Other FDA Approved Endoscopic Weight Loss Devices

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Division of Gastroenterology
NYU School of Medicine
A Global Epidemic
Scope of the Problem

• **Demographic:**
  - 66% of Americans are overweight or obese
  - VHA serves more than 9 million veterans
  - 78% are overweight or obese

• **Economic:**
  - Cost in 1998: $78.5 billion (6.5% of budget)
  - Cost in 2008: $148 billion (9.1% of budget)
  - 37% rise in obesity from 1998 to 2006

**Mayo Clinic Data of 30,000 employees:**

- **BMI<25**
  - Smoker: $1,275

- **BMI 30-35**
  - Smoker: $1,850

- **BMI>35**
  - Smoker: $5,500

Finkelstein EA et al. Health Affairs 2009
Wolf A, Obes Res 1998
## Obesity Treatment Guide

<table>
<thead>
<tr>
<th>Intervention</th>
<th>BMI Category (kg/m)</th>
<th>Effectiveness</th>
<th>Complications</th>
</tr>
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<tbody>
<tr>
<td>Diet, Exercise, Behavior Tx</td>
<td>25-26.9</td>
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<tr>
<td>Surgery</td>
<td>With co-morbidities</td>
<td>✔️</td>
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</tbody>
</table>

TOS Obesity Treatment Guidelines 2013
The bottom line...

- Lifestyle/medications hard to maintain, low efficacy
- Surgery alone cannot contain the obesity epidemic

New Therapeutic options that are more effective than medications and less invasive than surgery are needed
What is Bariatric Endoscopy?

• Treat **complications after weight loss surgery**
  – Revision of failed bypass
  – Treatment of complications: fistulas, leaks
• **Endoscopic weight loss methods**
  – Early intervention
  – Bridge to decrease surgery risk
  – Metabolic
Bariatric Endoscopic Methods: Primary Therapies

Primary Endoscopic Weight Loss

FDA-Approved
- Intragastric Balloons
- Endoscopic Gastroplasty
- Aspiration Therapy

Experimental Small Bowel Therapies
- Duodeno-jejunal liner
- Jejuno-ileal anastomosis
Aspiration Therapy

- Approved for age 22-65
- Indicated for BMI of 35 to 55 kg/m²
- Approved for long-term use
- Requires a nutritionist follow-up

Concept

• Percutaneous Endoscopic Gastrostomy (PEG) tubes
  – Used for feeding in patients unable to eat
  – Used for removal of gastric fluid in patients with intestinal obstruction

• AspireAssist® System
  – Concept developed by Drs. Sam Klein, Moshe Shike, and Steve Solomon
  – Used for Aspiration Therapy (AT): removal of a portion of gastric contents after a meal for weight loss

• AspireAssist used by over 1000 patients in US & Europe
  – Maximum duration of use to date: 6 years
Aspiration System

Device in Use

Device Not in Use
Placement: Standard PEG “pull” gastrostomy

Transillumination is required*

Discrete finger indentation

Standard “pull” technique

Intragastric “tail” on Aspire tube

External bolster for recovery

A-Tube curls into fundus

Transillumination successfully achieved in 99%* of patients

*One “failed” procedure where transillumination was not achieved initially, but was successfully achieved in a subsequent procedure via repositioning to Reverse Trendelenburg
Mechanisms of Action

**Lifestyle Therapy and Aspiration Therapy Use**

1. **CALORIC DIVERSION**
   - ≤30% of calories drained by AspireAssist
   - * Responsible for 50-80% of weight loss

2. **IMPROVED EATING BEHAVIOR**
   - Thorough chewing/ slower eating
   - Increased water consumption
   - Less snacking
   - Mindful Eating
   - Meal Planning

**Meal Consumption Time**

<table>
<thead>
<tr>
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<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Time</td>
<td>10.6</td>
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</table>

**Number of Snacks/ Day**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Snacks</td>
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<td>1.5</td>
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</table>

**Calorie Consumption**

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<tr>
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<th>Significantly decreased</th>
<th>Somewhat decreased</th>
<th>No change</th>
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<tbody>
<tr>
<td></td>
<td>47%</td>
<td>31%</td>
<td>17%</td>
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</table>

* Responsible for 50-80% of weight loss

Sullivan et al, Gastroenterology 2013; 145: 1245–1252
PATHWAY Study Design (FDA Phase III Trial)

2:1 RANDOMIZATION

- 111 AspireAssist, 60 Lifestyle Therapy

INCLUSION CRITERIA

- Body Mass Index (BMI) 35 – 55
- Age 21-65
- Failed previous weight loss attempts

