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# Bariatric Surgery and NAFLD/MAFLD

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# OUTLINE

- BARIATRIC SURGERY: PROCEDURES AND MECHANISMS
- CLINICAL EFFECTIVENESS OF BARIATRIC SURGERY IN NAFLD WITHOUT ADVANCED LIVER DISEASE
- BARIATRIC SURGERY IN CIRRHOSIS
- BARIATRIC SURGERY IN LIVER TRANSPLANT CANDIDATES
- OUTCOME OF LIVER TRANSPLANTATION AFTER PRIOR BARIATRIC SURGERY
- LIVER FAILURE AFTER BARIATRIC SURGERY
- BARIATRIC SURGERY AND ALCOHOL

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# Bariatric surgery (BS) vs Metabolic surgery (MBS)?

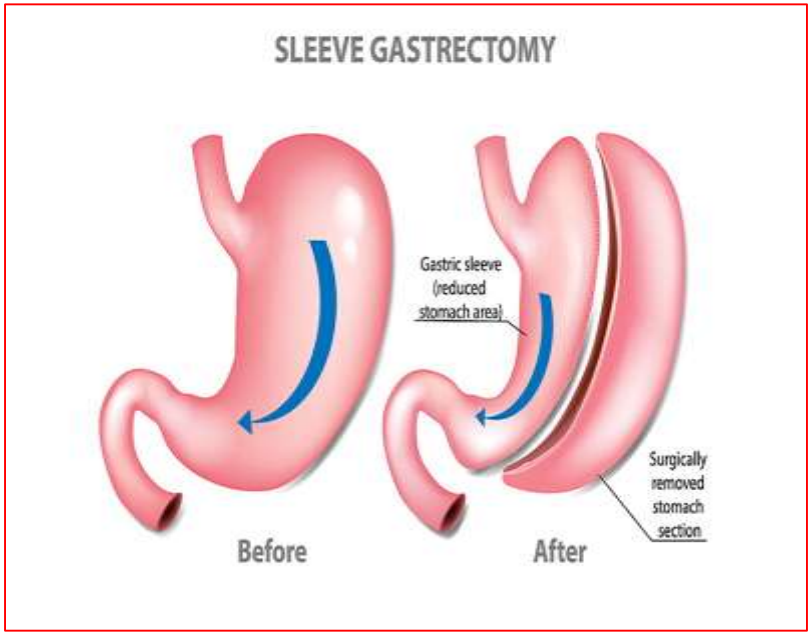
**Shift in the goal: from weight loss to control of metabolic disease**

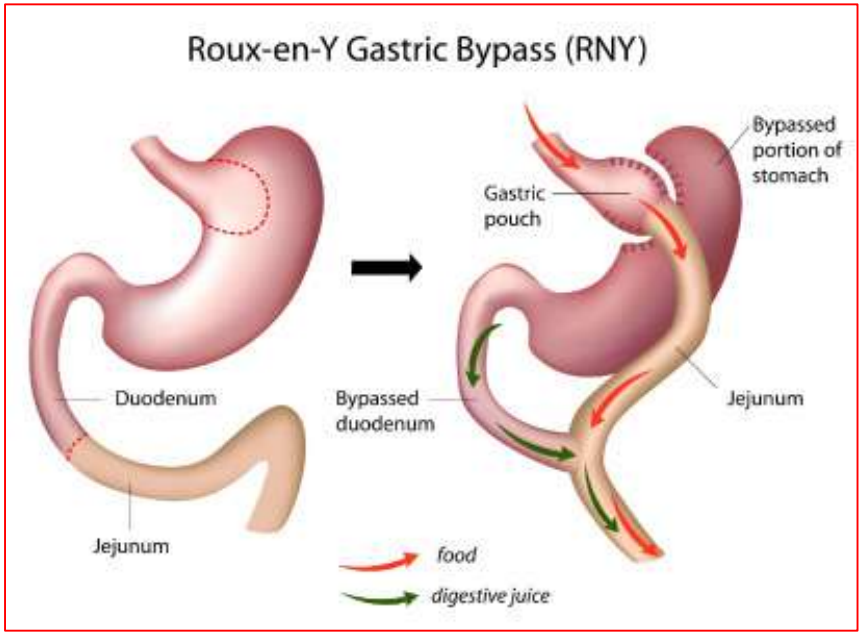
| | Bariatric surgery | Metabolic surgery |
|---|---|---|
| Purpose | Weight loss | Glycemic/metabolic control; CV risk reduction |
| Indication criteria | BMI-centric | Uncontrolled type 2 diabetes, metabolic syndrome, NASH, increased CV risk |
| Operations | Traditional (RYGB, SG, BPD, LAGB) | Traditional (RYGB, SG, BPD, LAGB)<br>Investigational (DJB, IT endoscopic duodenal Sleeve) |
| Measures of outcome | Weight loss (excess weight loss) | Glycemic control, blood pressure, lipid control, CV risk reduction, weight loss |
| Presumed mechanisms of action | Restriction to food intake/malabsorption | Several, complex, neuroendocrine |

# Surgical procedures

- **Restrictive**
  - Vertical banded gastroplasty (VBG)
  - Adjustable gastric banding (AGB)
  - Sleeve gastrectomy (SG)
- **Largely Restrictive, Moderately Malabsorptive**
  - Roux-en-Y gastric bypass (RYGB)
  - Mini Gastric bypass (MGB)
- **Largely Malabsorptive, Mildly Restrictive**
  - Biliopancreatic diversion (BPD)
  - Duodenal switch (DS)

