

Comparative Evaluation of the Easyton Transpalpebral Tonometer and Goldmann Applanation Tonometer

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INTRODUCTION

Measuring intraocular pressure (IOP) has traditionally relied on corneal, applanation, and indentation measurement procedures¹. However, direct corneal measurements have many limitations which can be eliminated by using transpalpebral approaches to measurement of intraocular pressures^{2,3}.

Currently, there is limited published data regarding the new Easyton transpalpebral tonometer and its measurement properties in comparison to well-established measurement procedures.

This study evaluates the accuracy and applicability of the Easyton transpalpebral tonometer as an alternative to the Goldmann Applanation Tonometer (GAT) by comparing IOP measurements in a healthy, young adult population.

OBJECTIVES

1. Describe the relationship and measurement properties between IOP values measured by the Easyton Tonometer and GAT.
2. Assess and evaluate the potential use of transpalpebral measurements as an alternative to direct corneal measurements.

MATERIALS & METHODS

Study design: Balanced, two-factor, repeated measures, experimental research design. Factor one, EYE was fixed and contained two levels, right and left. Factor two, TONOMETER was fixed and contained two levels, Easyton and GAT.

Procedures: Healthy students enrolled in the Nova Southeastern University's Health Professions Division Programs were recruited for voluntary participation. IOP measurements were completed by a board-certified licensed eye care professional in an academic, clinical research setting. All measurements were completed in accordance with standard measurement procedures recommended by the tonometers' manufacturers. Five measurements were collected from each eye (R & L), with each of the two tonometers (Easyton & GAT), for each subject. The five measurements were averaged for each of the four research conditions and submitted to statistical analysis.

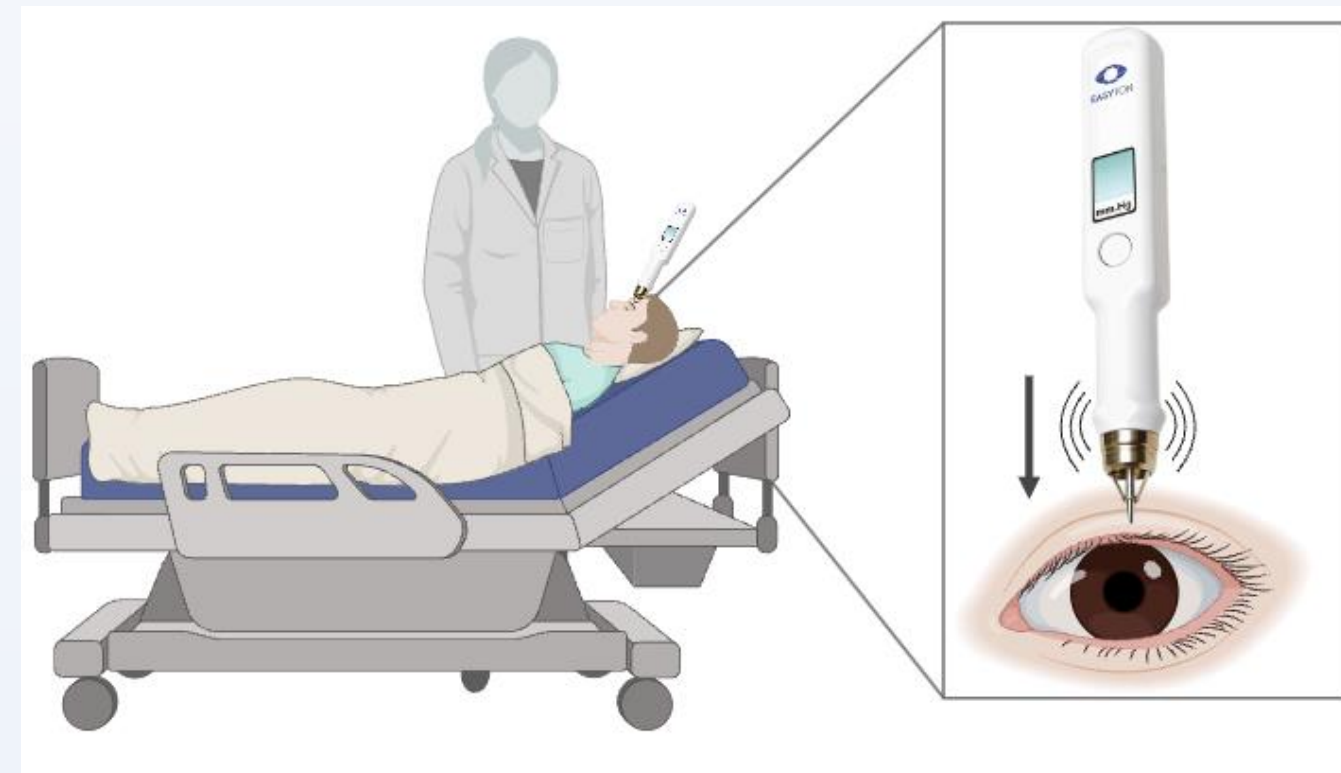


Figure 1: Schematic illustrating a clinician measuring IOP on a patient, using the Easyton tonometer. Created with BioRender.com