EXCLUSION CRITERIA

- GI disease/previous abdominal surg. that increases risk of A-Tube placement
- Previous bariatric surgery
- Serious cardiovascular disease
- History of major depressive or other severe psychiatric disorders
- Use of medications that cause clinically significant weight gain or loss
- Bulimia, Binge-eating, Night-Eating Syndrome

PRIMARY ENDPOINTS

- Mean percent Excess Weight Loss (EWL) >10% over control at 52 weeks
- At least 50% “Responder Rate” at 52-weeks (defined as 25% EWL)

Institutions
- Boston Medical Center
- Brigham & Women’s Hospital
- Weill Cornell Medical College
- St. Mary Medical Center
- University of Pennsylvania
- Howard University
- Northwestern University
- Mayo Clinic
- Washington University
- VA Center/ UC San Diego

Sponsor
- Aspire Bariatrics, Inc.
- King of Prussia, PA

One-Year data lock June 2015; Continue to follow-up for 5 years
Procedure Success/ Data

• Successful endoscopic placement in 111 of 114 endoscopies (97%) in 113 subjects
  – Endoscopy aborted in 1 subject because of suspected gastric varices
  – Endoscopy aborted in 1 subject because of previous (undisclosed) Roux-en-Y gastric bypass surgery
  – Endoscopy aborted in 1 subject because of inadequate transillumination, but later success in a re-attempt

• 89 of 111 (80%) AT placements done under conscious sedation

• Mean procedure time: 15 ± 7 minutes

• Mean recovery time: 106 ± 48 minutes

PATHWAY Study: Two Co-Primary Endpoints Met

Co-Primary Endpoint #1
Mean %EWL at 52 Weeks of AT Group at least 10% greater than Control Group

Co-Primary Endpoint #2
At least 50% of AT group achieves 25 %EWL or more at 52 Weeks

PATHWAY* Study: Weight Loss Results

**Total Body Weight Loss**

- AspireAssist: 14.2%
- Control: 4.9%

**Excess Weight Loss**

- AspireAssist: 37.2%
- Control: 13.0%

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Baseline</th>
<th>52-week change**</th>
<th>P value</th>
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<tbody>
<tr>
<td>HbA1C (%)</td>
<td>5.7 ± 0.6</td>
<td>-0.36 ± 0.45</td>
<td>&lt;0.001</td>
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<tr>
<td>Systolic BP (mm Hg)*</td>
<td>124.2 ± 13.3</td>
<td>-2.3% ± 15.7%</td>
<td>0.38</td>
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<tr>
<td>Diastolic BP (mm Hg)*</td>
<td>78.8 ± 8.1</td>
<td>-2.4% ± 9.7%</td>
<td>0.06</td>
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<td>Total cholesterol (mg/dl)*</td>
<td>193.8 ± 37.4</td>
<td>-2.5% ± 12.9%</td>
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<tr>
<td>LDL-cholesterol (mg/dl)*</td>
<td>115.4 ± 32.8</td>
<td>-4.2% ± 19.4%</td>
<td>0.06</td>
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<td>HDL-cholesterol (mg/dl)*</td>
<td>52.2 ± 14.4</td>
<td>+8.1% ± 18.1%</td>
<td>&lt;0.001</td>
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<td>Triglyceride (mg/dl)*</td>
<td>140.8 ± 81.7</td>
<td>-9.9% ± 36.2%</td>
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<tr>
<td><strong>IWQOL:</strong></td>
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<tr>
<td>Total IWQOL score</td>
<td>63.8±17.9</td>
<td>16.3±17.7</td>
<td>&lt;0.001</td>
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<tr>
<td>Physical Function</td>
<td>60.2±20.4</td>
<td>18.7±20.6</td>
<td>&lt;0.001</td>
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<tr>
<td>Self-Esteem</td>
<td>51.6±25.2</td>
<td>7.6 ± 17.3</td>
<td>&lt;0.001</td>
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<tr>
<td>Sexual Life</td>
<td>70.5±28.1</td>
<td>13.4±24.4</td>
<td>&lt;0.001</td>
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<td>Public Distress</td>
<td>73.1±21.3</td>
<td>11.5±20.0</td>
<td>&lt;0.001</td>
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<tr>
<td>Work</td>
<td>78.0±22.4</td>
<td>12.5 ± 20.1</td>
<td>&lt;0.001</td>
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</tbody>
</table>

Safety

Few and relatively minor adverse events

Low Rate of Serious Adverse Events

Only 5 SAEs in 4 subjects, all easily resolved (3.6% SAE rate)

1. Perioperative pain, 1 night stay
   Resolved with pain medication
2. Perioperative mild peritonitis, 2 night stay. Resolved w/ IV antibiotics
   Resolved w/ A-Tube removal
4. Postoperative: A-Tube fungal growth, resolved w/ A-Tube replacement

