# MBS and Kidney transplantation: Timing and Outcomes


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OSWALDO CRUZ
CENTRO ESPECIALIZADO EM OBESIDADE E DIABETES

SAFETY AND EFFICACY OF MBS BEFORE KT

X

SAFETY AND EFFICACY OF MBS AFTER KT


PROBLEM

# Recipient obesity and outcomes after kidney transplantation: a systematic review and meta-analysis

Nephrol Dial Transplant (2015)

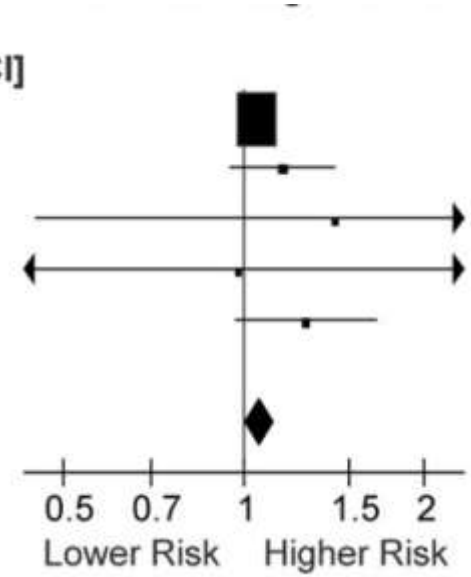
Christopher J. Hill[1], Aisling E. Courtney[1], Christopher R. Cardwell[2], Alexander P. Maxwell[1], Giuseppe Lucarelli[3], Massimiliano Veroux[4], Frederico Furriel[5], Robert M. Cannon[6], Ellen K. Hoogeveen[7], Mona Doshi[8] and Jennifer A. McCaughan[1]

B

| Study | Weight | Hazard Ratio [95% CI] |
|---|---|---|
| Cannon 2013 | 90.4% | 1.05 [1.00, 1.11] |
| Chang 2007 | 6.1% | 1.16 [0.95, 1.42] |
| Ditonno 2011 | 0.2% | 1.42 [0.45, 4.48] |
| Grosso 2012 | 0.1% | 0.98 [0.13, 7.39] |
| Hoogeveen 2011 | 3.3% | 1.27 [0.97, 1.66] |
| **Total (95% CI)** | **100.0%** | **1.06 [1.01, 1.12]** |

Heterogeneity: $I^2 = 0\%$

Test for overall effect: $Z = 2.46$ ($P = 0.01$)



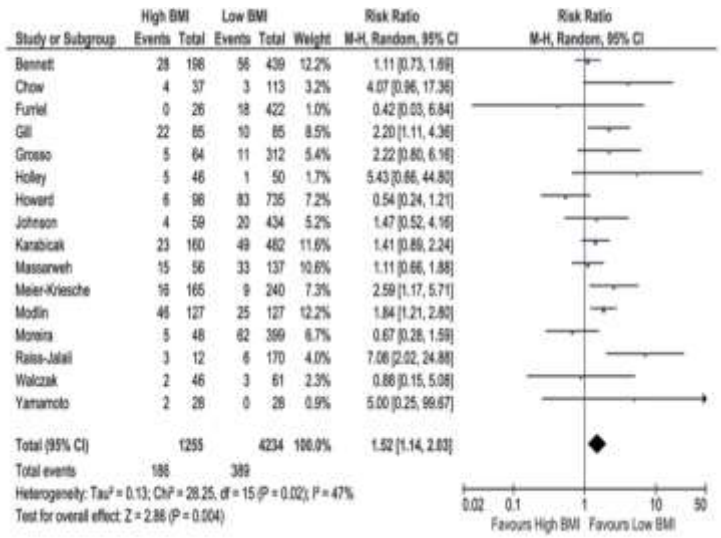

**Higher risk of graft loss**

RESEARCH ARTICLE Open Access

BMC Medicine (2015)

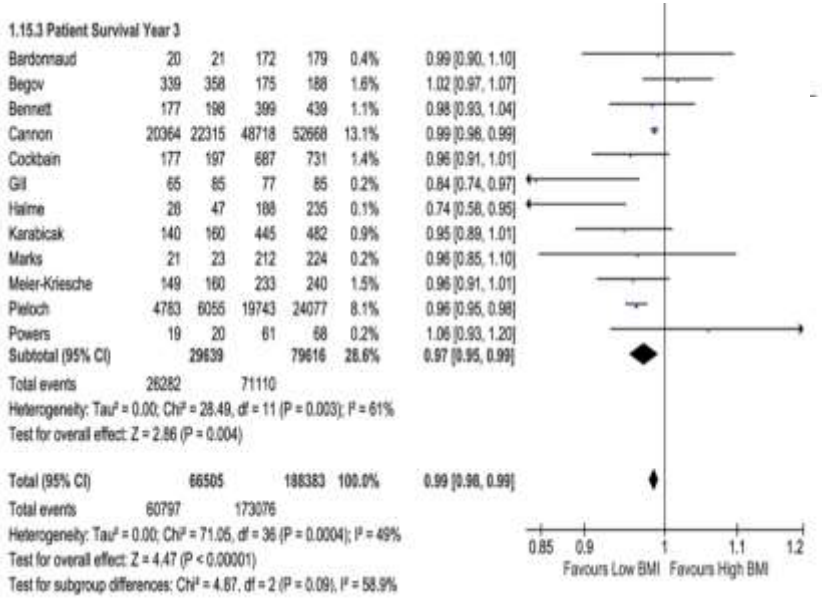
# Body mass index and outcome in renal transplant recipients: a systematic review and meta-analysis

Jeffrey A Lafranca[1], Jan NM IJermans[1], Michiel GH Betjes[2] and Frank JMF Dor[1*]



