

# Torque, Trocars, and Exposure Conquering the BMI > 60 Battlefield

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# The risk is real, and our tools stop working

**2.49**

Adjusted odds ratio for 30-day mortality at BMI  $\geq 50$  (95% CI 2.12–2.92) across 751,952 MBSAQIP cases — while severe complications rise only 8%

**0.1  $\rightarrow$  0.4%**

Mortality at BMI  $\geq 70$  versus below it. Pulmonary complications 0.5%  $\rightarrow$  1.9%, renal 0.2%  $\rightarrow$  0.9%, DVT 0.3%  $\rightarrow$  0.6%

**0.66**

Discriminative power of the MBSAQIP mortality calculator above BMI 60, down from 0.76 below BMI 45

## And there is no playbook.

A systematic search returns no indexed technical review dedicated to laparoscopic bariatric surgery at BMI  $>60$ . The Cochrane review of laparoscopic entry — 57 trials, 9,865 patients — reports that most studies selected low-risk patients and that many excluded patients with high body mass index. The definitive evidence on how to get into the abdomen was generated in patients who are not the ones in front of you.

*Everything that follows is technique reasoned from adjacent evidence — and I will tell you which is which.*

# The operation begins with the liver

## WHAT A PREOPERATIVE DIET ACTUALLY BUYS

**16.7%**

Mean liver-volume reduction across 21 studies and 814 patients, with 6.4% mean weight loss

**18% / 2 wk**

Volume falls  $18\% \pm 6.2\%$  in the first two weeks on serial MRI — and then stops. Intrahepatic fat keeps falling ( $51\% \pm 16\%$ )

**Histology**

Two weeks of 1,200 kcal/day gave less steatosis ( $P=.02$ ), fewer foci of lobular inflammation ( $P=.01$ ) and less ballooning ( $P=.04$ )

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*Two weeks is the dose. Longer buys fat, not room.*

## BUT BE HONEST ABOUT WHAT IT DOESN'T BUY

- In the largest randomized trial — 298 patients, five centres — the surgeon's perceived difficulty was lower with a very-low-calorie diet (26 vs 35 mm,  $P=.04$ ), but operative time was identical (81 vs 80 min), as were blood loss and intraoperative complications
- Thirty-day complications did favour the diet group (8 vs 18,  $P=.04$ )
- You buy liver volume partly with skeletal muscle and with compliance — a head-to-head trial found significant loss of skeletal muscle area only in the low-calorie arm
- No published study measures preoperative liver-volume reduction with a GLP-1 agonist. The steatosis data are from non-surgical trials over 24–72 weeks — do not present them as preoperative evidence

# The table, the position, and the clock

1

## Know your real weight limit

A common general surgical table is rated 1,200 lb static — 900 lb with full articulation, and 600 lb once you add tabletop slide. It is the articulation that derates it, not the patient alone.

Check imaging: CT limits run 450–675 lb. You can operate on a patient you cannot scan.

2

## Ramp, pad, and secure

Ramping to align the external auditory meatus with the sternal notch improved the laryngeal view over sniffing in a randomized trial ( $P=0.037$ ).

Preoxygenating at 25° head-up raised  $\text{PaO}_2$  from 360 to 442 mmHg and bought 46 extra seconds of apnoea time. That is the whole margin.

3

## Start the rhabdomyolysis clock

Rhabdomyolysis occurred in 12.9% of 480 prospectively studied bariatric patients. The only independent risk factor was duration of surgery, with a best cut-off at 230 minutes.

When it progresses to renal failure, 14% of cases, mortality is 25%.

## The BMI >60 patient is the one this actually kills.

### BMI 67

Median BMI in six patients with gluteal myonecrosis, versus 55 in controls ( $P=0.0022$ )

### 5.7 hours

Median table time in those cases, versus 4.0 hours ( $P=0.01$ )

### 3 of 6

Developed renal failure requiring dialysis — fatal in all three

*Every CK above 10,000 in one series was a patient over BMI 60. Pad the buttocks, hydrate, treat the clock as a variable you control.*



# First entry: midline discipline, or the left upper quadrant

## THE LARGEST BARIATRIC ENTRY SERIES

# 0.18%

Vascular injury across 2,207 optical-trocar entries performed without prior insufflation — four injuries, three needing laparotomy, no deaths. Every single injury occurred with off-midline placement.

