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Comparison of Effects of Sleeve Gastrectomy, Duodenal-jejunal Bypass and Ileal Transposition for the Treatment of Type II Diabetes

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BACKGROUND: Sleeve gastrectomy (SG), duodenal jejunal bypass (DJB) and ileal transposition (IT) have been reported to be effective for the treatment of T2DM. It is unknown which procedure has a stronger anti-diabetic effect. The purpose of this study was to compare the effectiveness of these novel procedures **METHODS:** SG, DJB, IT and sham operation of each procedure were performed in 10-12 weeks old Goto-Kakizaki rats, a spontaneous non-obese model of T2DM. The glucose homeostasis effect was evaluated by measuring fasting glucose (FBG) and glycosylated haemoglobin (HbA1c). Other parameters measured included gut hormonal alteration, body weight and lipid profile (cholesterol and triglycerides). **RESULTS:** All three procedures had significant lower FBG when compared to the respective sham groups. DJB and IT had lower FBG than SG (SG vs DJB, $p=0.023$; SG vs IT, $p=0.009$) whereas DJB and IT had a similar FBG level, $p=0.678$. For HbA1c, all procedures had lower levels than the respective sham groups, $p<0.001$. The HbA1c of SG rebounded on 8th week whereas HbA1c of DJB and IT remained at low level. SG had a significant higher HbA1c level than DJB and IT, $p<0.001$ while DJB and IT had a similar level, $p=0.685$. For gut hormones analysis, GLP-1 and GIP levels were raised in DJB. DJB and IT induced more weight loss than SG, $p=0.045$ and $p=0.038$. DJB and IT significantly lower the cholesterol level than their sham groups, $p=0.001$ and $p=0.013$. DJB was more effective than SG in reducing the cholesterol level, $p<0.001$. For triglyceride, SG had a lower level, $p=0.006$, DJB had no difference, $p=0.663$ whereas IT induced a higher level, $p=0.012$ when compared to the respective sham groups. **CONCLUSION:** SG, DJB and IT all had anti-diabetic effects. DJB and IT had more potent anti-diabetic effect than SG. Both foregut and hindgut theories might explain the anti-diabetic effect in DJB. The lipid absorption profile was different in three procedures. Each procedure has different effects on metabolic diseases and their clinical application deserve individual consideration.