



The Role of Bariatric Surgery on Kidney Transplantation: A Systematic Review and Meta-Analysis

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ABSTRACT

BACKGROUND: Obesity (BMI >35kg/m²) remains a relative contraindication for kidney transplant and can affect recipient outcomes. This systematic review and meta-analysis investigated the role of bariatric surgery before and after kidney transplantation (KTX).

METHODS: Databases including MEDLINE, EMBASE, CENTRAL, and PubMed were searched up to March 2019, and included studies that performed bariatric surgery on patients with severe obesity before and after KTX. Outcomes included change in BMI and rates of mortality and complications after bariatric surgery. For studies that performed bariatric surgery before KTX, additional outcomes included the rate of patients listed and those who successfully received KTX following bariatric surgery. Pooled estimates were calculated using the random effects meta-analysis of proportions.

RESULTS: 17 studies were eligible for the final review. 8 studies investigated the role of bariatric surgery before KTX. The weighted mean baseline BMI was 43.3 (3.2) kg/m² and mean BMI at 19.0 months follow-up was 34.3 (2.3) kg/m². After bariatric surgery, 84% (95% CI, 64%-98%) were successfully listed for KTX, 70% (95% CI, 37%-95%) of whom underwent KTX. 9 studies investigated the role of bariatric surgery after kidney transplant. Weighted mean baseline BMI was 44.1 (4.5) kg/m² and mean BMI at 11.3 months follow-up was 35.7 (3.8) kg/m². Overall mortality was 0% for both those who underwent bariatric surgery before or after receiving a KTX.

CONCLUSIONS: Bariatric surgery may be safe and effective in reducing weight to improve KTX candidacy in patients with severe obesity. It can also be used safely following KTX.

