Safety and efficacy of bariatric surgery in obese patients with CKD: the London Renal Obesity Network (LonRON) experience

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Introduction

- Bariatric surgery is currently the most effective treatment for obesity

- Clinical practice was suggesting that the complication rate may be higher in those with chronic kidney disease (CKD), than in those with normal kidney function

- London Renal Obesity Network (LonRON) formed to:
  1. determine the safety and efficacy of bariatric surgery in obese patients with CKD across 3 major London University Hospitals
  2. Develop a joint surgical and renal protocol for perioperative management
But isn’t obesity a good thing in CKD?

YES

- Obesity paradox in HD
- Protein energy wasting

NO

- Risk factor for CKD progression
- Dialysis access
- Kidney transplantation
- Obesity related glomerulopathy
Methods

- All obese patients with CKD
  - either under the care of a Nephrologist or with an eGFR < 60 ml/min/1.73m²
  - undergoing laparoscopic bariatric surgery from 2007-2012

- Patient demographics
- Surgery type
- Weight loss
- Complications and adverse events
Results

74 patients included (33M; 41F)

Figure 1: Diagram of bariatric surgery procedures (A) Roux-en-Y gastric bypass, (B) Adjustable Gastric Banding, (C) Sleeve Gastrectomy (Adapted from Bradley et al. Gastroenterology 2012, 143: 897-912)

38% underwent Roux-en-Y bypass (RYGB), 57% sleeve gastrectomy (SG), & 5% adjustable gastric banding (AGB)
### Table 1: Baseline characteristics of study participants (n=74)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%) or mean (±SD)</th>
</tr>
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<tbody>
<tr>
<td>Age (years)</td>
<td>52 (±10)</td>
</tr>
<tr>
<td>Gender</td>
<td>41 (55%) Female; 33 (45%) Male</td>
</tr>
<tr>
<td>eGFR (ml/min/1.73m²)</td>
<td>48 (±19)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>44.5 (±5.7)</td>
</tr>
<tr>
<td>CKD stages 1 and 2 (eGFR ≥ 60 ml/min/1.73m²)</td>
<td>8 (11%)</td>
</tr>
<tr>
<td>CKD stage 3 (eGFR 30-59 ml/min/1.73m²)</td>
<td>44 (59%)</td>
</tr>
<tr>
<td>CKD stage 4 (eGFR 15-29 ml/min/1.73m²)</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>CKD stage 5 non-dialysis</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>CKD stage 5 Hemodialysis</td>
<td>13 (18%)</td>
</tr>
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*eGFR calculated using the 4 variable MDRD study equation; SD, standard deviation*
Figure 2: Surgical procedure by chronic kidney disease (CKD) stages in obese patients with CKD
Weight loss

Figure 3: Mean weight loss after Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG) and adjustable gastric banding (AGB) in obese patients with CKD
Adverse events

- 2/74 (3%) 30 day mortality
- 4/74 (5%) >30 day mortality inc 2 deaths related to cancer
- 14/74 (19%) complications post surgery; half in HD

Table 2: Complications following bariatric surgery in obese patients with chronic kidney disease

<table>
<thead>
<tr>
<th>Complications</th>
<th>n (%)</th>
</tr>
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<tbody>
<tr>
<td>Acute Kidney Injury (reversible)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Dialysis access fistula/graft failure</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Gastric leak</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Acidosis or hyperkalemia</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Post operative chest infection</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Vitamin B12 or iron deficiency</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>
Discussion

- While bariatric surgery is efficacious for weight loss in obese patients with CKD, the complication and mortality rates are high.

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention/observation</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nguyen 2011</td>
<td>All bariatric surgery</td>
<td>CKD inc mortality risk (adj Odds Ratio 2.7)</td>
</tr>
<tr>
<td>Turgeon 2012</td>
<td>All bariatric surgery in patients with CKD</td>
<td>inc risk of complications as CKD progresses</td>
</tr>
<tr>
<td>Gajdos 2012</td>
<td>All non-emergent surgery in haemodialysis patients</td>
<td>inc risk of complications &amp; death post elective surgery in HD patients compared to non HD patients</td>
</tr>
</tbody>
</table>
Joint Renal Surgical Protocol

- Focuses on what should be done
- Individual centres can decide how to implement
- Developed to improve clarity around perioperative management and selection of optimal procedures to minimise risk

- Includes 6 components
  - Indications for referral
  - Assessment
  - Pre-surgery planning
  - Pre operative care
  - Post operative care
  - Discharge care
Protocol for Patients with CKD referred for Bariatric Surgery

Indications for referral
- Previous attempts at weight loss, and patient declares interest in surgery
- BMI > 35 kg/m²
- Co-morbid chronic disease (diabetes, hypertension, CKD, sleep apnoea, pain)
- Consider kidney function/likelihood of listing for transplantation with weight loss

Assessment
Enters obesity treatment pathway via referral to bariatric surgeon or physician
Pre-surgery dietary assessment and education concerning renal dietary modifications
Consider the following in parallel:

