Bariatric Surgery and Chronic Kidney Disease

DR. SHARADH SAMPATH
Goals

- Obesity and CKD (Dr. Gill)
- Introduction to bariatric surgery
- Is there a role for bariatric surgery in pre-transplant patients?
Body Mass Index (BMI)

BMI Formula = Weight(kg) / Height(m)²

- BMI 20 – 25 = Normal
- BMI > 30 = Obese
- BMI > 40 = Morbidly obese
How bad is it to be Obese?

- Framingham and NHANES – significant M&M
- 2nd largest health-related cause of mortality (after smoking)
- BMI > 40 = ↓ life expectancy
  - 20 years men
  - 5 years women
Obesity Trends Among Canadian and U.S. Adults, 1985

No Data <10% 10%-14% 15-19% ≥20%

PT Katzmarzyk, Can Med Assoc J 166:1039-1040, 2002
Obesity Trends Among Canadian and U.S. Adults, 1990

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Obesity Trends Among Canadian and U.S. Adults, 2004

AH Mokdad, CDC
M. Shields, Statistics Canada, 2005
Canadian Obesity rates according to Province

Data source: 2004 Canadian Community Health Survey: Nutrition
* Significantly different from estimate for Canada (p < 0.05)
E Coefficient of variation 16.6% to 33.3% (interpret with caution)
B.C.’s burden of disease

NIH Guidelines

• BMI 35-40 with co-morbidities (OSA, DM, HT, etc.)
• BMI > 40
• Ages 20-65

= 130 000+ patients in B.C.!
What Causes Obesity?

• Disordered Eating
  ○ Availability of low-cost, high-calorie food
  ○ 500 extra calories/day = 1lb/week

• Hormone/Genetics

• Addiction
  ○ Alcohol and drugs → Abstinence
  ○ Food → Moderation
How much do we know?

- Genetics/Metabolism
  - Obese patients metabolize food differently

- GI Hormones
  - Appetite stimulant hormones - Ghrelin
  - Diabetes – Incretins

- Summary
  - Obesity is a Disease
  - But the pathophysiology is ???
The Mother of All Diseases

- Heart disease
- Type 2 diabetes
- Hypertension
- Stroke
- Hyperlipidemia
- Arthritis
- Sleep Apnea
- Cancer
Direct cost of obesity in Canada in 1997 was estimated to be over $1.8 billion.

The 3 largest contributors were:
- Hypertension ($656.6 million)
- Type 2 diabetes ($423.2 million)
- Coronary artery disease ($346.0 million)

Canadian costs in 2008 was $4.6-7.1 billion (CIHI).
B.C. estimates $1 billion in 2011.
Treatment Options

- Diet
- Exercise
- Counselling
- Pharmacotherapy

EPIC FAIL!
Long-Term Weight Loss after Bariatric Surgery

Figure 4. Graph showing median % excess weight loss after gastric bypass in 342 patients.

Co-morbidity reduction

30 month f/u
### Table 9. CHANGE IN QUALITY OF LIFE

<table>
<thead>
<tr>
<th>Change in Quality of Life</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greatly improved</td>
<td>58</td>
</tr>
<tr>
<td>Improved</td>
<td>37</td>
</tr>
<tr>
<td>No change</td>
<td>5</td>
</tr>
<tr>
<td>Diminished</td>
<td>0</td>
</tr>
<tr>
<td>Greatly diminished</td>
<td>0</td>
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</table>
Mortality

- **NEJM 2007**
  - 40% decrease mortality over 7 years
  - 56% ↓ CAD
  - 92% ↓ DM
  - 60% ↓ Cancer

- **Christou 2004**
  - 1035 Sx vs. 5746 controls
  - 5yrs – death rate 0.68% vs. 6.17%
History of Bariatric Surgery in B.C.

