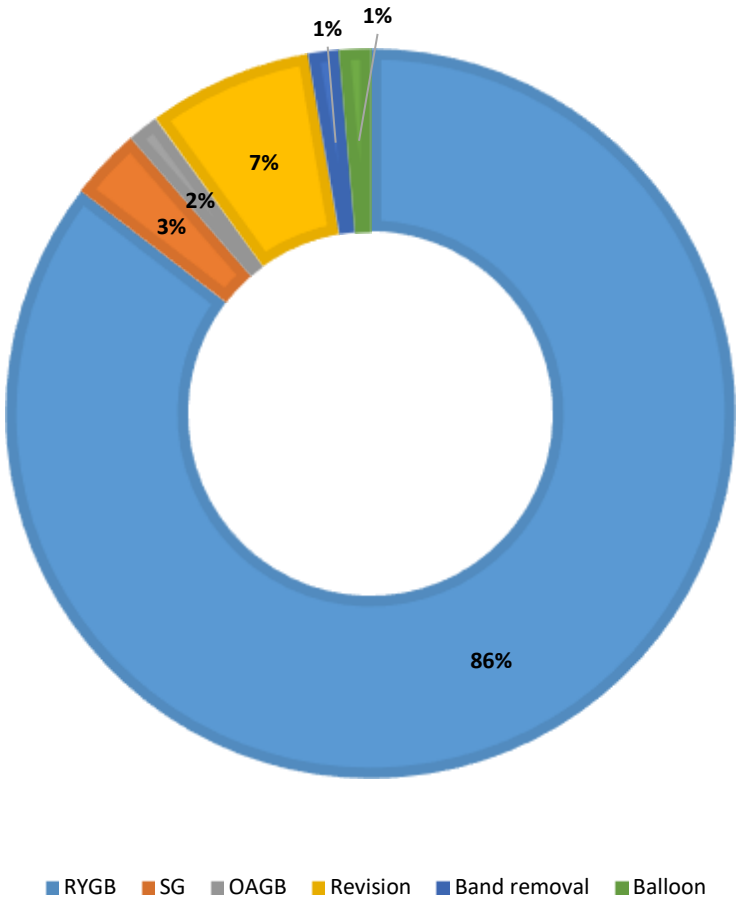
More length, more gain: A prospective analysis of 150 patients with a Biliopancreatic Limb Length of 200 cm and an Alimentary Limb Length of 75 cm in Roux-en-Y Gastric Bypass (RYGB)

Dr Muffazal Lakdawala

Director of Department of Minimal Access Surgical Science and General Surgery

Sir H.N. Reliance Foundation Hospital, Mumbai.



RYGB – Roux-en-Y gastric Bypass

LSG – Laparoscopic Sleeve Gastrectomy

OAGB – One Anastomosis Gastric Bypass

Revision:
SG to RYGB
Limb lengthening
Limb shortening
Mini Gastric Bypass to Single Anastomosis
Duodenal-Ileal bypass
Redo-gastrojejunostomy

Band removal

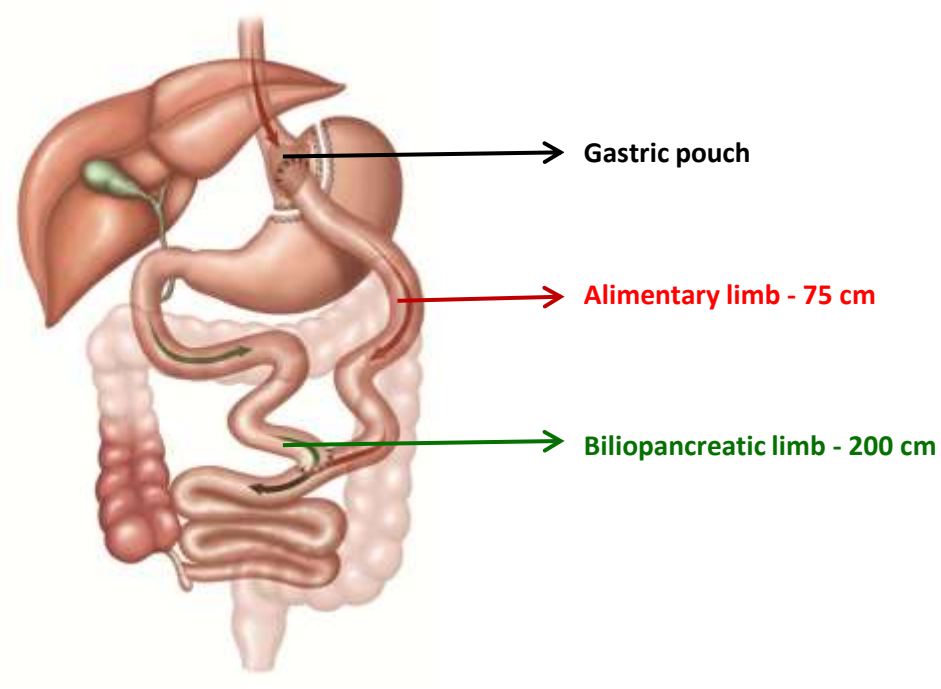
Endoscopic Balloon/ Swallowable Balloon

Introduction

Roux-En-Y Gastric Bypass (RYGB) is the gold standard metabolic surgery since three decades.

It has been shown to be associated with 25–35% total body weight loss.

RYGB involves the formation of a small gastric pouch, an alimentary (Roux) limb and a biliopancreatic limb.

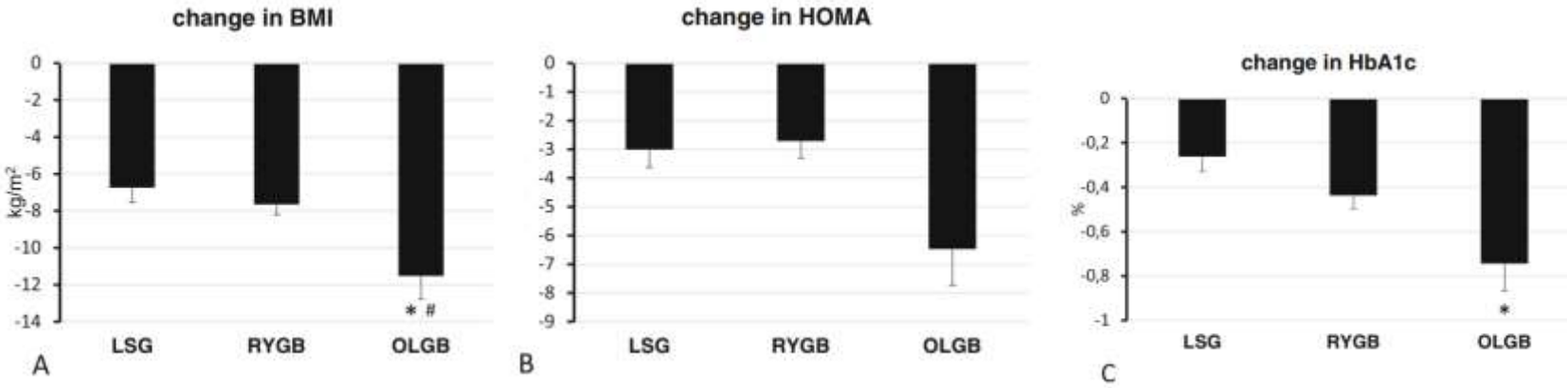


Obes Surg. 2018 Nov;28(11):3405-3414. doi: 10.1007/s11695-018-3314-9.