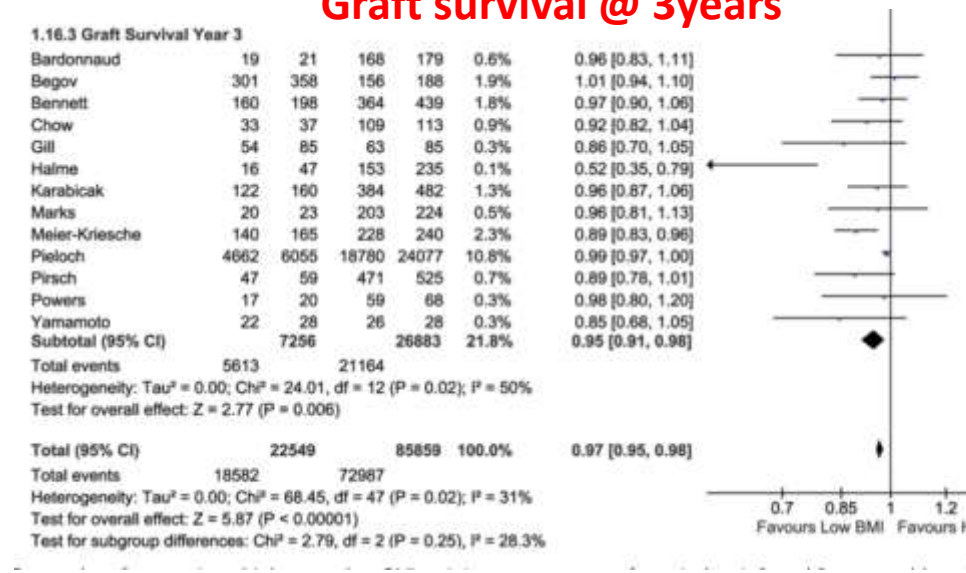

**Mortality**

All favors lower BMIs

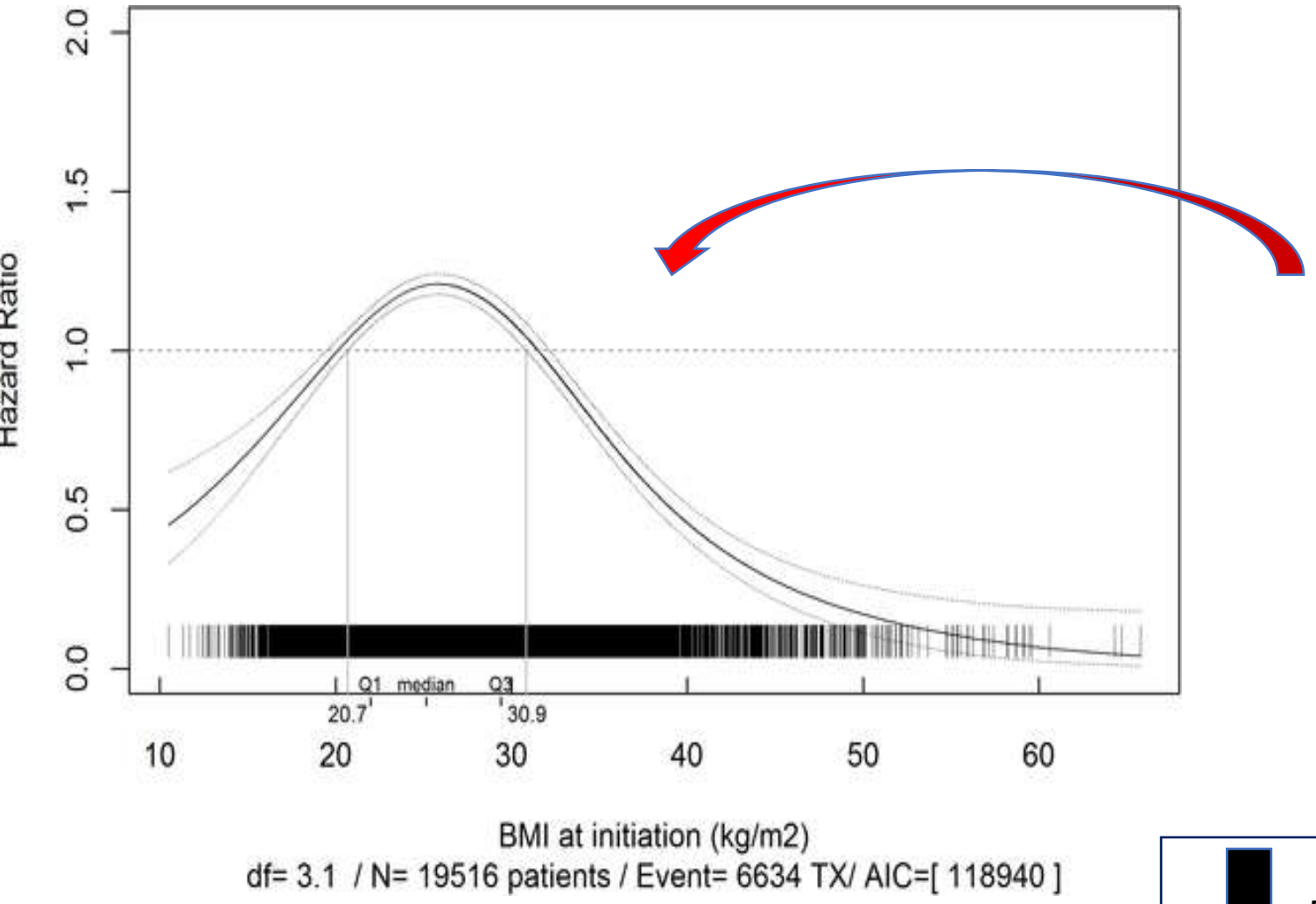



**Pt survival @ 3years**

**Graft survival @ 3years**



# Obesity 3rd leading reason in US for not being listed for transplant




Patients with a BMI ≥31 kg/m$^2$ at the start of dialysis are less likely to receive a kidney transplant and this probability decreased as the BMI increased

BMI 1 kg/m$^2$ ↓ ↑ 9 to 11% chance of transplant

Lassalle M, Fezeu LK, Couchoud C, Hannedouche T, Massy ZA, et al. (2017) Obesity and access to kidney transplantation in patients starting dialysis: A prospective cohort study. PLOS ONE 12(5): e0176616.

# SAFETY AND EFFICACY OF MBS BEFORE KT


MBS as a bridge to KT

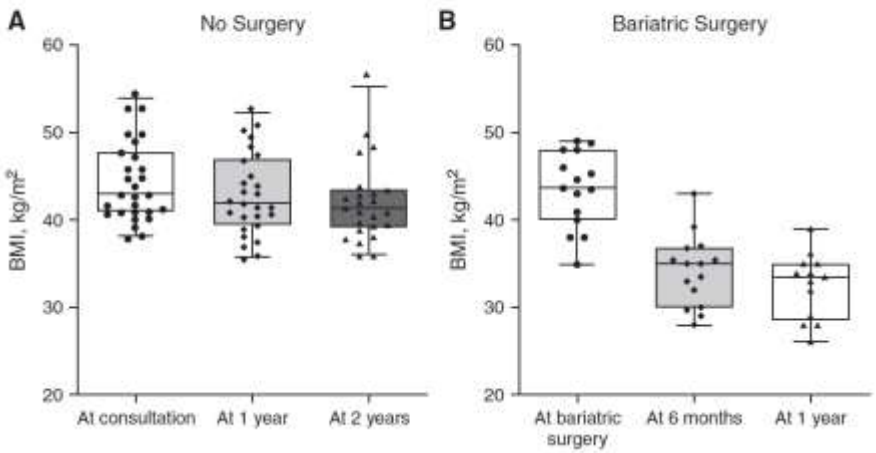
Original Investigation

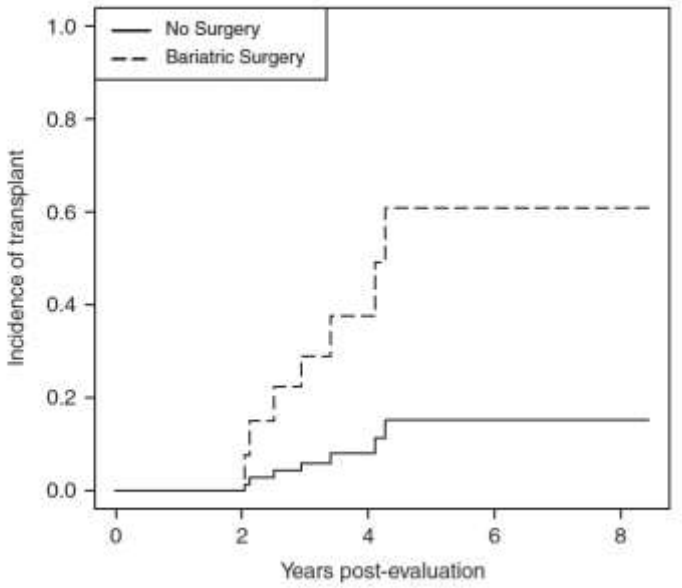
Kidney360

# Guiding Kidney Transplantation Candidates for Effective Weight Loss: A Clinical Cohort Study

2022

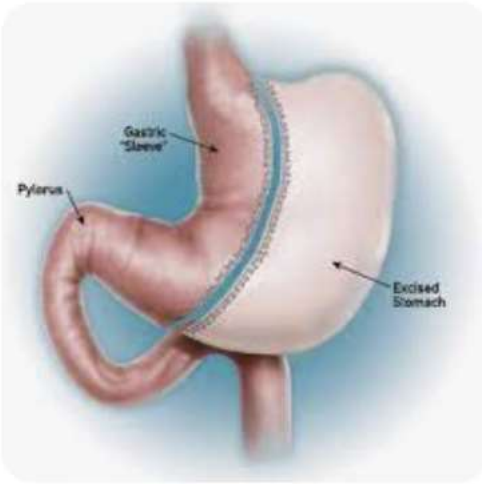
Aleksandra Kukla,[1,2] Tayyab Diwan,[2,3] Byron H. Smith,[2] Maria L. Collazo-Clavell,[4] Elizabeth C. Lorenz,[1,2] Matthew Clark,[4,5] Karen Grothe,[4,5] Aleksandar Denic,[1] Walter D. Park,[2] Sukhdeep Sahi,[1] Carrie A. Schinstock,[1,2] Hatem Amer,[1,2] Naim Issa,[1,2] Andrew J. Bentall,[1,2] Patrick G. Dean,[2,3] Yogish C. Kudva,[2,4] Manpreet Mundi,[4] and Mark D. Stegall[2,3]