INTRODUCTION

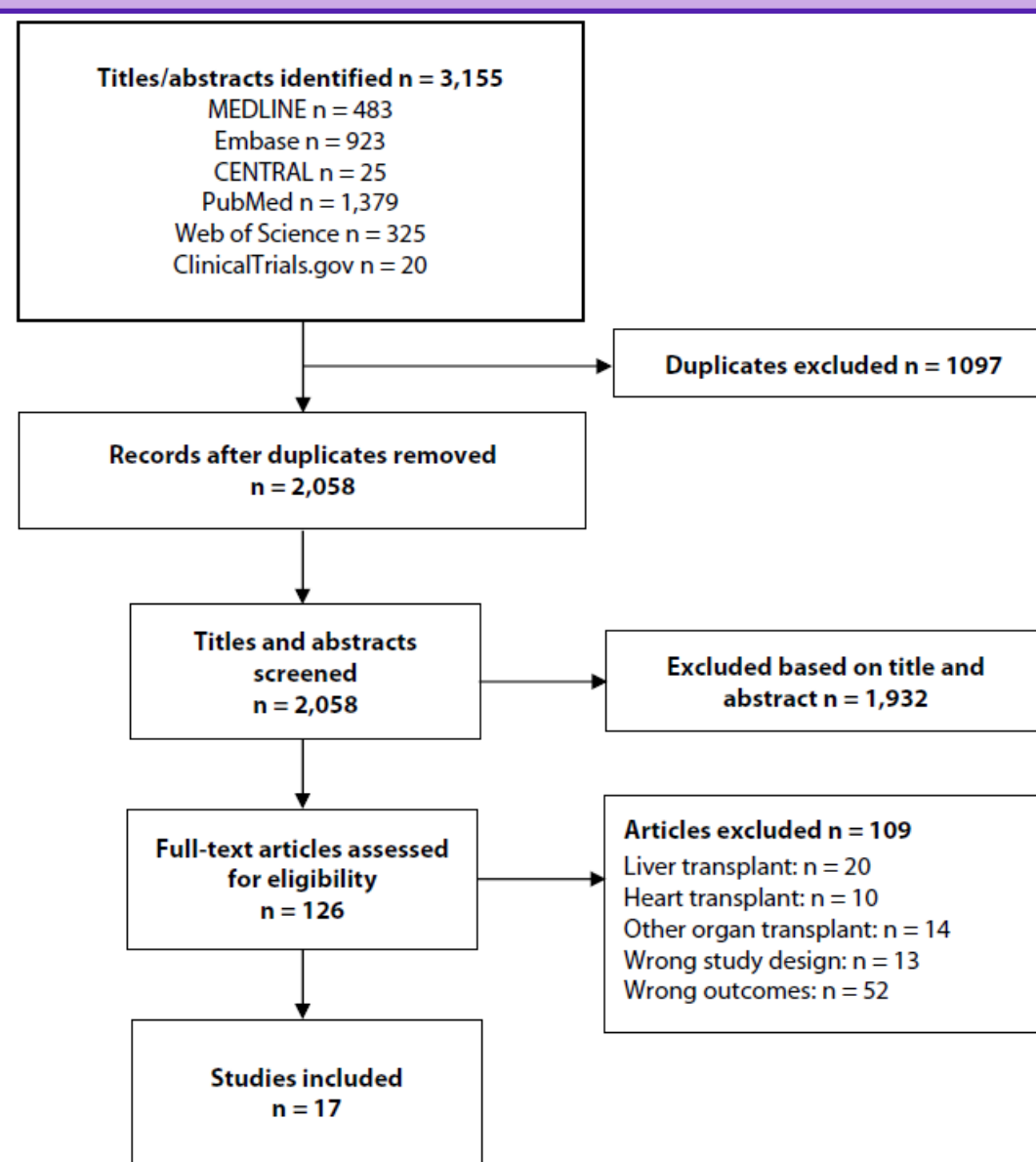
While the prevalence of obesity and its co-morbidities is increasing, this population is at risk for worsening kidney function and eventual need for dialysis and kidney transplantation. The Canadian Society of Transplantation recommends that obesity alone should not be a contraindication for KTX, but that patients with obesity undergo a supervised weight loss program to achieve a target BMI <30. However, the guidelines also state that the risks of transplantation may be unacceptably high in individuals with BMI >36 kg/m².

Bariatric surgery has been shown to be the most effective treatment for morbid obesity. Significant weight loss in this population can improves GFR, proteinuria and can resolve T2DM and HTN co-morbidities. Differences exist in the literature as to whether bariatric surgery can be used for weight loss prior to KTX, resulting in improved suitability for KTX, potentially improving postoperative KTX outcomes associated with increased BMI. Additionally, the safety and efficacy of bariatric surgery in the post-KTX severely obese patient has not been definitively shown.

This study aims to investigate the role of bariatric surgery in improving transplant candidacy in patients prior to KTX, as well its safety and efficacy for weight loss in KTX patients in the peri and/or postoperative period.

METHODS

The following databases were searched through March 2019 (MEDLINE, EMBASE, CENTRAL, PubMed, and Web of Science) for studies with patients receiving bariatric surgery for severe obesity before and after KTX. For pre-KTX bariatric surgery, outcomes included number of patient listed for transplant, successful transplants and all cause 30-day mortality post bariatric surgery. For post-KTX bariatric surgery, outcomes included all cause 30-day mortality post-bariatric surgery. Secondary outcomes such as weight regain, graft failure, minor complications and co-morbidities remission were recorded. All statistical analysis and meta-analysis were performed on STATA and Cochrane Review Manager.



