Bariatric endoscopy approach without surgery in Adult and Adolescent

Dr. Tarek Saleh
Gastroenterologist
www.drtareksaleh.com
I. Target of bariatric endoscopy

II. Endoscopic devices
   A. Gastric
      - Balloons
      - Gastric remodeling
         • POSE Gastroplasty
         • Endoscopic Sleeve Gastroplasty: ESG
         • Endomina Gastroplasty
         • Endoscopic revision of gastric bypass
   B. Ablative techniques in the duodenum

III. Summary

Obesity
I. Obesity is a serious chronic condition and is associated with comorbidities

II. Even moderate weight loss improve comorbidities: 5% of total body weight loss will correct: diabetes, hypercholesterolemia and high blood pressure

III. Guidelines for endoscopic treatment (ASGE): >25% of EWL or >5% of TBWL

IV. Our target in endoscopic procedures is achieve 10% of total body weight loss

V. But weight loss is difficult; and preventing weight regain after weight loss may be even more difficult
Treatment of NAFLD with diet, physical activity and exercise

- NASH-resolution: 10%, 26%, 64%, 90%
- FIBROSIS-regression: 45%, 38%, 50%, 81%
- STEATOSIS improvement: 35%, 65%, 76%, 100%
- % Patients achieving WL: 70%, 12%, 9%, 10%

52 weeks of lifestyle intervention

Metabolic improvement
Rule out eating disorders before any endoscopic procedures

**SCOFF screening test for eating disorders**

- 1. Do you make yourself **Sick** because you feel uncomfortably full?
- 2. Do you worry you have lost **Control** over how much you eat?
- 3. Have you recently lost more than **One** stone’s worth of weight (14 pounds) in a 3-month period?
- 4. Do you believe yourself to be **Fat** when others say you are too thin?
- 5. Would you say that **Food** dominates your life?

Answering yes to two of these questions is a strong indicator of an eating disorder.

Bariatric endoscopy: Novel anti-obesity therapies
• Doctors need multiple options to treat patients on an individual basis: there is not one therapy to meet all patient needs
• Patients are seeking non-surgical options: 74% have not considered bariatric surgery, primarily because:*  
  • 32% are afraid of having surgery  
  • 28% are not overweight enough  
  • 18% have heard of problems others have had
• Balloons are ideal for those struggling to lose weight through diet alone, who wish to avoid or don’t qualify for surgery
• Balloons are also useful in facilitating weight loss prior to surgical procedures to improve safety outcomes

*U.S. Consumer Research, N=425, Age 21-60, BMI 30-40
Patients consider the following attributes of intra-gastric balloon therapy to be important:

1. Doesn’t permanently change stomach or alter anatomy
2. Minimal Downtime for Patient
3. Not Surgery, No Incisions or Scars
4. Medically Supervised Diet and Behavior Modification Counseling
5. Outpatient 20-minute Procedure
6. No General Anesthesia
7. Doesn’t Restrict the Type of Food You Eat, Just the Quantity
8. Fast-track Weight Loss—Losing Weight Over a 6-month Period
Balloon History: Garren-Edwards Bubble

1984 Garren gastric bubble publications
- Polyurethane
- Air Filled
- 220 ml
- Sharp edges
- Recommended placement: 3 months
In 1987 Obesity Congress “Tarpon Springs” (USA), Scientific conference held with 75 international experts from the fields of gastroenterology, surgery, obesity, nutrition and to develop a general consensus on this technology

- Be effective at promoting weight loss
- Be filled with liquid (not air)
- Be capable of adjustment to various sizes
- Have smooth surface and low potential for causing ulcer and obstructions
- Contain a radiopaque marker that allows proper follow-up of the device if it deflates
- Be constructed of durable materials that DO NOT LEAK
Gastric Balloons

1. Liquid filled Balloon, for 6 months. FDA
2. Adjustable Balloon liquid filled for 1 year
3. liquid filled double balloon for 6 months. FDA
4. (3 capsules balloon) : air filled for 6 months. FDA
5. Air filled balloon for 6 months
6. Capsule liquid filled for 4 months
7. liquid filled for 1 year
Intragastric balloon procedure
Procedure-less Gastric Balloon
Indications for Balloon insertion