## AND THE INJURIES CONCENTRATE AT THE TOP OF THE RANGE

# 52.7

Mean BMI of the eight patients injured during optical entry in a series of 821 whose overall mean BMI was 45.9. Half had a BMI over 50. Three were liver lacerations, four mesenteric, one omental.

## How I do it — left upper quadrant, under vision, counting layers

# 8 cm

Lateral to the midline, just below the left subcostal margin — the described landmark for optical entry in this population

# 7 layers

Subcutaneous fat, anterior sheath, rectus, posterior sheath, transversus, transversalis fascia, peritoneum. Counting them tells you your angle is right

# 25 s

Median optical-trocar insertion time in one series; 28 seconds mean in another. Neither analysed time against BMI — but neither found entry to be the slow step

# Geometry you can control, and a hernia you will not see

## GET THE ANGLES RIGHT

**60° / 60°**

Manipulation and elevation angles giving the shortest execution time and best performance; 45–75° with equal azimuth is the workable range

**4.3 cm**

Mean abdominal wall thickness at the left upper quadrant with obesity, versus 2.4 cm without

**+1.9–2.5 cm**

Working distance to the retroperitoneum gained by shifting the camera port supraumbilically

## THE PORT THAT COMES BACK

**18.8%**

Trocar-site hernia after sleeve gastrectomy when 228 patients were imaged with CT rather than examined in clinic — against a published clinical rate of 0% to 1.6%. Nearly every hernia was at the epigastric port — a 16.6% absolute rate at that site. The left subcostal port had none.

## On torque, I have to be straight with you.

No published study measures instrument torque, port-site reaction force, or fulcrum amplification as a function of abdominal wall thickness. The physics is sound — a thicker wall is a longer lever arm — but in the literature it is asserted, not measured. What has been measured is the consequence: with inertial motion sensors across simulated wall thicknesses from BMI 20 to 50, jerk, angular speed and cumulative displacement of the head, torso and upper arms all rose significantly at the 40 and 50 kg/m<sup>2</sup> models — in novices and experts alike.

# The liver: retract less, and have a bail-out

## The only randomized comparison

Sixty bypasses, three arms. The Nathanson retractor produced significantly higher AST and ALT at 18 hours than either liver suspension tape or the V-shaped internal technique, and more pain on day one than suspension. The V-shaped internal technique took the longest to place.

*Goel R, Shabbir A, Huang CK. Surg Endosc 2013*

## The cheapest fix is free

Across 120 sleeves compared three ways, the authors concluded that intermittent release of the Nathanson retractor damages the liver less than continuous retraction, approaching a soft flexible retractor. It costs nothing to let go every twenty minutes.

*Fersahoğlu MM et al. Obes Surg 2021*

## A suspension technique scales

Across 1,874 consecutive cases over fifteen years, hiatal sling traction was achievable in all but two patients, with no liver injury and significantly less transaminase elevation than the Nathanson comparison group.

*Harsha MS, Palaniappan R. J Minim Access Surg 2026*

## When retraction fails, change the operation

Laparoscopic left-lobe mobilization is a described last resort. So is redesigning the case: a low gastrojejunal anastomosis that never requires a view of the angle of His was the original answer to an unretractable liver in the super-obese.

*Gandsas A. Obes Surg 2025 · Nguyen NT. Obes Surg 2005*

***Everyone calls hepatomegaly a leading cause of conversion. Almost nobody has published a rate for it.***

# Working space is a pharmacologic problem

**61.5% vs 15.3%**

Surgical complication rate when operating conditions were rated poor versus adequate, in a trial where each patient served as their own control ( $P < 0.001$ ). Poor exposure is not an aesthetic complaint.

## Deep block, not moderate

Optimal conditions were rated in 87.5% of measurements under deep neuromuscular blockade versus 64.6% under moderate ( $P < 0.001$ ). In the crossover trial, conditions improved in 29 of 34 patients on deep block and 4 of 31 on moderate. Pooled across four trials, surgical duration was unchanged.

*Fuchs-Buder T 2019 · Yang WL 2024 · Aceto P 2020*

## But not universally

One 60-patient randomized trial found no difference in the surgeon's rating of the field between deep and moderate blockade ( $4.2 \pm 1.0$  vs  $3.9 \pm 1.1$ ,  $P = .16$ ). The authors named their own small sample as the limitation. The effect is real but not guaranteed.