RESULTS

Bariatric Surgery BEFORE KTX

Literature review

- 8 included studies
- 2 retrospective cohort studies, 6 case series

Pooled population

- 142 patients (54.6% female)
- Age 49.0
- Baseline BMI 43.3

General Outcomes

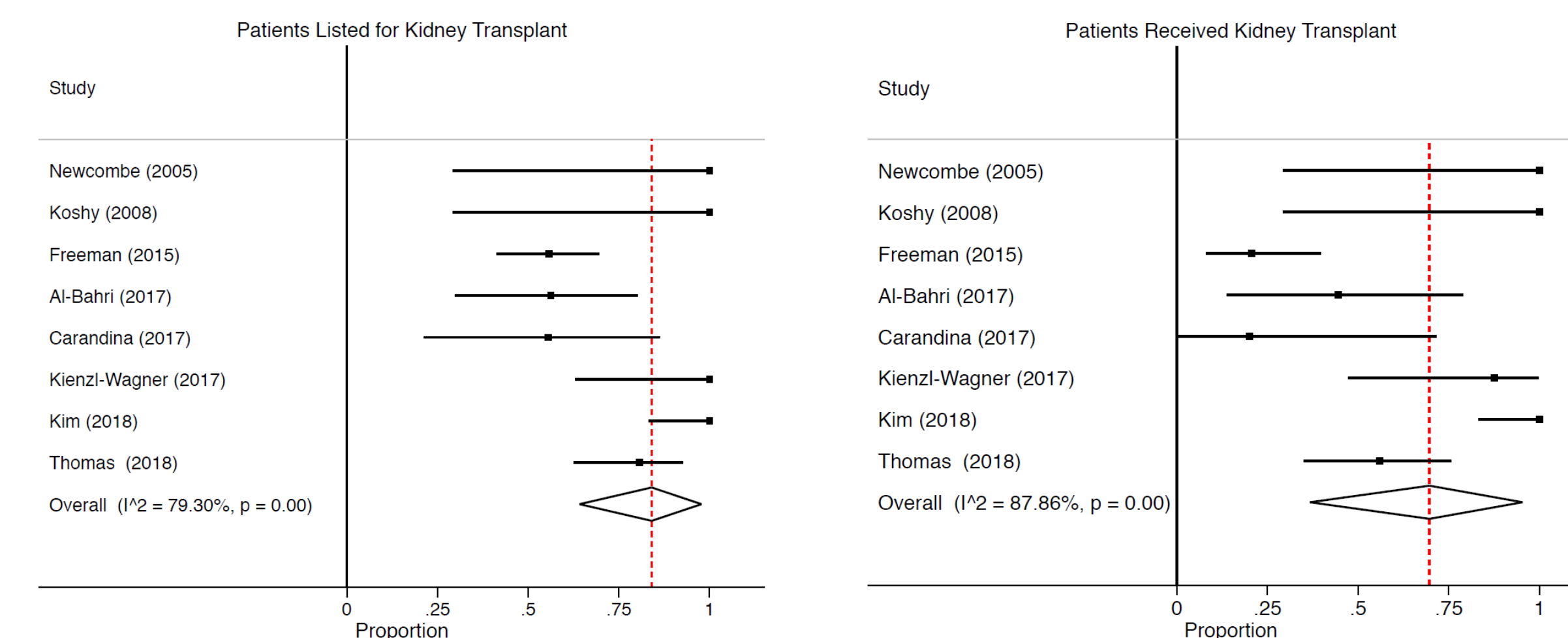
- 20.8% BMI reduction (34.3 at 19 months)
- 0% 30-day mortality
- 64% T2DM improvement/remission (5 studies, I²=78%)
- 48% HTN improvement/remission (5 studies, I²=56%)

Transplant outcomes

- 84% Successfully listed for KTX (95% CI, 64%-98%; 8 studies, I²=79%)
- 70% Successfully received KTX (95% CI, 45%-100%; 4 studies, I²=82%)
- 79% 1-year graft survival rate