RESULTS

Subjects: N=22, eyes=44. Age, mean years= 26.4 (SD 4.7). Gender, females=16, males=6.

Main results: Two-way ANOVA with repeated measures revealed no statistical difference between the right and left eyes ($F(1,87)=0.31, p=0.57$) or interaction with the two tonometers, Easyton and GAT ($(F(1, 87)=0.75, p=0.38)$).

Main results (continued): There was a statistically significant difference between Easyton and GAT IOP measurements ($F(1,87)=19.84, p<.001$). Easyton values (Mean 15.34 (SD 2.13) mmHg) were marginally higher than GAT values (Mean 13.39 (SD 1.95) mmHg).

The mean difference between Easyton and GAT values was 1.95 mmHg.

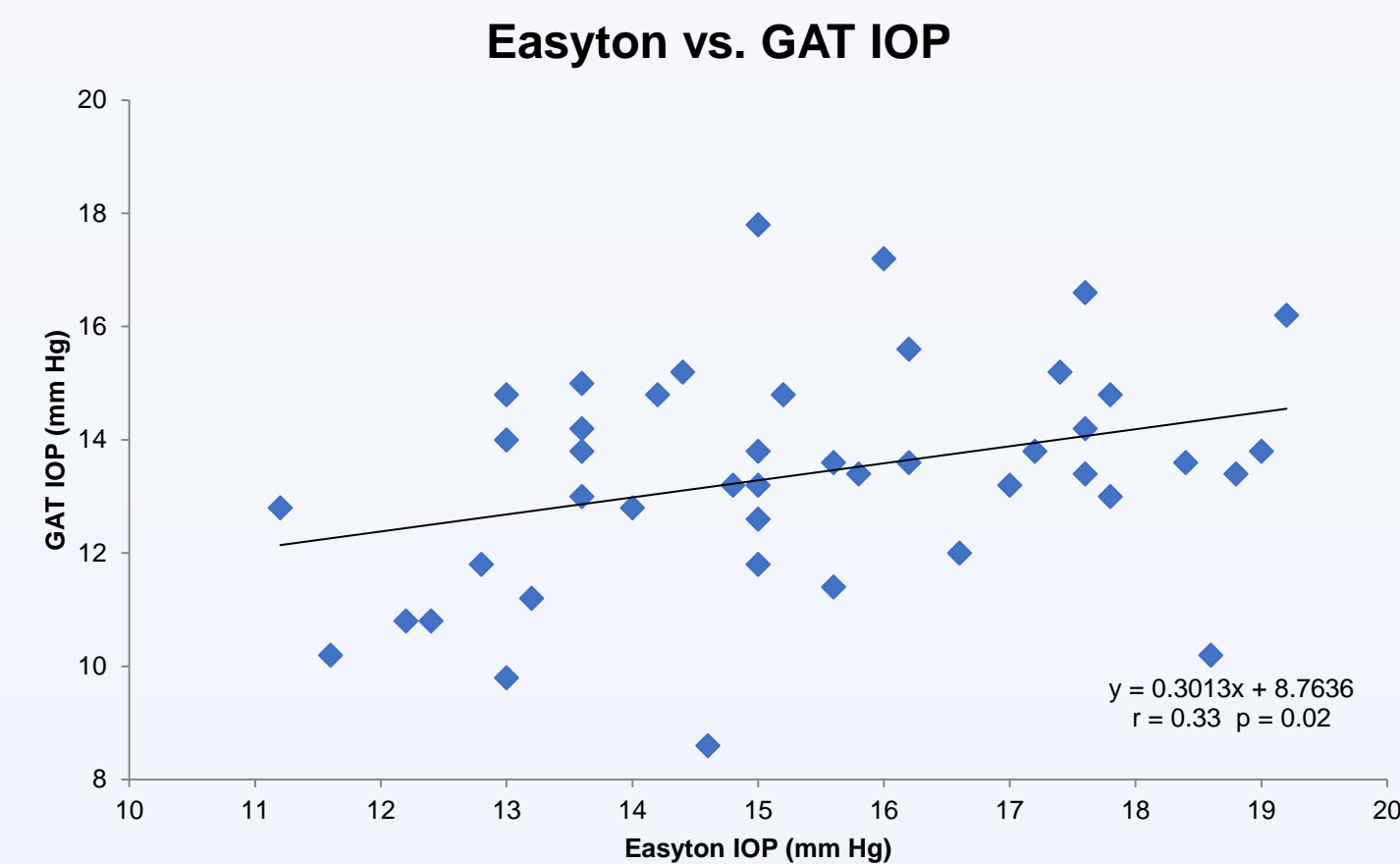


Figure 2: Scatter plot representing the relationship between IOP measurements taken by the Easyton tonometer and GAT. Each point represents an averaged IOP measurement from one eye.