# What data tell us

- SIGNIFICANT WEIGHT LOSS




↑ Transplant ELIGIBILITY

- CONTROL OF COMORBIDITIES (T2D, HTN, DYSLIPEDEMIA)

- SLIGHTLY HIGHER COMPLICATION RATE AND MORTALITY

JAMAL, 2015; MOZER,2017;FREEMAN,2018;COLIMAN 2019;Yemini,2020

# Bariatric Surgery as a Bridge to Renal Transplantation in Patients with End-Stage Renal Disease

OBES SURG, 2017

Shadi Al-Bahri[1] · Tannous K. Fakhry[1] · John Paul Gonzalvo[1] · Michel M. Murr[1]

| | Age/ sex | FU (yr) | Preop BMI | Postop BMI | %EBWL | %TWL | Procedure | Comments |
|---|---|---|---|---|---|---|---|---|
| Transplanted $n = 4$ | 54 F | 2 | 41 | 24 | 83 | 47 | LRYGB | Received PDDKT for ESRD secondary to FSGS. Recent aortic valve replacement. |
| | 55 F | 10 | 42 | 28 | 74 | 33 | LRYGB | Received DDKT for ESRD secondary to IgA nephropathy. |
| | 60 F | 3 | 45 | 25 | 84 | 44 | LRYGB | Received LKD for ESRD secondary to DM. |
| | 43 M | 10 | 57 | 28 | 80 | 50 | LRYGB | Received DDKT secondary to HTN, DM. |
| Listed $n = 5$ | 54 F | 4 | 42 | 22 | 94 | 47 | LAGB | Deceased prior to transplant, cardiac arrest, unrelated to LAGB done 6 years prior. |
| | 48 F | 2 | 43 | 28 | 78 | 41 | LRYGB | Listed and currently amidst pre-transplant preparation. |
| | 47 M | 2 | 47 | 34 | 55 | 33 | LRYGB | Recent mitral valve replacement and is now back on transplant list. |
| | 66 F | 3 | 54 | 33 | 63 | 38 | LRYGB | Listed and currently amidst pre-transplant preparation. |
| | 50 F | 3 | 38 | 33 | 47 | 20 | LRYGB | Recent coronary stenting and is now back on transplant list. |
| Not Listed $n = 5$ | 54 M | 1 | 44 | 38 | 28 | 40 | LSG | Deceased prior to transplant, multi-system organ failure from sepsis and pneumonia, unrelated to bariatric surgery. |
| | 56 M | 3 | 50 | 35 | 53 | 30 | LAGB | Lacking vascular access, hypercoagulable state. |
| | 66 F | 7 | 43 | 39 | 21 | 8 | LAGB | Removed from list for weight regain. |
| | 66 M | 2 | 42 | 20 | 85 | 51 | LRYGB | Recent anastomotic ulcer perforation requiring operative repair. |
| | 54 F | 3 | 53 | 37 | 49 | 30 | LRYGB | Unable to reach required BMI, Preop BMI 53, currently 37. |
| Lost to follow-up $n = 2$ | 56 F | 2 | 65 | 26 | 86 | 60 | LRYGB | Lost to follow-up 2 years after surgery. |
| | 53 M | 2 | 60 | 44 | 19 | 30 | LRYGB | Lost to follow-up 2 years after surgery. |

Journal of *Clinical Medicine*

MDPI

*Article*

# Bariatric Surgery Outcomes in Patients with Kidney Transplantation

Nov, 2022

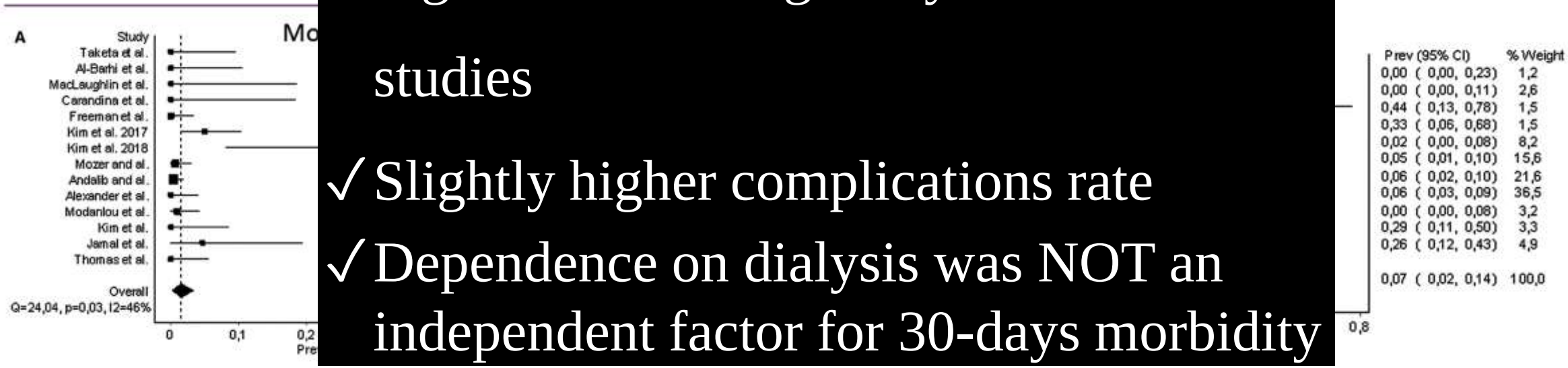
Adriana Pané [1,2,3,*], Alicia Molina-Andujar [4,5], Romina Olbeyra [3], Bárbara Romano-Andrioni [1,4], Laura Boswell [1,6], Enrique Montagud-Marrahi [4,5], Amanda Jiménez [1,2,7], Ainitze Ibarzabal [8], Judith Viaplana [3,9], Pedro Ventura-Aguiar [4,5], Antonio J. Amor [1], Josep Vidal [1,7,9], Lilliam Flores [1,7,9] and Ana de Hollanda [1,2,7,*]

**Review**
CLINICAL TRIALS AND INVESTIGATIONS

Obesity (2020) 28, 2290-2304.

# Effectiveness and Safety of Bariatric Surgery in Patients with End-Stage Chronic Kidney Disease or Kidney Transplant

*Jessica G*




- ✓ Significant heterogeneity between studies
- ✓ Slightly higher complications rate
- ✓ Dependence on dialysis was NOT an independent factor for 30-days morbidity

