Obesity in Transplant- Beyond the Weight

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Disclosures

Nothing to disclose

Objectives

1

Review a case example of a malnourished and obese patient who received a deceased donor kidney transplant

2

Discuss the rationale for risk associated with obesity in transplant

3

Identify other tools available to measure body composition in transplant patients

Patient Information-
Recipient Information, PMH, and Timeline

Patient Information

Age: 63 y.o. male
Date of Transplant: 3/5/2024
Organ Received: Right Kidney - DBD
ABO: O+
BMI: 30
Diagnosis: Diabetes Mellitus – Type I (age 5)
CPRA: 0
CMV - /EBV +
Induction: Simulect

Past Medical History

- ESRD due to diabetic nephropathy
  - Biopsy on 2/2017- diffuse neuropathy class IIB
  - PD through PD cath nightly
- CAD
- T1DM since age 12
  - Neuropathy
  - retinopathy
- Former smoker
- HTN
- HLD
- Hyperparathyroidism
- CABG x4 in 2000

Committee Review- Evaluation

- Waist Circumference: 48inches
- Frailty Score: 1
- BMI: 34kg/m2 (at time of evaluation)
- Metabolic Syndrome Criteria
  - Waist circumference >40in
  - BP >130/85
  - LDL Cholesterol <40 (patients was 26)

Summary of Transplant Timeline

Referral 7/8/22

Deferred 9/14/22
Too Sick

Eval Began
3/7/23

Waitlisted
5/22/23

Inactive 7/24/23
Too Sick

Reactivated
8/23/23

Transplanted
3/5/24

Readmitted
4/8/24

Expired 4/21/24

Case Summary Following Transplant-
Clinical Course and Outcomes

Transplant Initial Admission

- 3/5/24-4/5/24 (31 days)
- DGF
  - HD via tunneled dialysis cath on 3/13/24 and 3/16/24
  - Biopsy on 3/20 showed ATN, no cellular rejection
- Washout + Wound Vac
  - 3/26 US showed complex fluid collections
- Malnutrition
  - Dobhoff + tube feeds + discharged to Madonna
- NSTEMI
  - LHC severe stenosis
  - AICD placement 3/30
- Urinary Retention

Transplant Hospital Readmission

- 4/8/24-4/21/24 (13 days)
- Admitted after first follow-up clinic visit for increased O2 requirements (10L) and confusion
- AHRF, suspected respiratory failure 2/2 pulmonary edema
- Intubated 4/11/24
  - Given lack of improvement despite significant diuresis, repeat CT chest concerning for worsening fibrosis 2/2 to ARDS. Cardiology consulted for RHC, mildly elevated PW
- CVVHD started 4/19/24
- Code blue called 4/21/34, unable to obtain ROSC

Discussion

Obesity Risk Factors

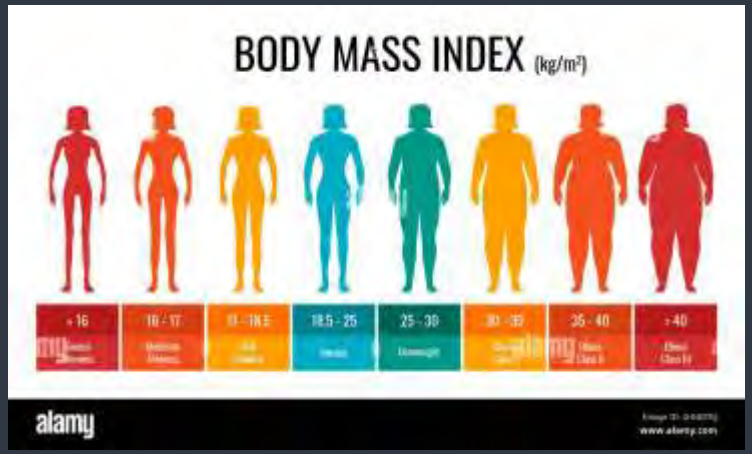
1. Wound healing problems
2. Longer length of stay
3. Delayed graft function
4. Increased risk of cardiac event
5. Mortality

**Despite these risks, it's important to note that transplantation still confers a survival benefit for obese patients relative to staying on dialysis. As always, clinical judgement weighing risk vs. benefit is critical*

Oniscu GC, Abramowicz D, Bolignano D, Gandolfini I, Hellemans R, Maggiore U, Nistor I, O'Neill S, Sever MS, Koobasi M, Nagler EV. Management of obesity in kidney transplant candidates and recipients: A clinical practice guideline by the DESCARTES Working Group of ERA. Nephrol Dial Transplant. 2021 Dec 24;37(Suppl 1):i1-i15. doi: 10.1093/ndt/gfab310. PMID: 34788854; PMCID: PMC8712154.

BMI vs. Obesity

Medical Definition:



WHO Definition:

The World Health Organization defines obesity as an abnormal or excessive fat accumulation that presents a risk to health.

