Laparoscopic One Anastomosis Gastric ByPass (OAGB)

“How do I do it”

Concepts and Results in a series of 13-years experience with 2,600 patients

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Hospital Campo Grande, Valladolid, Spain
7th International Congress of the Spanish Society of Obesity Surgery.
Valladolid - Spain
DIMINISHING POSTOPERATIVE RISKS OF GASTRIC BYPASS

- Stenosis
- Leak
- Bleeding
- Chronic Marginal Ulcer
- Severe Dumping

One Anastomosis GB
12 Possible Risk Factors

Failure in Weight Loss or Weight Regain!!!

Two Anastomosis GB
4 Possible Risk Factors

Obstruction??

Stenosis
Leak
Bleeding
Obstruction
Volvulus
Intussusception
Internal Hernia

Procedure of Dr. Carbajo
Laparoscopic One Anastomosis Gastric Bypass (OAGB)
LAPAROSCOPIC ONE ANASTOMOSIS GASTRIC BYPASS
ROBOTIC - IDRIVE ULTRA POWERED STAPLING SYSTEM
(OAGB)

KEY STEPS OF THE PROCEDURE

1. **Bilio-Pancreatic Limb:** between 250 to 350 cm average.

2. **Section of Greater Omentum:** in supermorbid and central obesity.

3. **Hiss Angle, Fat and G-E membrane Totally Dissected.**

4. **Gastric Pouch:** length: ~ 15cm, capacity: ~ 30 cc. *(calibrated with a 36 French tube).* Total dissection of fat in the posterior gastric wall.

5. **“Anti-reflux Mechanism”**: afferent loop suspended at least 10 cm on the gastric pouch.

6. **Gastro-Ileal Anastomosis Side to Side:** ~ 2.5 cm. width.
LAPAROSCOPIC ONE ANASTOMOSIS GASTRIC BYPASS
ROBOTIC - IDRIVE ULTRA POWERED STAPLING SYSTEM
(OAGB)

Post-operative X-Ray control

Radiologic control at 5 years
**RESULTS:** Patient Characteristics (July 2002 to February 2015)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td>43 (12 - 74)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>1599 (61.5%)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>1001 (38.5%)</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td>46 (31 - 86)</td>
</tr>
<tr>
<td><strong>EBW (kg)</strong></td>
<td></td>
<td>65 (28 - 220)</td>
</tr>
</tbody>
</table>
## RESULTS: Patient Characteristics (July 2002 to February 2015)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Surgery</td>
<td>1495</td>
<td>57.5%</td>
</tr>
<tr>
<td>Other Previous Open Surgery</td>
<td>627</td>
<td>24.12%</td>
</tr>
<tr>
<td>Other Associated Procedures</td>
<td>408</td>
<td>15.69%</td>
</tr>
<tr>
<td>Previous Bariatric Procedures</td>
<td>70</td>
<td>2.69%</td>
</tr>
</tbody>
</table>
### Length of Hospital Stay

<table>
<thead>
<tr>
<th></th>
<th>Uncomplicated Patients</th>
<th>Patients with Major Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.566 (99%)</strong></td>
<td><strong>1 day</strong></td>
<td><strong>9 days</strong></td>
</tr>
<tr>
<td></td>
<td>(15-120 h.)</td>
<td>(4-32 d.)</td>
</tr>
</tbody>
</table>
## Surgical Early Major Complications

