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XXIX IFSO World Congress

1-4 September 2026
Toronto, Canada

Anatomical Variability of Total Small Bowel Length in Thai Bariatric Patients: Sequential Measurement, Predictors, and Metabolic Associations

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PSU PRINCE OF SONGKLA UNIVERSITY

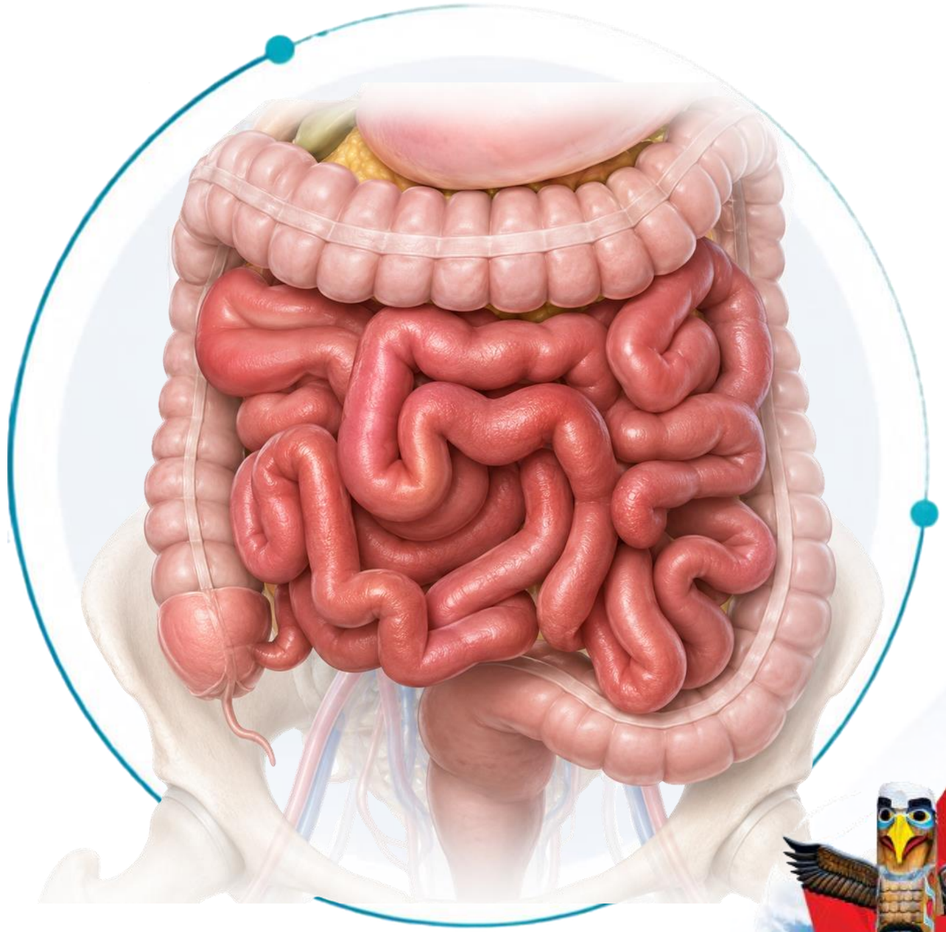
TORONTO2026 The Future of Obesity Management: From Weight Loss to Health Gain

Nothing to disclose

Background

- TSBL **varies widely** (506.5–795 cm)
- Thai bariatric **TSBL not well reported**
- Preoperative prediction may **prevent** severe malnutrition
- **Height** is the most consistently reported determinant

Multiple anthropometric factors have been reported to influence TSBL



Objectives

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Primary objectives

Characterize TSBL
in Thai bariatric patients

Qualify small bowel shortening
after intraoperative manipulation

Identify predictors
of initial and short TSBL

Secondary objective

E**xplore metabolic associations** with TSBL
(T2DM, glycemic burden, HT, DLP, lipid profiles, MetS)

Material and method

Prospective study

Enrolled patients

- Adult patients >= 18 years old with morbid obesity
- Underwent bariatric surgery
- Between November 2020 and April 2025
- No history of prior small bowel surgery or significant intra-abdominal adhesions