*Baete S et al. Anesth Analg 2017*

## Don't drop the pressure to be virtuous

In a randomized bariatric trial, low intra-abdominal pressure with deep blockade still required the pressure to be raised in 40% of patients for adequate overview, and median operating time ran 52 minutes against 38 at standard pressure. No trial has tested higher-than-standard pressure for exposure at extreme BMI.

*Leeman M et al. Surg Endosc 2021*

# Where the robot earns its keep at this BMI

Propensity-matched MBSAQIP, 2019–2022 · 4,370 matched sleeves at BMI  $\geq 60$  · robotic vs laparoscopic

**0.1% vs 0.3%**

Staple-line leak (p=0.029)

**0.1% vs 0.3%**

Postoperative bleeding (p=0.045)

**2.9% vs 3.7%**

Readmission (p=0.037)

**+21 min**

Operative time (p<0.001)

1

## The time penalty disappears as BMI rises

Across a propensity-matched BMI  $\geq 50$  cohort, robotic cases ran 199 minutes against 110 laparoscopic. Restrict the SADI-S analysis to the super-super-obese and the difference vanishes: 173 versus 153 minutes, P=0.107. The laparoscopic clock is what degrades.

Marincola G et al. *J Robot Surg* 2024

2

## The surgeon's muscle load stops tracking BMI

Surface EMG across normal- and high-BMI abdominal models: peak muscle usage was higher in normal-BMI straight-stick laparoscopy, higher still in high-BMI straight-stick, and generally flat across every robotic exercise at either BMI.

Moss EL et al. *J Minim Invasive Gynecol* 2020

3

## Access and variability decouple from habitus

In robotic sleeves in adolescents, access time was 19.1 versus 19.7 minutes for BMI below and above 50 — unchanged. Across 666,182 cases, operative-time variability was higher laparoscopically and more affected by the quality of the first assistant.

Mora MC 2022 · Ho K et al. *J Am Coll Surg* 2022

# Choose the operation, not just the approach

## THE SLEEVE CEILING IN SUPER-OBESITY

# 67.9%

of sleeve patients in a 514-patient super-obese cohort never reached a BMI below 35 at three years — against 29.2% after gastric bypass and 9.9% after one-anastomosis bypass.

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*If a sleeve at BMI 68 is the whole plan, the plan is probably wrong. If it is stage one, say so out loud — to the patient and in the note.*

A robotic duodenal switch series of 661 patients reported 1.9% major complications and a 0.45% leak rate — the hardest operation, in the heaviest patients, done well.

## WHAT STAGING ACTUALLY BUYS

### Safety

Across four institutions and 96 staged SADI patients — planned two-stage for BMI >50, plus revision for insufficient loss — there were no deaths and no conversions to open, with 5.3% early and 6.4% late complications

### Not speed

Bridging with an intragastric balloon before bypass at BMI  $\geq 50$  was behind single-stage at six months (11.9% vs 23.7% total weight loss,  $p < 0.001$ ) and level by twenty-four (32.0% vs 34.7%,  $p = 0.13$ )

### A bridge

Preoperative GLP-1 or GLP-1/GIP therapy in patients with BMI  $\geq 49.5$  produced 10.3 kg of weight loss versus 3.1 kg with lifestyle alone — though its effect on operative difficulty has never been measured

# Decide the bail-outs before you scrub, not at hour four

1

**The liver will not move**

Release and re-place intermittently → reposition the retractor → mobilize the left lobe → change the operation to one that never needs the angle of His.

2

**The field is poor and staying poor**

Deepen the block before you add a retractor. Restore pressure if you dropped it. Add reverse Trendelenburg — accepting that one trial showed a compliance benefit at 20° and another showed none at 25°.

3

**The clock passes 230 minutes**

That is the published inflection for rhabdomyolysis, not an arbitrary number. Reassess padding, hydration and whether the remaining work is worth doing today.

4

**You are fighting the wall, not anatomy**

Reposition a port supraumbilically to recover the 60°/60° geometry before you accept working off-axis for another two hours.

5

**Stage it**

In the 300-case series that established sleeve-as-first-stage, conversion was 0.6% — for massive hepatomegaly — and mortality 0.6%. Finishing the operation you planned is not the same as finishing the operation the patient needed.

# Six things I would take back to the OR

## 1 Two weeks of a low-calorie diet, not six

Liver volume falls 18% in fourteen days and then plateaus. Longer costs you muscle and compliance for no additional room.