# Most commonly done techniques are the sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB)



# Indications for BS and MBS vary across Asia-Pacific Countries [2018 survey]

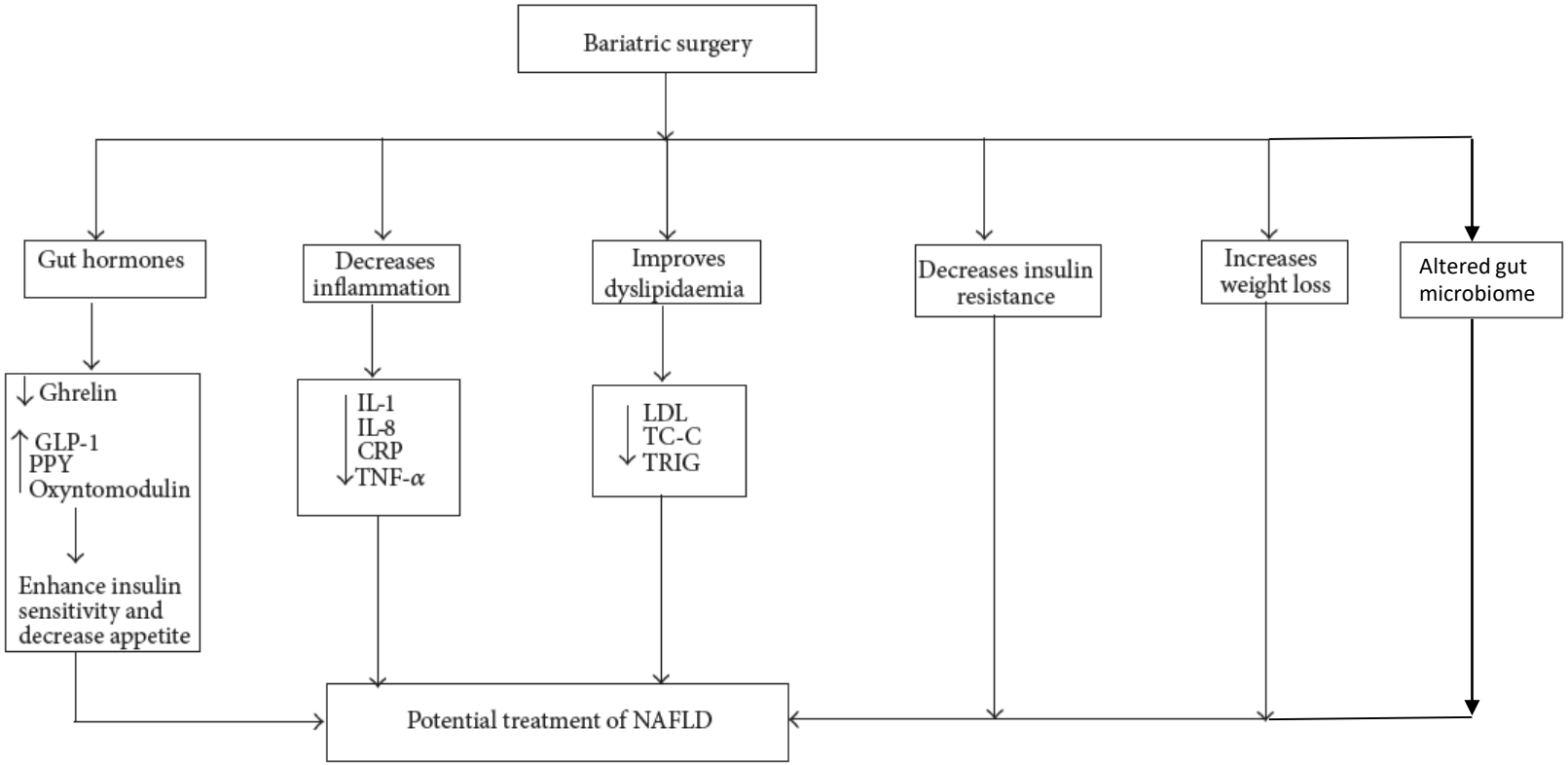
| Country | Indication | |
|---|---|---|
| | Bariatric surgery (BMI) | Metabolic surgery (BMI) |
| East Asia | | |
| Japan | ≥ 35 | ≥ 32 with DM or other two diseases |
| Korea | ≥ 35 or ≥ 30 with disease | ≥ 27.5 with DM |
| China | ≥ 32.5 | ≥ 27.5 with DM or other two diseases |
| Taiwan | ≥ 37 or ≥ 32 with diseases | ≥ 32.5 or ≥ 27.5 with DM or other diseases |
| Hong Kong | ≥ 35 or ≥ 30 with two diseases | ≥ 27.5 with uncontrolled DM |
| Southeast Asia | | |
| Philippines | ≥ 37 | ≥ 32 |
| Malaysia | ≥ 35 | ≥ 32 with DM or other two diseases |
| Singapore | ≥ 37.5 or ≥ 32.5 with disease | ≥ 27.5 |
| Indonesia | ≥ 35 | ≥ 30 with uncontrolled DM or MS |
| Thailand | ≥ 35 | ≥ 32 with DM or other two diseases |
| South Asia | | |
| India | ≥ 37.5 or ≥ 32.5 with diseases | ≥ 27.5 |
| Oceania | | |
| Australia | ≥ 40 or ≥ 35 with disease | ≥ 30 with disease or bad family history or Asian |
| West Asia | | |
| KSA | ≥ 40 | ≥ 35 with DM or other diseases |
| UAE | ≥ 40 or ≥ 35 with diseases | None |
| Qatar | ≥ 40 or ≥ 35 with disease or ≥ 30 with uncontrolled DM | None |
| Kuwait | ≥ 40 | ≥ 35 with DM or other diseases or ≥ 30 with severe MS |
| Turkey | ≥ 35 | None |

Ohta M etal. Bariatric/Metabolic Surgery in the Asia-Pacific Region: APMBSS 2018 Survey. Obes Surg. 2019 Feb;29(2):534-541.

# East/South East/South Asians lower BMI cut-off

| Society | Bariatric surgery | Metabolic surgery |
|---|---|---|
| Korean Society for the Study of Obesity (2020) | BMI ≥ 35 kg/m2 | Comorbidities with BMI ≥ 30 kg/m2<br><br>Uncontrolled T2D with BMI ≥ 27.5 kg/m2 |
| Joint Committee in the Japanese Society for Treatment of Obesity, the Japan Diabetes Society, and the Japan Society for the Study of Obesity (2021) | BMI ≥ 35 kg/m2 | BMI ≥ 32 kg/m2 with diabetes or two or more non-diabetic obesity-related health disorders |
| Chinese Society for Metabolic & Bariatric Surgery, Chinese College of Surgeons, and Chinese Medical Doctor Association (2019) | BMI ≥ 37.5 kg/m2 (strong recom)<br><br>BMI 32.5–37.5 kg/m2 (recom) | Comorbidities (≥ 2) with BMI 27.5–32.5 kg/m2 |
| Obesity and Metabolic Surgery Society of India Guidelines (2016) | BMI >37.5 kg/m2 | BMI > 32.5kg/m2 with the presence of T2D / any obesity related co-morbidities |
| International Federation for the Surgery of Obesity: Asia Pacific Chapter (IFSO-APC: 2011) | BMI >35 kg/m2 | BMI >30 kg/m2 with T2DM or metabolic syndrome<br><br>BMI >27.5kg/m2 with inadequately controlled T2DM or metabolic syndrome, the surgical approach may be considered as a non-primary alternative to treat. |

# BS/MBS and NAFLD: Proposed mechanisms



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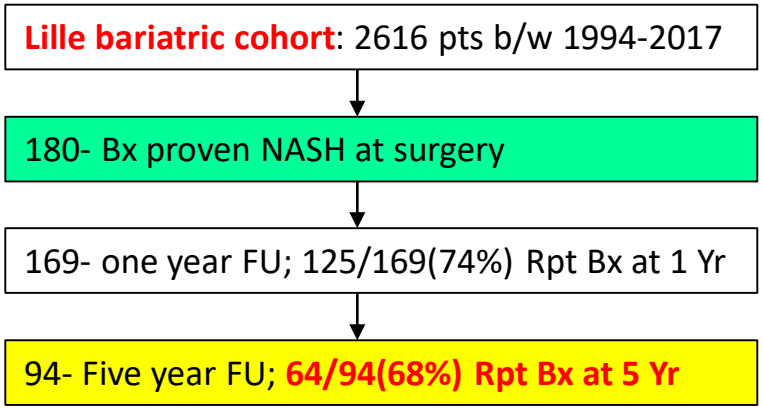
# Bariatric Surgery Provides Long-term Resolution of Nonalcoholic Steatohepatitis and Regression of Fibrosis

Centre Hospitalier Universitaire de Lille, Lille, France




Lassailly etal. Gastroenterology 2020; 59:1290–1301

# Bariatric Surgery Provides Long-term Resolution of Nonalcoholic Steatohepatitis and Regression of Fibrosis

Centre Hospitalier Universitaire de Lille, Lille, France

Lille bariatric cohort: 2616 pts b/w 1994-2017

↓

180- Bx proven NASH at surgery

↓

169- one year FU; 125/169(74%) Rpt Bx at 1 Yr

↓

94- Five year FU; 64/94(68%) Rpt Bx at 5 Yr

**Criteria for bariatric Sx:**

Morbidly (BMI >40 kg/m2) or severely obese (BMI >35 kg/m2), with at least 1 comorbidity factor (eg, arterial hypertension or diabetes mellitus), for at least 5 years and were resistant to medical treatment

No medical or psychologic contraindications to bariatric Surgery

Did not drink excessively

No history of long-term consumption of hepatotoxic drugs, and;

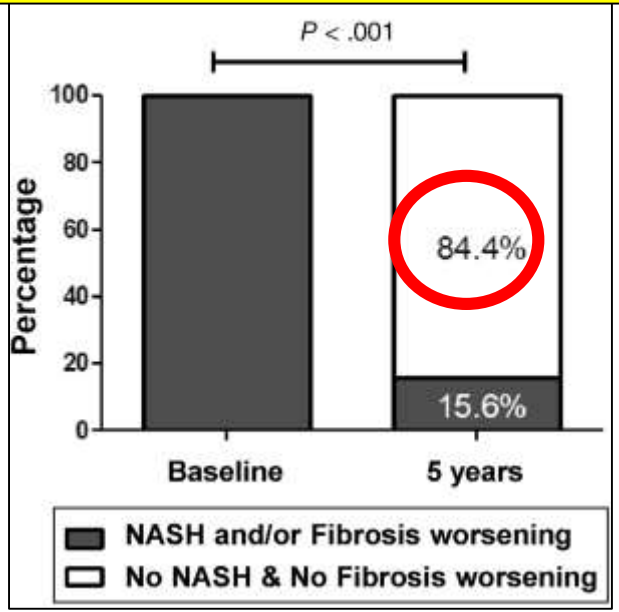
Screened negative for chronic liver disease.