No Metabolic / Electrolytic Abnormalities
Effect on Eating Behaviors

• Subjects assessed for binge-eating, bulimia, & night-eating syndrome
  – Eating Behavior Assessment: Questionnaire on Eating and Weight Patterns-Revised (QWEPR) and the Eating Disorder Examination
  – Assessments at Baseline, Week 14 (AT subjects only), Week 28, and Week 52
  – 1 Control subject developed binge-eating syndrome at Week 28 and was removed from study
  – No AT subject showed any evidence of worsening eating behaviors

• Frequency of aspiration monitored by Connector counts
  – No evidence of any subject excessively aspirating

• Self-reported data show an improvement in eating behaviors: more thorough chewing, more H2O consumption, less snacking, greater meal planning, mindful eating
  – Observed weight loss in AT subjects greater than can be explained through aspiration

Sullivan et al, Gastroenterology 2013; 145: 1245–1252
### Aspiration Therapy Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Location</th>
<th>PI</th>
<th>Start Date, First Patient</th>
<th>Start Date, Last Patient</th>
<th>Number of Patients Enrolled</th>
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<tbody>
<tr>
<td><strong>Controlled Studies</strong></td>
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<tr>
<td>RCT</td>
<td>St. Louis, MO</td>
<td>Steve Edmundowicz</td>
<td>3/2009</td>
<td>12/2009</td>
<td>18</td>
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<tr>
<td>RCT (“Pivotal Trial”)</td>
<td>USA (10 centers)</td>
<td>Chris Thompson Lou Aronne</td>
<td>12/2012</td>
<td>6/2014</td>
<td>171</td>
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<tr>
<td>Controlled AT vs RYGB</td>
<td>Karlskrona</td>
<td>Henrik Forssell</td>
<td>6/2015</td>
<td>1/2016</td>
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<tr>
<td>Adolescent Study</td>
<td>Ostrava, Czech Republic</td>
<td>Marek</td>
<td>7/2016</td>
<td>TBD</td>
<td>30</td>
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<tr>
<td><strong>Observational Studies</strong></td>
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<tr>
<td>Pilot Study</td>
<td>Monterrey, Mexico</td>
<td>Fernando Lavalle</td>
<td>9/2007</td>
<td>2/2008</td>
<td>11</td>
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<tr>
<td>Post-Market</td>
<td>Karlskrona, Sweden</td>
<td>Henrik Forssell</td>
<td>6/2012</td>
<td>9/2012</td>
<td>25</td>
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<tr>
<td>Post-Market</td>
<td>Spain, CZ Republic, Austria, Italy, Denmark, Holland</td>
<td>Machytka, Turro, Bammer, Testoni, Fehlert, Forssell</td>
<td>10/2012</td>
<td>Ongoing</td>
<td>~300</td>
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<tr>
<td>Super-Obese</td>
<td>CZ Republic, Spain</td>
<td>Machytka, Turro</td>
<td>9/2013</td>
<td>8/2015</td>
<td>30</td>
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</table>
Durable Weight Loss Across 4 Studies

%Excess Weight Loss

European, Baseline BMI=45.7 (1)
Swedish, Baseline BMI=39.7 (3)
Pivotal, Baseline BMI=42.4 (2)
US Feasibility, Baseline BMI=42.0 (4)

Months of Therapy

12 24 36 48

63 82 20 10
39 43 17 7
24 20 17 5
12

(4) Sullivan et al, Gastroenterology 2013; 145: 1245–1252
Long-term Results

- 85 patients enrolled from June 2012 to December 2016 in 3 centers (Ostrava, Czech Republic; Karlskrona, Sweden; Barcelona, Spain)

- Outcomes:

<table>
<thead>
<tr>
<th></th>
<th>1 yr</th>
<th>2 yrs</th>
<th>3 yrs</th>
<th>4 yrs</th>
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<tbody>
<tr>
<td>n</td>
<td>63</td>
<td>34</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>TBWL(±SD)</td>
<td>17.6%(8.6)</td>
<td>21.7%(10)</td>
<td>22.1%(9.7)</td>
<td>19.2(13.6)</td>
</tr>
</tbody>
</table>

Machytka E, Buzga, Turro R et al. IFSO 2017 O.169
### Long Term Weight Loss Results

