Role of Metabolic Surgery In Management of Type II Diabetes Mellitus

Essay

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In General Surgery

BY

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List of Abbreviations

AACE	:	American Association of Clinical Endocrinologists
ACC	:	Acetyl coenzyme a carboxylase
ACE	:	Angiotensin-converting enzyme
ADA	:	American Diabetes Association
ADIPOR	:	Adiponectin receptors
AE	:	Adverse events
AFCAPS/TexCAPS	:	Air Force/Texas Coronary Atherosclerosis Prevention Study
AG	:	Acylated ghrelin
AGB	:	Adjustable Gastric Band
AgRP	:	Agouti-related protein
AHA	:	American Heart Association
AMPK	:	Amp-activated protein kinase
Apo-B	:	Apolipoprotein B
APPL1	:	Adaptation protein
ARBs	:	Angiotensin receptor blockers
ARC	:	Arcuate nucleus
ARIC	:	Atherosclerosis Risk in Communities
ASCVD	:	Atherosclerotic cardiovascular disease
ATP III	:	Adult Treatment Panel III
BMI	:	Body mass index
BP	:	Blood pressure
BPD	:	Bilio pancreatic diversion
BPD-DS	:	Bilio-pancreatic diversion / duodenal switch
CETP	:	Cholesteryl ester transfer protein
CHD	:	Coronary heart disease
CHF	:	Congestive heart failure
CI	:	Confidence interval
CIMT	:	Carotid intimal media thickness
CRP	:	C-reactive protein
CVD	:	Cardiovascular disease
DAIR	:	Digestive Adaptation with Intestinal Reserve
DASH	:	Dietary Approaches to Stop Hypertension
DB-GENE	:	Diabetes gene

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DJB	:	Duodeno-jejunal Bypass
DJBS	:	Duodenal Jejunal Bypass Sleeve
DM	:	Diabetes mellitus
DPP-IV	:	Dipeptidylpeptidaseiv
EDJBS	:	Endoscopic Duodenal Jejunal Bypass Sleeve
EGIR	:	European Group for Study of Insulin Resistance
ELISA	:	Enzyme-linked immunosorbent assay
eNOS	:	Endothelial nitric oxide synthase
ER	:	Endoplasmic reticulum
ERK	:	Extracellular signal-regulated kinase
EWL	:	Excess weight loss
FDA	:	Food and Drug Administration
FFA	:	Free fatty acids
FRS	:	Framingham Risk Score
GBP	:	Gastric bypass
GDM	:	Gestational diabetes mellitus
GH	:	Growth hormone
GIP	:	Gastric inhibitory peptide or glucose-dependent insulinotropic peptide
GIP GLUCOSE	:	Dependent insulinotropic polypeptide
GK rats	:	Goto-Kakizaki rats
GLP-1	:	Glucagon-like peptide 1
HbA1c	:	Hemoglobin A1c
HDL	:	High density lipoprotein
HDL-C	:	High density lipoprotein cholesterol
HIV	:	Human immunodeficiency virus
HMW	:	High molecular weight
HOMA	:	Homeostatic Model Assessment
HOMA-IR	:	Homeostasis model assessment of insulin resistance
HSL	:	Hormone-sensitive lipase
IAP	:	Intra-abdominal pressure
IDF	:	International Diabetes Foundation
IFG	:	Impaired fasting glucose

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IFN-Γ	:	Interferon-γ
IGB	:	Intragastric ballon
IGS	:	Implantable Gastric Stimulation
IGT	:	Impaired glucose intoleranc
IL	:	Interleukin
IL-1	:	Interleukin-1
IR	:	Insulin resistance
IRAS	:	Insulin Resistance Atherosclerosis Study
IRS-1	:	Insulin receptor substrate-1
IT	:	Ileal Transposition
JIB	:	Jejuno ileal bypass
KOPS	:	Kiel Obesity Prevention Study
LAGB	:	Laparoscopic Adjustable Gastric Band
LBPD/DS	:	Laparoscopic bilio-pancreatic diversion / duodenal switch
LCD	:	Low calorie diet
LDL	:	Low density lipoprotein
LDL-C	:	Low density lipoprotein cholesterol
LGBP	:	Laparoscopic gastric bypass
LPL	:	Lipoprotein lipase
LRYGB	:	Laparoscopic roux-en-y gastric bypass
LRYGBP	:	Laparoscopic Roux-en-Y Gastric Bypass Procedure
LSG	:	Laparoscopic sleeve gastrectomy
MC4R	:	Melanocortin 4 receptor
MetS	:	Metabolic syndrome
NAFLD	:	Nonalcoholic fatty liver disease
NASH	:	Nonalcoholic steatohepatitis
NCEP	:	National Cholesterol Education Program
NGT	:	Normal glucose tolerance
NHANES	:	National Health and Nutrition Examination Survey
NHLBI	:	National Heart, Lung, and Blood Institute
NIDDM	:	Non-insulin-dependent diabetes mellitus
NPY	:	Neuropeptide Y

