

Is Bariatric Surgery The Cure for Diabetes Mellitus?

KOSAI NR

Upper Gastrointestinal, Bariatric and Metabolic Surgical Unit, Department of Surgery, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia

Obesity is a life-long, progressive, life-threatening, costly, genetically-related, multi-factorial disease of excess fat storage with multiple co-morbidities. Bariatric Surgery is currently the most effective therapy available for morbid obesity and can result in improvement or complete resolution of obesity related co-morbidities including diabetes mellitus (DM) (Buchwald et al. 2009). Current indication for bariatric surgery are BMI of more than 35 with co-morbidities, BMI of more than 40 without co-morbidities, having failed conservative method of weight loss with no serious psychiatric disorders. There are several different types of bariatric surgery which includes purely restrictive procedure such as adjustable gastric bands, sleeve gastrectomy and gastric plication, combined restrictive and malabsorptive procedure such as gastric bypass and finally pure malabsorptive procedure such as mini-gastric bypass, bilio-pancreatic diversion and duodenal switch. The advent of laparoscopic technique has resulted in improvement of its safety profile with a 30 day mortality of

0.1-0.3%, similar to a laparoscopic cholecystectomy. Obesity is the primary risk factor for type 2 DM (Chan et al. 1994). DM is a chronic metabolic disorder which if left untreated may lead to serious complications and death. Until the advent of bariatric surgery, the mainstay treatment for DM in the morbidly obese includes diet control, oral hypoglycaemic agents and insulin. One of the main aims of treatment for DM is to prevent the development and progression of micro and macrovascular disease. A 1 percent reduction in HbA1c results in 14%, 37% and 21% reduction in macrovascular, microvascular and deaths related to DM respectively. Remission of DM is a common effect seen after bariatric surgery in the obese diabetics patients (Buchwald et al. 2009). While the initial believe that remission of DM was due to weight loss and reduction in insulin resistance, current evidence show that remission of DM is apparent even before significant weight loss occurs suggesting a more complex neuro-hormonal regulation involvement. It is believed that several enteral hormones

Address for correspondence and reprint requests: Dr. Nik Ritza Kosai Nik Mahmood, Department of Surgery, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia Tel: +603-91456201 Fax: +603-91456684 Email: nikkosai@yahoo.co.uk

are produced following surgeries like sleeve gastrectomy and gastric bypass. The amelioration of DM which occur sooner (within four days of surgery) than associated weight loss was in fact first noted and reported in 1955 following a subtotal gastrectomy with a loop gastro-jejunostomy (Friedman et al. 1955). The foregut (Rubino et al. 2006), hindgut (Patriiti et al. 2005), ghrelin hormones and weight loss are thought to be the main mechanism of action of remission of DM following surgery. Furthermore, it was identified that the main gut hormones involved in the entero-insular axis are GLP-1 (Glucagon-like peptide-1) and GIP (Gastric Inhibitory Polypeptide) which are also called 'incretins', Whilst ghrelin and PYY (peptide YY) seems to play a less prominent role in glucose homeostasis (Papamargaritis et al. 2013). Currently there is compelling evidence from clinical studies such as the STAMPEDE (Schauer et al. 2014), SOS (Swedish Obese Subject Trial) (Sjostrom et al. 2012) and recent systematic review and meta-analysis (Buchwald et al. 2009) that supported the superiority and effectiveness of bariatric surgery in the amelioration of DM when compared to medical therapy alone. In 2011, a position statement made by the International Diabetes Federation (IDF) recommends surgery for diabetic patients with a BMI of more than 35 whom have not achieve treatment targets with medical therapy and in under some circumstances patients with a BMI between 30 to 35 should be eligible for surgery. Hence, is bariatric surgery the cure for diabetes mellitus? It all depends on how we see

and perceived. The definition of 'cure' means complete eradication for life. Based on the overwhelming clinical evidence, beyond doubt complete resolution of type 2 DM is achievable, however as shown in the SOS trial where 50% relapse occurred at 10 years follow-up due to multifactorial reasons, whether this is sustainable life-long is questionable. Still, there are many questions to be answered. One thing which is clear is the important role of bariatric surgery in achieving a significant and sustainable weight loss, partial and complete remission in type 2 DM of close to 80% and other metabolic related problems with significant quality of life and cost economics outcome (Buchwald et al. 2009, Klein et al. 2009).

REFERENCES

- Chan, J.M., Stampfer, M.J., Ribb, E.B. 1994. Obesity, fat distribution, and weight gain as risk factors for clinical diabetes in men. *Diabetes Care* 17: 961-9.
- Buchwald, H., Estok, R., Fahrenbach, K., Banel, D., Jensen, M.D., Pories, W.J., Bantle, J.P., Sledge, I. 2009. Weight and type 2 diabetes after bariatric surgery: systematic review and meta-analysis. *Am J Med* 122(3): 248-56.
- Friedman, M.N., Sancetta, A.J., Magovern, G.J. 1955. The amelioration of diabetes mellitus following subtotal gastrectomy. *Surg Gynecol Obstet* 100(2): 201-4.
- Klein, S., Ghosh, A., Cremieux, P.Y., Eapen, S., McGavock, T.J. 2011. Economic impact of the clinical benefits of bariatric surgery in diabetes patients with BMI≥35 kg/m. *Obesity (Silver Spring)* 19(3): 581-7.
- Papamargaritis, D., Miras, A.D., le Roux, C.W. 2013. Influence of diabetes surgery on gut hormones and incretins. *Nutr Hosp* 28(Suppl 2): 95-103.
- Patriiti, A., Facchiano, E., Annetti, C., Aisa, M.C., Galli, F., Fanelli, C., Donini, A. 2005. Early improvement of glucose tolerance after ileal transportation in a non-obese type 2 diabetes rat model. *Obes Surg* 15(9): 1258-64.

- Rubino, F., Forgione, A., Cummings, D.E., Vix, M., Gnuli, D., Mingrone, G., Castagneto, M., Marescaux, J. 2006. The mechanism of diabetes control after gastrointestinal bypass surgery reveals a role of the proximal small intestine in the pathophysiology of type 2 diabetes. *Ann Surg* **244**(5): 741-9.
- Schauer, P.R., Bhatt D.L., Kirwan, J.P., Wolski, K., Brethauer, S.A., Navaneethan, S.D., Aminian, A., Pothier, C.E., Kim, E.S.H., Nissen, S.E., Kashyap S.R. 2014. Bariatric surgery versus intensive medical therapy for diabetes-3 year outcomes. *N Engl J Med* **370**: 2002-13.
- Sjostrom, L. 2013. Review of the key results from Swedish obese subjects (SOS) trial-a prospective controlled intervention study of Bariatric Surgery. *J Intern Med* **273**(3): 219-34.