Effects of Bariatric Surgery in Obese Patients With Hypertension: The GATEWAY Randomized Trial (GAstric bypass to Treat obEse patients With steAdy hYpertension)

Discussant
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Conflict of interest

• Conferences/Consultants/Experts
  – Abbott, Eli Lilly Valeant, Merck, Servier, Novartis, Merck, BI, Sanofi, Amgen, NovoNordisk
Study design

- Patients with hypertension
  - Using at least 2 medications maximum doses or
  - > 2 medications moderate doses
  - Body-mass index: 30.0 and 39.9 kg/m²
  - Roux-en-Y gastric bypass plus medical therapy vs. medical therapy alone

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Primary end point

- Reduction of at least 30% of the total number of antihypertensive medications
- Maintaining blood pressure
  - <140/90 mm Hg at 12 months

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Results

- 100 randomized patients
  - 70% female, age 43.8 ± 9.2 y, BMI 36.9 ± 2.7 kg/m² and 96% completed follow-up
- Reduction of at least 30% of the total number of antihypertensive medications
  - 41/49 patients; gastric bypass group (83.7%)
  - 6/47 patients; control group (12.8%)
- Remission of hypertension (gastric bypass)
  - 25/49 (51%), office BP
  - 22/48 (45.8%), 24-hour ABPM

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Hypertension outcomes per bariatric surgery procedures

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>Restrictives procedures</th>
<th>Hybrid procedures</th>
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<tbody>
<tr>
<td></td>
<td>Adjustable gastric banding</td>
<td>Sleeve gastrectomy</td>
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<tr>
<td>1 year</td>
<td>19 - 55%</td>
<td>15 - 82%</td>
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<tr>
<td>2 - 5 years</td>
<td>17 - 64%</td>
<td>25 - 75%</td>
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Possible mechanisms

- **Insulin resistance**
  - Renal sodium reabsorption and increased sympathetic tone

- **Inflammation**
  - Modulation of arterial stiffness

- **Gut hormones**
  - Glucagon-like peptide (GLP)-1 and peptide YY
    - Entero-renal axis concept influencing electrolyte transport in the renal tubular cells as well as causing diuresis
What about more obese patients?

- The main challenge in blood pressure measurement is upper arms are frequently short, large and conical.
- Indication for bariatric surgery
  - BMI $\geq 40$ kg/m$^2$
  - BMI $\geq 35$ kg/m$^2$ and at least one or more obesity-related co-morbidities.
Bariatric Surgery

Weight Loss
↓BMI
↓Visceral Fat

Inflammation
↓Inflammation
↓Hs-CRP
↓IL-6 and TNF-α
Improved endothelial dysfunction
↓Oxidized LDL
↓Endothelin-1

Metabolism
↑HDL-Cholesterol
↓TG and LDL-Cholesterol
↓Apolipoprotein B
↑Insulin sensitivity
↑Adiponectin

Cardiovascular Comorbidities
↓Type 2 Diabetes
↓Hypertension
↓Dyslipidemia
↓Metabolic Syndrome
↓Obstructive Sleep Apnea

Cardiovascular Performance
Improved left systolic and diastolic dysfunction
↓Left Ventricular Hypertrophy
↓Left Ventricular Cardiac Mass
↓Hypertension
Improved markers atherosclerosis
↓Sympathetic over-activity

Bariatric Surgery
What’s new

• Hypertension after bariatric surgical is reported from studies designed for a different primary endpoint, restricted to diabetic patients or from observational studies.

• Patients randomized to gastric bypass were 6 times more likely to reduce at least 30% of the total number of antihypertensive medications.

What was expected?

• Weight loss

• Improvements in the metabolic and the inflammatory profile

• This trial confirms the results from observational studies with better control of residual confounding due to the randomized and standardized design.

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