Obesity Surgery (2019) 29:975–982
https://doi.org/10.1007/s11695-018-3604-2

ORIGINAL CONTRIBUTIONS

# National Postoperative Bariatric Surgery Outcomes in Patients with Chronic Kidney Disease and End-Stage Kidney Disease

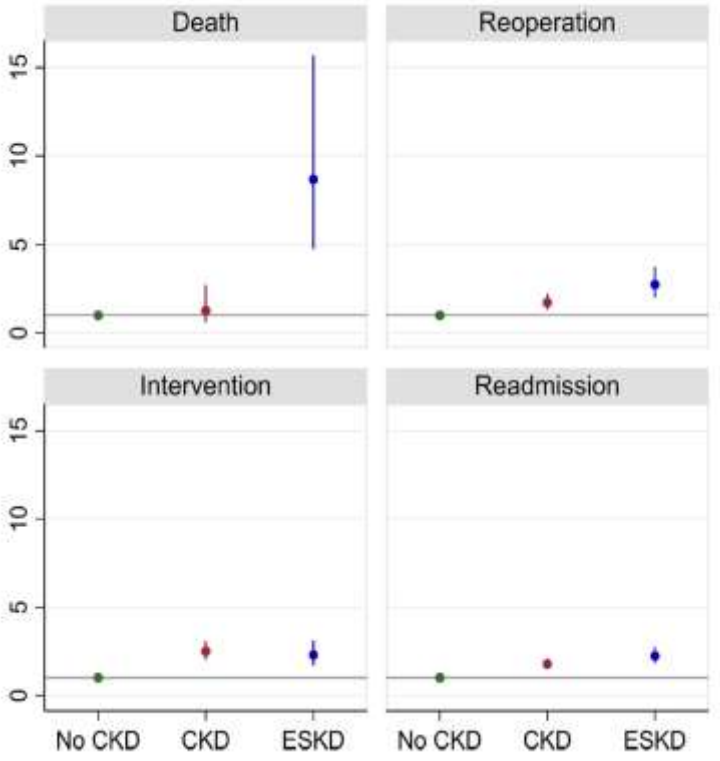
Jordana B. Cohen[1,2] · Colleen M. Tewksbury[3] · Samuel Torres Landa[4] · Noel N. Williams[3] · Kristoffel R. Dumon[3]

MBSAQIP data : 323,000 w/o CKD; 1694 with CKD and **925 ESKD**

- ✓ **Overall complication rate is low**
- ✓ **ESKD mortality after MBS comparable to non-surgical ESKD pts**
- ✓ **ESKD should nor be a contraindication to surgery**

| | No CKD $N = 323{,}034$ | CKD $N = 1694$ | ESKD $N = 925$ | $P$ value |
|---|---|---|---|---|
| Mortality, $n$ (%) | 322 (0.1%) | 7 (0.4%) | 13 (1.4%) | < 0.001 |
| Reoperation, $n$ (%) | 5389 (1.7%) | 64 (3.8%) | 45 (4.9%) | < 0.001 |
| Intervention, $n$ (%) | 6266 (1.9%) | 102 (6%) | 45 (4.9%) | < 0.001 |
| Readmission, $n$ (%) | 15,677 (4.9%) | 182 (10.7%) | 113 (12.2%) | < 0.001 |
| Acute kidney injury, $n$ (%) | 552 (0.2%) | 63 (3.7%) | | < 0.001 |

Propensity score matching



# SAFETY AND EFFICACY OF MBS AFTER KT


PROBLEM

- ✓ **Kidney transplant recipients gain an average of 10 kg during the first year after transplantation.**

- ✓ **Obesity may have adverse effects on cardiovascular disease and wound healing, and life expectancy is reduced in comparison with leaner transplant recipients**

Cohen JB, Lim MA, Tewksbury CMet al.. Bariatric surgery before and after kidney transplantation: long-term weight loss and allograft outcomes. *Surg Obes Relat Dis* 2019;

. Alexander JW, Goodman H.. Gastric bypass in chronic renal failure and renal transplant. *Nutr Clin Pract* 2007; 22: 16–21 [PubMed] [Google

. Golomb I, Winkler J, Ben-Yakov Aet al.. Laparoscopic sleeve gastrectomy as a weight reduction strategy in obese patients after kidney transplantation. *Am J Transplant* 2014; 14: 2384–

. Elli EF, Gonzalez-Heredia R, Sanchez-Johnsen Let al.. Sleeve gastrectomy surgery in obese patients post-organ transplantation. *Surg Obes Relat Dis* 2016; 12: 528–534 [PubMed]