- BMI from 27 to 40: Patient who need to lose from 10 to 30 kg
- BMI >40 refusing bariatric surgery
- Super morbid obese patients who need to lose weight before surgery
Indications for Balloon insertion in Children

- Must have tried at least 6 months of intensive lifestyle treatment
- Demonstrate emotional and cognitive maturity
  - Screen for depression
- Demonstrate physical maturity
  - Completed at least >95% of estimated growth
  - Tanner Stage 4-5 for puberty rating
  - Generally >13 years of girls
  - >15 years for boys
Indications for Balloon insertion in Children

-Lifestyle Changes: Demonstrated ability to understand and comply with lifestyle changes postoperatively (nutrition, physical activity, supplementation medical follow up)

-Psychosocial

  • Mature decision making and ability to provide informed consent
  • Appropriate social support without abuse or neglect
  • If psychiatric condition is present (i.e. anxiety, depression, binge-eating disorder), it is under treatment
  • Family/patient have ability and motivation to comply with recommended treatment
  • Compliance with office visits
Contraindications

- Inflammatory disorders or ulcer
- Any previous gastric surgery
- Bleeding conditions, blood thinners medications, use of Non steroids anti-inflammatory drugs
- Achalasia or severe esophageal motility disorders
- Esophageal or pharyngeal stricture or diverticulum
- Psychiatric disorders, severe eating disorders
- Alcoholism or drug addiction
- Refuse of diet and behavior modification program
- Pregnant or breast feeding
Bazerbachi and Abu Dayyeh, et al. Obesity Surgery 2018
Diet following balloon placement

- **PHASE 1: Liquids / Fluids only (week 1)**
  
  stomach can only accept liquids during this phase.

- **PHASE 2: Soft Pureed and Mashed Food (week 2)**

  now it is time to add non-liquid food to your diet, but only if it’s very soft, mashed or has been pureed.

- **PHASE 3: Solid food (week 3)**

  Portions MUST still be small but it is no longer necessary to puree or mash your food.
Days 1-3: Clear Liquid Diet

<table>
<thead>
<tr>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ice chips</td>
</tr>
<tr>
<td>• Small sips of water</td>
</tr>
<tr>
<td>• Clear broth (fat free and low salt) chicken, beef or vegetables. or a low salt stock cube diluted in hot water</td>
</tr>
<tr>
<td>• Sugar free gelatin/Jell-O</td>
</tr>
<tr>
<td>• Unsweetened diluted Fruit juices without pulp, such as apple diluted in water (1 cup per day. Always mix ½ cup juice with ½ cup water)</td>
</tr>
<tr>
<td>• Coconut water (1 cup per day)</td>
</tr>
<tr>
<td>• Sugar free Sports drinks</td>
</tr>
<tr>
<td>• Herbal tea without milk or cream or sugar</td>
</tr>
<tr>
<td>• Pure Honey (1 tsp.)</td>
</tr>
</tbody>
</table>
Days 4-7: Full Liquid Diet

Food and beverages recommended in this phase (in addition to the previous ones included in the clear liquid diet)

<table>
<thead>
<tr>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat-free dairy (milk, yogurt), without chunks of fruits</td>
</tr>
<tr>
<td>Sugar free gelatin/Jell-O and custard or mouhallabieh (low fat milk)</td>
</tr>
<tr>
<td>Herbal, green tea, chamomile, anise without sugar (you can add fat-free milk)</td>
</tr>
<tr>
<td>Low fat labneh or low fat spreadable cheese or cottage cheese</td>
</tr>
<tr>
<td>Soups (mixed in the blender). You can add any vegetable, potato, meat, chicken, lentils...</td>
</tr>
<tr>
<td>Optifast shakes (vanilla, chocolate or strawberry)</td>
</tr>
<tr>
<td>Oatmeal cooked with skimmed milk</td>
</tr>
</tbody>
</table>
Removal of gastric balloon