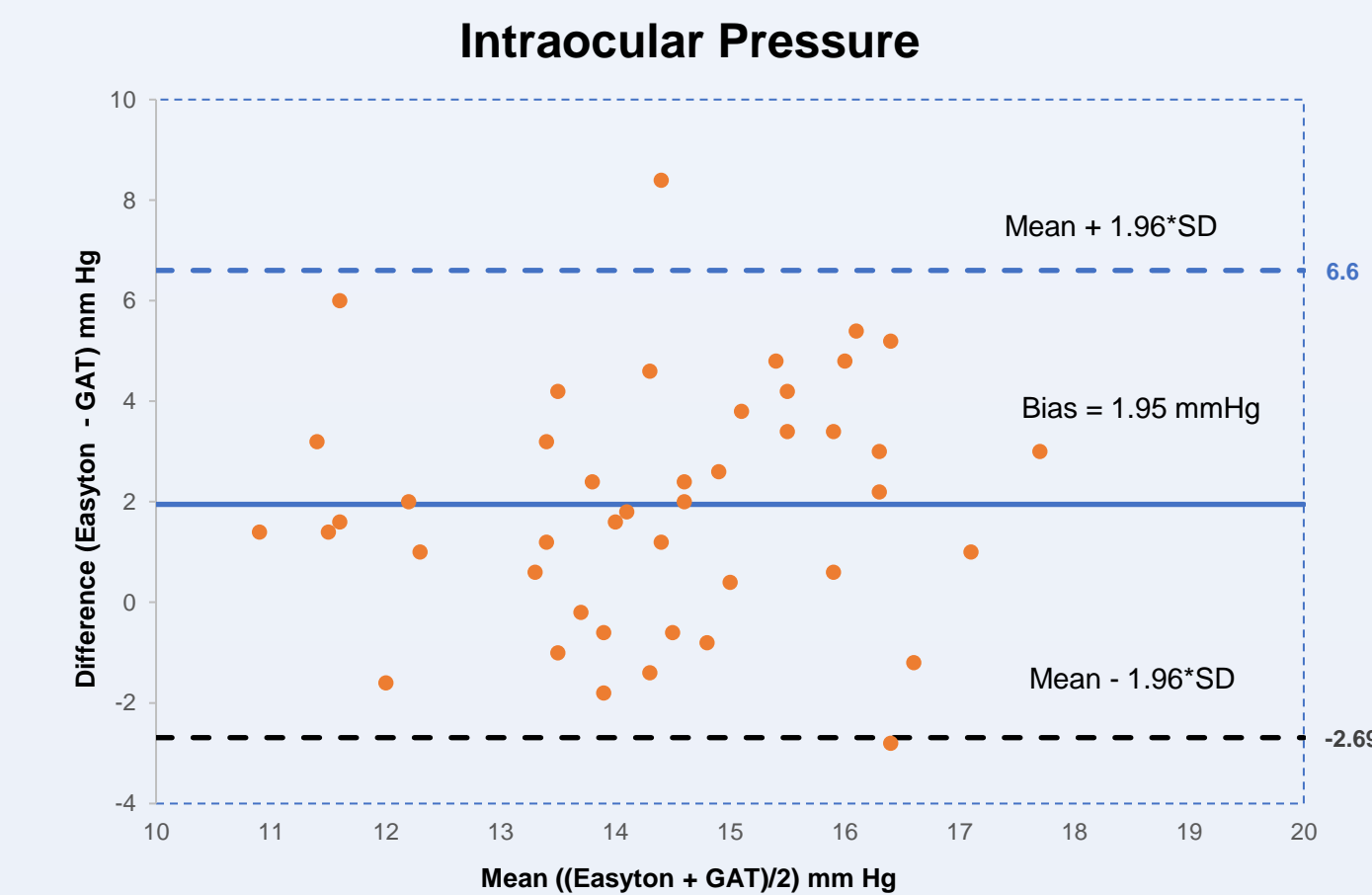


Figure 3: Bland-Altman plot of the IOP using the Easyton tonometer against GAT. Each point represents an averaged IOP measurement from one eye. The solid line represents the mean difference (1.95 mmHg). The dotted lines represent the upper and lower 95% limits of agreement.

CONCLUSIONS

Transpalpebral IOPs measured by the new Easyton tonometer were on average, statistically higher than the mean corneal IOP measured from the conventional GAT. However, from a clinical perspective, the two instruments generate similar IOP values in a healthy, young adult population. Our findings are consistent with other studies investigating the accuracy of IOP measurements taken with the Easyton compared to GAT and other well-established tonometers⁴.

