Restricting Access to Care by Using Body Mass Index as Eligibility Criteria for Total Ankle Arthroplasty

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INTRODUCTION: Preoperative BMI screening is commonly used in hip and knee arthroplasty to reduce complications, but its role in total ankle arthroplasty (TAA) remains unclear. Existing studies on BMI and TAA complications have produced conflicting results, with some showing no association and others suggesting higher risks for obese patients. The global rise in obesity has important implications for orthopaedic care, as obesity is both highly prevalent and a known risk factor for osteoarthritis. TAA offers substantial benefits for patients with end-stage ankle arthritis, yet BMI-based eligibility criteria risk excluding vulnerable populations such as Black patients, women, and younger individuals. This study evaluates the trade-off between reducing complications and restricting access to care when applying BMI-based eligibility criteria for TAA.

METHODS: This retrospective cohort study analyzed 3,061 patients (both male and female) who underwent primary total ankle arthroplasty (TAA) between January 1, 2007, and December 31, 2023, using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database, identified by CPT 27702. Institutional review board approval and informed consent were not required, as this study used a de-identified national dataset. Preoperative BMI was calculated from recorded height and weight, and patients with missing data were excluded. NSQIP variables were used to identify infections, medical complications (e.g., pneumonia, venous thromboembolism, myocardial infarction, death), and surgical complications (e.g., readmission, prosthesis failure, reoperation). Patients were stratified into World Health Organization BMI categories (<25, 25–29.9, 30–34.9, 35–39.9, ≥40 kg/m²). Chi-square tests were used to compare complication rates between obese III patients and the overall cohort, with statistical significance set at p<0.05. We then modeled the effects of BMI-based cutoffs (25, 30, 35, and 40 kg/m²) on complications avoided versus complication-free surgeries denied, and calculated positive predictive value (PPV) for each cutoff, compared to random selection.

RESULTS SECTION: This study included 3,061 patients from the NSQIP database who underwent primary total ankle arthroplasty (TAA) between 2007 and 2023, of whom 30 were excluded for missing data or emergent surgery, leaving 3,019 for analysis. The cohort had a mean age of 64.5 years (SD 10.2), mean BMI of 31.3 (SD 6.0), and was 45.1% female and 75.7% White. Overall, 165 patients (5.5%) experienced a complication, with no significant difference compared to patients with BMI ≥40 kg/m² (11 patients, 4.5%). The most frequent complications were readmission and superficial infection, though these did not differ significantly by BMI class. Odds ratios showed slightly increased complication risk for underweight/normal and Obese I patients (OR 1.08 and 1.05), and decreased risk for Obese II and Obese III patients (OR 0.65 and 0.77).

If a BMI cutoff of ≥40 kg/m² were enforced, 2,619 surgeries (86.8%) would have proceeded without complications, 154 (5.1%) would have proceeded with complications, 235 (7.8%) complication-free surgeries would have been denied, and 11 (0.4%) patients would have avoided a complication. The PPV at this threshold was 4.5% (95% CI, 1.9–7.1%), meaning 21 patients would be denied a complication-free surgery for each complication avoided. At a cutoff of ≥30 kg/m², 1,504 (49.8%) complication-free surgeries would have been denied, 81 (2.7%) complications avoided, and the PPV was 5.1% (95% CI, 4.0–6.2%), with 19 patients denied a complication-free surgery for each complication avoided. By comparison, random selection yielded a PPV of 5.5%, with 17 denied per complication avoided. Across all cutoffs, BMI thresholds performed no better than random selection and resulted in substantial denial of safe surgeries.

DISCUSSION: Prior studies suggest obesity increases complications after total ankle arthroplasty (TAA), but our analysis of 3,019 patients found no correlation between rising BMI and perioperative complications. Using BMI cutoffs denied many patients safe surgeries while avoiding very few complications, with random selection performing marginally better than any BMI-based criterion. Limitations include reliance on NSQIP, which captures only 30-day outcomes and excludes patients denied surgery based on BMI. Despite these limitations, the findings highlight that BMI is a poor predictor of perioperative risk and that BMI-based eligibility disproportionately restricts access to care. Overall, strict BMI cutoffs should not guide TAA eligibility, and shared decision-making is a more equitable approach.

SIGNIFICANCE/CLINICAL RELEVANCE: Restricting access to total ankle arthroplasty using BMI thresholds denies many patients complication-free surgeries without meaningfully reducing risk. These findings challenge current assumptions about BMI-based eligibility and support more evidence-driven criteria to guide surgical decision-making.