<table>
<thead>
<tr>
<th>Intraoperative Complications (resolved by Open Surgery)</th>
<th>Bleeding</th>
<th>2 (0.08 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gastro-esophageal Perforation</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td></td>
<td>Incorrect Gastric Transection</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td>Immediate Postoperative Complications (resolved by Open Surgery)</td>
<td>Leaks</td>
<td>2 (0.08 %)</td>
</tr>
<tr>
<td></td>
<td>Intestinal Obstruction</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td></td>
<td>Partial Necrosis of Excluded Stomach</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td></td>
<td>Bleeding</td>
<td>2 (0.08%)</td>
</tr>
<tr>
<td>Immediate Postoperative Complications (resolved by Lap. Surgery)</td>
<td>Bleeding</td>
<td>10 (0.4%)</td>
</tr>
<tr>
<td></td>
<td>Leaks</td>
<td>2 (0.08 %)</td>
</tr>
<tr>
<td></td>
<td>Intestinal Obstruction</td>
<td>3 (0.11 %)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Acute Gastric Distension</td>
<td>26 (1%)</td>
</tr>
</tbody>
</table>
**Non Surgical Early Major Complications**

<table>
<thead>
<tr>
<th>Complications Treated Conservatively</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaks</td>
<td>10 (0.4 %)</td>
</tr>
<tr>
<td>Acute Pancreatitis</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td>Infected Hematoma</td>
<td>1 (0.04 %)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12 (0.5%)</strong></td>
</tr>
</tbody>
</table>

**LAPAROSCOPIC ONE ANASTOMOSIS GASTRIC BYPASS: 13-YEAR EXPERIENCE IN 2.600 PATIENTS**

**Mortality**

- Massive Pulmonary Embolism: 1 (0.04 %)
- Nosocomial Pneumonia (Post-reintervention): 1 (0.04 %)
- DIC-Post Band reversion: 1 (0.04 %)
### Late Complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-intestinal stenosis</td>
<td>Pneumatic Dilatation</td>
<td>7 (0.3%)</td>
</tr>
<tr>
<td>9 (0.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosthesis</td>
<td></td>
<td>2 (0.08%)</td>
</tr>
<tr>
<td>Anastomotic Ulcer</td>
<td>Medical Treatment</td>
<td>13 (0.5%)</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Medical treatment</td>
<td>14 (0.5%)</td>
</tr>
<tr>
<td>B1-B6 Vitamin (severe deficit)</td>
<td>Medical treatment</td>
<td>3 (0.1%)</td>
</tr>
<tr>
<td>Revisional surgery</td>
<td>None</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>39 (1.5%)</td>
</tr>
</tbody>
</table>
Endoscopic Studies at 5-Year Follow-Up

- Postop. UGI endoscopic (control) studies planned for all patients completing 5-year f/u
- 1,750 patients completed at least 5-Year f/u
- 602 (34%) underwent UGI endoscopic studies

- NO significant acute or chronic lesions found
  NO erosive esophagitis or severe alkaline reflux

Findings:
- Stomal ulcer: 4 (0.7%)
- Mild / Moderate pouch gastritis: 41 (7%)
- H. Pylori +: 10 (1.7%)
**Percent of mean (and range)**

<table>
<thead>
<tr>
<th>EWL at:</th>
<th>1 year</th>
<th>2 year</th>
<th>3 year</th>
<th>4 year</th>
<th>5 year</th>
<th>10 year</th>
<th>12 year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>84% (55 –112%)</td>
<td>88% (58 –115%)</td>
<td>81% (55 –103%)</td>
<td>79% (51 –102%)</td>
<td>77% (48 –100%)</td>
<td>70% (45–98%)</td>
<td>69% (43–98%)</td>
</tr>
</tbody>
</table>
LAPAROSCOPIC ONE ANASTOMOSIS GASTRIC BYPASS: 13-YEAR EXPERIENCE IN 2.600 PATIENTS

Severe Comorbidities - Resolution Index

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>at Two years</th>
<th>at Ten years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslipidemia</td>
<td>100%</td>
<td>86%</td>
</tr>
<tr>
<td>Type II Diabetes</td>
<td>93%</td>
<td>90%</td>
</tr>
<tr>
<td>Arterial Hypertension</td>
<td>98%</td>
<td>87%</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>100%</td>
<td>99%</td>
</tr>
</tbody>
</table>
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSO- European Database Control**
(ince January 2010)

