Bariatric surgery

Bariatric surgery (weight loss surgery) includes a variety of procedures performed on people who have obesity. Weight loss is achieved by reducing the size of the stomach with a gastric band or through removal of a portion of the stomach (sleeve gastrectomy or biliopancreatic diversion with duodenal switch) or by resecting and re-routing the small intestine to a small stomach pouch (gastric bypass surgery).

MRI studies show that obese adults have reduced grey matter (GM) and white matter (WM) tissue density as well as altered WM integrity. Bariatric surgery can lead to dramatic weight loss and improvements in metabolic parameters, however it remains to be examined if it induces structural brain changes. The aim of this study is to characterize GM and WM density changes measured with MRI in a longitudinal setting following sleeve gastrectomy, and to determine whether any changes are related to inflammation and cardiometabolic blood markers.

METHODS: 29 severely obese participants (age: 45.9 ± 7.8 years) scheduled to undergo sleeve gastrectomy were recruited. High-resolution T1-weighted anatomical images were acquired 1 month prior to as well as 4 and 12 months after surgery. GM and WM densities were quantified using voxel-based morphometry (VBM). Circulating lipid profile, glucose, insulin and inflammatory markers (interleukin-6, C-reactive protein and lipopolysaccharide-binding protein) were measured at each time point. A linear mixed effect model was used to compare brain changes before and after SG, controlling for age, gender, initial BMI and diabetic status. To assess the associations between changes in adiposity, metabolism and inflammation and changes in GM or WM density, the mean GM and WM densities were extracted across all the participants using atlas-derived regions of interest, and linear mixed-effect models were used.

RESULTS: As expected, weight, BMI, waist circumference and neck circumference significantly decreased after SG compared with baseline ($p < 0.001$ for all). A widespread increase in WM density was observed after surgery, particularly in the cerebellum, brain stem, cerebellar peduncle, cingulum, corpus callosum and corona radiata ($p < 0.05$, after FDR correction). Significant increases in GM density were observed 4 months after SG compared to baseline in several brain regions such as the bilateral occipital cortex, temporal cortex, postcentral gyrus, cerebellum, hippocampus and insula as well as right fusiform gyrus, right parahippocampal gyrus, right lingula gyrus and right amygdala. These GM and WM increases were more pronounced and widespread after 12 months and were significantly associated with post-operative weight loss and the improvement of metabolic alterations. A linear mixed-effect models also showed associations between post-operative reductions in lipopolysaccharide-binding protein, a marker of inflammation, and increased WM density. To confirm our results, we tested whether the peak of each significant region showed BMI-related differences in an independent dataset (Human Connectome Project). We matched a group of severely obese individuals with a group of lean individuals for age, gender and ethnicity. Severe obesity was associated with reduced WM density in the brain stem and cerebellar peduncle as well as reduced GM density in cerebellum, regions that significantly changed after surgery ($p < 0.01$ for all clusters).

Bariatric surgery-induced weight loss and improvement in metabolic alterations is associated with widespread increases in WM and GM densities. These post-operative changes overlapped with baseline brain differences between severely obese and normal-weight individuals in a separate dataset, which may suggest a recovery of WM and GM alterations after bariatric surgery [1)].

Bariatric surgery (BS) is an increasingly common treatment for morbid obesity that has the potential to effect bone and mineral metabolism. The effect of prior BS on spine surgery outcomes has not been well established. The aim of this study was to assess differences in complication rates following spinal surgery for patients with and without a history of BS.

Retrospective analysis of the prospectively collected New York State Inpatient Database (NYSID) years 2004-2013. BS patients and morbidly obese patients (non-BS) were divided into cervical and thoracolumbar surgical groups and propensity score matched for age, gender, and invasiveness and complications compared.

One thousand nine hundred thirty-nine spine surgery patients with a history of BS were compared to 1625 non-BS spine surgery patients. The average time from bariatric surgery to spine surgery is 2.95 years. After propensity score matching, 740 BS patients were compared to 740 non-BS patients undergoing thoracolumbar surgery, with similar comorbidity rates. The overall complication rate for BS thoracolumbar patients was lower than non-BS (45.8% vs 58.1%, $P < 0.001$), with lower rates of device-related (6.1% vs 23.2%, $P < 0.001$), DVT (1.2% vs 2.7%, $P = 0.039$), and hematomas (1.5% vs 4.5%, $P < 0.001$). Neurologic complications were similar between BS patients and non-BS patients (2.3% vs 2.7%, $P = 0.62$). For patients undergoing cervical spine surgery, BS patients experienced lower rates of bowel issues, device-related, and overall complication than non-BS patients ($P < 0.05$).

Bariatric surgery patients undergoing spine surgery experience lower overall complication rates than morbidly obese patients. This study warrants further investigation into these populations to mitigate risks associated with spine surgery for bariatric patients [2].

Long-term studies show the procedures cause significant long-term loss of weight, recovery from diabetes, improvement in cardiovascular risk factors, and a reduction in mortality of 23% from 40%.

However, a study in Veterans Affairs (VA) patients has found no survival benefit associated with bariatric surgery among older, severely obese people when compared with usual care, at least out to seven years.

The U.S. National Institutes of Health recommends bariatric surgery for obese people with a body mass index (BMI) of at least 40, and for people with BMI 35 and serious coexisting medical conditions such as diabetes.

However, research is emerging that suggests bariatric surgery could be appropriate for those with a BMI of 35 to 40 with no comorbidities or a BMI of 30 to 35 with significant comorbidities. The most recent ASMBS guidelines suggest the position statement on consensus for BMI as indication for bariatric surgery. The recent guidelines suggest that any patient with a BMI of more than 30 with comorbidities is a candidate for bariatric surgery.

see Bariatric surgery for idiopathic intracranial hypertension.

[1]

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2)

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