

Ex Vivo Investigation of Angle, Moisture, and Compressions on Tactile Aesthesiometer Force in Laryngopharyngeal Sensory Testing

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BACKGROUND

-Ambiguity surrounds the impact of the laryngopharyngeal environment on the stimuli.
-This study aims to evaluate the effect on stimulus force delivered, related to:

- 1) Filament size
- 2) Saliva
- 3) Successive compressions
- 4) Angle of tissue contact

METHODS

-An ex vivo stimulus delivery device using cadaveric buccal mucosa was constructed to directly measure tactile force of monofilaments
-Dry and saliva-saturated nylon monofilaments (6-0, 5-0, 4.5-0, and 4-0) were each compressed six times at 0, 15, 30, 45 & 60-degrees from the vertical plane

DISCUSSION

-Aesthesiometers can deliver discrete stimuli in laryngopharyngeal sensory assessment.
-Stimuli can be delivered up to 45o deviation from orthogonal contact (15o for 4-0 aesthesiometer) for consistent force delivery.
-Saliva saturation does not affect the buckling force.

REFERENCES

1. Bearely S, Wang SJ, Cheung SW. Oral sensory dysfunction following radiotherapy: Oral Sensory Dysfunction. *Laryngoscope*. 2017;127(10):2282-2286.
2. Strohl MP, Young VN, Dwyer CD, et al. Novel Adaptation of a Validated Tactile Aesthesiometer to Evaluate Laryngopharyngeal Sensation. *Laryngoscope*. 2021 Jun;131(6):1324-1331.
3. Strohl MP, David AP, Dwyer CD, et al. Aesthesiometer-Based Testing for Laryngopharyngeal Hyposensitivity. *Laryngoscope*. 2022;132(1):163-168.
4. Young, VN, Kidane, J, Gochman, GE, Bracken, DJ, Ma, Y, & Rosen, CA.. Abnormal Laryngopharyngeal Sensation in Adductor Laryngeal Dystonia Compared to Healthy Controls. Presented at American Laryngological Association Annual Meeting at COSM, Dallas, TX, 2022
5. Ma, Y, Kidane, J, Bracken, DJ, Gochman, GE., Rosen, CA., & Young, VN. Assessment of Laryngeal Sensory Function using a Tactile Aesthesiometer in Healthy Adults. Presented at American Broncho-Esophagological Association Annual Meeting 2022, Dallas, TX, 2022

Cheung-Bearely aesthesiometers can deliver discrete stimuli in laryngopharyngeal sensation assessment

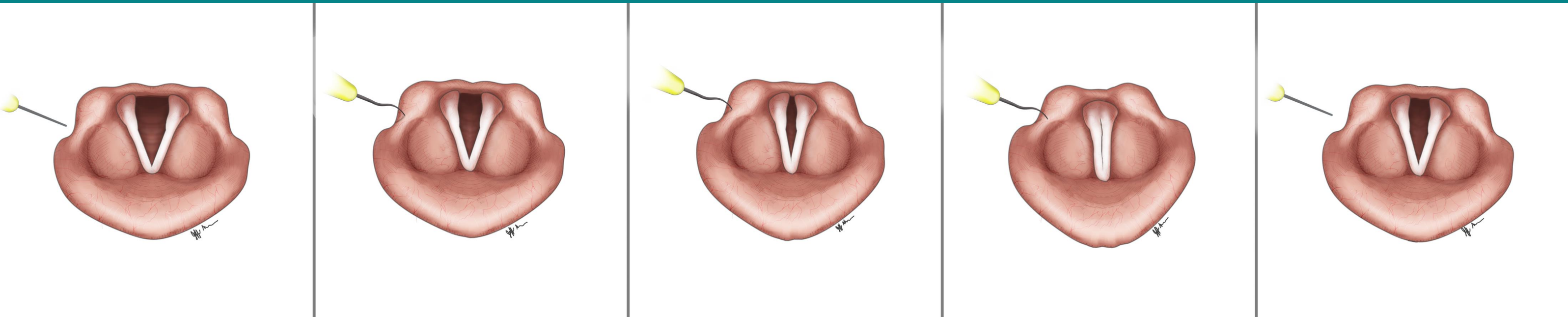


Figure 1: Illustration of Cheung-Bearely aesthesiometer-based sensory testing. Illustration by Jeffrey Sharon, MD