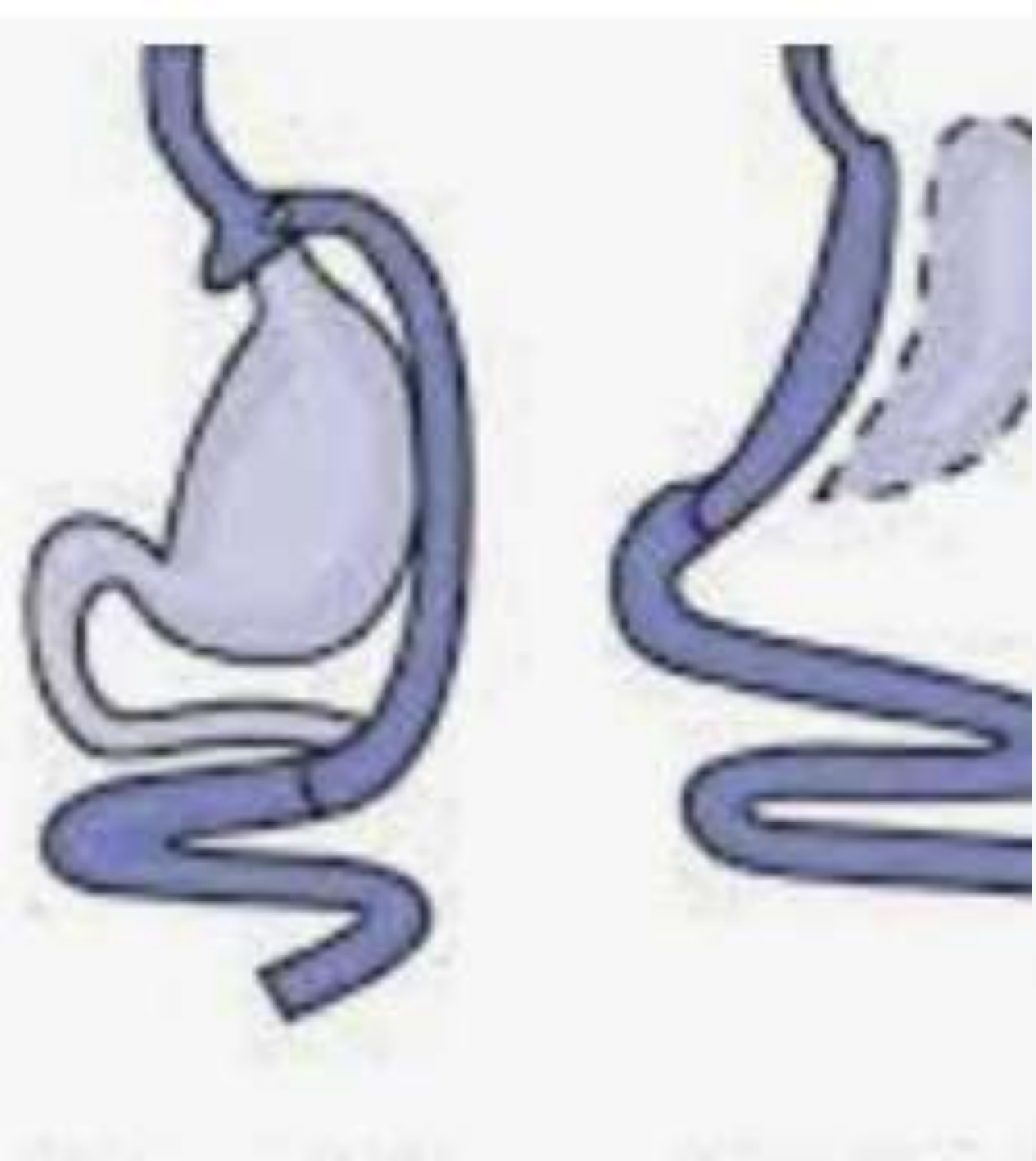
# MBS AFTER KT

**Substantial decrease in BMI without major complications**

**Risk of death and graft loss were lower with bariatric surgery in short term FU (up to 24 mo)**

**- Limited evidence of the advantages of surgery after KT.**
**- No data on long-term graft function and survival**

# Immunossupressants ***pharmacokinetic***

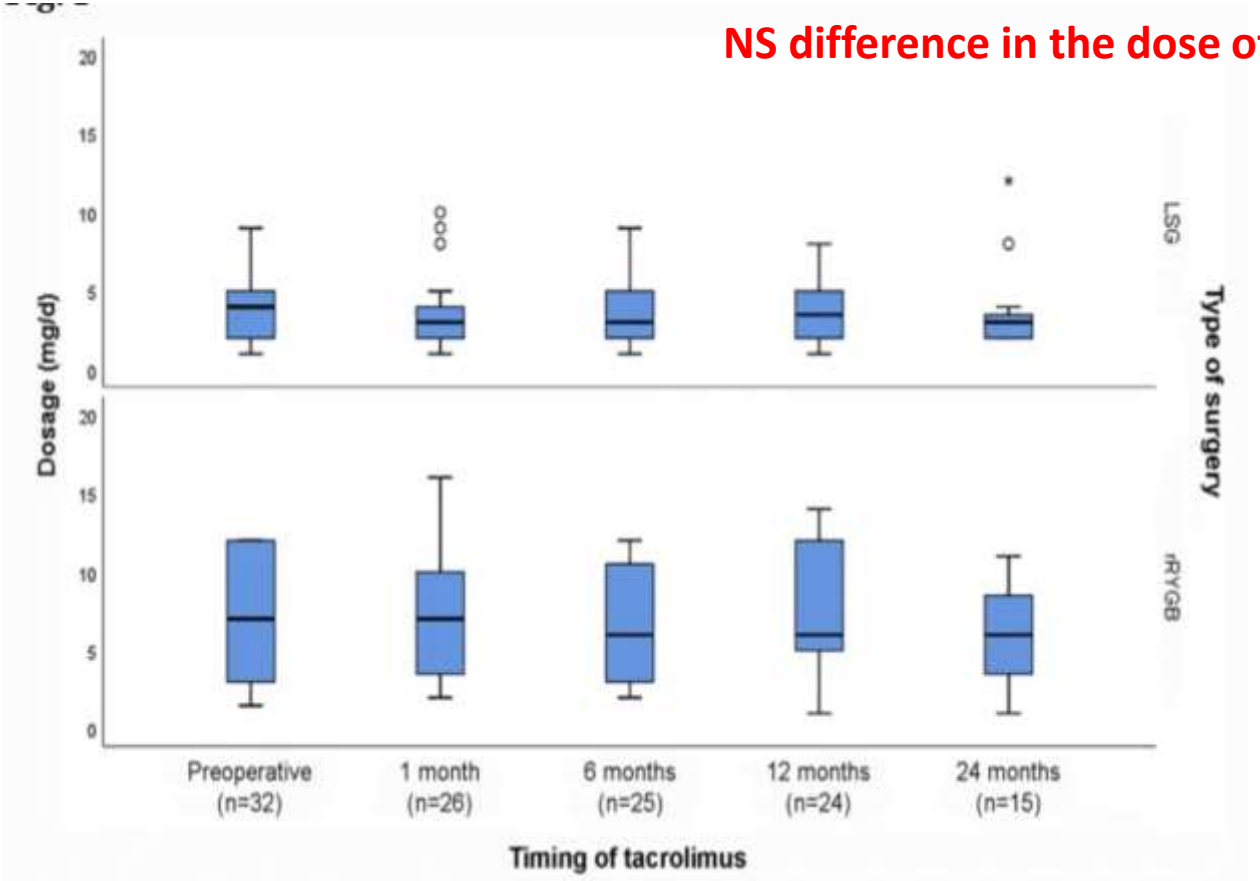


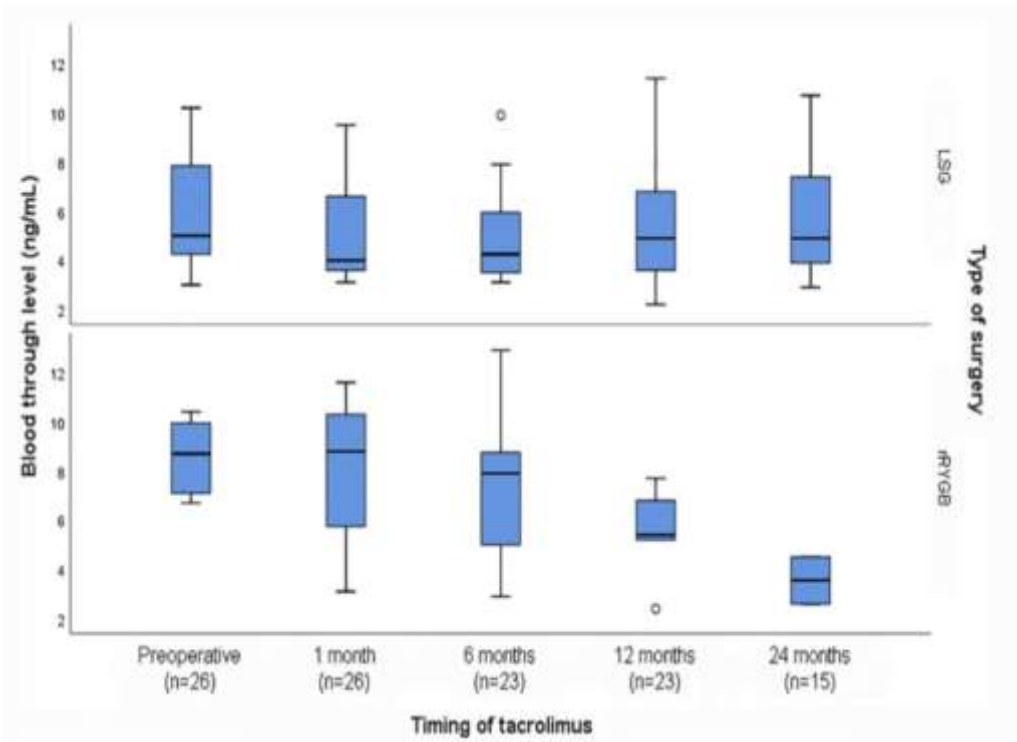
# Outcomes of Bariatric Surgery After Solid Organ Transplantation

Yilon Lima Cheng [1] · Enrique F. Elli [1]

Obes Surg, 2020

**NS difference in the dose of traculimus SG&RYGB**



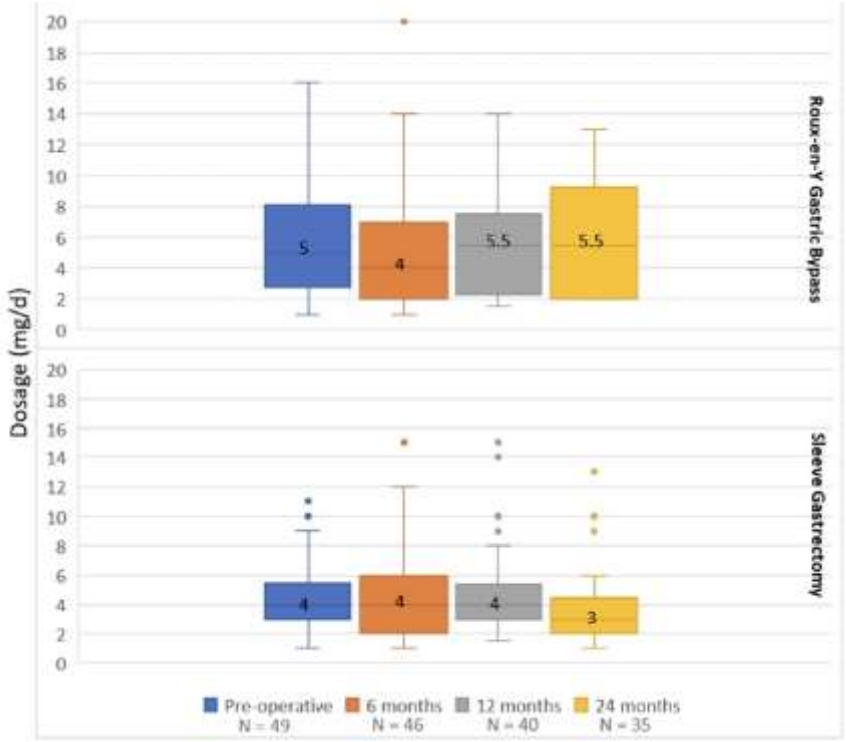
# Outcomes of Bariatric Surgery Before, During, and After Solid Organ Transplantation