Lassailly etal. Gastroenterology 2020; 59:1290–1301

# Bariatric Surgery Provides Long-term Resolution of Nonalcoholic Steatohepatitis without worsening of fibrosis at 5 years in majority (84%)

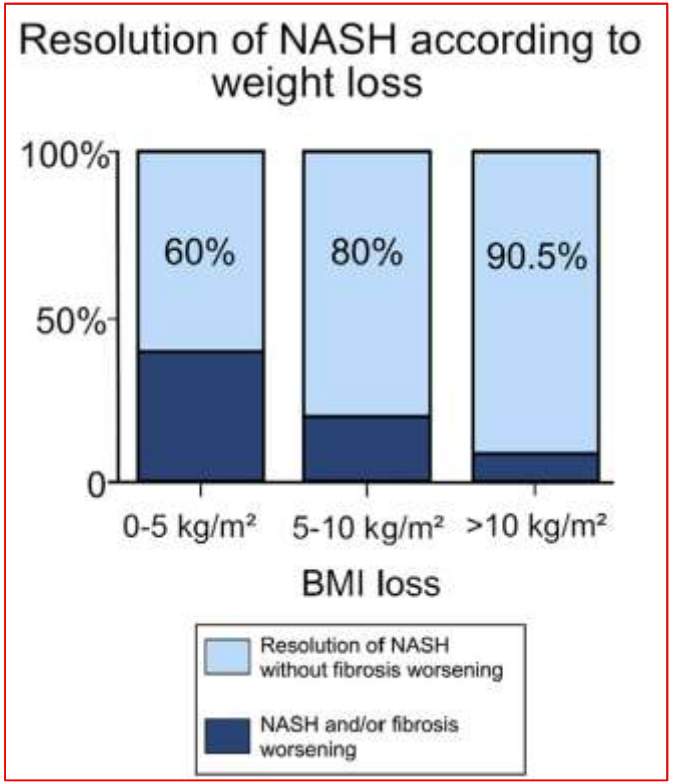
| Bariatric procedures | Total=180 |
|---|---|
| Gastric band | 39 (21.7) |
| Gastric bypass | 119 (66.1) |
| Sleeve gastrectomy | 21 (11.7) |
| Shunt | 1 (0.5) |

Resolution of NASH without worsening of fibrosis at 5 years after bariatric surgery (n=64 patients). Paired biopsy analysis




Lassailly etal. Gastroenterology 2020; 59:1290–1301

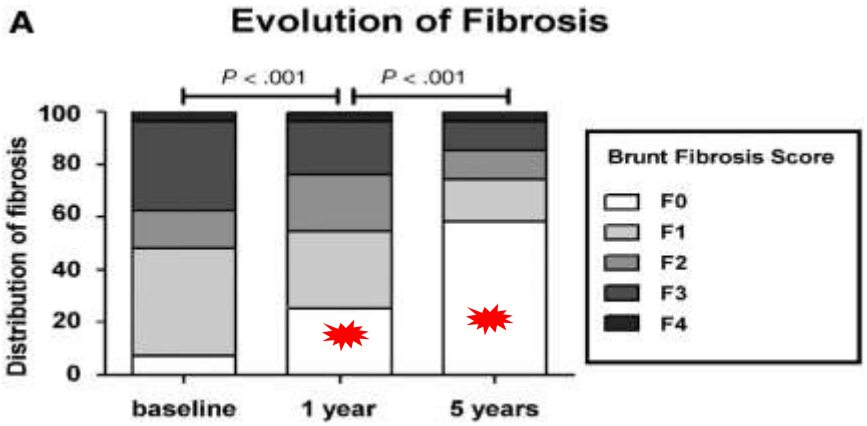
# Resolution of Nonalcoholic Steatohepatitis without worsening of fibrosis depends on the weight lost

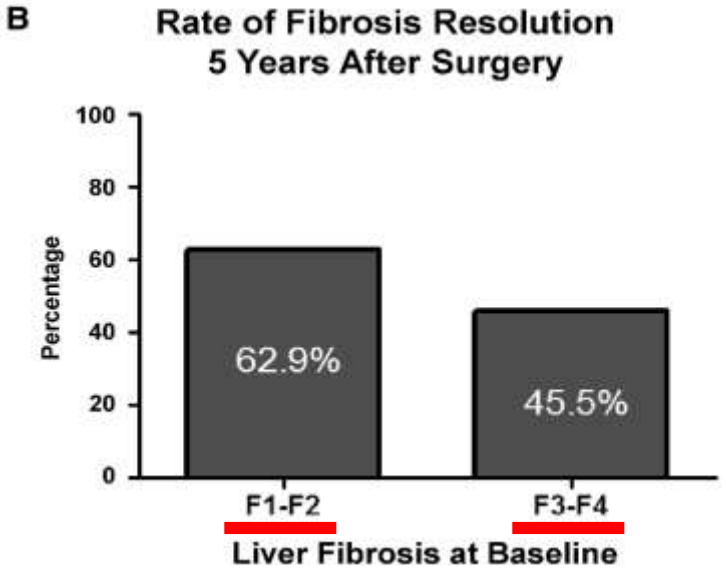



BMI loss >10 kg/m2=90% NASH resolution

Lassailly etal. Gastroenterology 2020; 59:1290–1301

# Bariatric Surgery Provides Long-term Regression of Fibrosis




The reduction of fibrosis is progressive, beginning during the first year and continuing through 5 years

Fibrosis resolution: defined by a **F0 fibrosis score on liver histology at 5 years.**

Lassailly etal. Gastroenterology 2020; 59:1290–1301

# Whether RYGB or LSG is more effective in improving NASH?- Meta-analysis 2021

Meta-analysis: 45 studies

24: exclusively on RYGB; 14: exclusively on SG; **7: evaluating both RYGB and SG**

**23: follow-up with liver biopsies**, 22: only biochemical assessment

9940 individuals; age 40.8 ± 6.9 years; female (71.9%)

**Baseline BMI was 46.5 ± 4.7 kg/m2**; Follow-up : 14 ± 6 months

No difference was found between RYGB and SG regarding the histopathological outcomes

**SG and RYGB are equivalently effective for treating NAFLD/NASH**

Barreto de Brito e Silva. Etal. Obesity Surgery (2021) 31:2762–2772

# BS associated with a significantly lower risk of incident major adverse liver outcomes and major adverse cardiovascular events (MACE) in NASH and obesity (vs nonsurgical care).

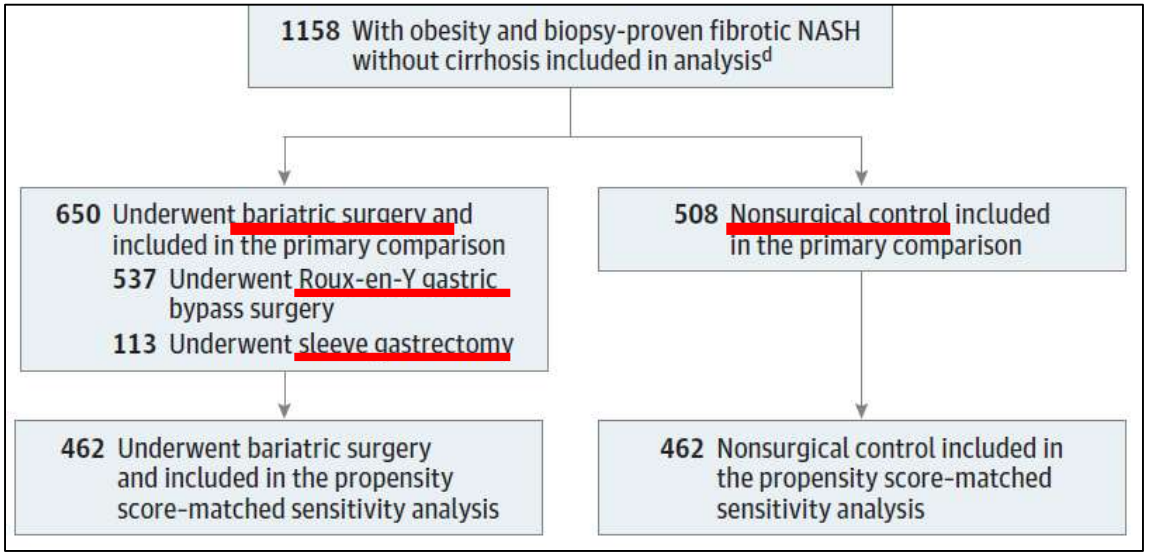
USA (Cleveland Clinic)