The Easyton transpalpebral tonometer generates IOP values similar to those measured by GAT and potentially could be used as an approximate substitute for GAT values, when direct corneal measurements can not be made or are medically contraindicated.

ACKNOWLEDGEMENTS

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4. Yildiz MB, Kose AO, Celik G, Kizilay O, Imamoglu S, Yildiz E. Agreement among Goldmann Applanation Tonometer, Easyton Transpalpebral Tonometer, Tonopen, and Icare in Patients with Keratoconus. *Beyoglu Eye J*. 2023;8(3):170-176. Published 2023 Sep 13. doi:10.14744/bej.2023.56933

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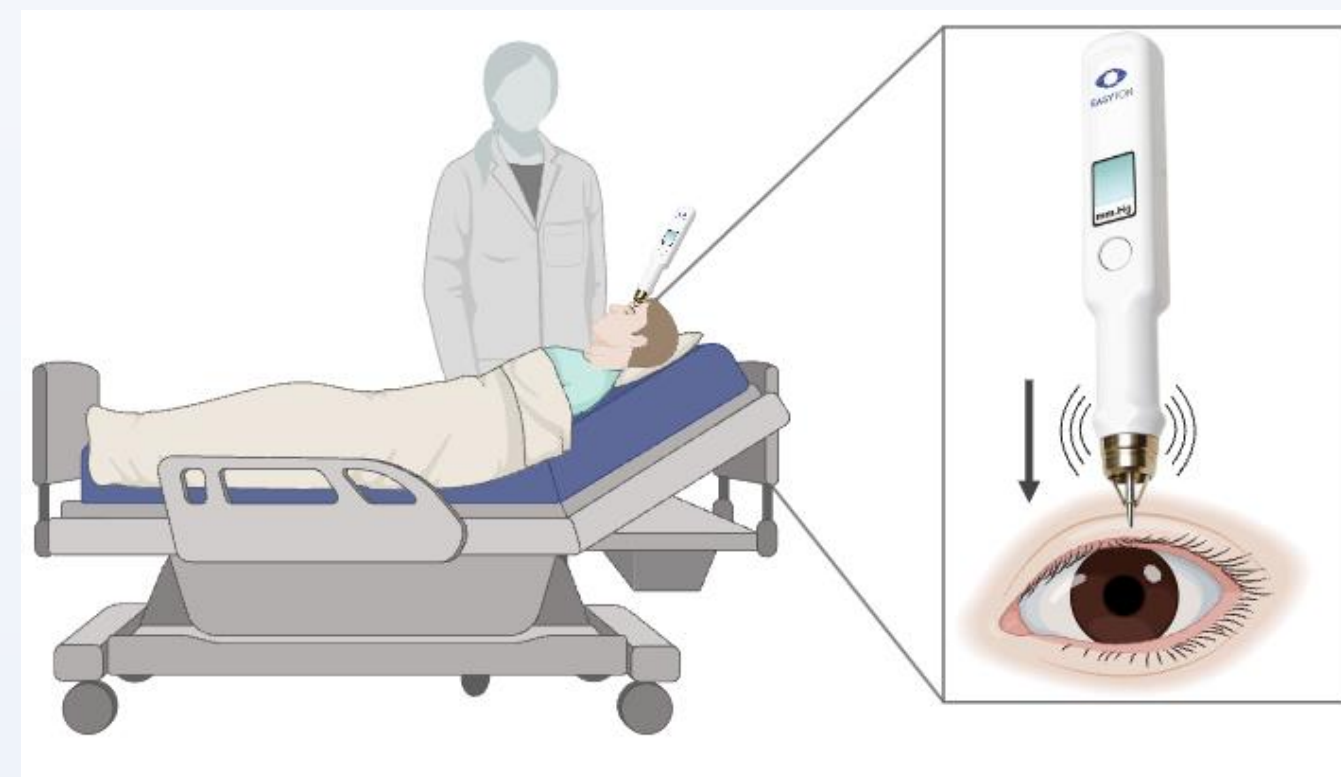