- Should be on liquid diet 48 hours before removal or adjustment
- Done under deep sedation
- Use of special needle and balloon extractor
- If air filled, no need to be on liquid diet before
How to choose

- Air filled balloon: less pain and vomiting but less weight loss because of no impact in gastric emptying

- Liquid filled balloon: induce pain and vomiting the first 3 to 4 days but more weight loss: decrease gastric emptying

- Adjustable balloon to reduce the volume if intolerance (reducing 100 to 150 ccc) or increase the volume after 3 months to reboots weight loss (250 cc more)
<table>
<thead>
<tr>
<th>Group</th>
<th>At removal</th>
<th>6 – 12 months after IGB removal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean weight loss, kg</td>
</tr>
<tr>
<td>All</td>
<td>35</td>
<td>11.94</td>
</tr>
<tr>
<td>BMI&lt;30</td>
<td>2</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI 30–35</td>
<td>15</td>
<td>8.3</td>
</tr>
<tr>
<td>BMI 35–40</td>
<td>18</td>
<td>21.1</td>
</tr>
</tbody>
</table>

IGB, intragastric balloon; EWL, excess weight loss; BMI, body mass index.

The Problem: Weight Regain After Intragastric Balloon Removal

Dr Alfredo Genco, Obesity Surgery, November 2010, Volume 20
<table>
<thead>
<tr>
<th>Group</th>
<th>Positioning time</th>
<th>Removal time (6 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI</td>
<td>%EBL</td>
</tr>
<tr>
<td>A</td>
<td>34.2 ± 3.9</td>
<td>43.5 ± 3.9</td>
</tr>
<tr>
<td>B</td>
<td>34.8 ± 3.3</td>
<td>45.2 ± 22.5</td>
</tr>
</tbody>
</table>

Mean BMI and mean %EBL at time of second BIB positioning and its removal (Group B) compared with patient underwent only diet (Group A)

*p < 0.05
Initial, intermediate, and final mean BMI, according to Group A (BIB + diet) and B (BIB + BIB)

Dr Alfredo Genco, *Obesity Surgery*, November 2010, Volume 20
Fig. 1 Mean body mass index in 112 patients who underwent sequential treatment with a second intragastric balloon.
The Problem: Weight Regain After Intragastric Balloon Removal
<table>
<thead>
<tr>
<th></th>
<th>IGB with medication (n=18)</th>
<th>IGB without medication (n=93)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>46.6</td>
<td>46.8</td>
</tr>
<tr>
<td>Gender (%)</td>
<td>83.3% female</td>
<td>88.2% female</td>
</tr>
<tr>
<td></td>
<td>16.7% male</td>
<td>11.8% male</td>
</tr>
<tr>
<td>Starting BMI, kg/m²</td>
<td>$35.5 \pm 4.2$ kg/m²</td>
<td>$34.7 \pm 6.7$ kg/m²</td>
</tr>
<tr>
<td>%TBWL at 6 months</td>
<td>$13.3% \pm 7.6$</td>
<td>$14.2% \pm 6.7$</td>
</tr>
<tr>
<td>%TBWL at 12 months</td>
<td>$21.4% \pm 8.7$</td>
<td>$13.1% \pm 8.6$</td>
</tr>
</tbody>
</table>
The Evolution of Surgical Devices

Open Surgery  Laparoscopic Surgery  Endoluminal Surgery

Different access = Different devices = Different Ergonomics
Endoluminal Surgery

- POSE procedure: Gastric Plications
- Endoscopic Sleeve Gastroplasty
-Revision of Gastric Bypass
How does the *pose procedure* work?

The physician passes miniaturized instruments through the mouth and into the stomach.
How does the *pose procedure* work?

The physician then secures folds in the upper portion of the stomach that stretches when you eat a big meal.
POSE
procedure
Figure 1.
Greater Gastric Curvature Endoscopic Tubularization Using Snowshoe Anchors for Weight Loss: A First Inhuman Pilot Prospective Feasibility Study of the POSE 2.0 Procedure

Background

Endoscopic procedures targeting the stomach have been an attractive target for endoscopic bariatric and metabolic therapies; however, most approved devices are temporary with risk of weight residuum after device removal.

