

A 1992 study found decreased levels of serum calcium, osteocalcin, 25-hydroxyvitamin D, and other markers of bone health in 26 women 10 years after gastric bypass surgery, compared with levels in 7 control women who lost weight without surgery. A trend toward lower bone density at the femoral neck in the surgery group did not reach statistical significance.

Another separate study found that forearm bone density was higher in eight obese patients than in eight normal-weight controls at baseline, but 1 year after bariatric surgery on the obese patients forearm densities were similar between groups (Braz. J. Med. Biol. Res. 2007;40:509-17). Femoral neck bone mineral density in the surgery patients dropped to levels significantly lower than in the control group, however, so the risk remains "controversial," he said.

Data from the National Health and Nutrition Examination Survey suggest that fracture risk doubles in obese people who lose 10% of body weight, but the survey doesn't compare the absolute fracture risk after weight loss with that in controls, he added. "We don't have very good ways to treat patients who get osteoporosis because of weight loss, if that's what's happening," Dr. Sabowitz said.

Bariatric surgery patients must switch their medications to liquid or crushable alternatives to get the medicine past the physiologic obstacles created by the surgery. Bisphosphonates come in pill form not amenable to this. There is no evidence for using antiresorptive agents in premenopausal women who may become osteoporotic because of bariatric surgery and weight loss.

"The main thing is to optimize preoperative status" by normalizing vitamin D and calcium levels and getting baseline readings of bone density and bone turnover markers to help with decision making, Dr. Sabowitz said.

He sends an occupational therapist to each patient's house to look for hazardous carpets, cords, or other things that might cause a fall. "We can really do a lot for these patients by just making sure we minimize their risk of falling," he said.

After bariatric surgery, put patients on liquid or chewable calcium and vitamin D supplements. Get quarterly measures of vitamin D, parathyroid hormone, and bone turnover markers, he said. Dr. Sabowitz gets annual bone density scans, mainly to accumulate data.

Start treatment for osteoporosis using the same criteria used for patients who have not had bariatric surgery and weight loss—mainly because there are no data to do otherwise. Some clinicians have suggested considering a large weight loss to be a risk factor for osteoporosis, which might prompt treatment in a patient with a T score of -1.5 plus this risk factor, "but there are no good data to support doing that," he said. ■

## Bariatric Outcomes Tied to Surgeon and Hospital Volume

BY ELIZABETH MECHCATIE  
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Three-year data on surgical patients in Pennsylvania support using surgeon and hospital volume as part of the credentialing process for bariatric surgery centers of excellence, according to a study of 14,716 patients who underwent bariatric surgery in Pennsylvania hospitals from 2000 to 2003.

Dr. Ann M. Rogers and her associates at Pennsylvania State University, Hershey, analyzed the relationship between surgeon and hospital volume on length of stay, in-hospital mortality, and 30-day mortality after adjusting for age, gender, ethnicity, payer, and score based on the severity of the patients' illness.

They found that bariatric surgery "performed by high-volume surgeons in hospitals where more than 100 cases were performed a year was associated with decreased mortality and length of stay, compared to those patients whose surgeons operated on fewer than 100 cases per year at hospitals with fewer than 100 cases per year."

Individual surgeons and hospitals were stratified into one of three categories: high volume (more than 100 cases per year), medium volume (50-100 cases per year), or low volume (fewer than 50 cases per year).

During the time period of the study, which was presented at the Academic Surgical Congress, the mean surgical volume per hospital increased from 20 to 120 cases per year, and in-hospital mortality decreased from 0.8% to 0.2%. Overall, 30-day mortality was 1.15%, and in-hospital mortality was 0.37%.

After controlling for other factors, the investigators found that 30-day mortality was 3.7 times higher among those treated by low-volume surgeons and 2.8 times higher among those treated by medium-volume surgeons, when compared with those treated by high-volume surgeons, which were significant differences.

In addition, 30-day mortality was 2.3 times greater for patients treated in low-volume hospitals and 1.6 times greater in medium-volume hospitals than in high-volume hospitals, which were significant differences.

Length of stay was significantly shorter in high-volume hospitals than in low- or medium-volume hospitals. "Our data showed progressively increasing length of stay from high- to medium- to low-volume hospitals and surgeons," Dr. Rogers said in an interview.

Medium-volume hospitals and surgeons were associated with about half a day longer length of stay, while low-volume hospitals and surgeons were associated with about an additional day and a half in the hospital, compared with those in the high-volume hospital and surgeon group, said Dr. Rogers, director of the Penn State surgical weight loss program.

Male gender and admission severity, as well as hospital and surgeon volume, were significantly associated with increased in-hospital and 30-day mortality. Men were at a 3.6 times greater risk for in-hospital and 30-day mortality, compared with women, which was significant, she said.

Dr. Rogers of the department of surgery at the Penn State Milton S. Hershey Medical Center, Hershey, said there is a fairly large body of literature looking at the impact of surgeon and hospital volume on the outcomes

of bariatric surgery, but that the Penn State group, spearheaded by Dr. Robert N. Cooney, is only the third to evaluate 30-day mortality, rather than in-hospital mortality alone.

Since 2006, when the Centers for Medicare and Medicaid Services decided to cover bariatric surgery performed at centers listed with the American Society for Bariatric Surgery/Surgical Review Corporation Center of Excellence or as an American College of Surgeons Level One Center of Excellence, hospitals have been under increased pressure to obtain bariatric surgery credentials.

As a result, many third-party payers either require that patients be treated only in credentialed centers or have created their own criteria for a center of excellence, Dr. Rogers noted. Surgeon and hospital volume are both considered in the credentialing process, and "we believe our results support the use of such criteria in the credentialing process" of both hospitals and surgeons, she said.

Studies of other surgical procedures have demonstrated higher morbidity and mortality associated with low-volume surgeons and hospitals, Dr. Myriam Curet said in an interview. The Penn State study confirms the finding that the relationship between volume and patient outcomes is also true for bariatric surgery, said Dr. Curet, a bariatric surgeon and professor of surgery at Stanford (Calif.) University.

This type of evidence was the impetus behind using the volume criteria for centers of excellence certification, "and this study confirms that this was the correct decision," she added. "If we're all aiming to improve patient outcomes, then having these kinds of volume criteria to designate centers of excellence is clearly important." ■