Obes Surg, 2022

Rocio Castillo-Larios[1] · Naga Swati Gunturu[1] · Enrique F. Elli[1]

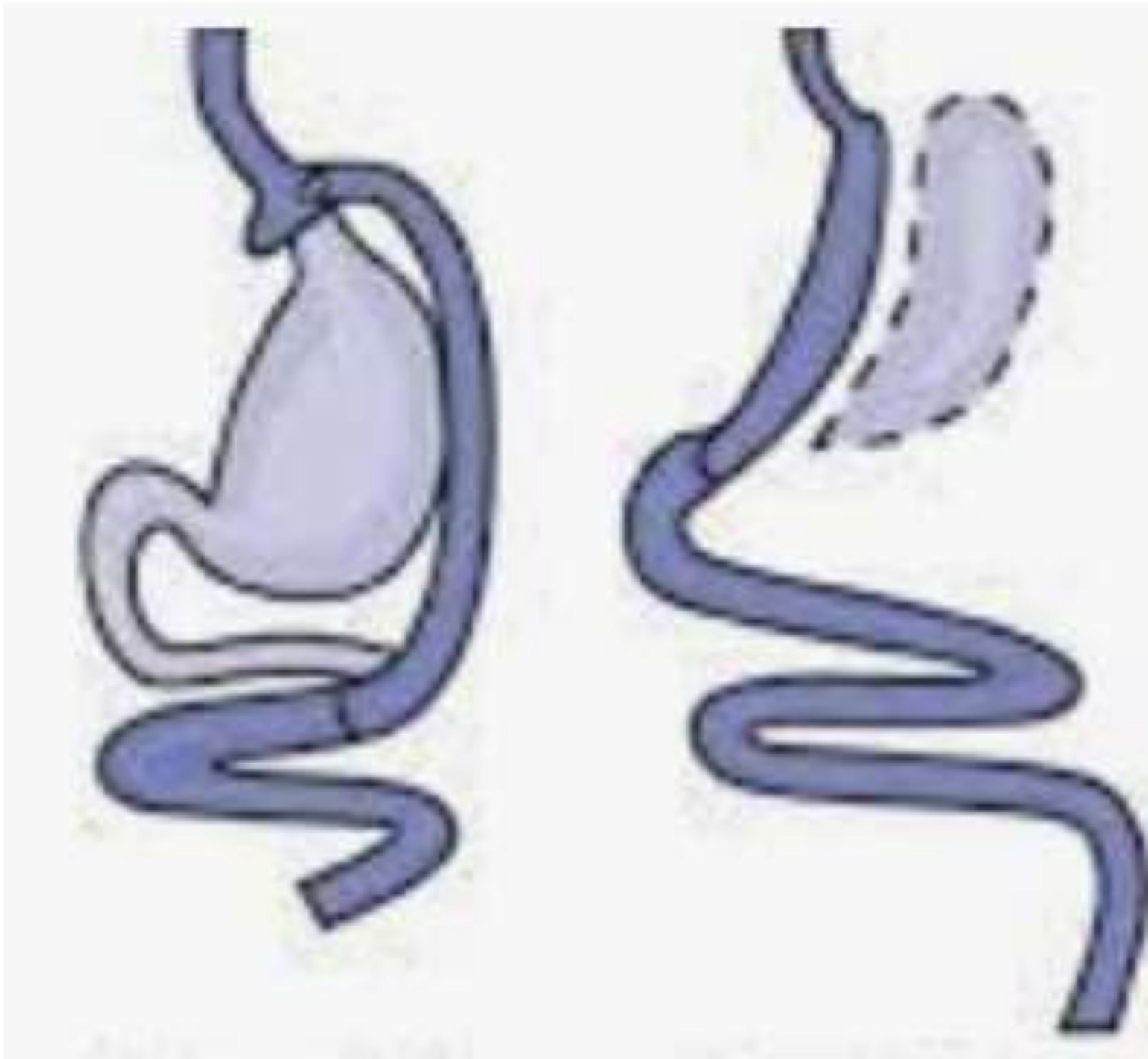
| | | | | | |
|---|---|---|---|---|---|
| Type of surgery (%) | | | | | 0.125 |
| Sleeve gastrectomy | 60 (75.5%) | 8 (77.7%) | 11 (100%) | 41 (71.9%) | |
| Roux-en-Y gastric bypass | 18 (24.5%) | 2 (22.3%) | 0 | 16 (28.1%) | |

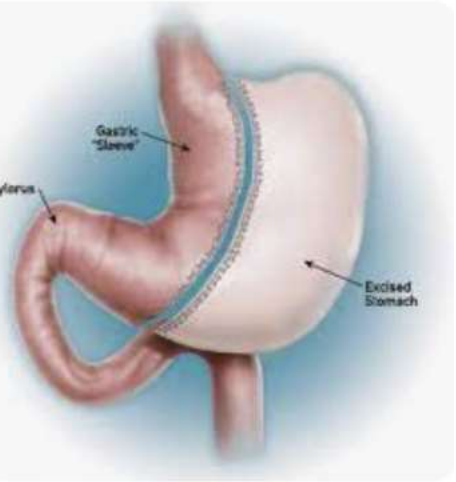
**Fig. 4** Tacrolimus dosage by type of bariatric surgery. *Numbers represent the median




**NS difference in the dose of traculimus SG&RYGB**

# INDIRECT COMPARISONS






. Kim Y, Jung AD, Dhar VKet al.. Laparoscopic sleeve gastrectomy improves renal transplant candidacy and posttransplant outcomes in morbidly obese patients. *Am J Transplant* 2018; 18: 410–416 [PubMed] [Google Scholar]

Freeman CM, Woodle ES, Shi Jet al.. Addressing morbid obesity as a barrier to renal transplantation with laparoscopic sleeve gastrectomy. *Am J Transplant* 2015; 15: 1360–

Kim Y, Shi J, Freeman CMet al.. Addressing the challenges of sleeve gastrectomy in end-stage renal disease: analysis of 100 consecutive renal failure patients. *Surgery* 2017; 162: 358–365

Ku E, McCulloch CE, Roll GRet al.. Bariatric surgery prior to transplantation and risk of early hospital re-admission, graft failure, or death following kidney transplantation. *Am J Transplant* 2021; 21: 3750–3757 [PMC free article]

Modanlou KA, Muthyala U, Xiao Het al.. Bariatric surgery among kidney transplant candidates and recipients: analysis of the United States Renal Data System and literature review. *Transplantation* 2009; 87: 1167–1173 [PMC free

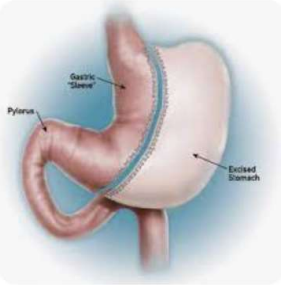

Thomas IA, Gaynor JJ, Joseph Tet al.. Roux-en-Y gastric bypass is an effective bridge to kidney transplantation: results from a single center. *Clin Transplant* 2018; 32: e13232.