Material and method

- **Small bowel length measurement**
  - Using a 100-cm umbilical tape for measure the antimesenteric border of the small bowel from ligament of Treitz to the IC valve

- **Single surgeon measurement**
- **Two sequential measurements**

Initial measurement:
Immediate measurement after abdominal entry

Post-manipulation measurement:
A sequential measurement after initial measurement

Results

Baseline demographic, anthropometric and metabolic variables

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A total 200 patients

33.1 years Mean age

45.46 kg/m² Mean BMI

60 % Female

Demographic & anthropometric

Sex	Female 120 (60%) : Male 80 (40%)
Weight	124.96 ± 26.04 kg
Height	165.48 ± 8.68 cm
BMI	45.46 ± 7.86 kg/m2

Metabolic profile

Diabetes mellitus	52 (26%)
Hypertension	60 (30%)
Dyslipidemia	174 (87%)
Metabolic syndrome	130 (65%)
HbA1C	6.14 ± 1.17%
Triglyceride	150.35 ± 103.51 mg/dL
HDL	43.62 ± 9.19 mg/dL

Results

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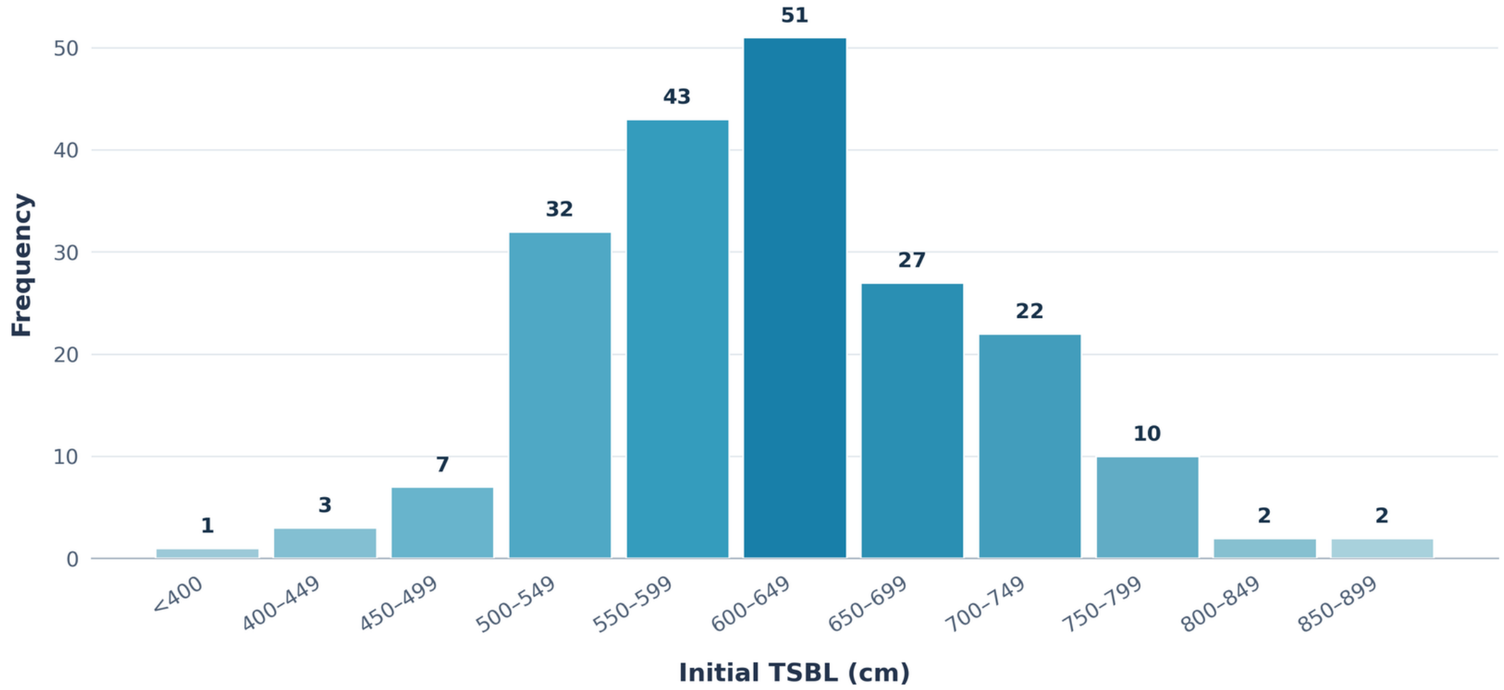
A total **200** patients