<table>
<thead>
<tr>
<th>Time</th>
<th>%TWL (Mean ± SD)</th>
<th>%EWL (Mean ± SD)</th>
<th>AWL (kg) (Mean ± SD)</th>
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<tbody>
<tr>
<td>1 year</td>
<td>18% ± 8%</td>
<td>43% ± 23%</td>
<td>23 ± 13</td>
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<tr>
<td>2 Years</td>
<td>22% ± 10%</td>
<td>48% ± 27%</td>
<td>27 ± 15</td>
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<tr>
<td>3 Years</td>
<td>22% ± 10%</td>
<td>50% ± 26%</td>
<td>29 ± 17</td>
</tr>
<tr>
<td>4 years</td>
<td>20% ± 14%</td>
<td>48% ± 36%</td>
<td>25 ± 20</td>
</tr>
</tbody>
</table>

**Increasing weight loss through Year 3**

Mean Baseline BMI: 45.7 ± 8.2 kg/m²

Machtyka, Forssell, Noren, Turro. Aspiration Therapy as a Tool to Treat Obesity: One to Four Year Results in an 85-Patient Ongoing Multi-Center Post-Market Study. IFSO 2017
Results in Super Obese Patients

- 11 patients, mean age 44.9 (32-63); mean BMI 66.5 kg/m² (55-80.4)
- 100% successful placements; AE: Minor skin irritations in 3

<table>
<thead>
<tr>
<th>Results:</th>
<th>1 yr</th>
<th>2 yrs</th>
<th>3 yrs</th>
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<tbody>
<tr>
<td>Kg lost</td>
<td>42.1 kg</td>
<td>45 kg</td>
<td>45.7 kg</td>
</tr>
<tr>
<td>TBWL, %</td>
<td>21.9%</td>
<td>25.5%</td>
<td>25.7%</td>
</tr>
<tr>
<td>EWL, %</td>
<td>34.1%</td>
<td>38.8%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Machytka E, Buzga, Turro R, Huberty. IFSO 2017 P.153
US Clinical Study Patient Experience Survey

Overall Satisfaction

- Satisfied: 92%
- Neutral
- Dissatisfied

Would Recommend to a Friend

- Likely: 93%
- Neutral
- Unlikely

Hanna, Age 35
Lost 77 pounds in 1 year
A Bariatric Endoscopy Program in Managed Care

12+ Month Program

**Weight Loss**

**Move! Program/PCP/GI/Endocrine/Surgery**

**Balloons/ESG/Aspiration Therapy**

BMI 30 - 40 (35-55) Kg/m²

4 weeks
0 month
6 months
12 months
24 months

Initial assessment
Move! (2 visits)
Bariatric Clinic (2 visits)

Device

Move! 1x month
Labs, weight
Adverse events

Ongoing assessment
Labs, Weight Meds?
Patient Selection is Key

• Patient motivation important to success
• Poor candidates: people with highly chaotic/difficult lives
• Successful aspiration requires thorough chewing
• If poor weight loss: either not aspirating regularly or poor chewing
• Improved methods of teaching chewing to patients
• Important ingredients to success: lifestyle counseling + group meetings

In screening process, patients should be able to articulate how they plan to fit aspiration therapy into their daily schedule
The Multidisciplinary Team
Resources: Training

• Physician credentialing:
  – Bariatric endoscopy fellowship
  – Board Certification in Obesity Medicine
  – Completed training at a certified course and approval of privileges at local hospital
  – Association for Bariatric Endoscopy

• Nurses training:
  – Protocols
  – Training courses for nurses:
    • Miami Flexible Endoscopic Surgery Course,
    • proctoring, etc
Resources: Aftercare Program

- Registered Dietician:
  - Certified by the Academy of Nutrition and Dietetics
  - Training in Weight Management; Certified Specialist in Weight Management
- Lifestyle/Wellness Coach
- Support groups
- Shared visit
Billing

- Facility fee: hospital or office-based
- Anesthesiologist fee
- Nutritionist fee
- Device cost
- Complications
- Office-based IV hydration option
- Total cost should include facility, anesthesia and liability
- Cash-pay model
Comprehensive approach

- Obesity is a chronic disease that requires long-term multidisciplinary management plan and standards of care.

Wellness Program participation; Primary Care/GI/Endocrine/Surgery follow-up

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- Re-evaluate. If BMI ↑ offer other therapies, including meds.
- Re-evaluate. If BMI ↑ offer other therapies, including meds.
- Re-evaluate. If BMI ↑ offer other therapies, including meds.
- Endoscopic gastroplasty or Surgery
- Endoscopic gastroplasty or Surgery
New Treatment Paradigm

<table>
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<th>BMI Category (kg/m)</th>
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<td>Pharmaco-therapy</td>
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<tr>
<td>With co-morbidities</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Endoscopic therapies</td>
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<td></td>
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<tr>
<td>With co-morbidities</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Surgery</td>
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</table>
Thank you!

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@PopovVioleta