RESULTS

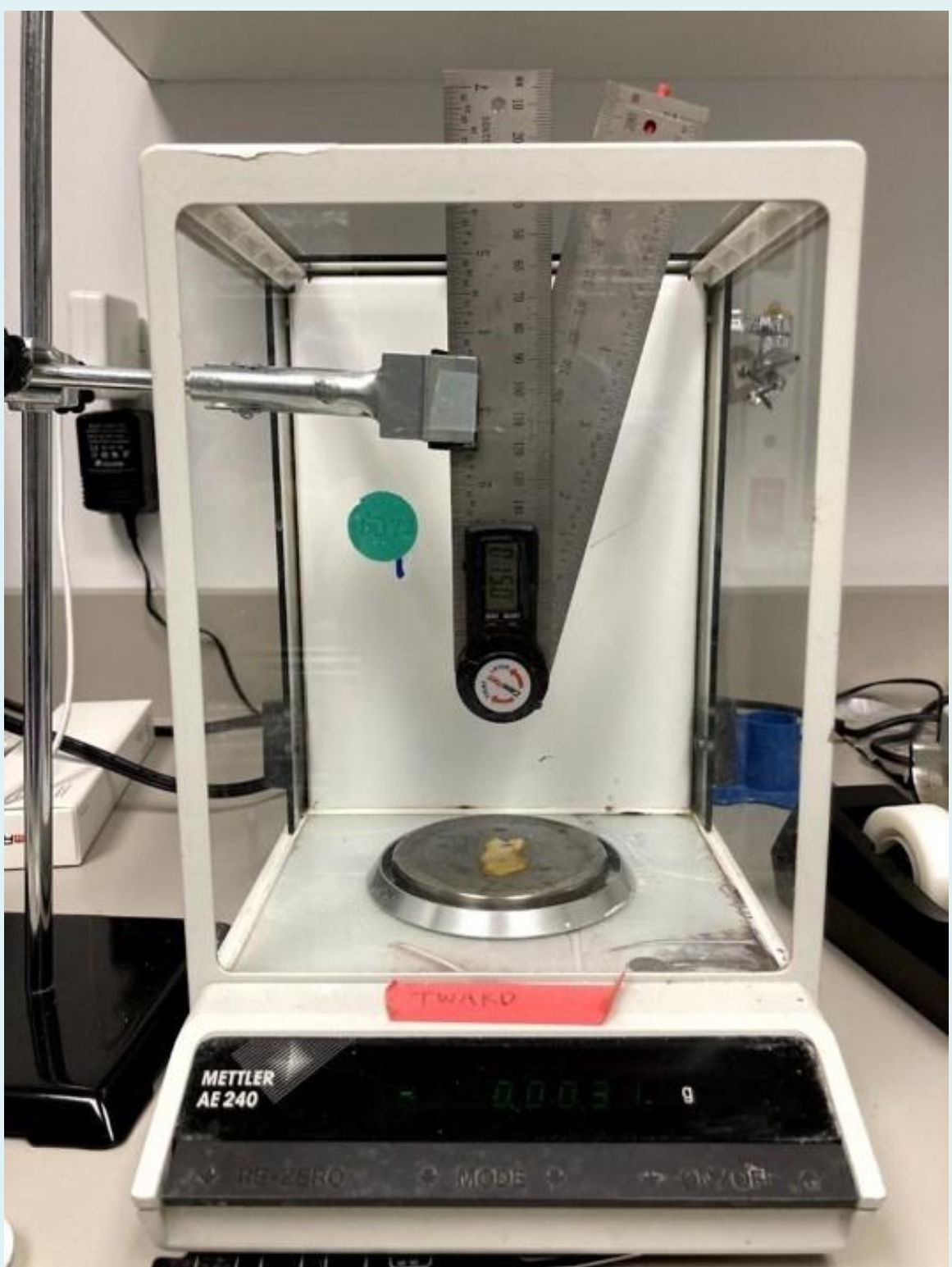