Jamal MH, Corcelles R, Daigle CRet al.. Safety and effectiveness of bariatric surgery in dialysis patients and kidney transplantation candidates. *Surg Obes Relat Dis* 2015; 11: 419–423 [PubMed] [Google Scholar] [Ref list]

Orandi BJ, Purvis JW, Cannon RMet al.. Bariatric surgery to achieve transplant in end-stage organ disease patients: a systematic review and meta-analysis. *Am J Surg* 2020; 220: 566–579

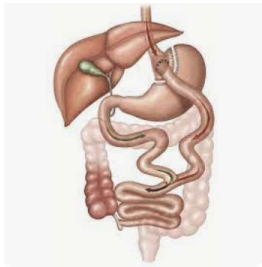
. Modanlou KA, Muthyala U, Xiao Het al.. Bariatric surgery among kidney transplant candidates and recipients: analysis of the United States Renal Data System and literature review. *Transplantation* 2009; 87: 1167–1173 [PMC free

Guggino J, Coumes S, Wion Net al.. Effectiveness and safety of bariatric surgery in patients with end-stage chronic kidney disease or kidney transplant. *Obesity* 2020; 28: 2290–2304




✓ Reduction in BMI varied between 6 and 17 kg/m$^2$

✓ 30–73% reduction of excess weight



✓ Lower incidence:

- Hypertension prior to transplant
- Delayed graft function
- Hospital readmission rate due to kidney dysfunction after transplantation

✓ 50% of patients lose sufficient weight to enable wait-listing for transplantation @ 1 YEAR

✓ 60% reduction of graft failure (RETROSPECTIVE STUDIES)

✓ Scarce reported outcomes on delayed graft function and early hospital readmission for renal dysfunction

✓ 3% mortality; 8-10 % major complications

✓ Reported mortality was 2-4% and 7-11% major complications

✓ Oxaluria nepheopathy should be screeened and considered

# Sleeve Gastrectomy Compared with Gastric Bypass for Morbidly Obese Patients with End Stage Renal Disease: a Decision Analysis

Rashikh A. Choudhury [1] · Gerard Hoeltzel [2] · Kas Prins [1] · Eric Chow [3] · Hunter B. Moore [1] · Peter J. Lawson [1] · Dor Yoeli [1] · Akshay Pratap [4] · Peter L. Abt [2] · Kristoffel R. Dumon [2] · Kendra D. Conzen [1] · Trevor L. Nydam [1]

Journal of Gastrointestinal Surgery,2019

***Markov decision analytic model – 30.000 pts, 10.000 per intervention***

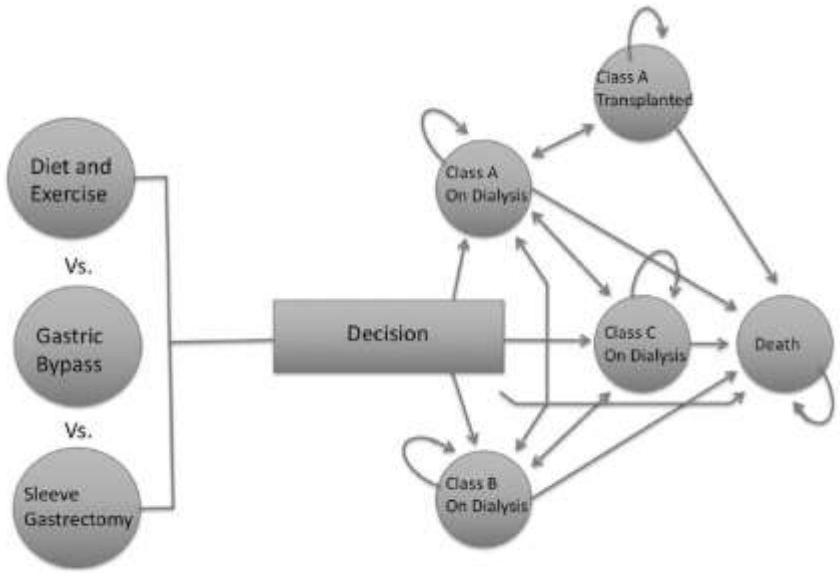
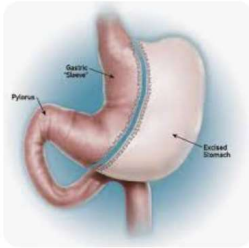



**Table 1** Decision model, transition probabilities

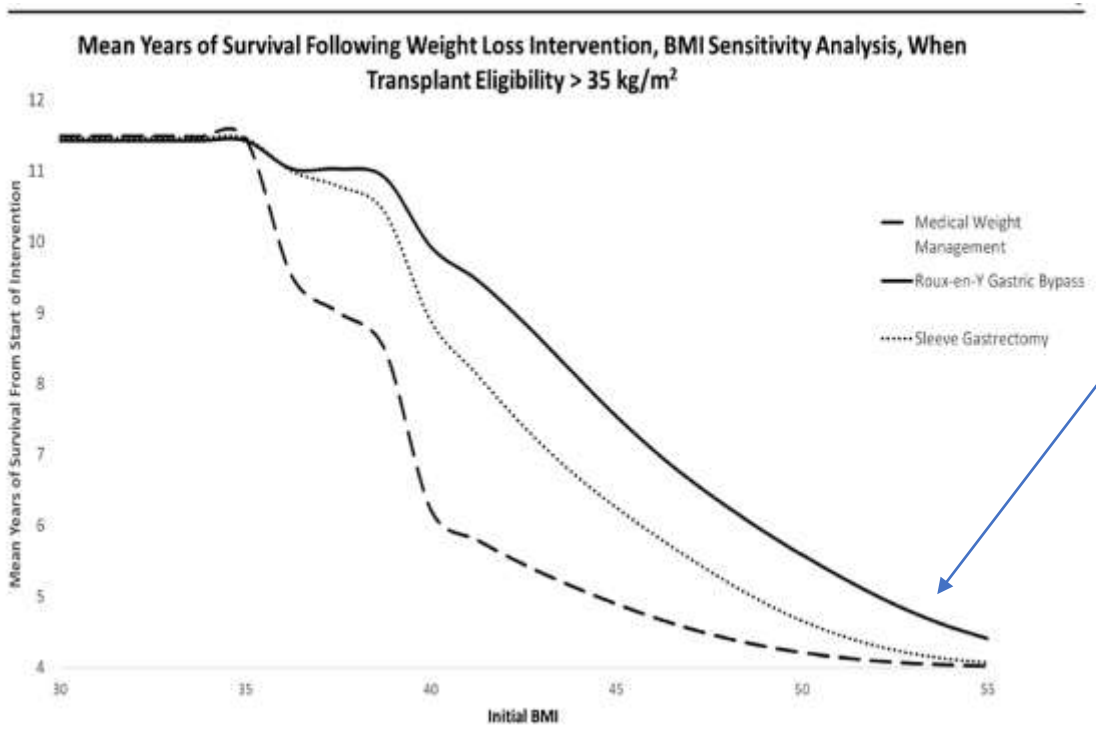
| Variables | Estimate (time) | Reference |
|---|---|---|
| Roux-en-Y gastric bypass procedure associated mortality rate | 0.5% dead (30 days) | Buchwald et al., 2004[32] |
| Sleeve gastrectomy procedure associated mortality rate | 0.23% dead (30 days) | Hajer et al., 2018[33] |
| Hemodialysis mortality for obese patients (BMI > 30 kg/m$^2$) | 60% dead (6 years) | Abbott et al., 2004[34] |
| Graft failure for obese patients (BMI > 30 kg/m$^2$) | 36% graft failure (5 years) | Yamamoto et al., 2002[35] |
| Weight class A (BMI 30 to 35) yearly all-cause mortality rate | 17.0 deaths per 1000 (1 year) | Whitlock et al., 2009[36] |
| Weight class A wait time for renal transplant | 75% transplanted (6 years) | Segev el al, 2008[5] |
| Weight class B (BMI 35 to 40) yearly all-cause mortality rate | 21.7 deaths per 1000 (1 year) | Whitlock et al., 2009[36] |
| Weight class C (BMI greater than 40) yearly all-cause mortality rate | 27.2 deaths per 1000 (1 year) | Whitlock et al., 2009[36] |
| Renal transplant mortality for obese patients (BMI > 30 kg/m$^2$) | 70% dead (15 years) | Hoogeveen et al., 2011[37] |
| Weight loss after gastric bypass surgery | 23% ± 8% total body weight loss (2 years) | Jamal et al., 2015[31] |
| Weight loss after sleeve gastrectomy | 16% ± 7% total body weight loss (2 years) | Freeman et al., 2015[38] |
| Weight loss after diet and exercise therapy (medical weight management) | 7% ± 8%total body weight loss (1 year) | Curioni et al., 2005[39] |