The initial total small bowel length (TSBL) was **615.17 ± 85.27 cm** (range 380–853 cm)



Results

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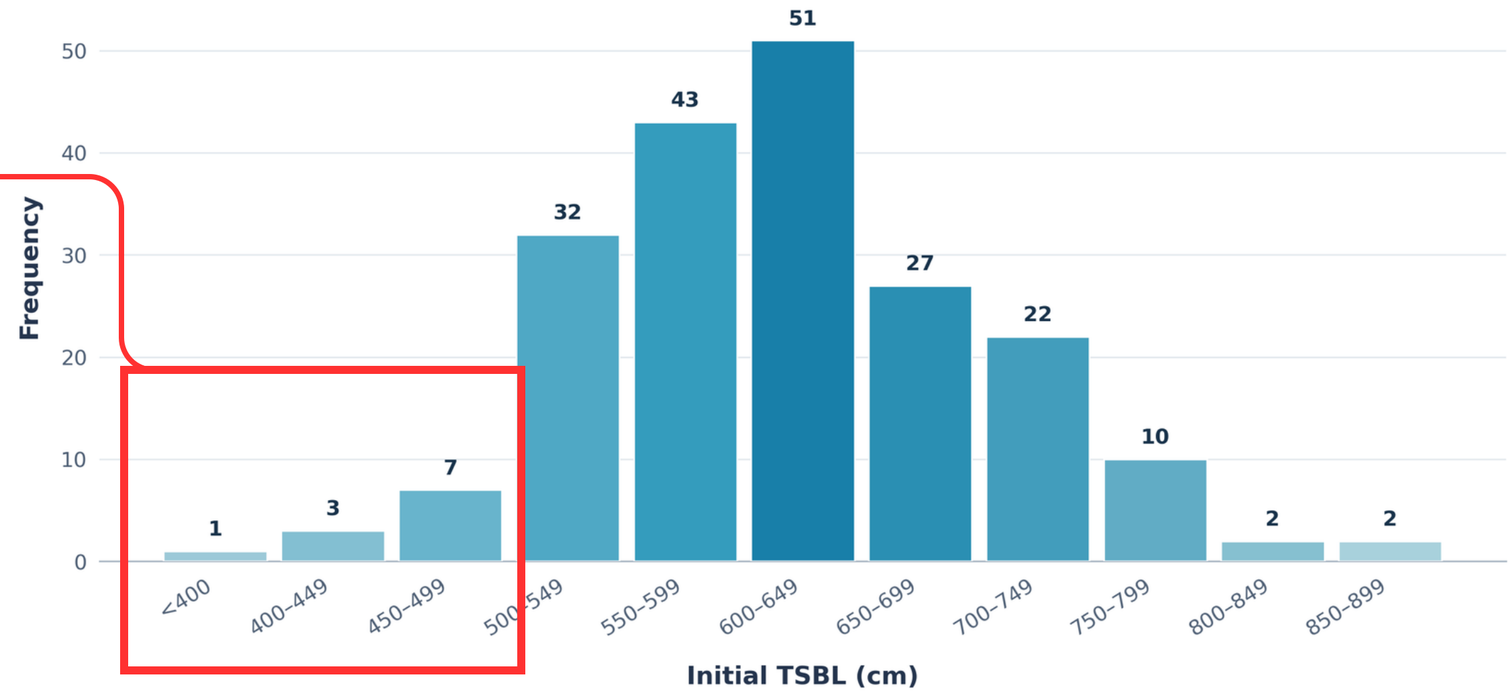
A total **200** patients

The initial total small bowel length (TSBL) was **615.17 ± 85.27 cm** (range 380–853 cm)