Evidence That the Length of Bile Loop Determines Serum Bile Acid Concentration and Glycemic Control After Bariatric Surgery

Adriana Mika [1 2], Lukasz Kaska [3], Monika Proczko-Stepaniak [3], Agnieszka Chomiczewska [1], Julian Swierczynski [4 5], Ryszard T Smolenski [4], Tomasz Sledzinski [6]

- Procedures – laparoscopic sleeve gastrectomy (LSG), Roux-en-Y gastric bypass (RYGB)(Bile loop: 100 – 150cm) and omega-loop gastric bypass (OLGB) (Bile loop: 200 – 280cm)

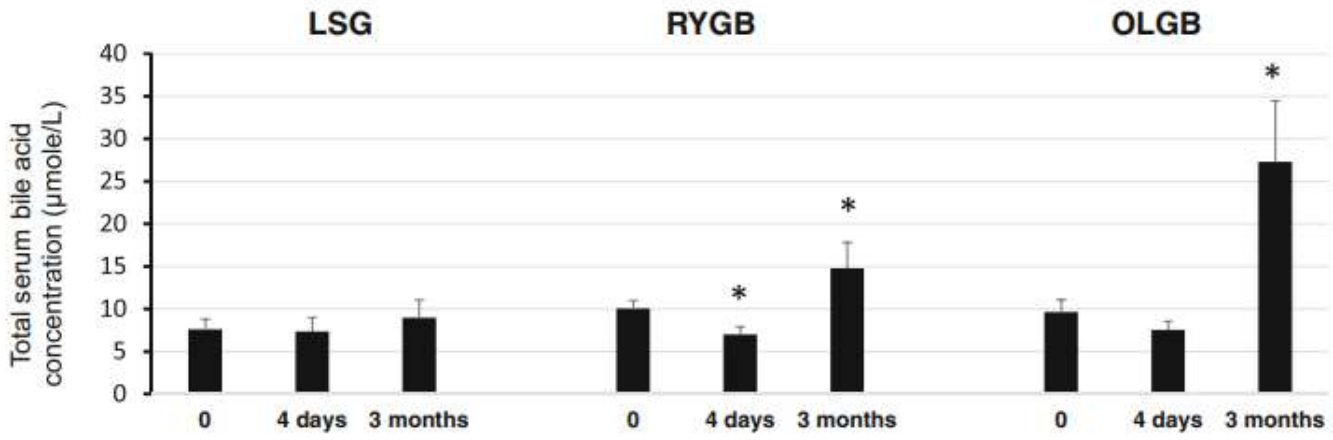


Changes in a BMI, b HOMA, and c HbA1c observed 3 months after various types of bariatric surgeries. *p < 0.05 vs. LSG, # p < 0.05 vs. RYGB

Obes Surg. 2018 Nov;28(11):3405-3414. doi: 10.1007/s11695-018-3314-9.

Evidence That the Length of Bile Loop Determines Serum Bile Acid Concentration and Glycemic Control After Bariatric Surgery

Adriana Mika [1 2], Lukasz Kaska [3], Monika Proczko-Stepaniak [3], Agnieszka Chomiczewska [1], Julian Swierczynski [4 5], Ryszard T Smolenski [4], Tomasz Sledzinski [6]

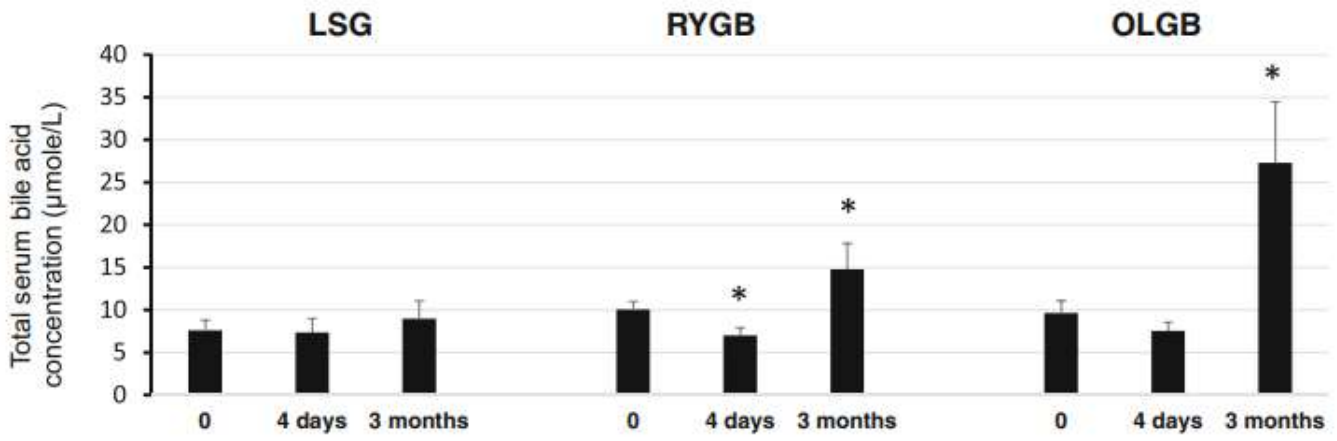


Effect of bariatric surgery type on serum concentration of total bile acids

Obes Surg. 2018 Nov;28(11):3405-3414. doi: 10.1007/s11695-018-3314-9.

Evidence That the Length of Bile Loop Determines Serum Bile Acid Concentration and Glycemic Control After Bariatric Surgery