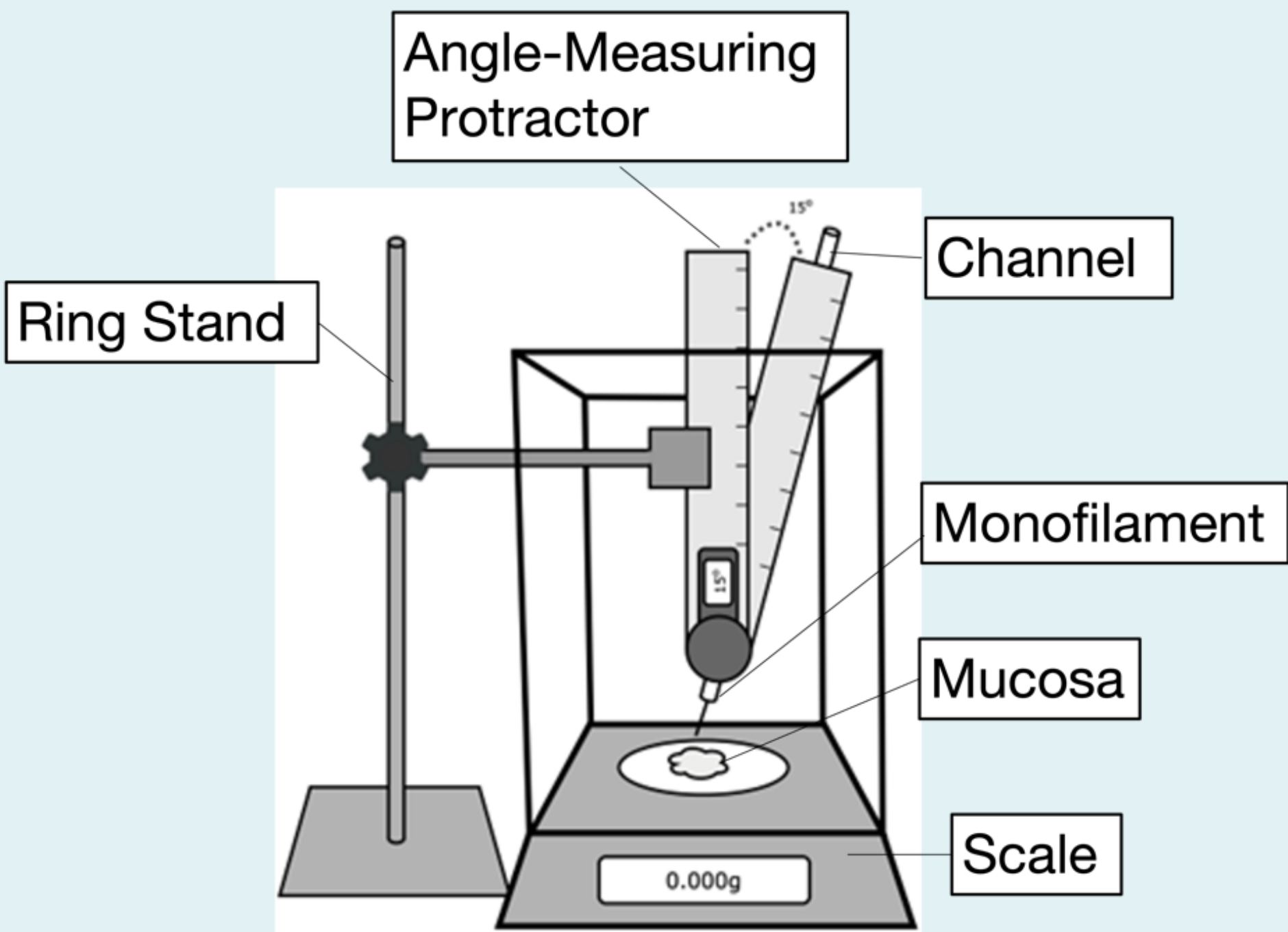