Short TSBL (<500 cm)

11 patients (5.5%)



Results

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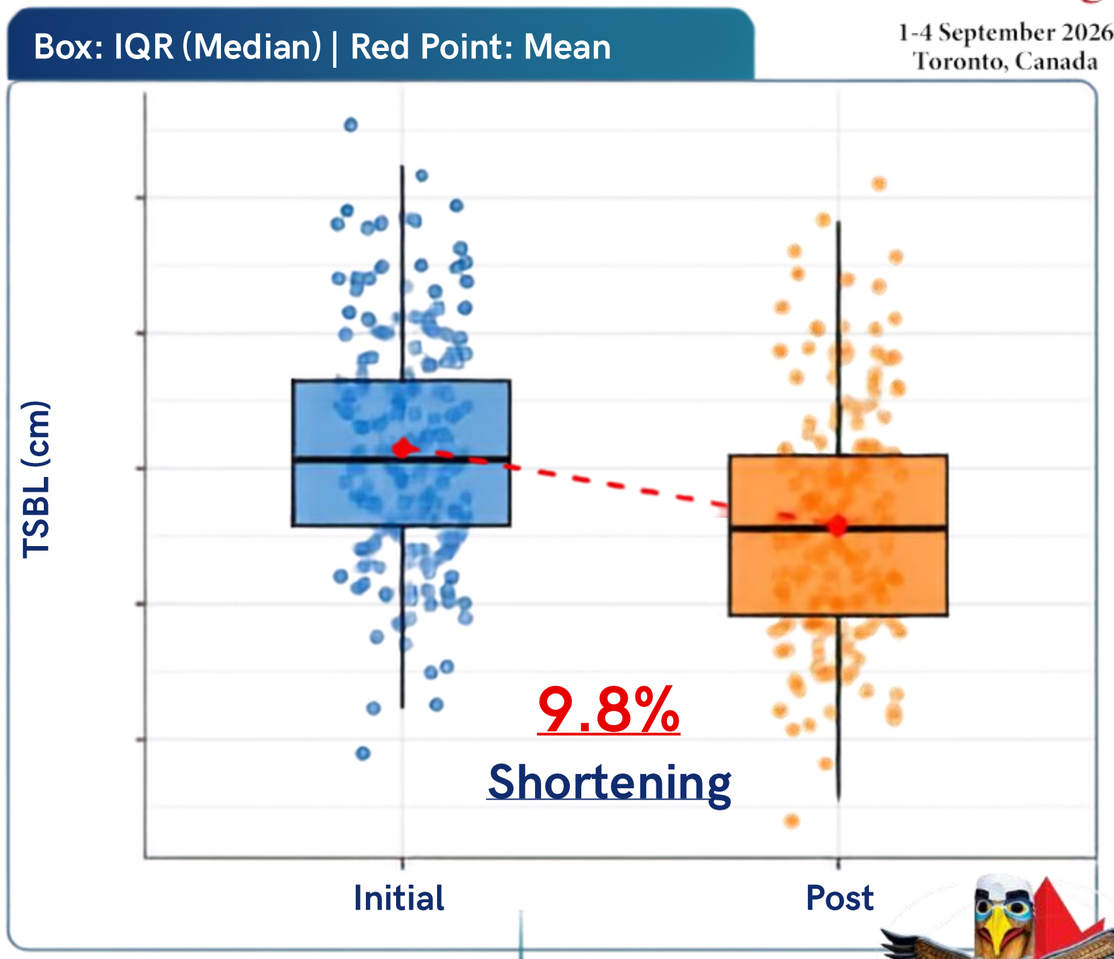
The initial total small bowel length (TSBL) was
615.17 ± 85.27 cm

The post-manipulation TSBL was
557.21 ± 84.45 cm

A significant reduction in **TSBL after** manipulation with a mean difference of **-57.96 cm** (95% CI -64.20 to -51.71; P < 0.001)

A significant reduction in a median percent shortening of **9.8%** (IQR 5.7–13.6; P < 0.001)