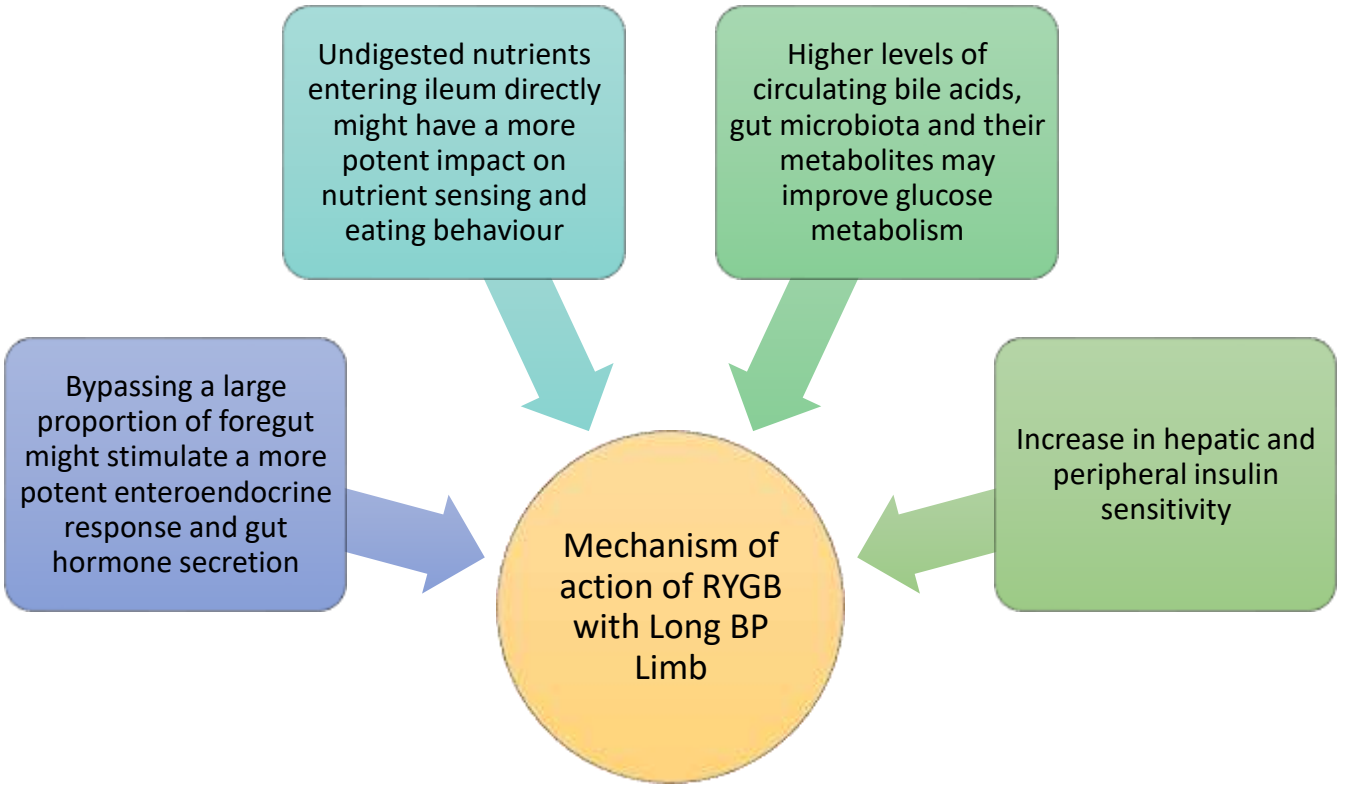
Adriana Mika [1 2], Lukasz Kaska [3], Monika Proczko-Stepaniak [3], Agnieszka Chomiczewska [1], Julian Swierczynski [4 5], Ryszard T Smolenski [4], Tomasz Sledzinski [6]



Effect of bariatric surgery type on serum concentration of total bile acids

Rationale for longer Biliopancreatic Limb:

Longer BP limb influence weight loss and glucose metabolism through various mechanisms.



(Kamocka, A. et al. 2022)

Study design

Study timeline

Pre-operative evaluation

Anthropometric
Biochemical
Radiological
Endoscopic
Psychological
Anaesthesia clearance
Others eg. Sleep study