63.9% women

Age, 49.8 years [IQR,40.9-57.9 yr]

**BMI: 44.1 [IQR, 39.4-51.4]**

Follow-up of **7 years** [IQR, 4-10 yr]




Aminian, et al. JAMA. 2021;326(20):2031-2042

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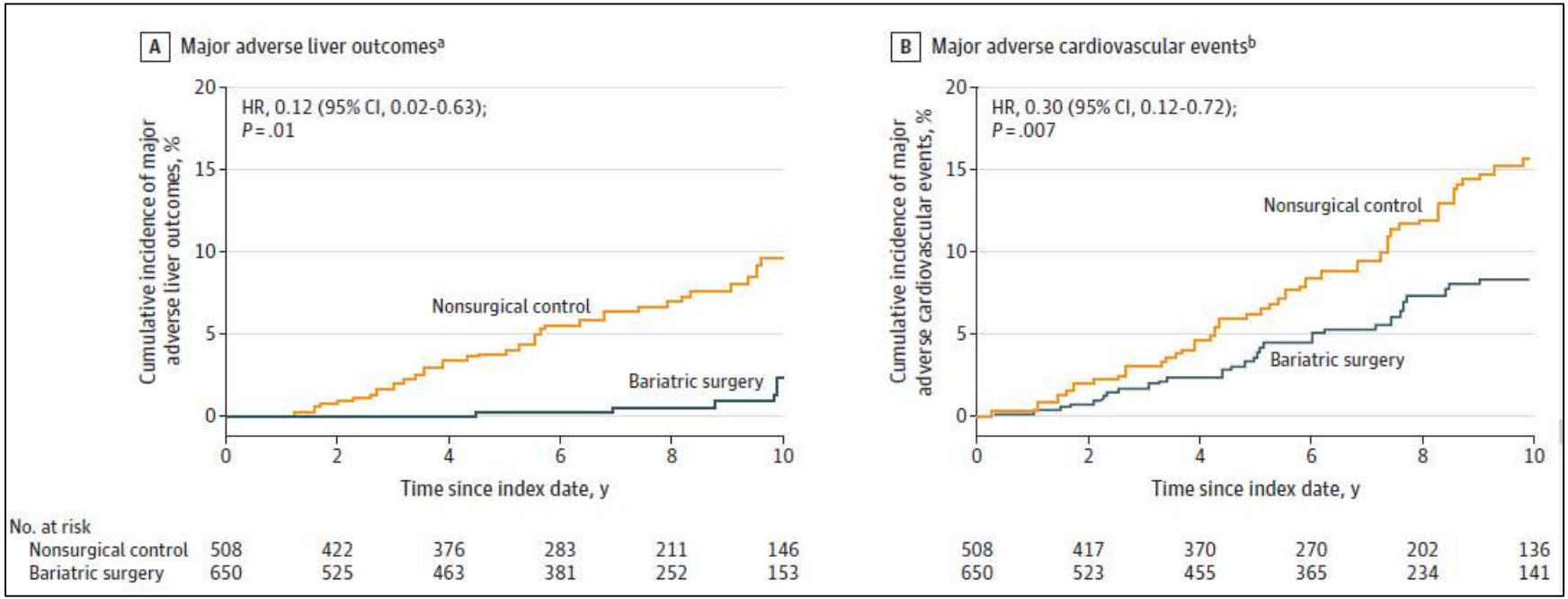



MALO: defined as the first occurrence of progression to clinical or histological cirrhosis, development of hepatocellular carcinoma, liver transplantation, or liver-related mortality after the index date.

MACE defined as the first occurrence of coronary artery events, cerebrovascular events, heart failure, or cardiovascular mortality after the index date.

Aminian, et al. JAMA. 2021;326(20):2031-2042

# Bariatric Surgery Reduces Cancer Risk in Adults With Nonalcoholic Fatty Liver Disease and Severe Obesity

USA, Retrospective cohort study of 18 to 64 years old newly diagnosed **NAFLD patients with severe obesity (ie, BMI ≥40 kg/m2)** between 2007 and 2017:
**With at least 12 mo f/u, and no h/o cancer before.**

NAFLD with severe obesity: 98090

↓

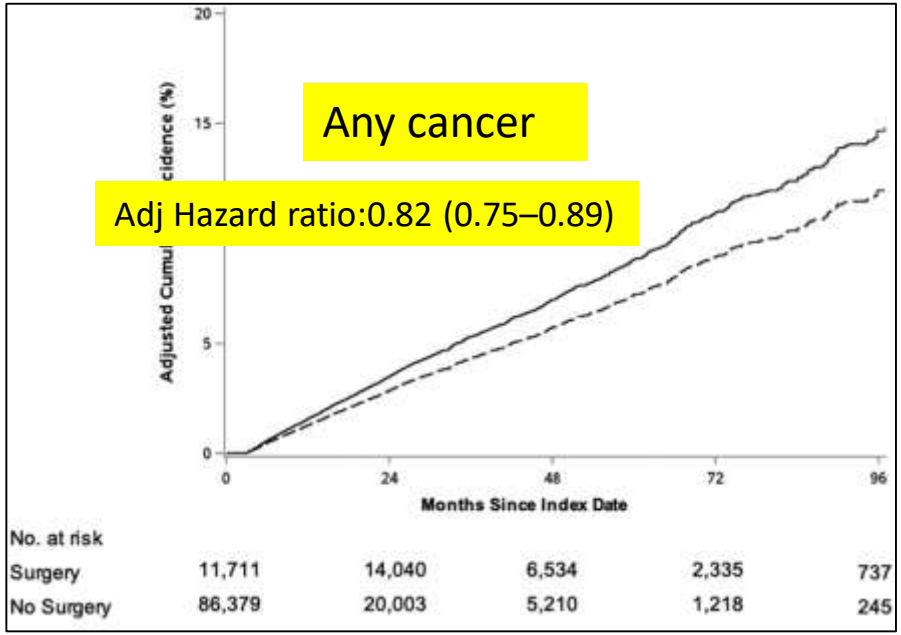
With bariatric surgery: 33435

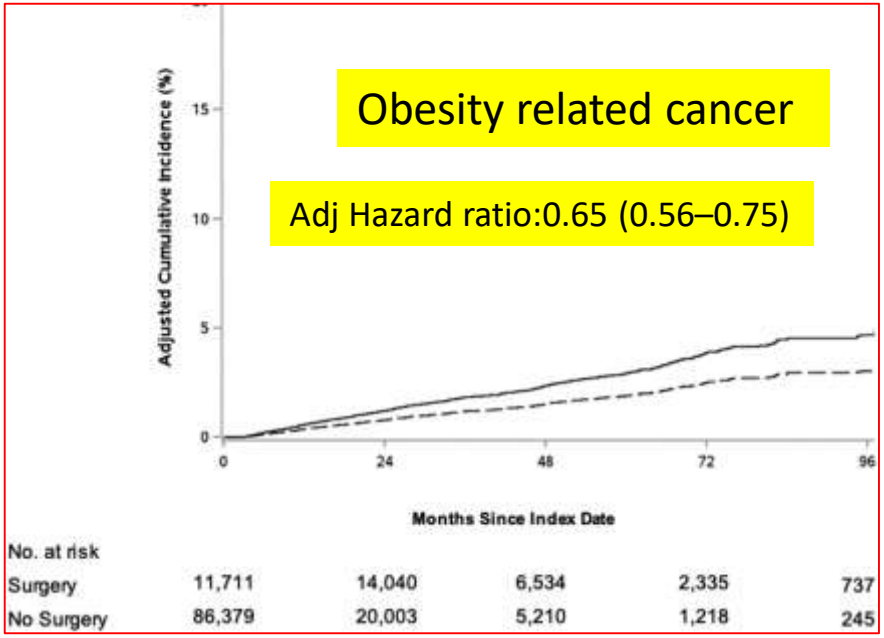
| Bariatric procedures | Total=33435 |
|---|---|
| Open RYGB | 733 (2.19) |
| Open VBG/SG | 272 (0.81) |
| Lap AGB | 4788 (14.32) |
| BPS-DS | 3221 (9.63) |
| Lap SG | 11,420 (34.16) |
| Lap RYGB | 12,663 (37.87) |
| Other | 338 (1.01) |

AGB, adjustable gastric band; BPS-DS, biliopancreatic diversion/duodenal switch; lap, laparoscopic; other, other partial gastrectomy; SG, sleeve gastrectomy; VBG, vertical-banded gastroplasty.