Objectives

The aim of the current pilot study is to prospectively evaluate the safety and feasibility of gastric volume reduction and tubularization of the greater curvature of the stomach leaving a small gastric fundus pouch using durable full-thickness supported anchors (i-Catch™ EZ Delivery Catheter with Snowshoe® Suture Anchors, USGI Medical, San Clemente, CA). We also assessed the impact of this procedure on gastric physiology.

Methods

Patients with Class III obesity were enrolled. The procedure was performed under general anesthesia. Patients followed a low-calorie lifestyle program for 12 months after the procedure and were prospectively followed to record adverse events and efficacy endpoints. Gastric intubation, upper GI series, and repeat endoscopy were performed after the procedure.

Procedure

The POSE-G Procedure: Targeting Gastric Emptying and Accommodation

Results

- N = 10
- Demographics (Table 1)
- Average (±SD) of patients placed to achieve the desired final configuration
- All procedures were done as outpatient with procedural time of 58 ± 11 minutes.
- No major adverse events occurred. One patient was hospitalized for one day observation after the procedure with the remainder of the procedures performed as an outpatient.
- One patient was lost to follow-up.
- Average percent total body weight loss (TfWt%) after 12 months: 22.3 ± 3.9% and 24.7 ± 4.3% (BMI). On an intention to treat analysis (ITT), 64.5% of patients achieved a 10% TfWt at 12 months.
- Upper GI series documented reduction of the greater curvature of the stomach in all patients (Figures 2 & 2).
- Repeat endoscopy at 4 months demonstrated durability of the tubularizations. In addition, this new procedure resulted in significant perturbations in gastric physiological parameters regulating appetite (Figure 5).

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean (±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Body Weight Loss (%)</td>
<td>22.3 ± 3.9%</td>
</tr>
<tr>
<td>BMI change (kg/m²)</td>
<td>24.7 ± 4.3%</td>
</tr>
<tr>
<td>Number of Anchor Deployed</td>
<td>32.4</td>
</tr>
<tr>
<td>Average (±SD)</td>
<td>83.8 ± 11</td>
</tr>
<tr>
<td>Procedure time (min) (mean)</td>
<td>58.5 ± 11</td>
</tr>
<tr>
<td>Post-procedure evaluation (≤ 6 months)</td>
<td>Loss of 10% change in weight</td>
</tr>
</tbody>
</table>

Conclusions

Greater gastric curvature tubularization using snowshoe endoscopic anchors is a promising new endoscopic bariatric and metabolic therapy with the potential for long-term durability and weight maintenance.
<table>
<thead>
<tr>
<th>Table: Demographics, Adverse Events, %TBWL, and Responders Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=13</td>
</tr>
<tr>
<td>Sex (% female)</td>
</tr>
<tr>
<td>BMI kg/m² (mean ± SD)</td>
</tr>
<tr>
<td>Number of Anchors placed (mean ± SD)</td>
</tr>
<tr>
<td>Procedure time (min) (mean ± SD)</td>
</tr>
<tr>
<td>Post procedure observation pain &amp; nausea (N)</td>
</tr>
<tr>
<td>Bleeding/Perforation/Infection/Death</td>
</tr>
<tr>
<td>1- Percent Total Body Weight Loss (%TBWL) at 3 months (mean ± SD)</td>
</tr>
<tr>
<td>2- Percent Total Body Weight Loss (%TBWL) at 12 months (mean ± SD)</td>
</tr>
<tr>
<td>3- Responder rate &gt;10%TBWL at 12 months (ITT)</td>
</tr>
</tbody>
</table>
Good news

The procedure got FDA approval to start trials in USA and trials already ongoing in Spain
Gastric EBTs: Gastric remodeling / plication
ENDOSCOPIC SLEEVE GASTROPLASTY
Endoscopic Sleeve Gastroplasty
Final Anatomic and Physiological Manipulation
ESG Multi-Center Studies (N = 508)

