Classification of Massive Weight loss Skin Excess and Laxity: The Stokes Scale

Erik Nuveen, MD, DMD, FAACS; Jamie Stokes, APRN, FNP-C; Sonia Abarzak, BS, MA

Introduction

In recent years, there has been an increase in demand for cosmetic surgeries in patients with a history of massive weight loss (MWL). To assist in the assessment and surgical treatment plan process, this study proposes the Stokes Scale.

This scale seeks to classify severity of excess skin and skin laxity in the body after massive weight loss on a 5 point scale. The Stokes Scale is intended to be used for physical assessment and communication between medical professionals. Previous studies have been limited by small patient selection (n=36) and inclusion of female patients only (Song et al., 2005).

Scale

0	Normal which is defined as no ptosis and/or no skin laxity
1	Mild laxity; Ideal skin position not requiring surgery
2	Moderate skin laxity with mild excess skin
3	Severe skin laxity with moderate excess skin with redundancy
4	Extreme skin excess and redundancy requiring extensive undermining, advancement and resection throughout the anatomical region.

Methods

Patient photo selection
100 patients were selected for evaluation with the proposed rating scale. Selected patients included male and female individuals with a history of massive weight loss (weight loss of 50% or greater of excess weight through lifestyle modification or bariatric surgical intervention) from a single office based surgery facility from 12/2014-09/2020.

Stokes Scale
The scale included 9 body areas that were common concerns of the patients; male chest/female chest, axilla, arms, abdomen, flank, back, buttocks, mons, and thighs. Areas were ranked on a likert scale from 0-4 and a visual rating scale. Scales were customized to specific body regions.

Validation of the scale
Five medical professionals reviewed photographs of the 100 patients and assigned a grade of 0, 1, 2, 3, or 4 based on severity. Five observers were utilized: 3 Board Certified and fellowship trained cosmetic surgeons, one Advanced Practice Registered Nurse and one Medical Assistant associated with consultation and follow care specific to MWL patients. Each was provided a photographic anthology of 9 body regions and asked to rank the severity of skin laxity and excess based purely on the photos presented. No further information was provided to the medical professional.
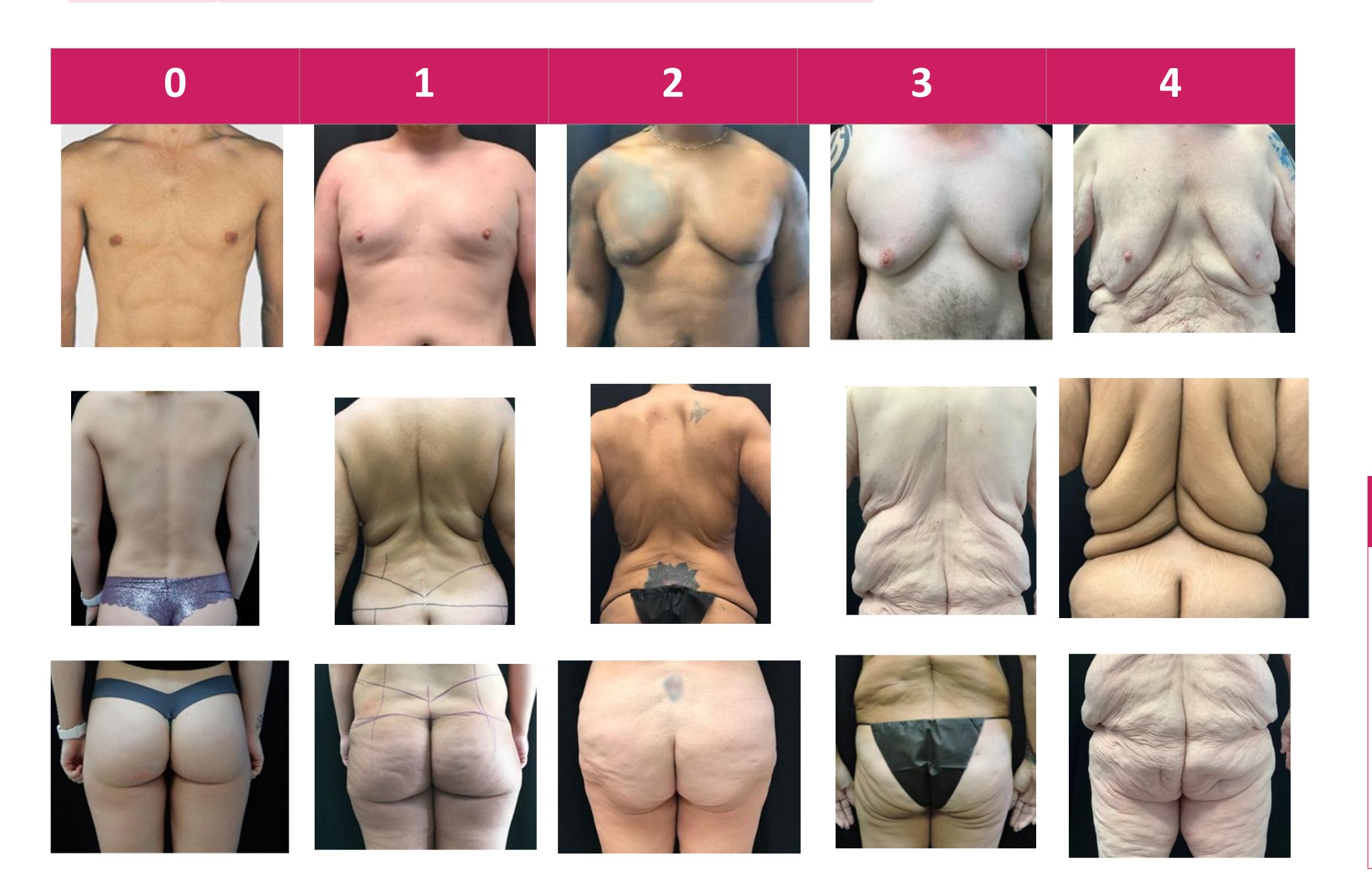
Statistical analysis
Interobserver validity was determined using Kappa Analysis.