**BMI Distribution**

**OAGB**

**RYGB**

**GB**

**SG**
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSQ- European Database Control**
(Since January 2010)

*Co-morbidities Prevalence*

**TOTAL OPERATIONS 717**

- **OAGB**

**TOTAL OPERATIONS 11455**

- **RYGB**

**TOTAL OPERATIONS 2447**

- **GB**

**TOTAL OPERATIONS 7862**

- **SG**
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSO- European Database Control**  
(Since January 2010)

**Previous Co-morbidities**

<table>
<thead>
<tr>
<th>Condition</th>
<th>OAGB</th>
<th>RYGB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>30.17%</td>
<td>36.20%</td>
</tr>
<tr>
<td>Prediabetes 2</td>
<td>16.90%</td>
<td>6.05%</td>
</tr>
<tr>
<td>Diabetes 2</td>
<td>14.48%</td>
<td>19.66%</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>51.38%</td>
<td>24.29%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>84.14%</td>
<td>49.94%</td>
</tr>
<tr>
<td>Osteoarticular</td>
<td>77.41%</td>
<td>32.10%</td>
</tr>
</tbody>
</table>

**TOTAL OPERATIONS**

- **OAGB**: 717
- **RYGB**: 11455
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFS0- European Database Control**
(Since January 2010)

*Previous Co-morbidities*

<table>
<thead>
<tr>
<th>Condition</th>
<th>OAGB</th>
<th>RYGB</th>
<th>GB</th>
<th>SG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>24.11%</td>
<td>2.66%</td>
<td>8.51%</td>
<td>16.45%</td>
</tr>
<tr>
<td>Pre Diabetes 2</td>
<td>35.23%</td>
<td>7.29%</td>
<td>16.63%</td>
<td>23.74%</td>
</tr>
<tr>
<td>Diabetes 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>11.98%</td>
<td></td>
<td></td>
<td>28.32%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>40.90%</td>
<td></td>
<td></td>
<td>34.29%</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL OPERATIONS**

- **OAGB:** 2447
- **GB:** 7862
- **SG:** 7862
**COMPARATIVE:** OAGB vs. RYGB vs. GB vs. SG

*IFSO- European Database Control*  
(Since January 2010)

**Hospital Stay**

- **TOTAL OPERATIONS 717**  
  OAGB

- **TOTAL OPERATIONS 11455**  
  RYGB

- **TOTAL OPERATIONS 2447**  
  GB

- **TOTAL OPERATIONS 7862**  
  SG
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSOS-European Database Control**
(Since January 2010)

**Intra-operative Complications**

**Total Operations**

- **OAGB**: 717 operations
- **RYGB**: 11,455 operations
- **GB**: 2,447 operations
- **SG**: 7,862 operations

**Complications:**

- **Bleeding**
- **Gastrointestinal perforation**
- **Liver Failure**
- **Injury vascular**
- **Injury splenic**
- **Other**
- **Deaths**

**Percentage Distribution:**

- **OAGB**: 0.27%
- **RYGB**: 0.55%
- **GB**: 0.14%
- **SG**: 0.72%
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

*IFS0- European Database Control*
(Since January 2010)

**Post-operative Complications**

**TOTAL OPERATIONS 717**

**OAGB**

**TOTAL OPERATIONS 11455**

**RYGB**
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

IFS0- European Database Control
(Since January 2010)

*Post-operative Complications*

- **GB**
  - Total Operations: 2447
- **SG**
  - Total Operations: 7862

### General Complications
- Bleeding: 0.2%
- Leak: 0.15%
- Intra-Abdominal Abscess: 0.05%
- Wound Dehiscence: 0.15%
- Intestinal Obstruction: 0%
- Anastomotic Stricture: 0%
- Gastric/Stomal Ulcer: 0%
- Liver Failure: 0%
- Vomiting: 0.05%
- Other: 0.2%