Rustagi etal. Gastroenterology 2021;161:171–184

# Bariatric Surgery Reduces Cancer Risk in Adults With Nonalcoholic Fatty Liver Disease and Severe Obesity




Obesity related cancers: Colon cancer, rectal cancer, postmenopausal breast cancer, hepatocellular carcinoma, kidney cancer, esophageal cancer, cancer of the gastric cardia, gallbladder cancer, pancreatic cancer, ovarian cancer, endometrial cancer, thyroid cancer, multiple myeloma, and meningioma.

Rustagi etal. Gastroenterology 2021;161:171–184

# Bariatric Surgery Reduces risk for colon, pancreatic, endometrial, thyroid cancers, hepatocellular carcinoma, and multiple myeloma

| Type of obesity-related cancer | Adjusted HR (95% CI) |
|---|---|
| Any obesity-related cancer | 0.65 (0.56–0.75) |
| Colon cancer | 0.66 (0.42–1.00) |
| Rectal cancer | 0.44 (0.10–1.37) |
| Postmenopausal breast cancer | 1.08 (0.74–1.54) |
| Hepatocellular carcinoma | 0.48 (0.24–0.89) |
| Kidney cancer | 0.90 (0.60–1.32) |
| Esophageal cancer | 0.33 (0.06–1.18) |

| Type of obesity-related cancer | Adjusted HR (95% CI) |
|---|---|
| Cancer of the gastric cardia | 0.46 (0.03–2.44) |
| Gallbladder cancer | 0.99 (0.05–12.58) |
| Pancreatic cancer | 0.46 (0.21–0.93) |
| Ovarian cancer | 0.70 (0.41–1.15) |
| Endometrial cancer | 0.49 (0.31–0.73) |
| Thyroid cancer | 0.61 (0.41–0.89) |
| Multiple myeloma | 0.33 (0.14–0.69) |
| Meningioma | 0.52 (0.05–2.90) |

Rustagi etal. Gastroenterology 2021;161:171–184

# Laparoscopic Sleeve Gastrectomy (SG) associated with significant risk reductions in all cancer outcomes (vs other procedures)

| **Bariatric procedures** | Any cancer<br>HR (95% CI) | Obesity-related cancers<br>HR (95% CI) |
|---|---|---|
| Open RYGB | 0.63 (0.37–1.03) | 1.04 (0.46–2.34) |
| Open VBG/SG | 1.12 (0.46–2.77) | 0.68 (0.14–2.62) |
| Lap AGB | 0.90 (0.71–1.12) | 0.60 (0.39–0.91) |
| BPS-DS | 0.75 (0.56–1.00) | 0.62 (0.37–1.02) |
| Lap SG | 0.77 (0.65–0.90) | 0.60 (0.44–0.80) |
| Lap RYGB | 0.81 (0.70–0.93) | 0.77 (0.59–1.01) |
| Other | 0.33 (0.11–0.83) | 0.35 (0.05–1.42) |

**Laparoscopic Sleeve Gastrectomy (SG) associated with significant risk reductions in all cancer outcomes**

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# Safety in cirrhosis

- An increasing number of Bariatric Surgery procedures performed in patients with cirrhosis described over the last decade.

- Mostly retrospective analyses of incidental findings at the time of surgery.

# High mortality in decompensated cirrhosis

USA, 2008 to 2013 Nationwide Inpatient Sample (NIS) database to study the trends and outcomes of bariatric surgery in patients with cirrhosis.
**Undergoing Roux-en-Y gastric bypass (RYGB) or vertical sleeve gastrectomy (VSG)**

RYGB or VSG admissions: 558017

↓

No cirrhosis: 554828
**Compensated Cirrhosis: 3086 [0.55%]**
**Decompensated cirrhosis: 104 [0.02%]**

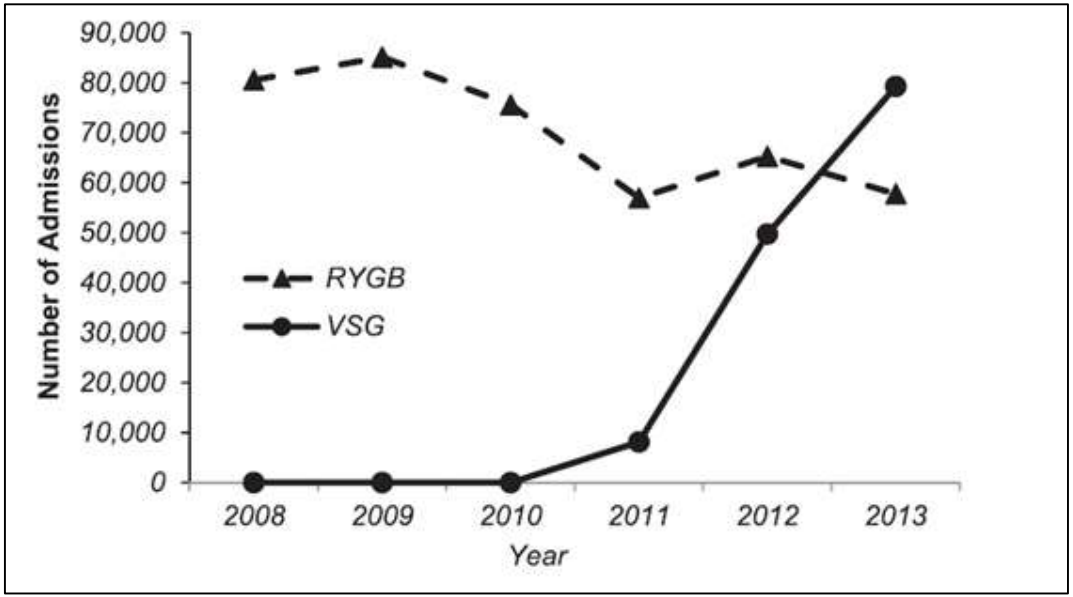
Decompensation defined by:
presence of ascites, HE, variceal bleeding, or SBP

| Variable | No cirrhosis (n = 554,828) | Compensated cirrhosis (n = 3086) | Decompensated cirrhosis (n = 103) |
|---|---|---|---|
| Mortality | 563 (0.1%) | 20 (0.6%) | 20 (19.4%) |
| Length stay, median (IQR) | 1.5 (1.0–2.0) | 1.7 (1.2–2.6) | 3.4 (2.0–7.6) |

Mumtaz etal. Obes Surg. 2020 Sep;30(9):3444-3452

# VSG preferred over RYGB post 2010

Trends of RYGB and VSG from 2008 to 2013

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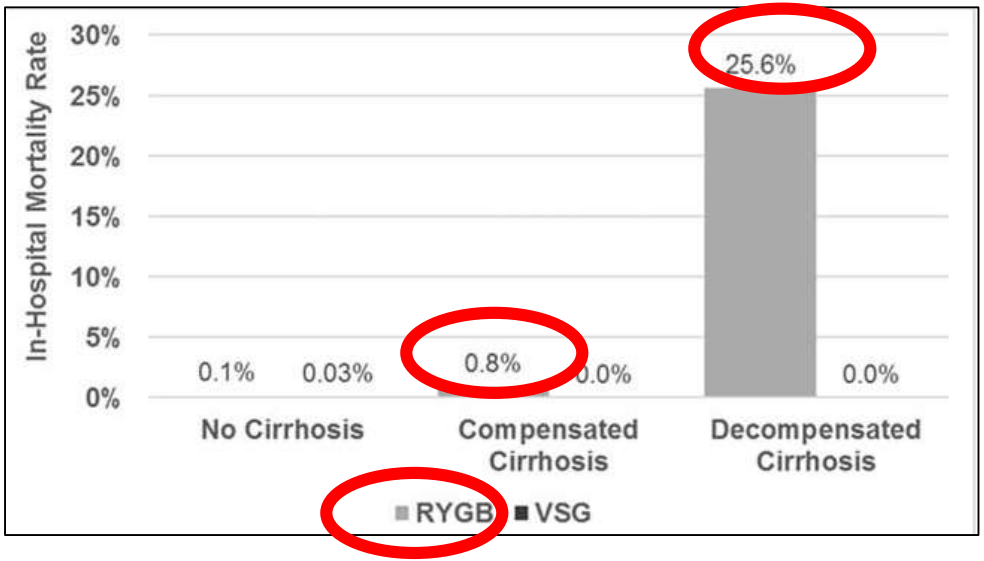
# VSG safer than RYGB