Patients operated between 2019 - 2021

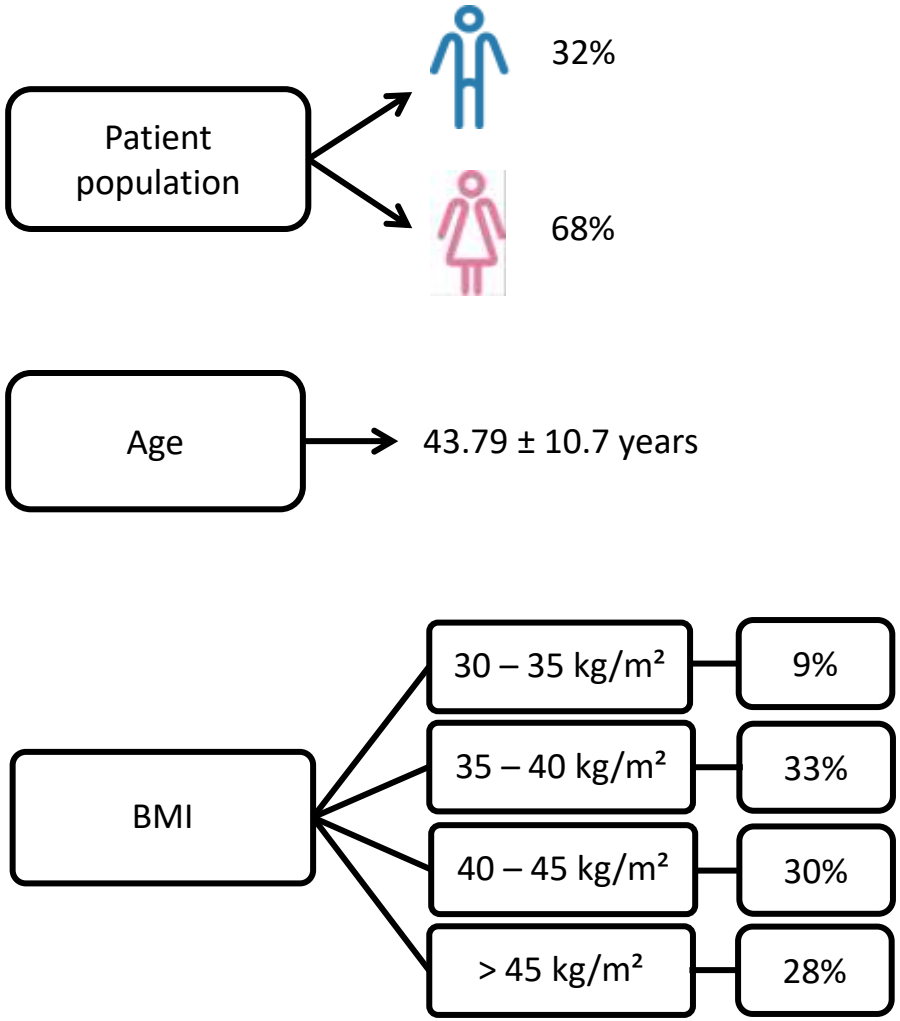
1 year follow up evaluation

Anthropometric
Biochemical
Radiological
Endoscopic

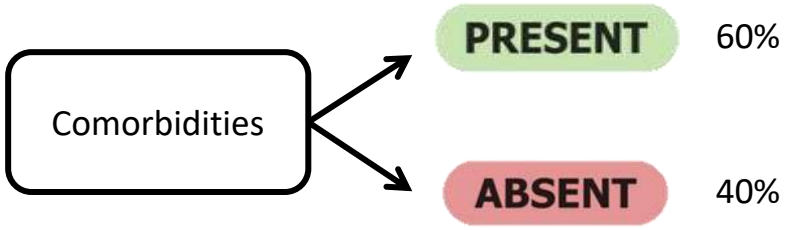
2 year follow up evaluation

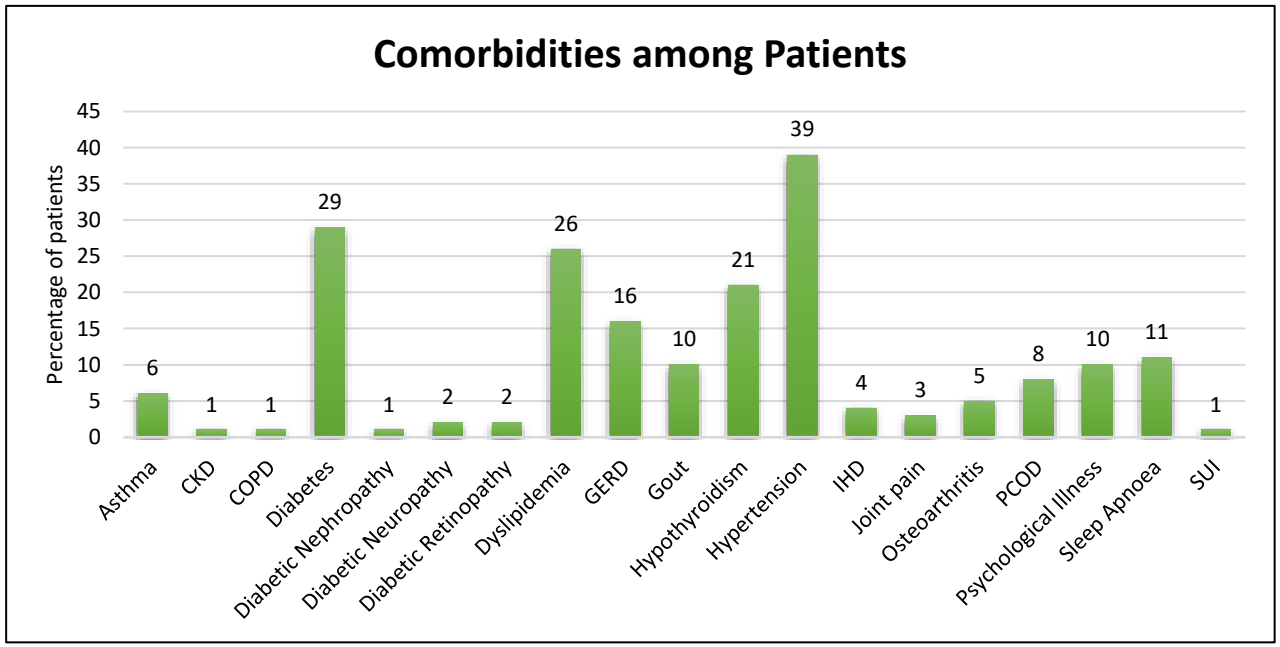
Anthropometric
Biochemical
Radiological
Endoscopic