### General Complications
- Bleeding: 1.54%
- Leak: 0.47%
- Intra-Abdominal Abscess: 0.21%
- Wound Dehiscence: 0.05%
- Intestinal Obstruction: 0.05%
- Anastomotic Stricture: 0.07%
- Gastric/Stomal Ulcer: 0%
- Liver Failure: 0%
- Vomiting: 0.07%
- Other: 0.63%
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFS0- European Database Control**

(Since January 2010)

*Post-operative Complications*
**Comparative: OAGB vs. RYGB vs. GB vs. SG**

**IFSO-European Database Control**
(Since January 2010)

**General Complications**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>OAGB</th>
<th>RYGB</th>
<th>GB</th>
<th>SG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophageal</td>
<td>0.00%</td>
<td>0.61%</td>
<td>1.41%</td>
<td>3.70%</td>
</tr>
<tr>
<td>Gastric</td>
<td>0.33%</td>
<td>1.62%</td>
<td>1.72%</td>
<td>0.23%</td>
</tr>
<tr>
<td>Metabolic</td>
<td>0.29%</td>
<td>0.46%</td>
<td>0.04%</td>
<td>1.18%</td>
</tr>
<tr>
<td>Hepatobiliary</td>
<td>0.00%</td>
<td>1.06%</td>
<td>0.21%</td>
<td>1.67%</td>
</tr>
<tr>
<td>Band Problems</td>
<td>0.00%</td>
<td>0.07%</td>
<td>0.35%</td>
<td>0.22%</td>
</tr>
<tr>
<td>Non-specific</td>
<td>0.00%</td>
<td>0.56%</td>
<td>0.11%</td>
<td>0.15%</td>
</tr>
</tbody>
</table>

**Total Operations:**
- OAGB: 717
- RYGB: 11455
- GB: 2447
- SG: 7862

**General Complications Rates:**
- OAGB: 0.56%
- RYGB: 4.32%
- GB: 4.02%
- SG: 7.23%
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSU- European Database Control**
(Since January 2010)

**General Complications:** “Esophageal”

- **TOTAL OPERATIONS 717**
  - OAGB: 0%
  - RYGB: 1.4%
  - GB: 4%
  - SG: 0%

- **TOTAL OPERATIONS 11455**
  - OAGB: 0.63%
  - RYGB: 0.12%
  - GB: 0.07%
  - SG: 0.56%
**Comparative: OAGB vs. RYGB vs. GB vs. SG**

**General Complications: “Gastric”**

**IFSO European Database Control**
(Since January 2010)

- **OAGB**
  - Total Operations: 717
  - Gastric ulcer: 0.28%
  - Stomal ulcer: 0.00%
  - Anastomotic stricture: 0.00%
  - Delayed gastric emptying: 0.28%

- **RYGB**
  - Total Operations: 11455
  - Gastric ulcer: 0.47%
  - Stomal ulcer: 0.57%
  - Anastomotic stricture: 0.41%
  - Delayed gastric emptying: 1.55%

- **GB**
  - Total Operations: 2447
  - Gastric ulcer: 0.17%
  - Stomal ulcer: 0.00%
  - Anastomotic stricture: 0.00%
  - Delayed gastric emptying: 0.17%

- **SG**
  - Total Operations: 7862
  - Gastric ulcer: 0.06%
  - Stomal ulcer: 0.00%
  - Anastomotic stricture: 0.00%
  - Delayed gastric emptying: 0.14%
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSO - European Database Control**
(Since January 2010)