- 19.9 months average time before KTX
- 75.9% deceased-donor KTX

Author, Year	N	Pre-Bariatric Surgery BMI, kg/m ²	Post-Bariatric Surgery BMI, kg/m ²	N Successfully Listed for Transplant (%)	N Successfully Received Transplant (%)	N Graft Survival 1 Year After Transplant (%)
Thomas, 2018	31	43.5	28.1	25 (80.6)	14 (45.2)	10 (71.4)
Kim, 2018	20	41.5	32.3	20 (100)	20 (14.1)	20 (100)
Newcombe, 2005	3	44.6	33.7	3 (100)	3 (100)	-
Koshy, 2008	3	40.1	34.1	3 (100)	3 (100)	-
Freeman, 2015	52	43	36.3	29 (55.8)	6 (11.5)	-
Al-Bahri, 2017	16	48	31.7	9 (56.3)	4 (25%)	4 (100)
Kienzl-Wagner, 2017	8	38	30.7	8 (100)	7 (87.5)	6 (87.5)
Carandina, 2017	9	45.9	28.3	5 (55.5)	1 (11.1)	-



Bariatric Surgery AFTER KTX

Literature review

- 9 included studies
- 6 case series, 1 retrospective cohort, 1 case-control, 1 non-randomized

Pooled population

- 274 patients (51.6% female)
- Age 47.2
- Baseline BMI 44.1

General Outcomes

- 19.1% BMI reduction (35.7 at 11.3 months)
- 0% all-cause 30-day mortality
- 72% T2DM improvement/remission (5 studies, I²=87%)
- 78% HTN improvement/remission (4 studies, I²=90%)
- 1 30-day minor complication (AKI)
- 1 30-day major complication (sleeve stricture/vomiting)

Transplant outcomes

- 2.4% Graft rejection or return to dialysis (Reported in 7/9 studies for 4/144 patients)
- 7.0 months average time before bariatric surgery
- 55.9% deceased-donor KTX

Author, Year	N	Pre-Bariatric Surgery BMI, kg/m ²	Post-Bariatric Surgery BMI, kg/m ²	Time from KTX to Bariatric Surgery (Yrs)	N Graft Failure or Return to Dialysis/ Rejection (%)
Viscido, 2018	5	42.18	29.8	15	-
Schindel, 2019	30	41.3	29.5	4.6	2 (4%)
Gazzetta, 2017	6	39.8	-	7.6	0 (0%)
Gheith, 2017	22	38.5	34.3	-	1 (4.5%)
Golomb, 2014	10	41.6	29.1	5.27	0 (0%)
Szomstein, 2010	5	52.2	32.2	-	0 (0%)
Arias, 2010	5	40.2	29.2	-	0 (0%)
Alexander, 2007	10	47.3	32.3	5.3	-
Modanlou, 2009	87	46.6	40.2	4.3	1 (1.1%)

MINORS score:

- 10.3 (0.99) for the 13 non-comparative studies
- 17.0 (2.12) for the 4 comparative studies

DISCUSSION

This study shows that bariatric surgery is safe in patients with obesity and end-stage renal disease prior to KTX, and safe in patients with obesity and with previous KTX (30-day mortality rate after bariatric surgery being 0% for both groups). Bariatric surgery also produces substantial weight loss that improves candidacy for KTX, since 84% of post-bariatric surgery patients qualifying for KTX, considering only 29.7% of all KTX recipients are obese. Bariatric surgery is also effective in reducing prevalence of T2DM and hypertension in this population, potentially optimizing patients prior to KTX. KTX should not be a contraindication to bariatric surgery as demonstrated by the low graft rejection/dialysis rate (2.4%). Overall, bariatric surgery provides the same substantial weight loss and benefits to KTX candidates and recipients as it does in the non-obese, non-bariatric surgical population, while also increasing access to KTX in ESRD for obese patients and reducing comorbidity load in the patient post-KTX.

CONCLUSION

Bariatric surgery is a safe and effective intervention to reduce weight and comorbidities in both pre-KTX and post-KTX patients. There is no universally accepted BMI cut-off or time interval relative to KTX to intervene with bariatric surgery, warranting further research into optimal timing and criteria for bariatric surgery in this population.

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Poster presentation by Zacharie Cloutier, MD