- Sartoretto, Sui, Hill, et al. Obesity Surgery 2018
- Morales, Perez, Morques, et al. Surgical Endoscopy 2018
### Impact on Comorbidities with ESG

<table>
<thead>
<tr>
<th></th>
<th>Prior to ESG, mean (SD)</th>
<th>12months after ESG, mean (SD)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HgbA1c, % (all patients)</td>
<td>6.1 (1.1)</td>
<td>5.5 (0.48)</td>
<td>0.05</td>
</tr>
<tr>
<td>HgbA1c, % (only diabetics and prediabetics)</td>
<td>6.6(1.2)</td>
<td>5.6 (0.51)</td>
<td>0.02</td>
</tr>
<tr>
<td>Waist circumference, cm</td>
<td>119.66 (14.05)</td>
<td>92.75 (5.85)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Systolic blood pressure, mmHg</td>
<td>129.02 (13.44)</td>
<td>122.23 (11.69)</td>
<td>0.023</td>
</tr>
<tr>
<td>LDL, mg/dL</td>
<td>121.62 (38.61)</td>
<td>124.27 (27.82)</td>
<td>0.786</td>
</tr>
<tr>
<td>TG, mg/dL</td>
<td>131.84 (83.19)</td>
<td>92.36 (39.43)</td>
<td>0.017</td>
</tr>
<tr>
<td>ALT (mg/dL)</td>
<td>32.28 (16.43)</td>
<td>20.68 (11.44)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
ENDOMINA PROCEDURE
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>1 month</th>
<th>3 months</th>
<th>6 months</th>
<th>9 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>51</td>
<td>50</td>
<td>49</td>
<td>49</td>
<td>48</td>
<td>45</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>35.1 (3.0)</td>
<td>33.2 (3.0)</td>
<td>32.5 (3.0)</td>
<td>32.2 (3.4)</td>
<td>32.3 (3.9)</td>
<td>32.6 (4.1)</td>
</tr>
<tr>
<td>Weight Loss (kg)</td>
<td>-</td>
<td>5.3 (2.6)</td>
<td>7.4 (3.7)</td>
<td>8.1 (5.0)</td>
<td>8.2 (5.9)</td>
<td>7.1 (6.4)</td>
</tr>
<tr>
<td>Excess Weight Loss (%)</td>
<td>-</td>
<td>20 (10)</td>
<td>28 (15)</td>
<td>31 (20)</td>
<td>33 (26)</td>
<td>29 (28)</td>
</tr>
<tr>
<td>Total Body Weight Loss (%)</td>
<td>-</td>
<td>5 (2)</td>
<td>8 (3)</td>
<td>8 (5)</td>
<td>8 (6)</td>
<td>7 (7)</td>
</tr>
</tbody>
</table>

Huberty et Al Endoscopy 2018
# Post-procedure typical recommendations

<table>
<thead>
<tr>
<th></th>
<th>Phase 1</th>
<th>Phase II</th>
<th>Phase III</th>
<th>Phase IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week</strong></td>
<td>Week 1-2</td>
<td>Week 3-4</td>
<td>Week 5</td>
<td>Week 6 on</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Fluids only</td>
<td>Soft-Pureed</td>
<td>Semi-soft or Mashed Diet</td>
<td>Solid Food</td>
</tr>
<tr>
<td><strong>Calories</strong></td>
<td>900Kcal</td>
<td>1200kcal</td>
<td>1500kcal</td>
<td>1500Kcal</td>
</tr>
<tr>
<td></td>
<td>Protein: 50g</td>
<td>Protein: 65g</td>
<td>Protein: 80g</td>
<td>Protein: 80g</td>
</tr>
<tr>
<td></td>
<td>Fat: 25g</td>
<td>Fat: 35g</td>
<td>Fat: 35g</td>
<td>Fat: 35g</td>
</tr>
<tr>
<td></td>
<td>Carbs: 100g</td>
<td>Carbs: 135g</td>
<td>Carbs: 200g</td>
<td>Carbs: 200g</td>
</tr>
<tr>
<td></td>
<td>Protein supplement necessary</td>
<td>Protein supplement necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluids</strong></td>
<td>2L fluid/day</td>
<td>1.5L/day</td>
<td>1.5L/day</td>
<td>1.5L/day</td>
</tr>
<tr>
<td><strong>Exercise</strong></td>
<td>Walk 2-3 X/day for 10 minutes each</td>
<td>Walk 2-3 X/day for 15 minutes each</td>
<td>aerobic 30-45 min exercise regime 3X week</td>
<td>aerobic 30-45 min exercise regime 5X week</td>
</tr>
</tbody>
</table>
ENDOSCOPIC REVISION OF ROUX & Y GASTRIC BYPASS
Prevalence of regain weight

