Published in final edited form as:

J Ren Nutr. 2013 May ; 23(3): 207–209. doi:10.1053/j.jrn.2013.02.005.

Obesity and body composition for transplant wait-list candidacy – challenging or maintaining the BMI limits?

Kirsten L. Johansen, MD

Department of Medicine, University of California, San Francisco and Nephrology Section, San Francisco VA Medical Center

Abstract

Most kidney transplantation programs have a maximum body mass index (BMI) above which they will not place a patient on the active waiting list. However, obesity is common among patients with end-stage renal disease, and weight loss is difficult, resulting in many patients being denied the opportunity to be considered for a transplant. BMI limits are in place because of data that outcomes are worse among obese transplant recipients than among those with lower BMI. However, the data to suggest that patient and graft survival is affected by obesity is not consistent, and obese patients with ESRD have better survival after kidney transplantation compared to remaining on dialysis. Therefore, it is important to examine the question of BMI limits carefully to ensure that we are achieving the right balance and making the best use of donated kidneys.

Introduction

Obesity is a very large problem among patients with ESRD on dialysis, with the average body mass index (BMI, kg/m²) among dialysis patients increasing steadily over the last 15 years (Figure).¹ As a consequence, greater numbers of obese patients are being referred for evaluation for kidney transplantation. Although many studies have demonstrated a survival advantage among obese dialysis patients relative to those with lower BMI, there is concern about worse transplant-related outcomes among obese patients, and many centers have adopted policies restricting transplantation among patients above a threshold BMI. In order to set rational policies about kidney transplantation among obese individuals, it is important to understand whether outcomes differ after transplant on the basis of BMI and whether transplantation improves survival among obese individuals compared to remaining on dialysis. The extent to which weight loss is feasible and safe among dialysis patients and whether weight loss is associated with improved transplant outcomes must also be considered.

Association of BMI with outcomes after transplant

Numerous observational studies have addressed the association of BMI with patient and graft survival after kidney transplantation,^{2–6} and the results are definitively not definitive. Of five studies with 1,000 or more patients published in the last 10 years, one showed a higher risk of death² and two showed decreased overall graft survival among obese transplant recipients;^{2,3} the other three studies showed no association of high BMI with graft

© 2013 The National Kidney Foundation, Inc. Published by Elsevier Inc. All rights reserved.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

or patient survival after adjusting for other predictors.⁴⁻⁶ The reasons for these discrepant results have not been clearly delineated but include different patient populations, different degrees of adjustment for covariate, and different lengths of post-transplant follow-up.

The data related to immediate post-transplant outcomes has been more consistent, however, with most studies showing an association between high BMI and delayed graft function,⁴ wound complications,⁷ and prolonged hospitalization.¹ Some authors have speculated that longer intraoperative time among obese patients, effects of hyperglycemia, inflammation, or body shape itself could be contributing factors.¹

Is transplantation beneficial among obese patients with ESRD?

Given that obese dialysis patients have a survival advantage compared to non-obese patients and their transplant outcomes are worse or no better than patients with BMI in the normal range, it is reasonable to consider whether transplantation prolongs survival for these patients. At least two recent studies have attempted to address this question.^{8,9} Glanton *et al.* assembled a cohort of 7,521 patients who started dialysis between 1995 and 1999 and were eventually placed on a kidney transplant waiting list.⁸ They found that obese patients who received a cadaveric or a living donor kidney transplant had lower risk of mortality than those who remained on the waiting list (HR 0.39, 95% CI 0.33 – 0.47 and HR 0.23, 95% CI 0.16 – 0.34, respectively), and obese patients experienced an apparent survival benefit from transplantation that was identical to that observed among non-obese patients. In a secondary analysis restricted to severely obese patients (BMI ≥ 41 kg/m²), renal transplantation was not significantly associated with survival. In a smaller but more modern cohort, Bennett *et al.* found a survival advantage associated with transplantation even for morbidly obese patients (BMI >35 kg/m²), although they compared post-transplant survival to that of a historical group of prevalent dialysis patients rather than to a more selected wait-listed group.⁹ Taken together, these studies suggest that although it is possible that some outcomes are worse for severely obese patients after kidney transplant, obese patients do derive a survival benefit from the procedure. Furthermore, a recent study showed that health-related quality of life is similar among non-obese, obese and morbidly obese individuals after transplantation,¹⁰ and it is well known that quality of life is vastly superior among kidney transplant recipients compared to patients receiving maintenance dialysis.