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NTS	:	Nucleus tractus solitarius
OB-GENE	:	Obesity gene
OGT	:	Oral glucose test
OGTT	:	Oral glucose tolerance test
OSA	:	Obstructive sleep apnea
PAI-1	:	Plasminogen activator inhibitor 1
PCOS	:	Polycystic ovarian syndrome
POMC	:	Pro-opiomelanocortin
PP	:	Pancreatic polypeptide
PPAR-α	:	Peroxisome proliferator-activated receptor- α
PPG	:	Post-prandial glucose
PRO-NT	:	Pro-neurotensin
PROSPER	:	Prospective Study of Pravastatin in the Elderly at Risk
PTH	:	Parathyroid hormone
PUFA	:	Polyunsaturated fatty acid
PVN	:	Paraventricular nucleus
PYY	:	Peptide yy
PYY3-36	:	Peptide tyrosine-tyrosine3-36
RR	:	Relative risk
RYGB	:	Roux-en-Y Gastric Bypass
RYGP	:	Roux-en-y gastric bypass
SG	:	Sleeve Gastrectomy
SOS	:	Swedish Obese Subjects
T2D	:	Type 2 diabetes
T2DM	:	Type 2 diabetes mellitus
T4	:	Thyroxine
TG	:	Triglycerides
TH1	:	T-Helper 1
TIA	:	Transient ischemic attacks
TNF-α	:	Tumor necrosis factor-α
TNF-A	:	Tumor-necrosis factor-alpha
TPN	:	Total parenteral nutrition
TREG	:	Regulatory t cells
UAG	:	Un-acylated ghrelin

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VAT	:	Visceral adipose tissue
VBG	:	Vertical Banded Gastroplasty
VLDL	:	Very low density lipoprotein
vWF	:	Von Willebrand factor
WBC	:	White blood cell count
WC	:	Waist circumference
WHO	:	World Health Organization

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Introduction

It has been estimated that 190 million people worldwide have diabetes mellitus (DM) and it is likely that this will increase to 324 million by 2025. This epidemic is taking place both in developed and developing countries and the combination of DM, obesity, and metabolic syndrome is now recognized as one of the major threats to human health in the 21st century ***(Geloneze, 2008).***

Roux-en-Y gastric bypass (RYGB) is the most commonly performed bariatric operation, ameliorates virtually all obesity-related comorbid conditions, the most impressive being a dramatic resolution of type 2 DM (T2DM). After RYGB, 84% of patients with T2DM experience complete resolution, and virtually all have improved glycemic control. Increasing evidence indicates that the impact of RYGB on T2DM cannot be explained by the effects of weight loss and reduced energy intake alone ***(Thaler and Cummings, 2009).***

Potential mechanisms underlying that direct antidiabetic impact of RYGB include increased lower intestinal hormones as glucagon-like peptide-1 (GLP-1), altered physiology from excluding ingested nutrients from the upper intestine, and other changes yet to be fully characterized. Research aimed at determining the relative importance of these effects and

identifying additional mechanisms promises not only to improve surgical design but also to identify novel targets for antidiabetic medications ***(Thaler and Cummings, 2009).***

The effect of purely restrictive procedures in improving glucose control is directly proportional to the degree of weight loss ***(Mingrone, 2008).***

Two hypotheses have been proposed to explain the early effects of bariatric surgery on T2DM, the hindgut hypothesis and the foregut hypothesis ***(Mingrone and Castagneto-Gissey, 2009).***

Rubino and Marescaux have developed an experimental animal model with duodenal exclusion. A surgery with only two anastomoses was performed on rats of the Goto-Kakizaki species, the most widely used animal model of nonobese T2DM. A duodeno-jejunal bypass and a simple enteroenteric anastomosis was performed, preserving the gastric volume ***(Pitompo, 2008).***

The continual advances in our knowledge of the pathogenesis and hormonal disorders of morbid obesity lead to the development of new technical options. In Europe, multinational studies are being assembled to look at a procedure called ileal transposition (IT). First described by Koopmans andSclafani in 1981. This procedure has actually

been proposed as beingpotentially useful in treating glucose intolerance related toobesity because of the potential for increasing GLP-1 secretion ***(Strader et al., 2004).***

Aim of the work

The aim of the work to study the effectiveness of metabolic surgery in management of type II diabetes millutes in morbid obese patient.

Metabolic Syndrome

Definition

The metabolic syndrome (MetS) refers to various metabolic risk factors that include abdominal obesity, dyslipidemia, hypertension, and hyperglycemia. It is now well known that it is associated with an increased risk of cardiovascular disease (CVD) and of type 2 diabetes (T2D) ***(Levesque and Lamarche, 2008).***

Historical View

The concept of MetS, also known as the insulin resistance syndrome, syndrome X, and the deadly quartet, may have been introduced as early as 1923 by **Kylin** as the clustering of hypertension, hyperglycemia, and hyperuricemia ***(Levesque and Lamarche, 2008).***

In 1947, **Vague** noted that a particular obesity phenotype, upper body adiposity (android or male type obesity) was commonly associated with metabolic abnormalities that were found in type 2 diabetes and cardiovascular disease ***(Daskalopoulou et al., 2006).***

40 years later, **Reaven** described the clinical importance of "Syndrome X". In the landmark publication of Reaven's 1988 Banting Medal award lecture, the syndrome is described as a constellation of insulin resistance, hyperglycemia,