Cardiac
- Repeat ECG and echo
  - If abnormal (wave or rhythm abnormalities, systolic or diastolic dysfunction) consider cardiology referral with view to stress echo/coronary angiogram/exercise stress test as appropriate

Respiratory
- Overnight oximetry and airflow
  - CPAP if indicated, for 6 weeks prior to surgery

Renal Optimisation
1. Renal diagnosis confirmed (if appropriate) and no active immunological disease
2. If history or signs of peripheral vascular disease (eg claudication, femoral bruises), or suspicion of renovascular disease (eg asymmetrical kidneys), request MR angiography or doppler US
3. Optimize fluid status, aiming for euolaemia

Factors influencing decision on which surgical procedure
Renal risk factors (eg history of hyperoxaluria or nephrolithiasis)
Patient preference
Results of assessments

Obesity MDM
- If approved, notify initial referrals and dietician when admission date known

Prior to surgery
- Identify named renal contact for each patient, and surgeon and nephrologist to decide on ward allocation.

Role of surgical team
- Liaise with named renal contact to confirm admission date
- Specify if pre operative dietary protocol required

Role of Renal Team
- If the patient is on haemodialysis:
  1. Obtain HD prescription and vascular access information if usual dialysis is off-site
  2. Optimise haemoglobin (Hb 100 – 120 g/L)
  3. Organise peritoneal dialysis and ensure the patient is well dialysed preoperatively with a session of dialysis booked either off-site or at bariatric centre on the day before surgery
  4. Discuss安排 post-operative dialysis (or filtration if ITU care required)
  5. Liaise with surgeons in regard to patient specific anticoagulation plan (see below)

Preoperative Care
1. Ideally, Dietitian to provide patient education, and dietary prescription for post-operative fluid diet considering renal dietary modifications
2. Avoid BP measurement/cannulation of fistula arm and use of dialysis catheter for IV access
3. Inform renal team that the patient is planned for surgery and consider the post operative need for renal replacement therapy (dialysis or filtration)
4. Continue EPO as normal
5. Anticoagulation: suspend warfarin, prophylaxis as appropriate (heparin/tinzaparin/clexane); stop aspirin 7 days prior to surgery; recommend prophylactic dose of tinzaparin 4500 units/or clexane 2mg subcutaneously however, this may be adjusted on the basis of eGFR, other medication and platelet count
6. If dialysing via a tunneled line consider using cirtalock rather than heparin preoperatively
7. Omit diuretics and anti-hypertensives on day of surgery
8. Stop metformin and DPP4 inhibitors (gliptins) and consider use of sliding scale
9. If on immunosuppressive agents, ensure these are continued throughout the surgical period; monitor drug levels appropriately. Consider hydrocortisone cover over the surgical period if the patient has a history of significant steroid requirement
10. Utilise appropriate antibiotic prophylaxis

Postoperative care
1. Patients should be managed on Renal or Surgical level 2 environment (HDU) postoperatively
2. Avoid BP measurement/cannulation of fistula arm and use of dialysis catheter for IV access
3. Careful attention to fluid balance and consider need for post-op fluids (potassium free)
4. Monitor potassium and treat hyperkalaemia, dialysis patients may need postoperative RRT on day of surgery
5. Monitor kidney function daily (unless on dialysis), and provide RRT if clinically indicated
6. Review diabetes medications - IV insulin sliding scale insulin for Type 1 DM; reintroduce metformin or DPP4-inhibitor as clinically indicated
7. Antibiotic cover recommended in all dialysis and post-transplant patients (ensure cover for Staph. Aureus and consider tissue penetrating antibiotic cover); consider antibiotic cover in non-dialysis patients
8. Reintroduce diuretics and anti-hypertensives if clinically indicated (monitor postural blood pressure); reintroduce anticoagulation as appropriate
9. Prophylactic tinzaparin/clexane for 1 month post surgery (unless contraindication eg, low platelets, high risk of bleeding complication)
10. Dietitian review, plus patient education, and dietary prescription for post-operative fluid diet if not able to provide prior to surgery

At discharge
1. Ensure early review in nephrology outpatient clinic to assess glycaemic control, fluid status, blood pressure, kidney function, and planned reinsttution of anticoagulation therapy
2. Dietitian review 1 week (telephone call for fluid intake assessment) and continue up to 12 months post-operatively
3. For patients with RYGB and CKD stage 3b and 4 advice should be given to maintain a fluid intake of greater than 2L per day
4. Surgical review at 4-6 weeks, 6 months and 12 months (ongoing review for band adjustments as clinically indicated)
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Outcomes

- Oral presentation at ASN 2013 and paper submitted, largest bariatric surgery CKD cohort
- Joint protocol in use across LonRON sites
- Prospective study commenced post implementation of the joint protocol to improve clarity around perioperative management and selection of optimal procedures to minimise risk
- Larger, longer-term studies, and investigation of non-surgical alternatives remain priorities.