Despite significant progress in the development of new treatments for severe obesity, bariatric surgeries like Roux-en-Y gastric bypass (RYGB) remain the gold-standard. A large part of the weight loss associated with RYGB is from reductions in food intake, which is still considered by many to be merely due to the smaller stomach size postoperatively. I will present evidence from preclinical and clinical studies showing that complex changes in gut-brain communication likely underlie the improved feeding behaviour after RYGB. This will cover how various gut-derived signalling molecules impinge on molecularly and anatomically distinct feeding circuits. While work in the field is still in its relative infancy, it is anticipated that a greater understanding of the mechanisms behind the marked and sustained weight loss unique to bariatric surgery will lead to safer, knifeless alternatives.