Study Outcomes: Demographic data



Study Outcomes: Demographic data





CKD – Chronic kidney disease

COPD – Chronic obstructive pulmonary disorder

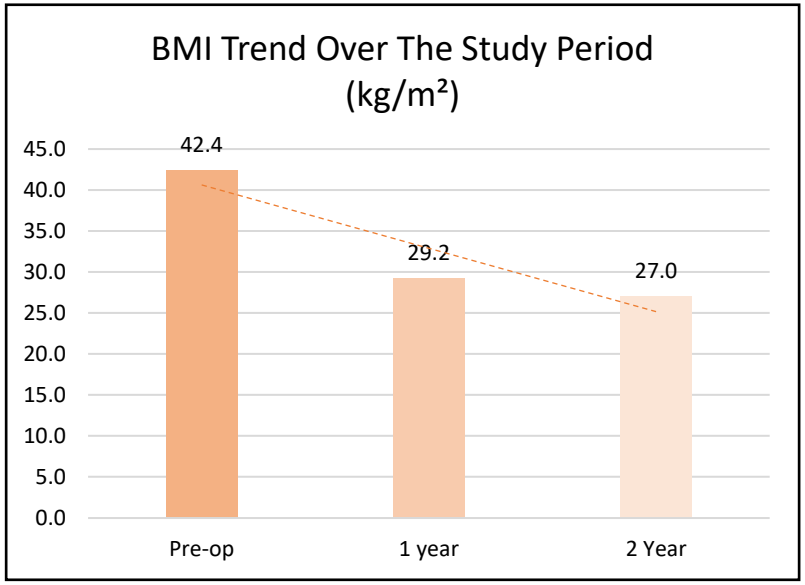
GERD – Gastroesophageal reflux disorder

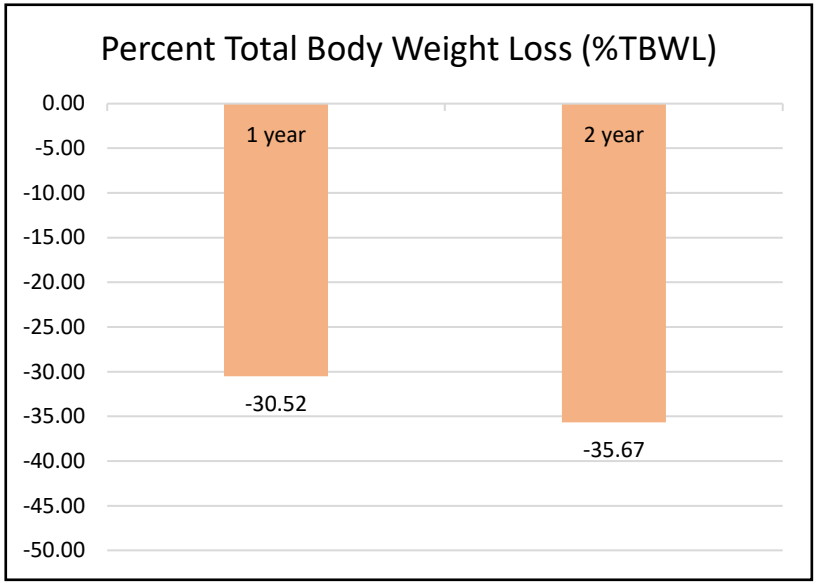
IHD – Ischemic heart disease

PCOD – Polycystic ovarian disease

SUI – Stress urinary incontinence

Study Outcomes: Weight and BMI

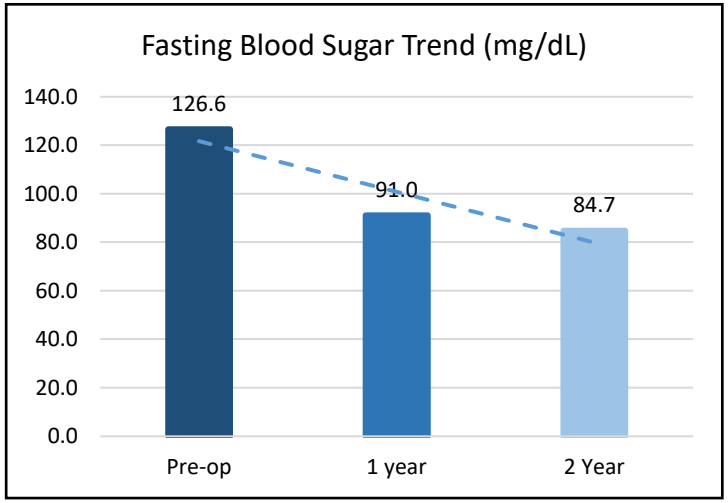


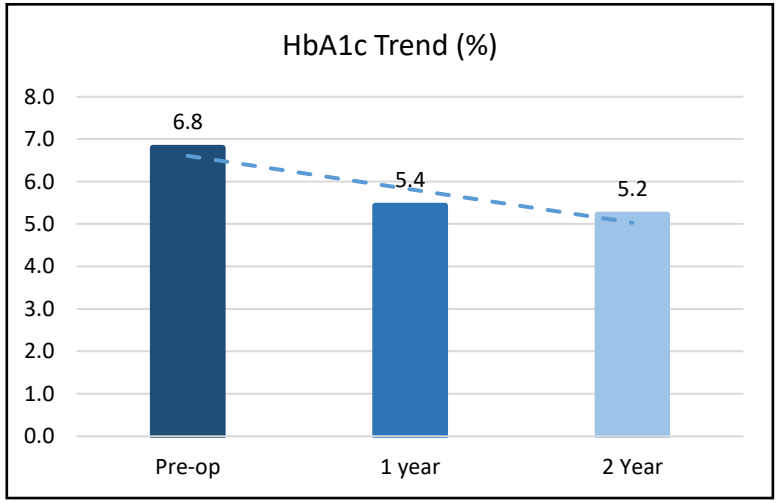


Study Outcomes: Remission of Metabolic Syndrome

Glucose Metabolism - Fasting blood sugar and HbA1c

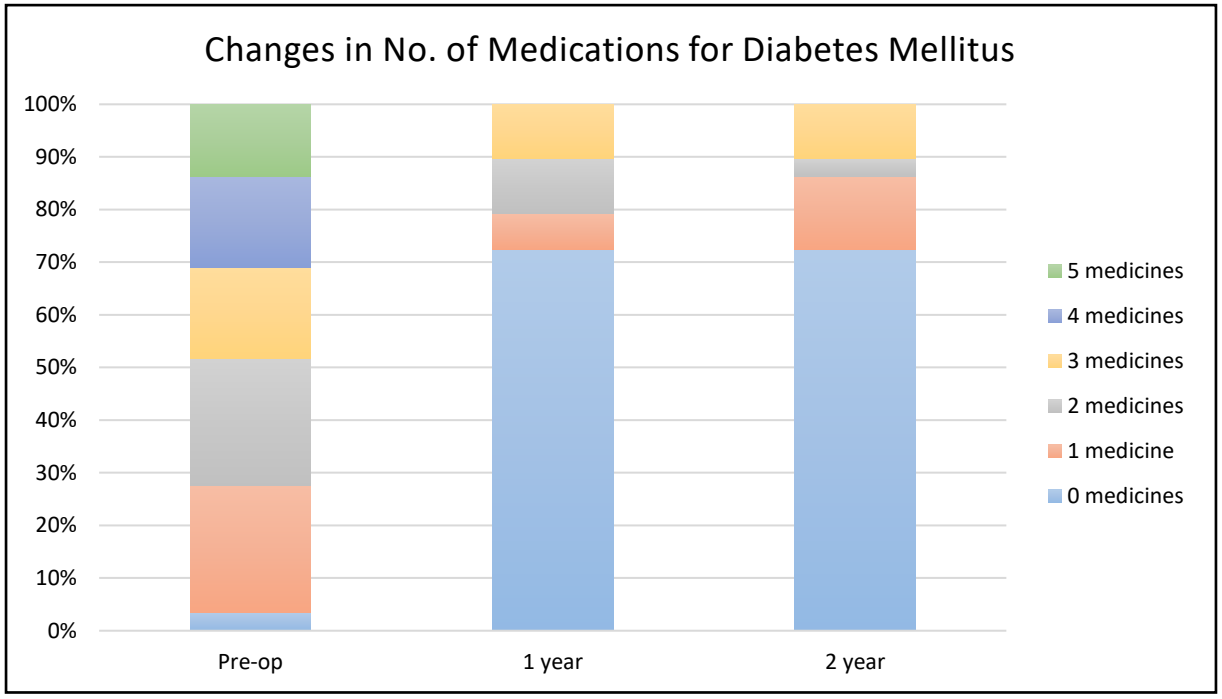
- 29% patients had Diabetes before surgery
- Patients observed a statistically significant improvement in Glucose metabolism parameters ($p < 0.05$)





Study Outcomes: Remission of Metabolic Syndrome

Glucose Metabolism - Fasting blood sugar and HbA1c



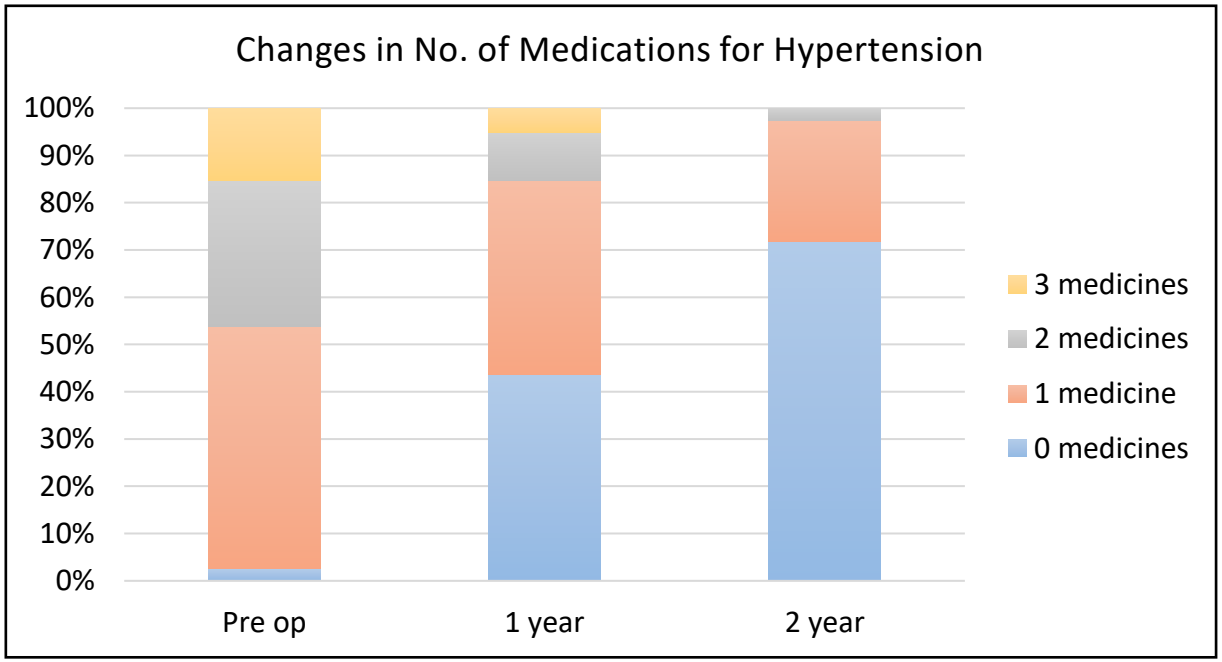
Out of the 29% patients that had Diabetes before surgery, more than 70% were off the medications while remaining were on a lower dose of medication.