## 2 Treat operative time as a surgical variable

230 minutes is the published rhabdomyolysis inflection, and every CK above 10,000 in one series was a patient over BMI 60.

## 3 Midline, or left upper quadrant under vision

Every vascular injury in a 2,207-case optical-entry series was off-midline. Counting seven layers tells you your trajectory is right.

## 4 Close the epigastric port, image the rest

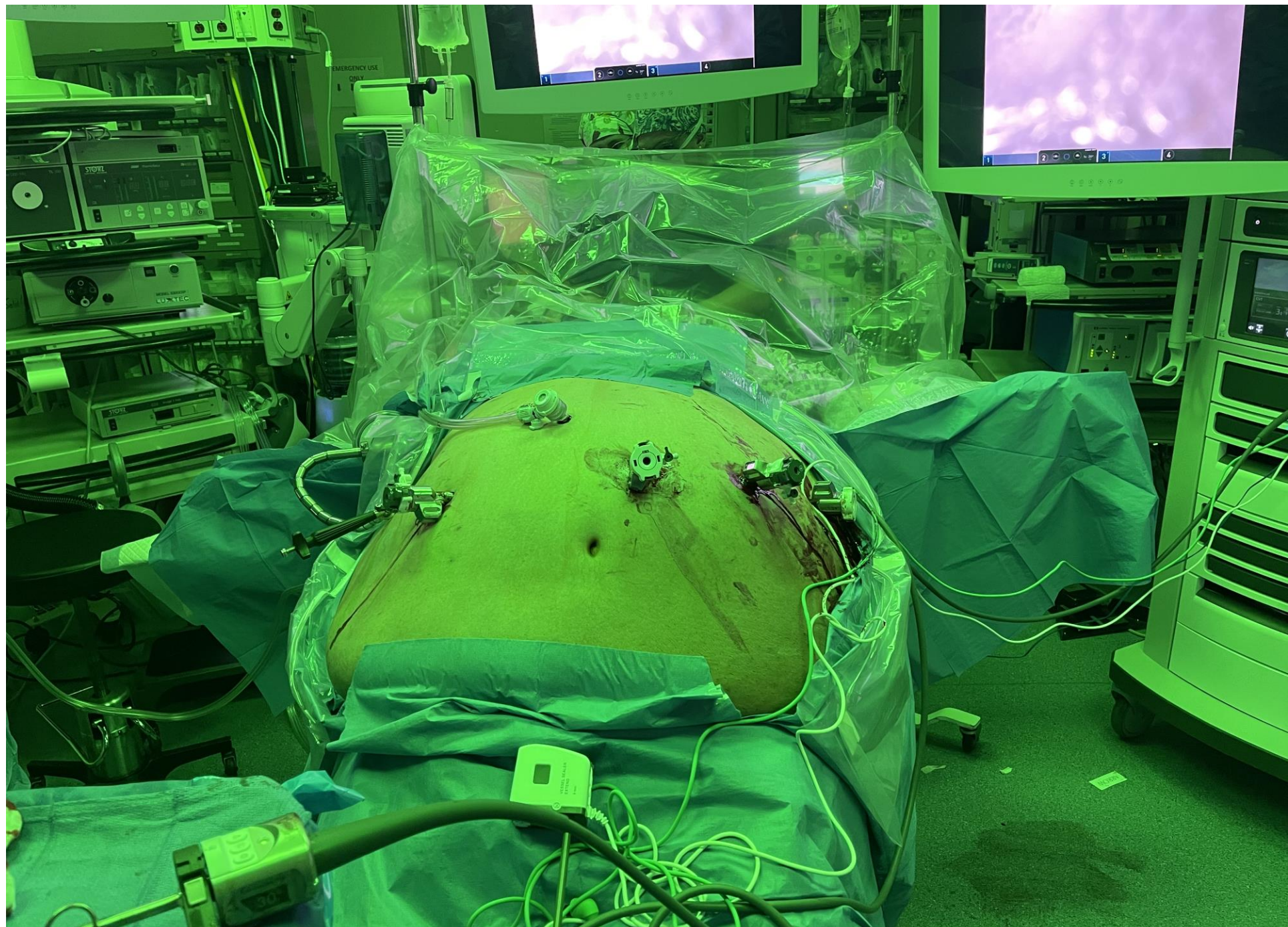
Trocar-site hernia is 18.8% on CT versus about 1% in clinic, and the epigastric port accounts for nearly all of it.