- Surgery-only model
- Several centers
- No quality control
- Aggressive surgical procedures
- Limited follow-up/Poor patient selection
Old techniques

- Open surgery
  - Vertical banded gastroplasty
  - Distal gastric bypass
  - Ileogastric bypass
Challenges and Complications

- Weight loss failure
- Malabsorption
  - Severe / life threatening nutritional deficiencies
  - Dehydration
- Open Surgery
  - > 30% risk of hernia
  - Fistulas
  - Strictures
Conception

- Goal of creating a multidisciplinary center of excellence
- Long-term follow-up
- Laparoscopic, evidence based surgery
Program Research

- Site visits in Canada, U.S. and Europe
- International training
- Care delivery models in Ontario and Alberta
- Recruit and train a team
North American Standards

CAPBS, ASMBS, NSQIP – minimum requirements

- Minimum 2 surgeons
- Minimal volumes 120 cases per center and 50 cases per surgeon
- Multidisciplinary team
- ICU, interventional radiology, therapeutic endoscopy
- Long-term follow-up
Team

- Medicine – Surgeons, Anesthesia, Internal Medicine, Respirology, Endocrine (new), Psychiatry, Plastic Surgeon, Intensivists
- Nursing – O.R., ward nursing, nurse co-ordinator (new)
- Allied Health – dietitian, occupational therapist, exercise physiologist, unit clerk
- Partnership - Medical and Hospital Admin
Infrastructure

- Ward beds, stretchers, commodes, transfer lifts
- Interventional radiology capability
- Therapeutic endoscopy equipment
- Testing and monitoring capability for OSA patients
Equipment

- Bariatric length laparoscopic sets
- Bariatric safety equipment, O.R. beds, patient transfer systems
- Bariatric stapling and energy devices
- D.I.
Hospital Readiness - Education

- ED – complications
- Ward – patient management, safety and sensitivity
- O.R. – patient transfer, equipment use and maintenance
- Worksafe compliance
- Buy in – DI, anesthesia, medicine
1) wait list for admission to RH bariatric surgery program
   - 1000 (18 referrals per week)

2) Volumes
   2011/12 – 48
   2012/13 – 86
   2013/14 – 200
   2014/15 – 200 - 250
Pre-operative Assessment

• Allied Health
• Surgeon
• Laboratory
• Endoscopy
• OSA
• Imaging
• IM/Anesthesia/Endocrine
Patient Expectations

- Non-smoker
- No issues with alcohol/drug addiction
- Lifestyle modifications
  - Diary
  - Readings
  - Attendance at classes and assessments
Contra-indications

- Untreated Axis 1-2 disorder
- Suicide attempt within 2 years
- Smoker
- Alcohol/Drug addiction (active)
- IBD
- Connective tissue disease
- Anesthetic risk

- Previous bariatric surgery
Courses

- Orientation session
- Winning at Losing – 7 weeks
- Bariatric Cooking Class – 4 weeks
- Changeways – 8 weeks with monthly follow-up
Multidisciplinary Rounds

- Twice monthly meetings
- Review and discuss patient readiness
- Develop patient care protocols
- Quality improvement and research initiatives
Research

- **Approved ongoing projects**
  - Sleep apnea resolution
  - Co-morbidity reduction
  - Patient experience
  - Effect of Changeways program on patient outcomes

- **Future Projects**
  - Ghrelin
  - Adipose tissue and Inflammation (Dr. M. Levings)
Patient Advocacy

British Columbia Obesity Network
Provincial Advocacy

- Creation of BCON
- Annual Meetings
- Education
- Policy Guidance
Laparoscopic Sleeve Gastrectomy

- Restrictive
- Resective
  - Ghrelin secreting cells
  - Appetite stimulant
- MSP covered
Gastric Bypass

- Early satiety
- Altered nutrient absorption
- Powerful hormone changes
- MSP covered
Splitting the Omentum
Gastroenterostomy

© N. Nguyen
Entero-enterostomy
## Complications

<table>
<thead>
<tr>
<th>Early</th>
<th>Late</th>
</tr>
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<tbody>
<tr>
<td>- Cardiopulmonary</td>
<td>- Malnutrition</td>
</tr>
<tr>
<td>- Leak</td>
<td>- Stricture</td>
</tr>
<tr>
<td>- Bleed</td>
<td>- Weight loss failure</td>
</tr>
<tr>
<td></td>
<td>- Hernia</td>
</tr>
<tr>
<td></td>
<td>- Kidney stones</td>
</tr>
<tr>
<td></td>
<td>- Internal Hernia</td>
</tr>
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</table>
Renal Stones

- Calcium Oxalate
- Simulated “short-gut” – calcium reabsorption
- Common in extensive bypass
- Our bypass – 100-130cm
Follow-up