CDC, June 2022

Sarcopenic Obesity

1. “Obesity Paradox”
2. Decreased muscle mass > decrease physical activity > decreased basal metabolic rate > further decreased muscle loss and fat gain > increased visceral fat > increased inflammation and insulin resistance > more muscle lass
3. Increased risk of atherosclerosis and heart failure

Mirzai S, Carbone S, Batsis JA, Kritchevsky SB, Kitzman DW, Shapiro MD. Sarcopenic Obesity and Cardiovascular Disease: An Overlooked but High-Risk Syndrome. Curr Obes Rep. 2024 Sep;13(3):532-544. doi: 10.1007/s13679-024-00571-2. Epub 2024 May 16. PMID: 38753289; PMCID: PMC11306598.

Additional Measurements

Waist Circumference

- BMI and waist circumference studied in a prospective cohort of 993 kidney transplant patients.
  - Elevated waist circumference associated with higher mortality
    - > 100 cm (40in) for males
    - > 90 cm (35in) for females
  - Incorporating measures of visceral adiposity in the definition of obesity may improve the risk stratification of kidney transplant recipients and of dialysis patients wait-listed for kidney transplantation.

CDC, June 2022

Kovesdy et al. Am J Transplant, Dec (2010)

DEXA

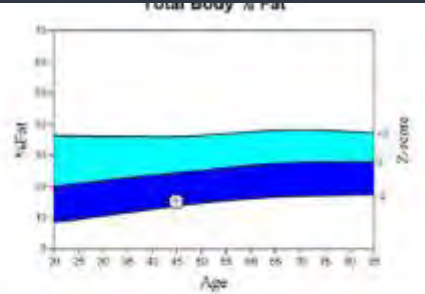
Dual-Energy X-Ray Absorptiometry (DEXA)

1. Total body fat percentage
2. Visceral adipose tissue
3. Skeletal muscle mass
4. Bone density

Healthy Percentage Body Fat Ranges

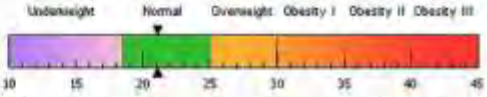
Age	Body Fat % Men	Body Fat % Women
20-39	8-19%	21-32%
40-59	11-21%	23-33%
60-79	13-24%	24-35%

Gallagher, et al. Am J Clin Nutr. 72: 694-701 (2000)



Source: NHANES Classic White Male

World Health Organization Body Mass Index Classification
BMI = 21.1 WHO Classification Normal



BMI has some limitations and an actual diagnosis of overweight or obesity should be made by a health professional. Obesity is associated with heart disease, certain types of cancer, type 2 diabetes, and other health risks. The higher a person's BMI is above 25, the greater their weight-related risks.

Body Composition Results

Region	Fat Mass (g)	Lean + BMC (g)	Total Mass (g)	% Fat	%Fat Percentile YN	%Fat Percentile AM
L Arm	579	3461	4041	14.1	29	11
R Arm	618	3319	3937	15.7	35	15
Trunk	4563	29147	33710	13.5	17	4
L Leg	1961	9915	11876	16.5	19	11
R Leg	1909	10431	12341	15.5	14	7
Subtotal	9031	56274	65905	14.6	18	4
Head	1161	3508	4669	24.9		
Total	**10792**	**59782**	**70574**	**15.3**	**19**	**5**
Android (A)	773	4288	5065	15.3		
Gynoid (G)	2079	9774	11854	17.5		

Scan Date: 17 December 2018 ID: A1217180R
Scan Type: a Whole Body
Analysis: 06 August 2019 13:45 Version 13.6.0.5
Auto Whole Body Fan Beam
Operator: DA
Model: Horizon A (S/N 301197M)
Comment: Volutzsome BCA

Adipose Indices

Measure	Result	Percentile YN	Percentile AM
Total Body % Fat	**15.3**	**19**	**5**
Fat Mass/Height² (kg/m²)	3.33	17	5
Android/Gynoid Ratio	0.87		
% Fat Trunk/% Fat Legs	0.85	37	12
Trunk/Limb Fat Mass Ratio	0.90	36	10
Est. VAT Mass (g)	312		
Est. VAT Volume (cm³)	328		
Est. VAT Area (cm²)	64.8		

Lean Indices

Measure	Result	Percentile YN	Percentile AM
Lean/Height² (kg/m²)	17.6	20	12
Appen. Lean/Height² (kg/m²)	7.91	20	16

Est. VAT = Estimated Visceral Adipose Tissue
YN = Young Normal
AM = Age Matched

Literature and Patient Case

Literature

- Prolonged length of stay
- Elevated waist circumference associated with higher mortality
  - 100cm (40in) for males
- Increased risk of delayed wound healing
- Increased risk of post-transplant cardiac event
- Delayed graft function
- Sarcopenic Obesity = Poorer outcomes

Patient

- Initial stay: 31 days; readmission: 13 days
- Waist circumference of 46inches
- Wound vac after a washout (21 days after transplant)
- NSTEMI post transplant
- DGF requiring dialysis (fluid overload, hyperkalemia)
- Pt with severe malnutrition and cachexia

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