Figure 2: Ex vivo laryngopharyngeal stimulus model: (A) diagram of stimulus delivery apparatus with labeled components; (B) photograph of final model

Table 1: Summary of Predictors for Tactile Force Delivered

Aesthesiometer Variable	b-Coefficient (95% CI)	p-value
Size		
6-0	REF	
5-0	0.065 (0.037, 0.092)	<.001
4.5-0	0.103 (0.076, 0.131)	<.001
4-0	.251 (0.224, 0.279)	<.001
Angle		
15	.003 (-0.028, 0.034)	.853
30	-.024 (-0.054, 0.007)	.130
45	.001 (-0.030, 0.032)	.954
60	-.049 (-0.080, -0.019)	.002
Compression Number		
	-.004 (-0.005, -0.003)	<.001
Saturation in Saliva		
	.002 (-0.017, 0.022)	.829

CI, Confidence Interval; REF, Reference level

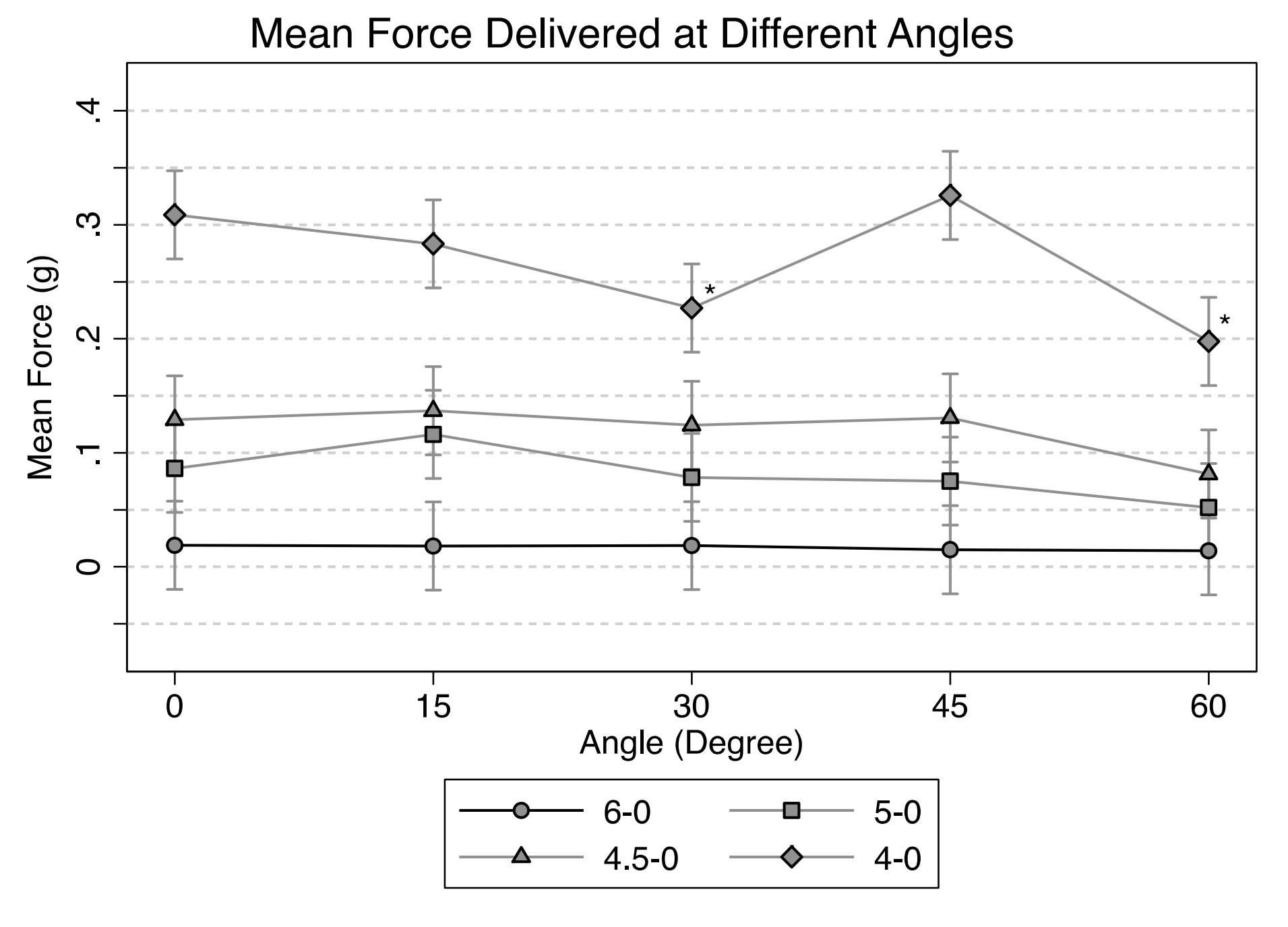


Figure 3: Mean buckling force measured at different degrees deviation of contact from the vertical plane. Mean force is decreased at 30- and 60- degrees deviation for 4-0 aesthesiometer on pairwise comparison. *(p-value < 0.05)