- Surgeon/Garratt – 2 weeks, 6 weeks, 6 months, yearly
- GP communication
- Bloodwork/Supplements
- OSA re-testing
- IM – monitors co-morbidity resolution and medication changes
You fix them... you bought them

- 2 surgeons participate in each case
- 1:1 call coverage for post-op complications
- Transfers from B.C. / Out of province / out of country complications
Preliminary Results at 1 year

- 1st 91 patients (sleeve and bypass)
- Excess weight loss – 74%
- Diabetes remission 76%
- HT (50%)
Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes

Philip R. Schauer, M.D., Sangeeta R. Kashyap, M.D., Kathy Wolski, M.P.H., Stacy A. Brethauer, M.D.,
and P. Kirwan, Ph.D., Claire E. Pothier, M.P.H., Susan Thomas, R.N., Beth Abood, R.N., Steven E. Nissen, M.
and Deepak L. Bhatt, M.D., M.P.H.
Results - Weight loss at 1 year (kg)

Schauer et al.

- Baseline: 100 kg
- 1 year: 73.4 kg

RH

- Baseline: 160 kg
- 1 year: 117 kg

Legend:
- baseline
- 1 year
Results – Glycemic Control

- Schauer et al.: Pre-op Hgb A1c (40%) and 1 year Hgb A1c
- RH: Pre-op Hgb A1c (62%) and 1 year Hgb A1c
Our Complications (since 2011)

<table>
<thead>
<tr>
<th>Early</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 post-op bleeds</td>
<td>2 strictures – 1 required surgery</td>
</tr>
<tr>
<td>1 subclinical leak</td>
<td>3 weight loss failures</td>
</tr>
<tr>
<td>1 reintubation for OSA</td>
<td>10 readmissions for post-op dysphagia – 1-2 day stays</td>
</tr>
<tr>
<td>1 PE (on prophylactic LMWH)</td>
<td>0 severe cases of malnutrition</td>
</tr>
<tr>
<td></td>
<td>0 kidney stones</td>
</tr>
<tr>
<td></td>
<td>1 hernia</td>
</tr>
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Summary

- 2 years of planning before the 1st surgery
- 4 years of project development... and counting
- Buy-in from entire hospital
  - In-services
  - Educational talks
- Commitment to life-long patient follow-up
Time Commitment

- Multidisciplinary Assessment
- Follow-up
- Surgery
Role for BS in facilitating other surgery?

- Joint replacement
- Massive incisional hernia repair
- Pre-malignant conditions
- Diverticular disease
- ? Prior to kidney transplant
Evidence for BS and Kidney Transplant

Theory

- Technically easier
- Fewer peri-op complications 2\textsuperscript{nd} to obesity
- Less graft rejection
Safety – Bypass

Alex et al. 2007
41 patients
• 25 Dialysis
• 6 pre-dialysis
• 10 post transplant

1 year wt. loss 70.5%

No 30day mortality
Safety - Sleeve

Diwan et al.

- sleeve gastrectomy in 10 renal transplant candidates
- No 30 day mortality
- No peri-op complications
- LOS 3 days
- EWL at 3 months = 34%
- BMI change = 5.8
Improvement in Transplant Candidacy

Lin et al. 2013
• ESRD, ESLD
• BMI C.I. - > 40 or > 35 with DM

LSG
• 26 patients
• 12 months EWL = 50%
• All on transplant list
Navaneethan et al. 2009

25 patients Stage 3 CKD
• BMI 49.8; GFR 47.9

12 months post-op
• BMI 34.5; GFR 61.6

Type of surgery not specified
Summary

- Mostly retrospective studies
- Acceptable safety
- Role of BS pre-transplant
- Role of BS to defer/delay dialysis
Which CRF patients are surgical candidates?

Pre or post transplant candidates?

Patient factors
  - Motivation/Insight
  - Operability

Timelines
  - 3-6 months pre-conditioning
  - 3-6 months for weight loss
Questions?
References

- Shauer et al. Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes. NEJM. 2012
- Lin et al. Laparoscopic Sleeve Gastrectomy is Safe and Efficacious for Pretransplant Candidates. Surgery for Obesity and Related Disease. 2013
- Navaneethan et al. Bariatric Surgery and Progression of CKD. Surgery for Obesity and Related Diseases. 2009
- Diwan et al. Laparoscopic Sleeve Gastrectomy in Obese Renal Transplant Candidates. Abstract