At pre-operative period, 1 patient was diagnosed with diabetes but was not on any medications for it.
(Data includes tablets and insulin injections)

Study Outcomes: Remission of Metabolic Syndrome

Hypertension

- 39% patients had hypertension before surgery

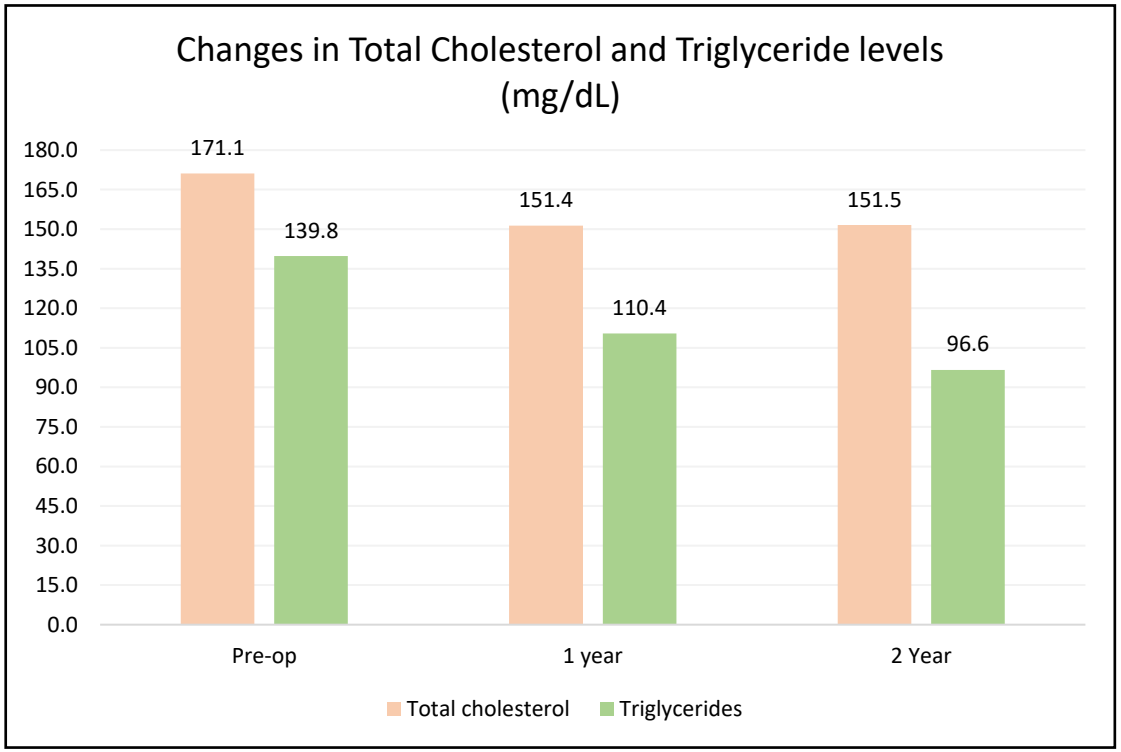


More than 70% were off the medications for hypertension while remaining were on a lower dose of medication at 2 year follow up.

* At pre-operative period, 1 patient was diagnosed with hypertension but was not on any medications for it.

Study Outcomes: Remission of Metabolic Syndrome

Dyslipidemia – Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL), High density lipoprotein (HDL).

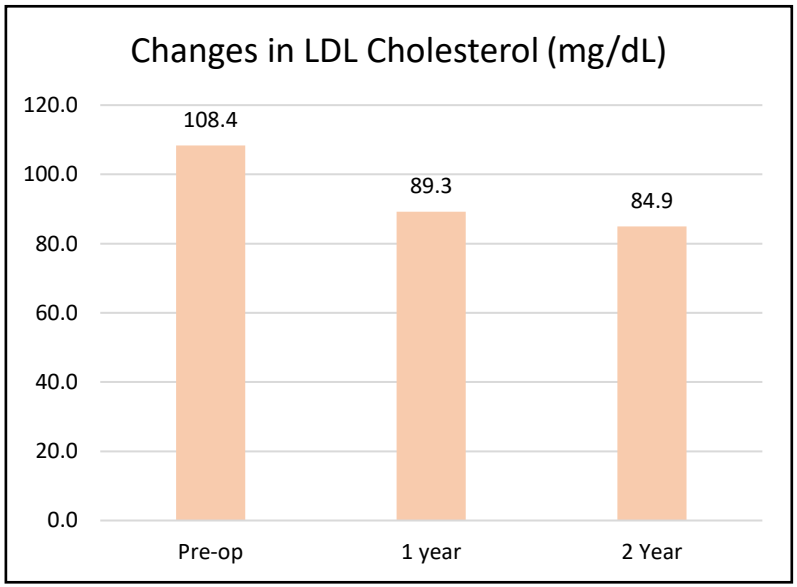


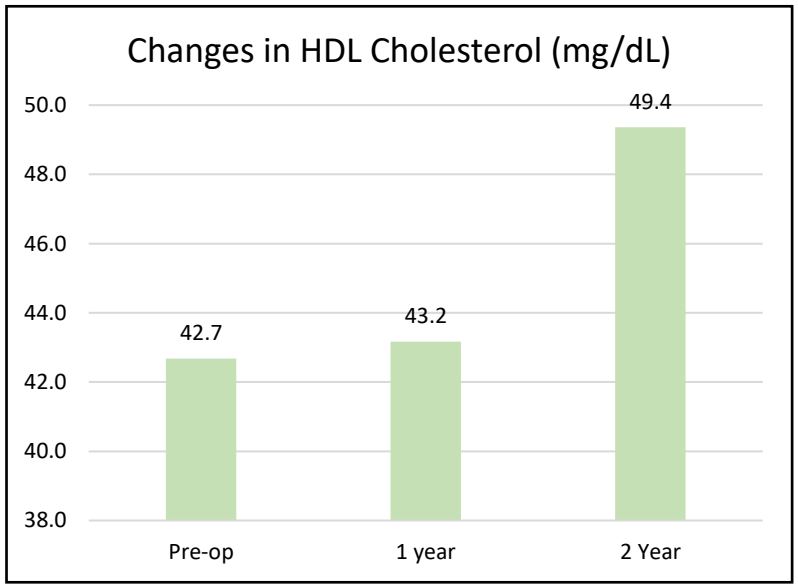
26% patients had dyslipidemia before the surgery.

A significant improvement was observed in Total cholesterol and Triglyceride levels at follow up ($p < 0.05$).

Study Outcomes: Remission of Metabolic Syndrome

Dyslipidemia – Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL), High density lipoprotein (HDL).

