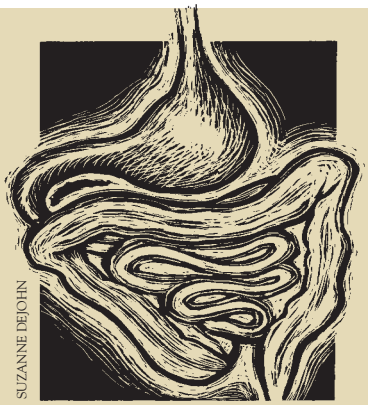
Reducing obesity

By Kenneth Burchard, M.D.


SUZANNE DEJOHN

In some institutions, the gastric bypass is the most common elective abdominal surgical procedure performed today.

In 1967, University of Iowa surgeon Edward Mason, M.D., Ph.D., discovered that patients with peptic ulcer disease who underwent a gastric resection (removal of part of their stomach) often suffered an unwanted consequence—weight loss. Since their smaller stomach remnant restricted their food intake, he reasoned that a gastric-resection type procedure might have a therapeutic effect for obese patients, by preventing them from consuming too much food.

So Mason developed a model that he tested first in dogs. The procedure entailed stapling the top part of the stomach to create a small pouch, then using a gastrojejunostomy—attaching the pouch to the jejunum, the upper part of the small intestine—to provide intestinal continuity. The two-thirds of the stomach that was "bypassed" was left in place. Mason thought that complete removal of the bypassed stomach would be too radical and might cause ulcers to develop at the gastrojejunostomy site. He also wondered whether even his model could cause ulcers. Only after he had determined that the bypass procedure carried little risk of ulcer formation did he begin to test its effects on weight and nutrition in obese people.

Technique: Four decades later, the medical community has enthusiastically embraced Mason's pioneering concept for weight control, with some adjustments in technique. Now the pouch is smaller, about thumb-sized, and the connection (called a "Roux-en-Y") to the small intestine is different than what Mason originally described. In some institutions, the gastric bypass is the most common elective abdominal surgical procedure performed today. As gastric-bypass patients lose their excess weight, other obesity-associated health conditions from which they may have suffered—such as diabetes, heart disease, high blood pressure, stroke, certain cancers, depression, and osteoarthritis—begin to improve.

The medical community has also tried other types of bariatric surgery. Shortly after developing the gastric bypass, Mason set the stage for human weight control studies when he offered a simpler operation called a gastroplasty. A gastroplasty is a procedure that restricts food intake, but without bypassing the stomach. One example is the vertical banded gastroplasty (VBG)—so-called because a band is used to create a small pouch at the top of the stomach to serve as a receptacle for ingested food. The food traverses the rest of the stomach and enters the upper intestinal tract along the normal pathway. The VBG, however, has proved to be less effective and less durable than the gastric bypass.

So there seems to be something about bypassing the stomach and the adjacent gastrointestinal (GI) tract that enhances weight control. And in addition to weight control, a gastric bypass typically results in rapid, profound improvements in the blood-sugar levels of diabetics.

Experimental models of obesity and diabetes have identified a complex array of hormonal interactions that are influenced by the upper GI tract. The increasing numbers of patients who have undergone gastric bypass are providing an ample study population to investigate these interactions.

Many gastric bypass patients say that, even months after the surgery, they are no longer hungry. A recent study has demonstrated that persistently low levels of the stomach hormone ghrelin are secreted following a gastric bypass. Ghrelin levels typically increase before a meal and are associated with the sensation of hunger. Might low levels of this appetite-enhancing hormone be the reason that hunger is suppressed and provide some clues as to why the gastric bypass is more effective than procedures that let food traverse the normal GI pathway?

Complications: But even as bariatric surgery seems to be helping obese patients lose weight, there is some risk of complications, including ulcers at the site of the surgery—a risk that ranges from zero to 10%. No one knows why there is such a wide range. It's unlikely that the ulcers are caused by stomach acid, because today's gastric pouches are smaller than the ones that Mason created—so less acid bathes the nearby jejunum. If ulcers do develop, they tend to appear a few weeks after the surgery. After being treated with medicines or by dilating the connection between the stomach and the small intestine, they usually go away without long-term therapy. A recently developed experimental model of the gastric bypass using an obese rat might provide the opportunity to determine if a novel pathophysiologic mechanism of stomach-induced small bowel injury is responsible.

The pathophysiologic complexity of obesity and diabetes and the effects of gastric bypass surgery are more compelling than the transient difficulties at the surgical site that are described above; these effects demand further study in obese rats. Lessons thus learned can then be studied in the ever-increasing population of humans who are receiving this intervention.

Interplay: The threat of obesity and diabetes is steadily increasing in this country. More than 25% of adult Americans are now obese, with six million considered morbidly obese—that is, at least 100 pounds overweight. Effective surgical therapy not only provides an immediate decrease in the obesity-related threats to their health, but also offers a continuing opportunity for an interplay between bench and clinical research—and the hope that these health- and life-threatening illnesses can eventually be controlled with even less radical techniques than Mason could ever have envisioned. ■

"Bench to Bedside" explores the research underlying advances in clinical medicine. Burchard is a professor of surgery and former director of DHMC's Bariatric Surgery Program.