## 5 Ask for a deeper block before another retractor

Poor conditions carried a 61.5% complication rate against 15.3%. Retract the liver intermittently — it is free and it works.

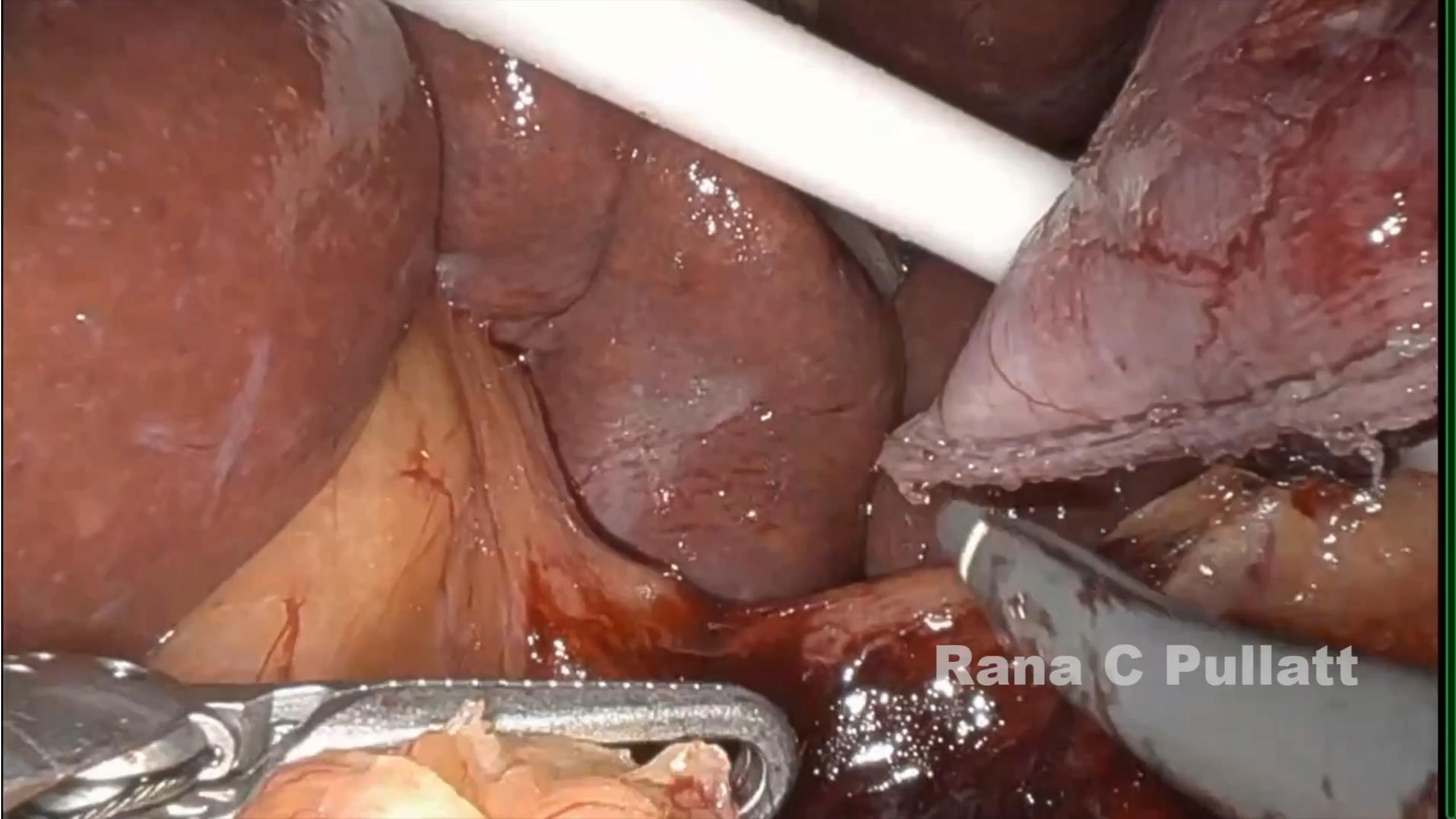
## 6 Use the robot where the wall is the enemy

At BMI  $\geq 60$  the laparoscopic time penalty catches up with the robotic one, and surgeon muscle load stops tracking BMI. Be equally clear it has not shown benefit for bypass at this BMI.





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Thank You  
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