- Most of RYGP regain weight 30% from weight nadir
- Over 20% of RYGP regain nearly all of their weight loss weight
- Regain weight in between 5 to 10 years: 10 to 20% estimated

Revision of gastric bypass
OverStitch™
Endoscopic Suturing System
# OverStitch: Weight Loss Results

<table>
<thead>
<tr>
<th>Months</th>
<th>n</th>
<th>Absolute</th>
<th>%RWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three</td>
<td>21</td>
<td>11.5kg (1.4-36.3kg)</td>
<td>63.8</td>
</tr>
<tr>
<td>Six</td>
<td>17</td>
<td>11.7kg (2.3-27.2kg)</td>
<td>69.5</td>
</tr>
<tr>
<td>Twelve</td>
<td>16</td>
<td>10.8kg (0.7-27.2kg)</td>
<td>56.3</td>
</tr>
</tbody>
</table>

- 88.9% achieved weight loss or stabilization of weight gain at 12 months
Ablative techniques in the duodenum
Bariatric surgery illustrates the critical role of the duodenum in causing insulin resistance.

- Surgery improves metabolic diseases
- Bypassing duodenum alone improves insulin resistance
- Compelling evidence duodenal mucosa is altered by diets high in fat & sugar
- This altered hormonal signaling probably leads to insulin resistance

Could an physiological abnormality of the duodenum, caused by excess sugar exposure, be at the root of metabolic diseases like T2D and NASH?
Early Preclinical Proof-of-Concept Studies in Rodent Model

Duodenal mucosal abrasion lowered hyperglycemia in GK rats

A. Balloon-inflated abrasion device

B. Normal duodenal mucosa

C. Duodenal mucosa after abrasion

D. Duodenal abrasion resulted in immediate lowering of hyperglycemia during an OGTT in the GK rat (n=9) (Fig E), compared to the parallel sham-treated GK rat cohort (n=5) that experienced no lowering of glycemia.
High fat and high sugar diets cause overgrowth in the duodenal lining resulting in serious metabolic disease.
Effect of DMR on HbA1c level and liver enzymes in the FIH cohort (most recent data capture of n = 48)

Figure 1. Post DMR change (mean ± SE) in (A) HbA1c, (B) FPG, (C) HOMA-IR, (D) weight, (E) ALT and (F) AST. E-F dotted grey lines ALT and AST levels divided into tertiles based on baseline levels (high: squares, middle: triangles, low: diamonds). ALT tertiles (E): high >39 U/L, middle 28-39 U/L, low <28 U/L. AST tertiles (F): high >28 U/L, middle 21-28 U/L, low <21 U/L. *p < 0.05, compared to baseline, repeated measures ANOVA Bonferroni correction.
• Endoscopic modulation of anatomy or endoscopic intervention on duodenal mucosa may improve diabetes type II
• If Surgery in Diabetes type II becomes an accepted option, transoral endotherapy is the future option
• If duodenal “resurfacing” works, it could be the least invasive non pharmacological to treat a new disease: metabolic enteropathy
Summary

1. The GI tract is front and central in weight and metabolic regulation
2. Level 1 of evidence demonstrate efficacity of endoscopic and metabolic bariatric therapies in achieving significant weight loss and metabolic improvement
3. Those devices are tools to reduce weight but more difficult is the sustainability
4. Association with medications should improve results
5. The future is bright lot’s of new devices are under trials
Thank you

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