Results

All anatomical areas resulted in a mean kappa value of 0.426. According the Landis and Koch, 1977, Guidelines for interpreting Kappa values, this corresponds to moderate inter-rater agreement. Each anatomical region was evaluated for inter-rater variance and revealed the thigh region as highest in agreement. The back region analysis revealed the lowest level of agreement in this photographic analysis. Physician inter-rater variance was 0.19725, or slight, while non-physician inter-rater agreement was 0.309, or fair. Male subject analysis revealed higher subject agreement.

Discussion

Classification systems seek to objectify the subjective. This allows for more consistent communication between medical professionals and stratification of risks and complications in medical research on the massive weight loss patients. Past classification systems have utilized females only and in limited numbers. Our study was developed to improve statistical power through larger case numbers and test interobserver reliability, with the addition of male MWL patients. Past studies have had limited power and have lacked male subjects.
Our findings support the Stokes Scale as consistent and with high interobserver reliability in this study of 100 patients. This study is the largest of its kind ever published and adds to the ability of practitioners to communicate and plan surgical intervention for the massive weight loss patient.
Our inter-rater variance analysis revealed significant variation in classification. Lowest agreement was found between physicians. This may result from physician education and clinical experience level, frequency of exposure to the MWL patients, gender bias. Application of these findings may devalue alternative care providers from classification and the associated corrective action/surgery required specifically in the MWL patient population. This suggests that the operating surgeon may be best served to evaluate his/her own patients in order to determine ideal treatment. The delegation of classification and associated surgical correction may be inappropriate. There is a very high variance among physicians who rate photographs of MWL patients. Further study is indicated to determine a correlation to physical examination.

0	1	2	3	4

References

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