IMAGES AND TABLES:

Demographics		Normal or Underweight (n=389)		Overweight (n=1645)		Obese I (n=867)		Obese II (n=472)		Obese III (n=246)		All Patients (n=3019)	
Age		65.63 ± 11.78		65.61 ± 10.43		64.55 ± 9.12		63.39 ± 9.62		60.64 ± 9.90		64.51 ± 10.39	
Body Mass Index		23.12 ± 1.65		27.68 ± 1.40		32.32 ± 1.42		37.21 ± 1.38		44.32 ± 4.34		31.27 ± 6.01	
Gender	Female	231	59.4%	372	35.6%	354	40.8%	247	52.3%	157	63.8%	1361	45.1%
	Male	157	40.4%	670	64.3%	508	58.6%	223	47.2%	87	35.4%	1645	54.5%
	Non-binary	1	0.3%	3	0.3%	5	0.6%			2	0.8%	13	0.4%
Race	White	282	72.5%	784	75.0%	676	78.0%	355	75.2%	189	76.8%	2286	75.7%
	Asian	13	3.3%	20	1.9%	9	1.0%	2	0.4%	1	0.4%	45	1.5%
	Black	6	1.5%	23	2.2%	21	2.4%	24	5.1%	11	4.5%	85	2.8%
	American Indian or Alaska Native	1	0.3%	5	0.5%	4	0.5%	2	0.4%	1	0.4%	13	0.4%
	Pacific Islander	0	0.0%	4	0.4%	3	0.3%	0	0.0%	0	0.0%	7	23.2%
Ethnicity	Hispanic	13	3.3%	39	3.7%	30	3.5%	20	4.2%	12	4.9%	114	3.8%
Comorbidities													
Smoker		37	9.5%	70	6.7%	58	6.7%	29	6.1%	19	7.7%	213	7.1%
Excessive Alcohol		0	0.0%	4	0.4%	2	0.2%	0	0.0%	0	0.0%	6	0.2%
Functional Status	Independent	377	96.9%	1021	97.7%	848	97.8%	455	96.4%	239	97.2%	2940	97.4%
	Partially Independent	4	1.0%	8	0.8%	8	0.9%	7	1.5%	4	1.6%	31	1.0%
Diabetes Mellitus		22	5.7%	78	7.5%	118	13.6%	103	21.8%	48	19.5%	369	12.2%
Hypertension		157	40.4%	507	48.5%	531	61.2%	312	66.1%	169	68.7%	1676	55.5%
Peripheral Vascular Disease		0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Chronic Obstructive Pulmonary Disease		10	2.6%	19	1.8%	25	2.9%	19	4.0%	15	6.1%	88	2.9%
Pneumonia		0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Dyspnea	with Exertion	4	1.0%	19	1.8%	20	2.3%	16	3.4%	11	4.5%	70	2.3%
	at Rest	0	0.0%	0	0.0%	2	0.2%	2	0.4%	1	0.4%	4	0.1%
Angina		0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Myocardial Infarction		0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Percutaneous Coronary Intervention		1	0.3%	4	0.4%	2	0.2%	0	0.0%	1	0.4%	8	0.3%
Cardiac Surgery		1	0.3%	1	0.1%	2	0.2%	1	0.2%	0	0.0%	5	0.2%
Congestive Heart Failure		0	0.0%	5	0.5%	12	1.4%	7	1.5%	5	2.0%	29	1.0%
Stage 2 or 3 Acute Kidney Injury		0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Dialysis		1	0.3%	1	0.1%	1	0.1%	0	0.0%	0	0.0%	3	0.1%
Transient Ischemic Attack		1	0.3%	1	0.1%	0	0.0%	0	0.0%	0	0.0%	1	0.0%
Cerebral Vascular Accident		0	0.0%	2	0.2%	1	0.1%	0	0.0%	1	0.4%	4	0.1%
Discharge Destination													
Home		361	0.90	976	0.93	796	0.92	439	0.89	217	0.88	2759	0.91
Skilled Facility or Rehabilitation Facility		22	0.06	32	0.03	40	0.05	36	0.07	21	0.09	150	0.05
Unskilled Facility		0	0.00	1	0.00	1	0.00	0	0.00	1	0.00	2	0.00
Other Facility		3	0.01	6	0.01	7	0.01	10	0.02	4	0.02	30	0.01
Elopement		0	0.00	0	0.00	1	0.00	0	0.00	0	0.00	1	0.00

BMI Cutoff	Surgeries Performed Without Complications	Surgeries Performed With Complications	Surgeries Denied Without Complications	Surgeries Denied With Complications	% of All Complications Avoided	% of All Complication Free Surgeries Allowed	Positive Predictive Value (PPV) (%)	Number of Patients Denied Complication Free Surgery for Each Complication Avoided
≥25kg/m²	365 (12.1%)	24 (0.8%)	2489 (82.4%)	141 (4.7%)	85.5	12.8	5.4 (4.5 - 6.2)	18
≥30kg/m²	1350 (44.7%)	84 (2.8%)	1504 (49.8%)	81 (2.7%)	49.1	47.3	5.1 (4.0 - 6.2)	19
≥35kg/m²	2165 (71.7%)	136 (4.5%)	689 (22.8%)	29 (1.0%)	17.6	75.9	4.0 (2.6 - 5.5)	24
≥40kg/m²	2619 (86.8%)	154 (5.1%)	235 (7.8%)	11 (0.4%)	6.7	91.8	4.5 (1.9 - 7.1)	21
Random	1427 (47.3%)	82.5 (2.7%)	1427 (47.3%)	82.5 (2.7%)	50.0	50.0	5.5	17