**Sleeve Gastrectomy favoured:**

Shorter operative time

Lower technical complexity

Better postoperative outcomes

Preservation of access to the biliary tree (for potential need for transplantation)

Limited impact on absorption of immunosuppression post LT

Mumtaz etal. Obes Surg. 2020 Sep;30(9):3444-3452

# Center experience also a predictor of mortality in patients undergoing bariatric surgery on Multivariable logistic regression

| Variable | Adjusted odds ratio (95% CI) | p value |
|---|---|---|
| Cirrhosis<br>None<br>Compensated<br>Decompensated | <br>Reference<br>1.88 (0.65, 5.46)<br>83.8 (19.3, 363.8) | <0.001 |
| Age | 1.06 (1.04, 1.08) | <0.001 |
| Sex, male versus female | 2.59 (1.76, 3.81) | <0.001 |
| Elixhauser comorbidity Index, ≥ 3 versus < 3 | 5.30 (3.45, 8.15) | <0.001 |
| Procedure, RYGB versus VSG | 3.90 (1.79, 8.48) | <0.001 |
| Low-volume center (< 50 gastric bypasses/year) | 5.25 (3.38, 8.15) | <0.001 |

Mumtaz etal. Obes Surg. 2020 Sep;30(9):3444-3452

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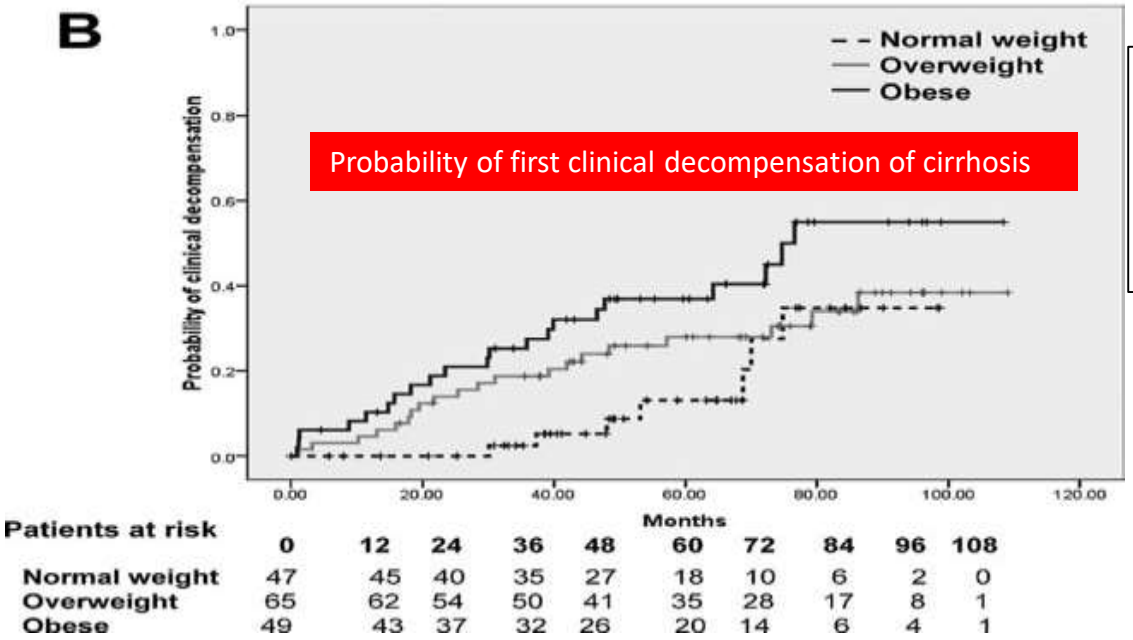
# Obesity Is an Independent Risk Factor for Clinical Decompensation in Patients with Cirrhosis of all etiologies- increases waitlist mortality

European Multicenter; 161 patients with compensated cirrhosis
Median follow-up: 59 months




| Patients at risk | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
|---|---|---|---|---|---|---|---|---|---|---|
| Normal weight | 47 | 45 | 40 | 35 | 27 | 18 | 10 | 6 | 2 | 0 |
| Overweight | 65 | 62 | 54 | 50 | 41 | 35 | 28 | 17 | 8 | 1 |
| Obese | 49 | 43 | 37 | 32 | 26 | 20 | 14 | 6 | 4 | 1 |

Normal weight: BMI 18.5-24.9 kg/m2

Overweight: BMI 25-29.9 kg/m2

Obese: BMI >30 kg/m2

Berzigotti et al. HEPATOLOGY 2011;54:555-561

# Paucity of good quality data on bariatric surgery in LT candidates

- Most papers report on small case series or retrospective datasets, and there is a risk of publication bias

- Timing can be before, during, or after LT.

# Bariatric surgery before, during, or after LT?- Pros and Cons

| | Before | During | After |
|---|---|---|---|
| Pros | Can make patient eligible for LT (if BMI ineligibility exists in the LT programme)* | Single intervention | Allows for operation on a patient with good liver function |
| Cons | Not recommended in decompensated patients | Additional morbidity and mortality risk in a complex high-risk Patient.<br><br>Bariatric surgeon available at LT | Higher technical difficultly due to postoperative abdominal adhesions<br><br>Complications related to immunosuppression |

*** There are no universal guidelines on the BMI cut-off for transplant eligibility.**

Many institutions have BMI limits that exclude morbidly obese patients from transplantation, resulting in prolonged wait times for LTX in this population

# Bariatric Surgery Before LT: Meta-analysis

8 studies [6 retrospective and 2 prospective cohort]

**187 patients**, mean age = 50.4 years (74.4% female) underwent bariatric surgery before LTX

Sleeve gastrectomy (SG; 3 studies)
laparoscopic SG (LSG; 4 studies)
Roux-en-Y gastric bypass(RYGB; 3 studies)
biliopancreatic diversion (BPD; 1 study)
duodenal switch (DS; 1 study)
jejunoileal gastric bypass (JIB; 3 studies).

**5 studies conducted bariatric surgery with the intention of improving LTX candidacy**

3 studies included patients with prior bariatric surgery unrelated to improving LTX candidacy

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# Bariatric Surgery Before LT: Meta-analysis

30 day mortality- 0%
30-day minor complications-4%
30-day major complications-1%

Beyond 30 day mortality (all cause)- 7%

2 studies:
**Complete resolution of T2D: 41.14%**
**Complete resolution of HT: 22.5%**

At 12-months f/u: BMI change:
45.7 (2.0) to 31.8 (8.3) kg/m2

% reduction of BMI 30.4% after bariatric surgery

**5 studies conducted bariatric surgery with the intention of improving LTX candidacy**

**Time b/w BS and LT: 14 months (7-22 months)**

78% being listed for transplant and

**33% subsequently receiving LTX**

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# Bariatric Surgery during LT: Meta-analysis

2 studies [1 retrospective and 1 prospective cohort]

**32 patients**, mean age = 51.9 years (50% female) underwent bariatric surgery during LT

**SG was the only type of bariatric surgery performed among these patients.**

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# Bariatric Surgery during LT: Meta-analysis

1 year mortality- 0%

**Complete resolution of T2D: 58.3%**
**Complete resolution of HT: 66.7%**

At f/u: BMI change:
47.6 (1.1) to 33.3 (2.9) kg/m2

% reduction of BMI 30%

1 study Complications:

Roperation for bleeding: 3(10.3%),

Staple line leak:1(3.4%)

Steroid-resistant rejection:1(3.4%)

HAT:2 (6.8%), one of whom eventually underwent re-transplant.