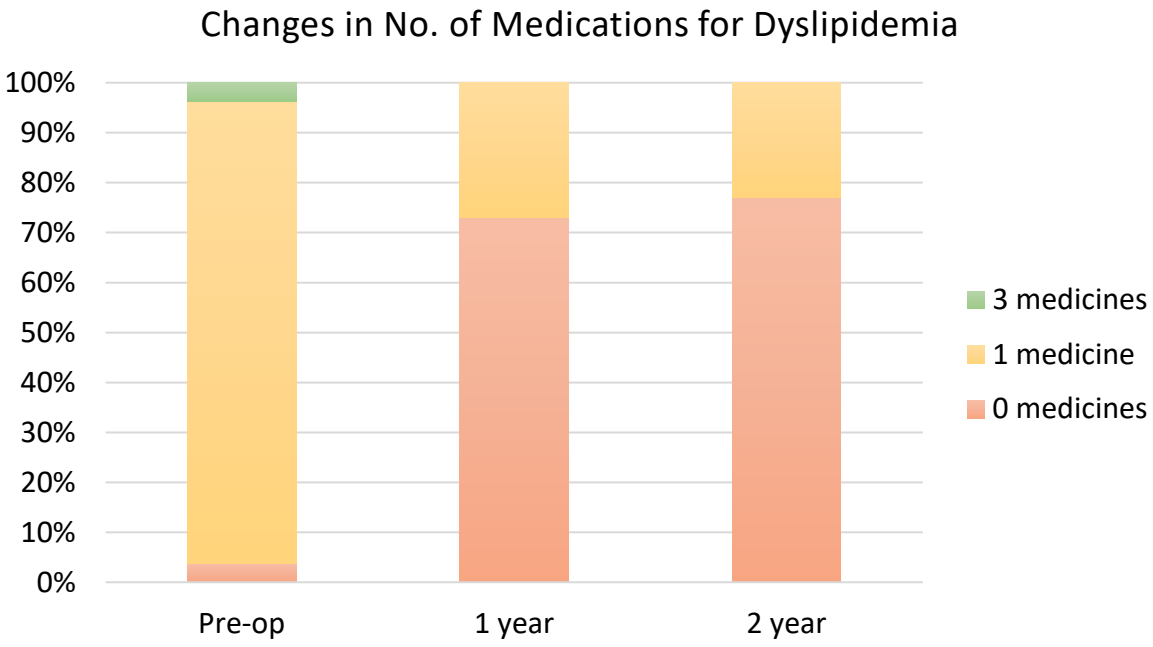




The improvement in LDL and HDL cholesterol levels was also found to be statistically significant ($p < 0.05$).

Study Outcomes: Remission of Metabolic Syndrome

Dyslipidemia – Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL), High density lipoprotein (HDL).

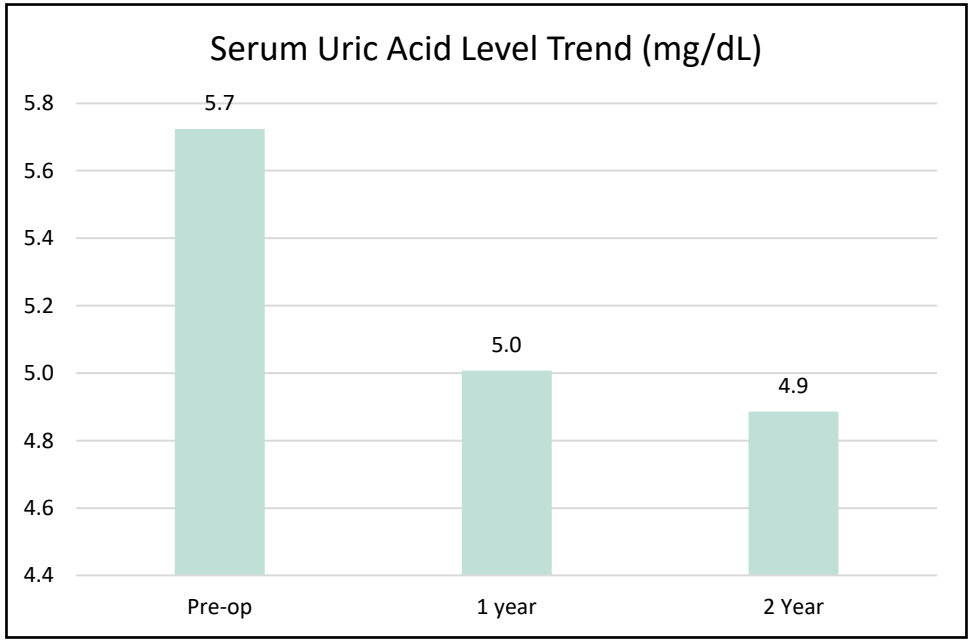


About 75% of patients were off the medications for dyslipidemia at 2 year follow up.

* At pre-operative period, 1 patient was diagnosed with dyslipidemia but was not on any medications for it.

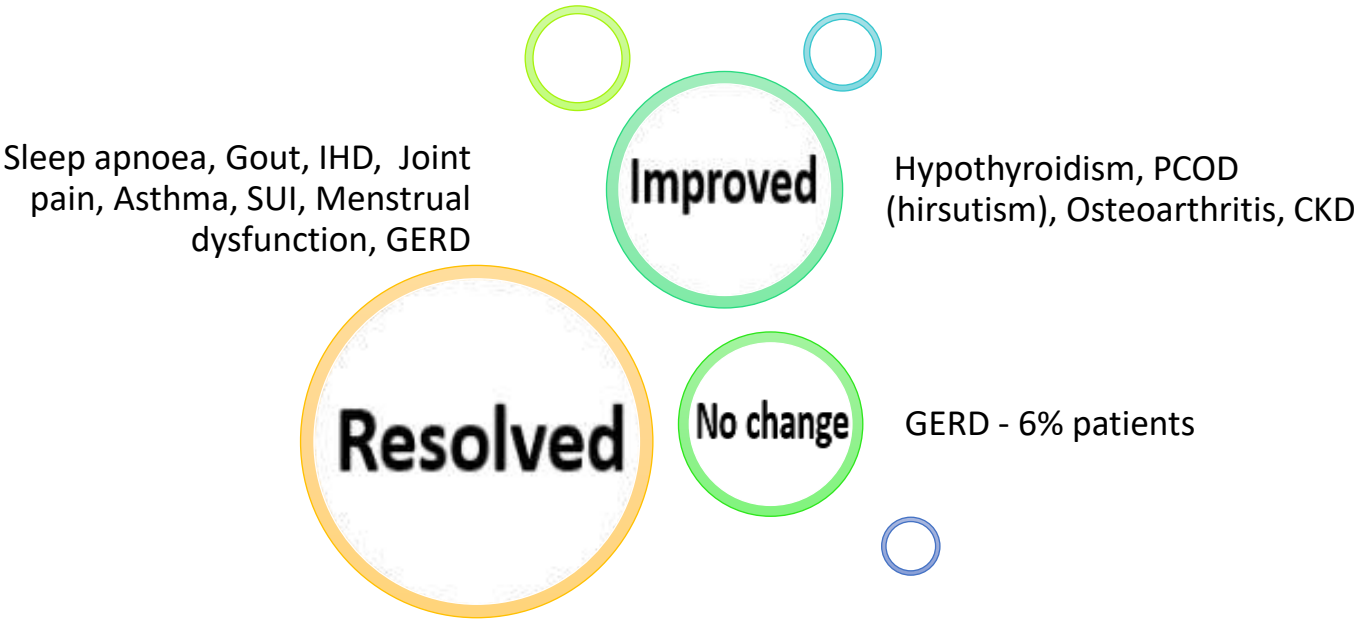
Study Outcomes: Remission of Metabolic Syndrome

Serum uric acid levels



A significant change was observed in serum uric acid levels of the patients ($p < 0.05$).