RESULTS

Multivariable regression models of TSBL

Using anthropometric variables

A Model A: Age, Gender, Weight and Height

Variable	β (beta)	95% CI for β	P value
Age	0.95	-0.33 to 2.23	0.146
Gender [female]	-3.23	-35.40 to 28.94	0.844
Weight (kg)	0.68	0.13 to 1.23	0.015 *
Height (cm)	2.16	0.27 to 4.06	0.025 *

$R^2 = 0.140$

RESULTS

Multivariable regression models of TSBL

Using metabolic variables

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A Model A: Age, Gender, Weight, Height and Diabetes Mellitus

Variable	β (beta)	95% CI for β	P value
Age	0.54	-0.76 to 1.85	0.415
Gender [female]	-3.34	-35.16 to 28.48	0.837
Weight (kg)	0.62	0.09 to 1.18	0.022 *
Height (cm)	2.11	0.23 to 3.99	0.027 *
DM	30.38	4.49 to 56.26	0.021 *

$R^2 = 0.162$

B Model B: Age, Gender, Weight, Height and HbA1C

Variable	β (beta)	95% CI for β	P value
Age	0.65	-0.59 to 1.89	0.301
Gender [female]	-6.12	-37.11 to 24.86	0.698
Weight (kg)	0.70	0.17 to 1.22	0.009 **
Height (cm)	1.93	0.10 to 3.76	0.039 *
HbA1C (%)	19.12	9.93 to 28.31	<0.001 **

$R^2 = 0.207$

C Model C: Age, Gender, Weight, Height, HbA1C and DM drug use

Variable	β (beta)	95% CI for β	P value
Age	0.83	-0.45 to 2.12	0.205
Gender [female]	-7.67	-38.80 to 23.45	0.629
Weight (kg)	0.71	0.18 to 1.24	0.008 **
Height (cm)	1.90	0.07 to 3.73	0.042 *
HbA1C (%)	22.86	11.16 to 34.56	<0.001 **
DM drug use	-18.86	-55.36 to 17.63	0.311

$R^2 = 0.212$

KEY TAKEAWAYS

Diabetes mellitus is independently associated with **longer TSBL.**

Higher HbA1c is the strongest predictor of **longer TSBL.**

HIGHLIGHT

*What predicts a **longer** Total Small Bowel Length (TSBL)?*

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BEST PREDICTIVE MODEL

Combined anthropometric & metabolic variables

Variable	β (beta)	95% CI for β	P value
Weight (kg)	0.65	0.15 – 1.15	0.011 *
Height (cm)	2.09	0.60 – 3.58	0.006 *
HbA1c (%)	19.59	10.48 – 28.70	<0.001 **

Model explanatory power $R^2 = 0.202$

KEY TAKEAWAYS

Higher weight is associated with longer TSBL.

Higher height is associated with longer TSBL.

Higher HbA1c is the **strongest predictor** of longer TSBL.

PRE-OPERATIVE PREDICTIVE TSBL FORMULA

$$\textit{Initial TSBL (cm)} = \underset{\text{(Constant)}}{67.7589} + \underset{\text{(Weight (kg)}}{0.6491} \times \underset{\text{(Height (cm)}}{2.0908} \times \underset{\text{(HbA1c (\%)}}{19.59899}$$

* $P < 0.05$ ** $P < 0.01$

STUDY SUMMARY & TAKE HOME MESSAGES

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Wide variability in TSBL

615.17 ± 85.27

(range 380–853 cm)

5.5%

TSBL <500 cm

Measure Individually

supporting individualized measurement when tailoring bypass procedures to minimize nutritional risk.

Bowel handling shortens TSBL

with an average **9.8% decrease**

Measure consistently

Bowel manipulation may shorten length by ~10% and bias measurement.

Anthropometric & Metabolic associations

Weight, height, and HbA1c

Independent predictor I Model R^2 = 20.2%

Connect anatomy with metabolic

Longer TSBL was associated with diabetes and higher HbA1C, suggesting

a link between intestinal anatomy and glycemic burden

New hypothesis

Dose bowel length influence glycemia? -or

Dose chronic hyperglycemia drive intestinal adaptation?