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# Bariatric Surgery after LT: Meta-analysis

9 studies [7 case series, 2 case report]
**64 patients**, mean age = 56 years (48.3% female) underwent bariatric surgery after LT

SG (8 studies) and
RYGB (3 studies)

**The median time between LT and bariatric surgery was 27.5 months (25 to 120)**

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# Bariatric Surgery after LT: Meta-analysis

30 day mortality- 0%
30-day minor complications-4%
30-day major complications-9%

Beyond 30 day mortality (all cause)- 7.8%

**Complete resolution of T2D: 41%**
**Complete resolution of HT: 48%**

Major Complications:

Incisional hernia

Balloon dilatation

Bile leak

At 33.8 mo f/u: BMI change:
43.4 (1.44) to 31.7 (24.8) kg/m2

% reduction of BMI 27%

Lee Y etal. Surg Obes Relat Dis. 2020 Sep;16(9):1336-1347

# OUTLINE

- BARIATRIC SURGERY: PROCEDURES AND MECHANISMS
- CLINICAL EFFECTIVENESS OF BARIATRIC SURGERY IN NAFLD WITHOUT ADVANCED LIVER DISEASE
- BARIATRIC SURGERY IN CIRRHOSIS
- BARIATRIC SURGERY IN LIVER TRANSPLANT CANDIDATES
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- LIVER FAILURE AFTER BARIATRIC SURGERY
- BARIATRIC SURGERY AND ALCOHOL

# Impact of Prior Bariatric Surgery on Perioperative Liver Transplant Outcomes

USA, 78 with h/o BS prior to evaluation for consideration of primary LT

156: matched concurrent cohort on age, MELD at evaluation, and etiology

**RYGB (63%)**

Mean weight loss between the BS and the time for evaluation for LT: 130 pounds

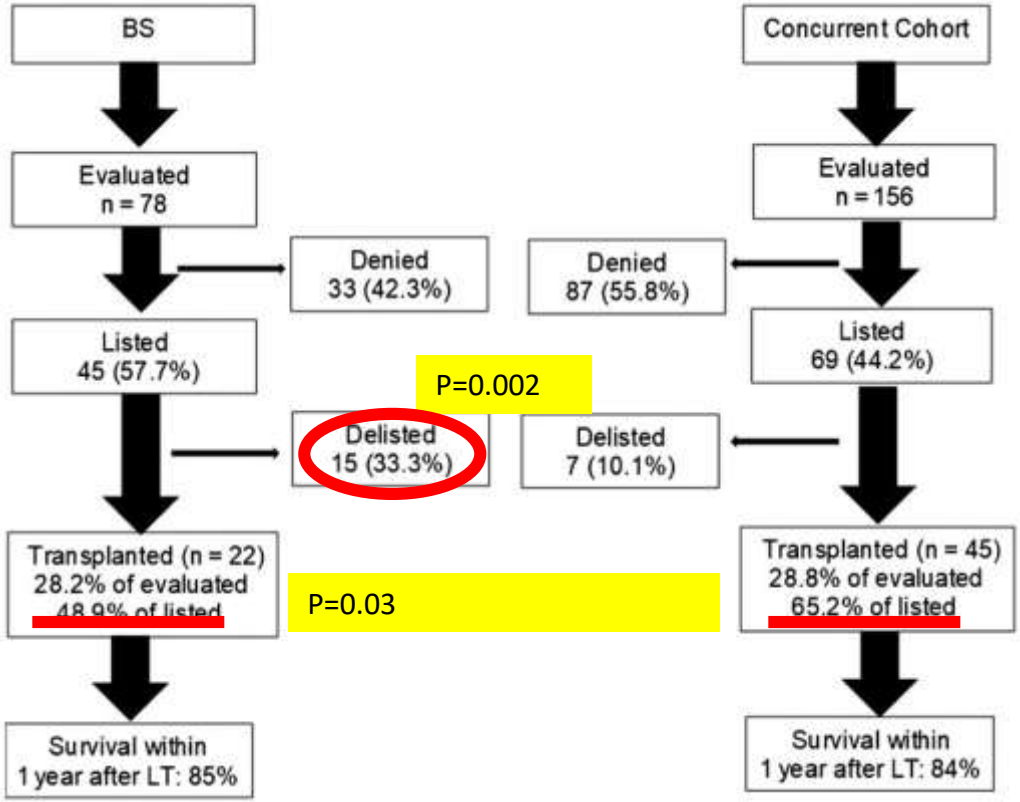
Liver cirrhosis diagnosis:

- **After BS :67.5%**
- At time of BS: 22.5%
- **Before BS: 10%**

**Median time between the BS and evaluation for LT: 7 years**

Idriss etal. Liver Transplantation 2019; 25: 217–227

# Rate of LT was lower from the time of listing in BS cohort vs concurrent cohort




Idriss etal. Liver Transplantation 2019; 25: 217–227

# Patients malnourished at the time of LT higher in BS vs concurrent cohort

| Variable | BS cohort, 78 | Concurrent cohort, 156 | P |
|---|---|---|---|
| Malnourished by SGA | 64.1% | 39% | <0.01 |
| Total skeletal surface area, cm2 | 127 [105-141] | 153 [131-191] | 0.005 |

Rates of sarcopenia higher among **patients delisted after listing** (**71.4%** versus 16.7%; *P* = 0.04).

Idriss etal. Liver Transplantation 2019; 25: 217–227

# RYGB and its metabolic outcomes exert negative effects on patients on the waiting list and on LT outcomes

| Variable | RYGB surgeries | Non-RYGB surgeries | P |
|---|---|---|---|
| Skeletal muscle index, cm2/m2 | 42.0 [36.0-45.0] | 52.0 [43.0-57.0] | <0.01 |
| Delisting or death after listing | 44% | 16.4% | 0.04 |

Idriss etal. Liver Transplantation 2019; 25: 217–227

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# Deterioration of liver function and development of liver failure can occur after BS/MBS

Jejunoileal bypass (JIB): 10% liver failure on long term.

Procedure abandoned now

Requarth JA etal. Arch Surg. 1995;130(3):318-325.

Biliopancreatic diversion (BPD): liver failure requiring LT can occur- case series

Rarely done now

Addeo P etal. Surg Obes Relat Dis. 2019;15(8):1394-140

# Liver failure following Roux-en-Y gastric bypass (RYGB) and one-anastomosis gastric bypass (OAGB)

Austria, Post BS patients presenting with severe liver dysfunction

**N=10**, (m:f = 2:8; median age 48 years, range 22–66 years)

After median postoperative time of **15 months (range 2–88 months).**

RYGB=3
RYBG ⟶ distal GB=2
Gastric band ⟶ OAGB=2
OAGB=3

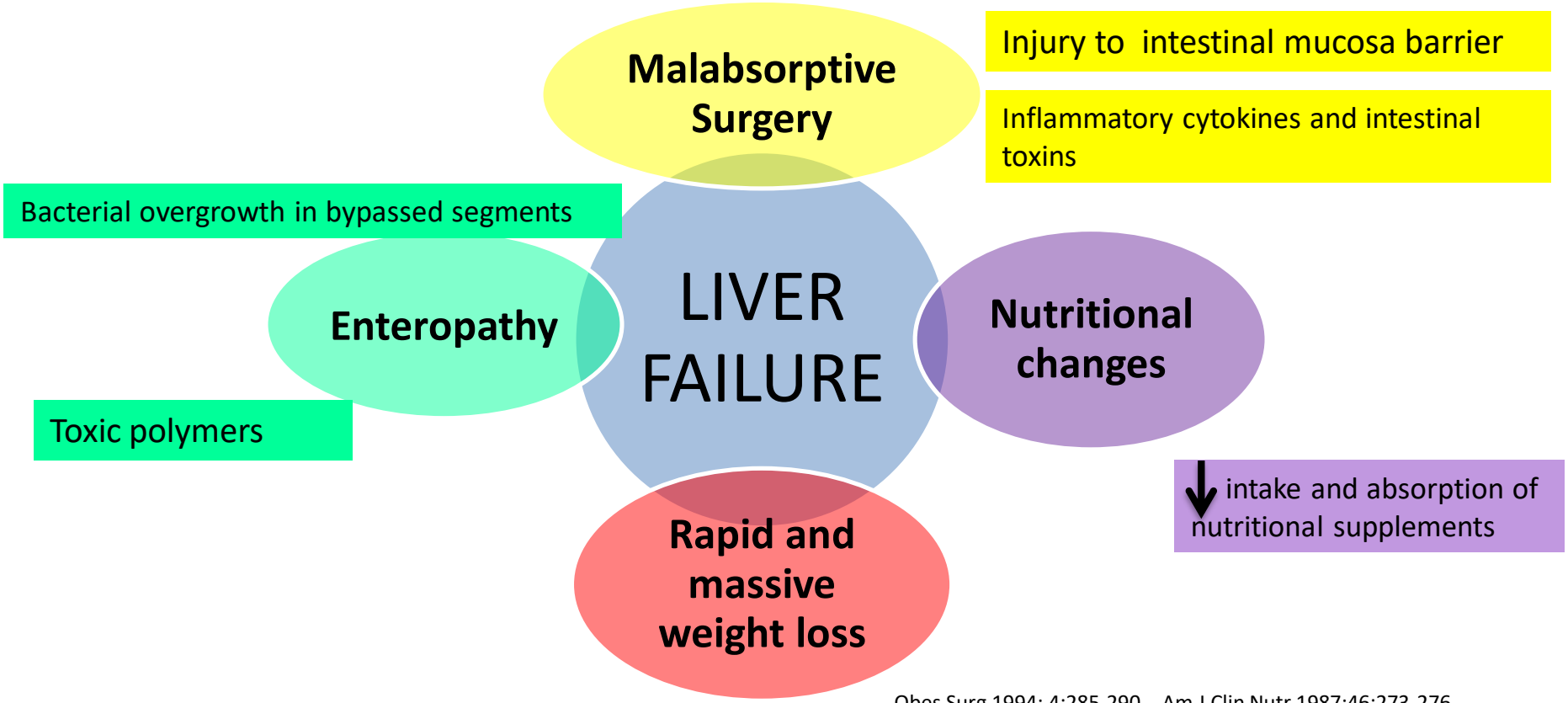
**8= lengthening of the alimentary/ common limb led to an improvement or complete remission of symptoms.**