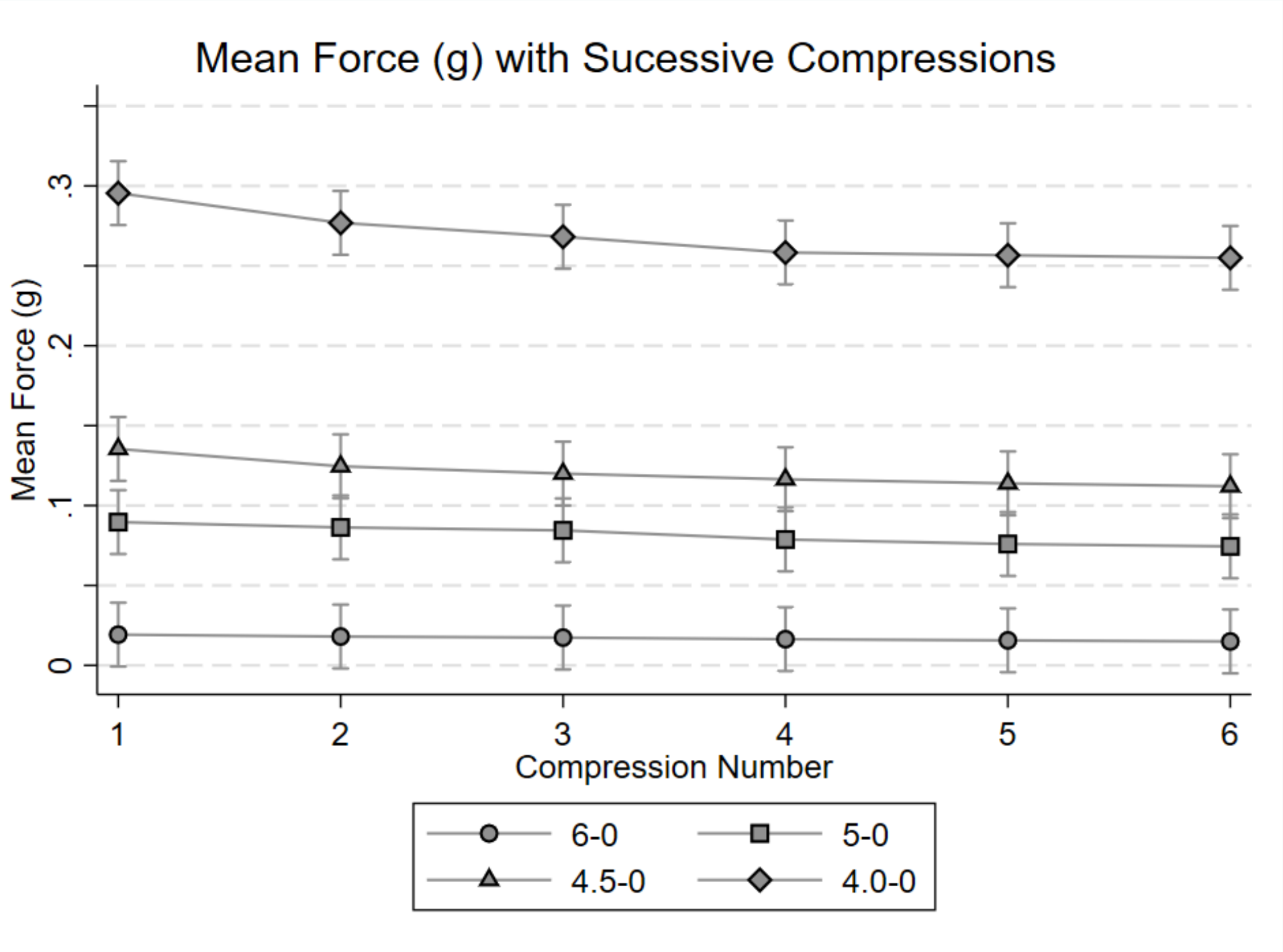


Figure 4: Mean buckling force measured with successive compressions. Mean force measured decreases monotonically for all aesthesiometers