Can obese patients with ESRD lose weight?

Implicit in the establishment of BMI thresholds for transplantation is the notion that obesity is reversible and beneficial, i.e., that patients can safely lose weight and become eligible for transplantation and that doing so will improve outcomes. (There is also, perhaps, the tacit judgment that failure to lose weight is the fault of the patient). Unfortunately, there is a paucity of available data to address these assumptions. A 2001 report from a single center noted that when obese patients were told to lose weight in order to become transplant candidates, only 10% actually lost weight, and only 5% lost enough weight to be listed for transplant. It is not clear from this report how much weight patients needed to lose or what strategies they employed. Nevertheless, this statistic is consistent with clinical observations: even with the powerful motivation of a possible kidney transplant, most severely obese patients are unable to lose weight simply because they are told to do so. One center reported outcomes of a multidisciplinary weight management program that utilized diet, exercise, behavior therapy, and the antiobesity drug orlistat among obese patients with CKD, 22 of whom were on dialysis.¹¹ In that study, 44 of 64 eligible patients began the intervention, and 32 (20 on dialysis) completed 24 months of participation. The 20 who declined the intervention served as a control group. At the end of the intervention, participants weighed 5.5 kg less than non-participants, on average, and 9 of 26 otherwise transplant-eligible

patients in the intervention group were wait listed compared to one of 18 in the control group. Outcomes of kidney transplantation were not reported in this small study. Modanlou *et al.* examined weight loss after bariatric surgery among kidney transplant candidates and recipients using Medicare claims in the United States Renal Data System and found that patients who had surgery before transplant (n=101) lost approximately 60% of their excess weight;¹² those who underwent bariatric surgery after transplantation (n=87) lost 31% of their excess weight.

Is weight loss prior to transplantation beneficial?

With regard to transplant-related outcomes associated with weight loss, there are few data specifically addressing intentional weight loss. Rather, available data come from observational studies that focus on weight loss for any reason (i.e., intentional or unintentional).^{7,13,14} In addition to a higher risk of wound complications associated with obesity, Kuo *et al.* also observed that a history of weight loss was associated with *higher* risk of complications, even among obese patients⁷. They hypothesized that changes in body shape with weight loss, particularly the development of an abdominal panniculus, which could interfere with wound healing, might explain their findings. However, they also noted that weight loss may have identified a subpopulation of patients who were at higher risk of wound complications on the basis of malnutrition. Molnar *et al.* examined the association of weight changes and patient survival among dialysis patients wait listed for kidney transplant and found an inverse association between weight change and hazard of death such that the more weight patients lost the higher their risk of death.¹⁴ The higher mortality associated with weight loss persisted when the analysis was restricted to obese patients. However, the possibility that weight loss was an indicator of intercurrent illness cannot be excluded, and post-transplant outcomes were not examined. In a large cohort of U.S. transplant recipients, Schold *et al.* reported that approximately one third had a change in World Health Organization BMI category while on the transplant wait list.¹³ Almost 25% of obese and over 30% of morbidly obese candidates reduced their BMI category during wait listing. However, weight loss was not associated with improvement in graft survival among obese patients (and was associated with worse outcomes among normal and underweight patients). Furthermore, there was a graded and inverse association between weight changes before and after transplantation so that those who lost weight beforehand generally gained weight afterwards.

Conclusion

In summary, there is fairly solid evidence that morbid obesity is associated with delayed graft function and wound infections after kidney transplantation but far less clear-cut evidence that overall graft or patient survival is adversely affected by excess weight. Intentional weight loss is not a trivial endeavor for dialysis patients, and advice to lose weight without referral to a weight loss program seems unlikely to engender success. Furthermore, it has not been demonstrated that weight loss followed by transplantation improves transplant outcomes. In fact, additional waiting time on dialysis related to attempted weight loss would be likely to be harmful in terms of both patient and graft survival. Therefore, although policies that preclude patients from receiving a transplanted kidney above a specific and arbitrary BMI are based on objective and measureable criteria, it remains unclear whether they are really consistent with equitable organ allocation for all candidates, particularly in light of the growing number of obese dialysis patients. Nevertheless, the widening BMI gap between dialysis patients and transplant recipients over the last 15 years (Figure) suggests that these policies *are* limiting access to transplantation among obese dialysis patients. The nephrology community is desperately in need of better data on the efficacy and safety of weight loss interventions among obese dialysis patients

and on the effects of pretransplant weight loss (and the extra waiting time that results from attempted weight loss) on transplant outcomes. Until such data are available, the scientific validity and equity of BMI limits must be questioned.