1= Liver transplantation was required

1= died (septic shock and decompensated liver)

Eilenberg etal. OBES SURG (2018) 28:812–819

# Risks factor for Liver Failure after BS/MBS




Obes Surg 1994; 4:285-290… Am J Clin Nutr 1987;46:273-276

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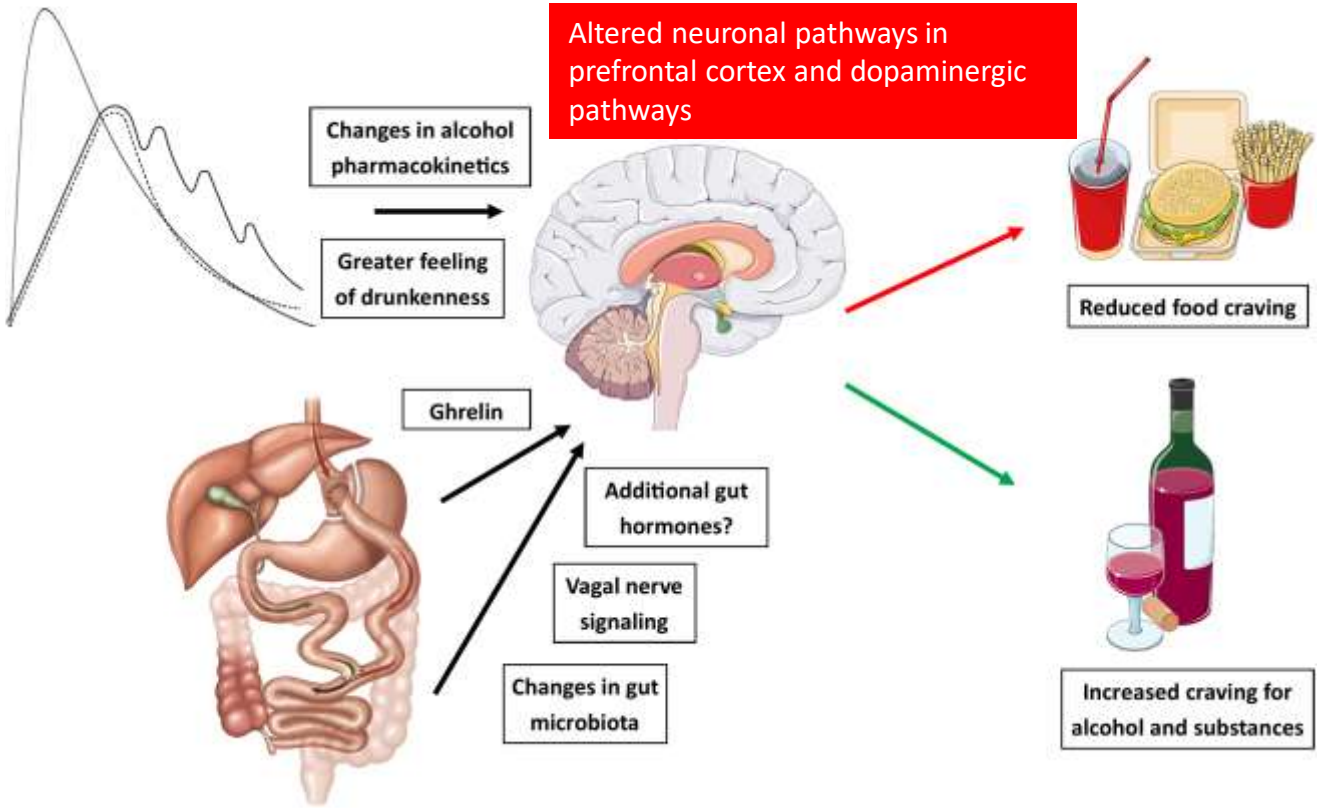
# Potential mechanisms involved in postbariatric surgery alcohol use disorder




Lefere etal. Obesity Reviews. 2021;22:e13294.

# Bariatric surgery and Alcohol absorption and elimination

- Conflicting data as to the lifetime and current prevalence of AUD in patients seeking weight loss surgery

Ertelt TW, et al. Surg Obes Relat Dis 2008; King WC, et al. JAMA 2012; Wee CC, et al. Surg Obes Relat Dis 2014; Svensson PA, et al. Obesity (Silver Spring) 2013

- Gastric bypass surgery is associated with:
  - ✓ Accelerated alcohol absorption (shorter time to reach maximum concentration)
  - ✓ Higher maximum alcohol concentration
  - ✓ Longer time to eliminate alcohol in both men and women
  - ✓ Increased risk for development of AUD

Klockhoff H, et al. Br J Clin Pharmacol 2002; Hagedorn JC, et al. Surg Obes Relat Dis 2007; Woodard GA, et al. J Am Coll Surg 2011; Horowitz M, et al. Int J Obes 1986; Lee SL, et al. Alcohol Clin Exp Res 2006; Steffen KJ, et al. Surg Obes Relat Dis 2013

- Data less clear regarding altered pharmacokinetics after SG and no evidence that alcohol absorption is affected by gastric banding

Maluenda F, et al. Obes Surg 2010; Changchien EM, et al. J Am Coll Surg 2012

# SUMMARY AND CONCLUSIONS

- BS/MBS very effective for obesity and metabolic comorbidities including NAFLD/MAFLD
- Indications for BS/MBS vary across Asia-Pacific Countries
- East/South East/South Asians lower BMI cut-off for BS/MBS vs Western/Caucasian Population
- BS/MBS have effects on food intake, gut hormone secretion, metabolic signalling pathways, and adipose tissue dysfunction.

# SUMMARY AND CONCLUSIONS

- BS/MBS provides long-term resolution of NASH and fibrosis regression
- BS/MBS associated with significantly lower risk of incident major adverse liver outcomes and major adverse cardiovascular events NASH and obesity
- BS/MBS reduces cancer risk (including HCC) in adults with NAFLD and severe obesity
- BS/MBS- high mortality in decompensated cirrhosis
- BS/MBS can safely be performed in selected patients with liver cirrhosis and an attractive option in carefully selected transplant candidates with severe obesity

# SUMMARY AND CONCLUSIONS

- SG and RYGB are equivalently effective for treating NAFLD/MAFLD
- SG –preferred procedure in last decade especially patients with cirrhosis
- Reports of liver failure following BS/MBS esp older bypass procedures
- BS/MBS may be a risk factor for alcohol abuse, the development of ALD in these patients should be monitored.
- BS/MBS should be used after appropriate screening and with close follow-up, and the beneficial effects generally far outweigh the risks.
- Multidisciplinary coordination and approach needed

# Future directions

- Need for randomized trials to demonstrate efficacy
- Identifying subset likely to benefit: concept of metabolically benign obesity
- Phenotypic and Genotype stratification to assist patient selection for surgical treatment of NAFLD/MAFLD.

# Thank You