**General Complications**: “Metabolic”

- **OAGB**
  - TOTAL OPERATIONS 717
  - Protein deficiency: 0.28%
  - Secondary hyperparathyroidism: 0.20%
  - Peripheral neuropathy: 0.00%
- **RYGB**
  - TOTAL OPERATIONS 11455
  - Protein deficiency: 0.49%
  - Secondary hyperparathyroidism: 0.23%
  - Peripheral neuropathy: 0.03%
- **GB**
  - TOTAL OPERATIONS 2447
  - Protein deficiency: 0.04%
  - Secondary hyperparathyroidism: 0.04%
  - Peripheral neuropathy: 0.00%
- **SG**
  - TOTAL OPERATIONS 7862
  - Protein deficiency: 1.21%
  - Secondary hyperparathyroidism: 0.95%
  - Peripheral neuropathy: 0.12%
COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG

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(Since January 2010)

General Complications: “Hepatobillary”

1.05%

0.21%

0%

1.66%

0.01%

717

11455

2447

7862
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFS O- European Database Control**
(Since January 2010)

**General Complications:** “Non - specific”

- **TOTAL OPERATIONS**
  - OAGB: 717
  - RYGB: 11455
  - GB: 2447
  - SG: 7862

- **Comparative Statistics**
  - OAGB: 0.06% Incisional hernia, 0.00% Intestinal obstruction, 0.00% Intolerance of bariatric procedure
  - RYGB: 0.42% Incisional hernia, 0.12% Intestinal obstruction, 0.02% Intolerance of bariatric procedure
  - GB: 0.16% Incisional hernia, 0.00% Intestinal obstruction, 0.00% Intolerance of bariatric procedure
  - SG: 0.16% Incisional hernia, 0.00% Intestinal obstruction, 0.00% Intolerance of bariatric procedure
**COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG**

**IFSO- European Database Control**
(Since January 2010)

% EWL at 36 Months

<table>
<thead>
<tr>
<th>Month</th>
<th>3°</th>
<th>6°</th>
<th>9°</th>
<th>12°</th>
<th>18°</th>
<th>24°</th>
<th>36°</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAGB</td>
<td>44</td>
<td>73</td>
<td>74</td>
<td>90</td>
<td>90</td>
<td>88</td>
<td>87</td>
</tr>
<tr>
<td>RYGB</td>
<td>37</td>
<td>43</td>
<td>54</td>
<td>68</td>
<td>66</td>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>

**TOTAL OPERATIONS**

<table>
<thead>
<tr>
<th>717</th>
<th>OAGB</th>
</tr>
</thead>
</table>

| 11455 | RYGB |

EAC-BS
COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG

IFSO- European Database Control
(Since January 2010)

% EWL at 36 Months

TOTAL OPERATIONS
GB 7

TOTAL OPERATIONS
7862 SG
COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG

IFS0- European Database Control

Evolution of % EWL

<table>
<thead>
<tr>
<th>3º Month</th>
<th>6º Month</th>
<th>9º Month</th>
<th>12º Month</th>
<th>18º Month</th>
<th>24º Month</th>
<th>36º Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAGB</td>
<td>R-Y-GB</td>
<td>SG</td>
<td>GB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>44</td>
<td>54</td>
<td>58</td>
<td>64</td>
<td>64</td>
<td>52</td>
</tr>
<tr>
<td>33</td>
<td>43</td>
<td>51</td>
<td>58</td>
<td>61</td>
<td>61</td>
<td>52</td>
</tr>
<tr>
<td>18</td>
<td>28</td>
<td>29</td>
<td>29</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>
COMPARATIVE: OAGB vs. RYGB vs. GB vs. SG

IFSO- European Database Control
Evolution of % EBMIL

Graph showing the comparison of OAGB, R-Y-GB, SG, and GB over different months.
1. The OAGB (BAGUA) technique in our experience does not reduce the "complexity" of the surgical procedure, but significantly reduces operative time and length of hospital stay compared to other complex techniques; it also substantially decreases both early and late complication rates.
CONCLUSIONS

2. Excellent results in our long-term follow-up in regards to EWL, EBMIL, resolution of co-morbidities and quality of life make OAGB a safe and effective technique, and a powerful alternative for the treatment of morbid and super-morbid obesity after a 13-year experience.