Acknowledgments

This work was supported in part by National Institutes of Health contract N01-DK-7-0005. The interpretation and reporting of the data presented here are the responsibility of the authors and in no way should be seen as an official policy or interpretation of the U.S. government.

References

1. Potluri K, Hou S. Obesity in kidney transplant recipients and candidates. *Am J Kidney Dis.* 2010; 56:143–156. [PubMed: 20452710]
2. Meier-Kreische H, Amdorfer J, Kaplan B. The impact of body mass index on renal transplant outcomes: a significant independent risk factor for graft failure and patient death. *Transplantation.* 2002; 73(1):70–74. [PubMed: 11792981]
3. Gore JL, Pham PT, Danovitch GM, et al. Obesity and outcome following renal transplantation. *Am J Transplant.* 2006; 6:357–363. [PubMed: 16426321]
4. Chang S, Coates P, McDonald S. Effects of body mass index at transplant on outcomes of kidney transplantation. *Transplantation.* 2007; 84(8):981–987. [PubMed: 17989603]
5. Marcen R, Fernandez A, Pascual J, et al. High body mass index and posttransplant weight gain are not risk factors for kidney graft and patient outcome. *Transplant Proc.* 2007; 39(7):2205–2207. [PubMed: 17889138]
6. Streja E, Molnar M, Kovesdy C, et al. Associations of pretransplant weight and muscle mass with mortality in renal transplant recipients. *Clin J Am Soc Nephrol.* 2011; 6(6):1463–1473. [PubMed: 21415312]
7. Kuo J, Wong M, Perez R, Li C, Troppmann C. Renal transplant wound complications in the modern era of obesity. *J Surg Res.* 2012; 173(2):216–223. [PubMed: 21816424]
8. Glanton C, Kao T, Cruess D, Agodoa L, Abbott K. Impact of renal transplantation on survival in end-stage renal disease patients with elevated body mass index. *Kidney Int.* 2003; 63(2):647–653. [PubMed: 12631130]
9. Bennett W, McEvoy K, Henell K, idikiti S, Douzdzian V, Batiuk T. Kidney transplantation in the morbidly obese: complicated but still better than dialysis. *Clin Transplant.* 2011; 25:401–405. [PubMed: 20946469]
10. Zayfudim V, Feurer ID, Moore DR, Moore DE, Pinson CW, Shaffer D. Pretransplant overweight and obesity do not affect physical quality of life after kidney transplantation. *J Am Coll Surg.* 2010; 210:336–344. [PubMed: 20193898]
11. MacLaughlin HL, Cook SA, Kariyawasam D, Roseke M, van Niekerk M, Macdougall IC. Nonrandomized trial of weight loss with orlistat, nutrition, education, diet, and exercise in obese patients with CKD: 2-year follow-up. *Am J Kidney Dis.* 2010; 55(1):69–76. [PubMed: 19926371]
12. Modanlou K, Muthyala U, Xiao H, et al. Bariatric surgery among kidney transplant candidates and recipients: analysis of the United States renal data system and literature review. *Transplantation.* 2009; 87(8):1167–1173. [PubMed: 19384163]
13. Schold J, Srinivas T, Guerra G, et al. A "weight-listing" paradox for candidates for renal transplantation? *Am J Transplant.* 2007; 7(3):550–559. [PubMed: 17173655]
14. Molnar M, Streja E, Kovesdy C, et al. Associations of body mass index and weight loss with mortality in transplant-waitlisted maintenance hemodialysis patients. *Am J Transplant.* 2011; 11:725–736. [PubMed: 21446975]

Figure.
Mean BMI among patients initiating dialysis and receiving transplant, 1995–2009