Study Outcomes: Remission/ Improvement in other Comorbidities



Study Outcomes: Complications/ Side effects

As with any malabsorptive procedure, serious nutritional and metabolic complications need to be understood, acknowledged, and screened for regularly.

Complications/ side-effects seen among our patients were:

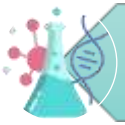
- Protein Energy Malnutrition
- Steatorrhea
- Nutritional deficiencies (Vitamin B12, Vitamin D and Iron)
- Dumping syndrome
- Excess weight loss

Study Outcomes: Protein Energy Malnutrition (PEM)

Patients are at a risk of Protein Energy Malnutrition (PEM) after long limb RYGB especially if they are not compliant with nutritional supplementation guidelines. Food intolerance and aversion further contribute to the problem.

To identify PEM after bariatric surgery:

Anthtopometric evaluation - (Muscle mass and fat free mass)



Biochemical evaluation - (Total proteins, Albumin and Globulin)

Clinical evaluation - Signs & symptoms

Diet recall

Clinical signs of PEM are

- Generalized weakness
- Excessive hair loss
- Poor wound healing
- Loss of lean body mass
- Anaemia

Based on blood protein levels PEM can be classified as:

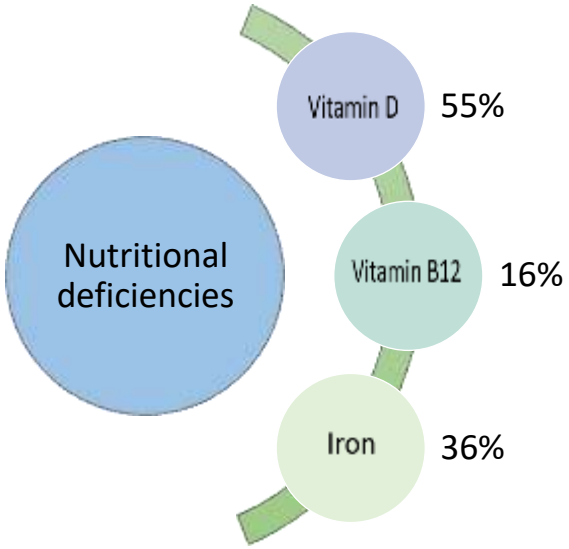
Stages of PEM	**Serum Albumin levels (g/dl)**
Mild	3.0 to 3.5
Moderate	2.5 to 3.0
Severe	<2.5

Study Outcomes: Protein Energy Malnutrition (PEM)/ Steatorrhea

In our study, **17% patients** showed clinical signs of PEM such as weakness, hair loss, loss of lean body mass and low serum albumin levels.

Steatorrhoea was a complaint in 13% of the patients however, it was resolved in 50% and improved in 50% of the patients by the end of study period

Study Outcomes: Nutritional Deficiency



- Vitamin D deficiency was corrected in 37% of the patients.
- B12 deficiency was corrected in 69% of the patients.
- Iron deficiency was corrected in 97% of the patients.

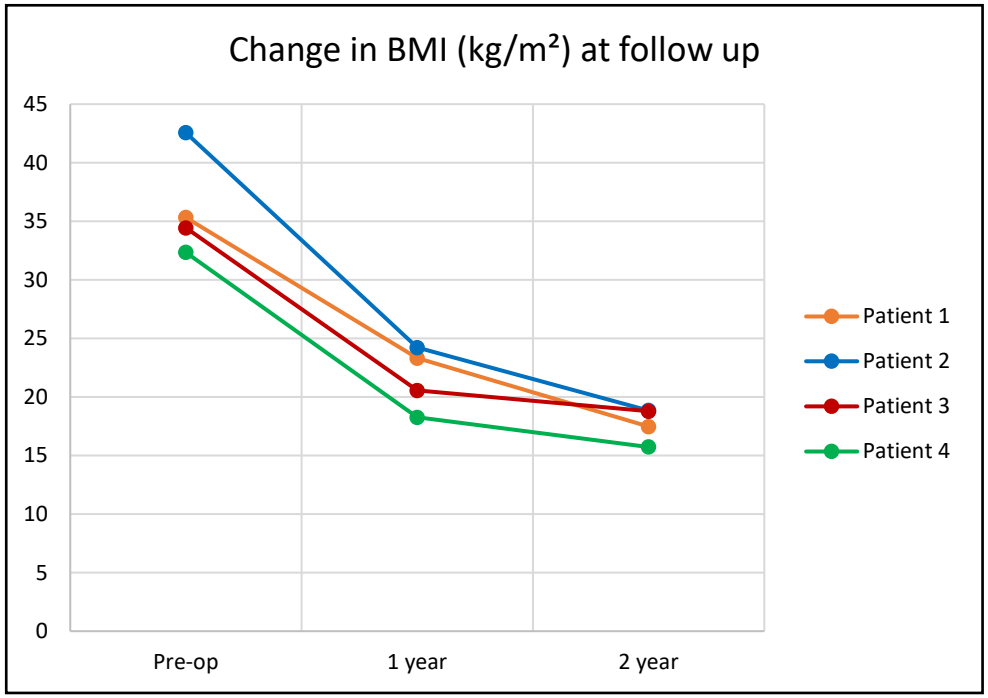
The challenge with management of nutritional deficiencies is the adherence to dietary and supplementation guidelines.

Management of Nutritional Deficiencies

- Proper compliance with Nutritional supplementation strategies.
- Regular follow up and assessment as advised by primary care team.

Study Outcomes: Excess weight loss

- Excess weight loss was seen in 4 patients.
- Limb shortening was successfully performed in 2 patients to manage excess weight loss.



BMI of Patients with Excess Weight Loss

	Pre-op	1 year	2 year
Patient 1	35.32	23.31	17.47
Patient 2	42.57	24.21	18.85
Patient 3	34.44	20.55	18.78
Patient 4	32.35	18.26	15.73

Management of Excess weight loss

- Limb shortening

Study Outcomes: Other complications

Other complications seen in our patients include:

- Dumping syndrome – 20% patients
- Diarrhoea – 11% patients
- Marginal ulcers – 2%

Pharmacotherapy and/or surgery was used to manage above complications as appropriate.

Conclusion

RYGB with a BP length of 200cm is a fairly safe procedure.

It leads to significant weight loss and improvement in metabolic parameters.

More length is associated with **More gain and Remission of Comorbidities .**

However, the benefits come at the risk of developing:

- PEM which can be managed with adherence to nutritional supplementation regimen.
- Steatorrhea which can be managed by dietary modification and pharmacotherapy.