**WL, probability of tranplantation,risks of dyalisis and surgical mortality**

X



***RYGB is more effective therapy for such patients by increasing access to transplant and thereby improving long-term survival.***




Improved survival after RYGB

# BEST TIMING

Original article

# Bariatric surgery before and after kidney transplant: a propensity score–matched analysis

SOARD,2023

Yitian Fang, M.D.[a], Loubna Outmani, B.Sc.[a], Anoek A. E. de Joode, M.D., Ph.D.[b], Hendrikus J. A. N. Kimenai, M.D.[a], Joke I. Roodnat, M.D., Ph.D.[c], Judith W. H. 't Hart, M.D.[d], Ulas L. Biter, M.D.[d], René A. Klaassen, M.D.[e], Ron W. F. de Bruin, M.D., Ph.D.[a], Jan N. M. IJzermans, M.D., Ph.D.[a], Robert A. Pol, M.D., Ph.D.[f], Robert C. Minnee, M.D., Ph.D.[a,*]

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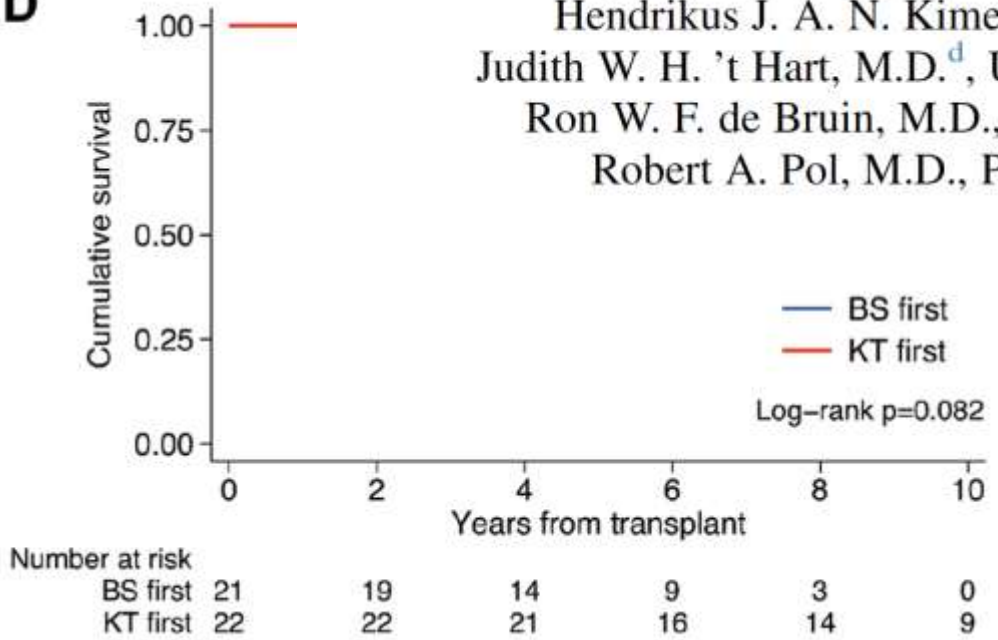
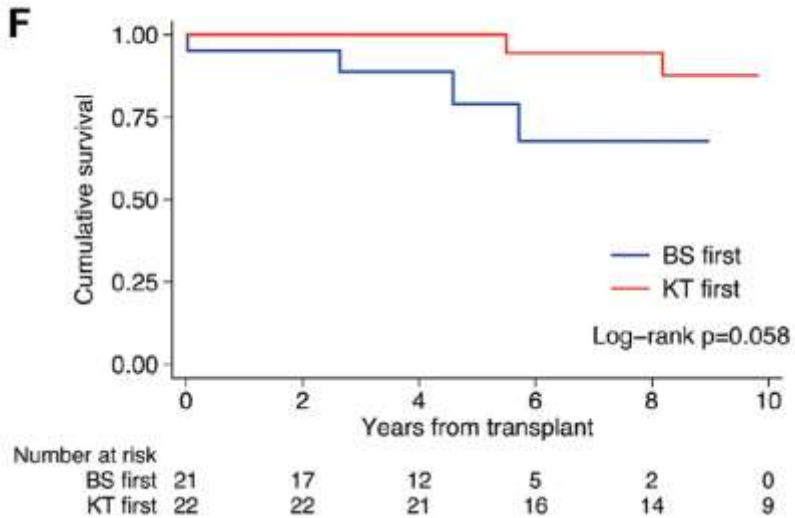



F




***No statistical difference was found in patient survival and death-censored graft survival between the 2 groups***

# Gastric bypass *versus* best medical treatment for diabetic kidney disease: 5 years follow up of a single-centre open label randomised controlled trial

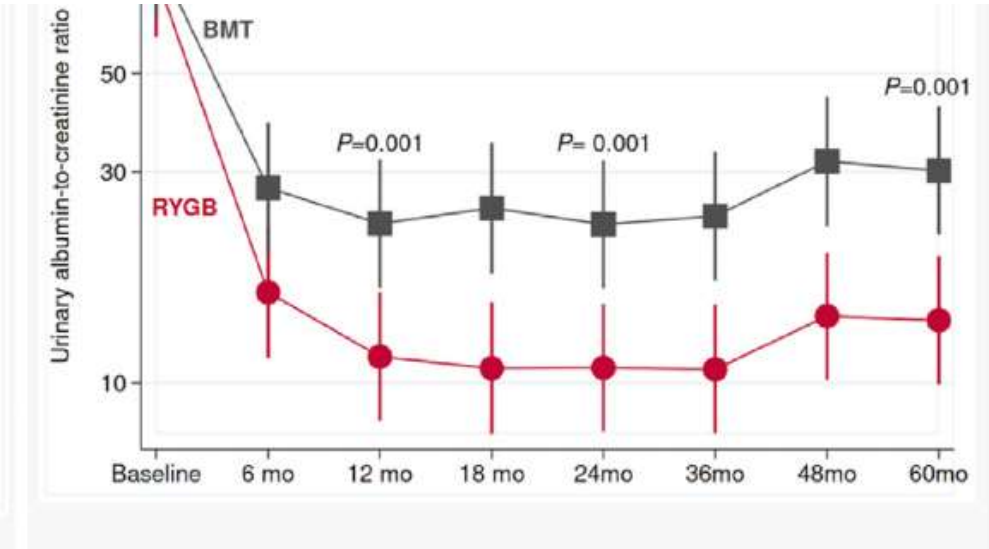
Ricardo V. Cohen,[a,*] Tiago Veiga Pereira,[b,c] Cristina Mamédio Aboud,[a] Tarissa Beatrice Zanata Petry,[a] José Luis Lopes Correa,[a] Carlos Aurélio Schiavon,[d] Carlos Eduardo Pompílio,[a] Fernando Nogueira Quirino Pechy,[a] Ana Carolina Calmon da Costa Silva,[a] Lívia Porto Cunha da Silveira,[a] Pedro Paulo de Paris Caravatto,[a] Helio Halpern,[a] Frederico de Lima Jacy Monteiro,[a] Bruno da Costa Martins,[a] Rogerio Kuga,[a] Thais Mantovani Sarian Palumbo,[a] Allon N. Friedman,[e] and Carel W. le Roux[f,g]

The Lancet eClinMed , online Nov 11,2022

# X BMT

## Early stage CKD remission

Remission of albuminuria with eGFR > 60 ml/min




# 63.1% favoring RYGB

# X

# BMT

# MBS & KT

- Reasonably safe
- Leads to significant WL and control of comorbidities
- Immunossuopressants are not an issue
- May be performed before or after KT
- No level 1 evidence on the better operation, but RYGB seems to increase Tx eligibility with better WL and control of BP, lipids and T2D
- Screen oxaluria after RYGB
- MBS should be done long BEFORE the progression to ESRD. It would mostly avoid this discussion!


Thank you!!
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