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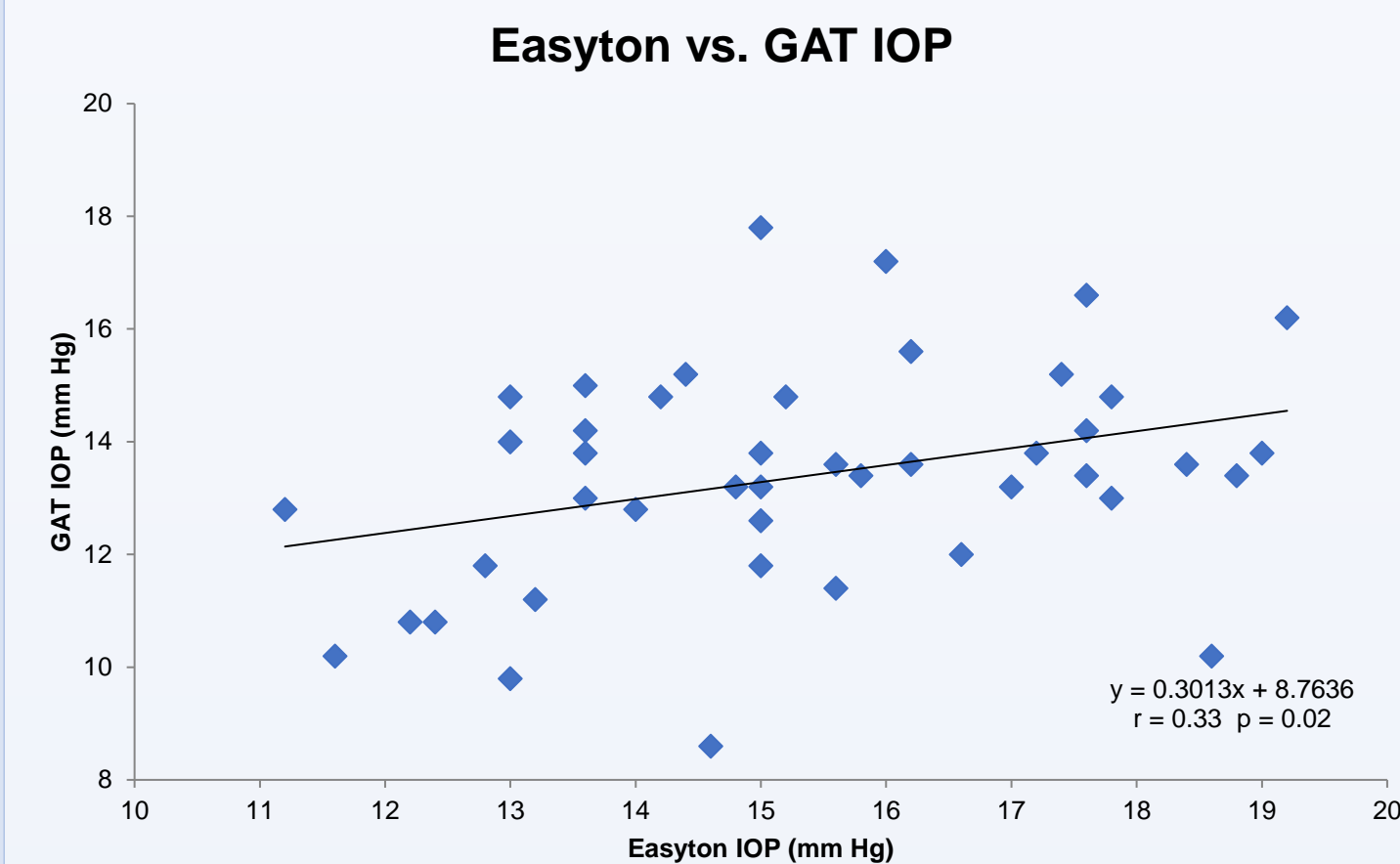


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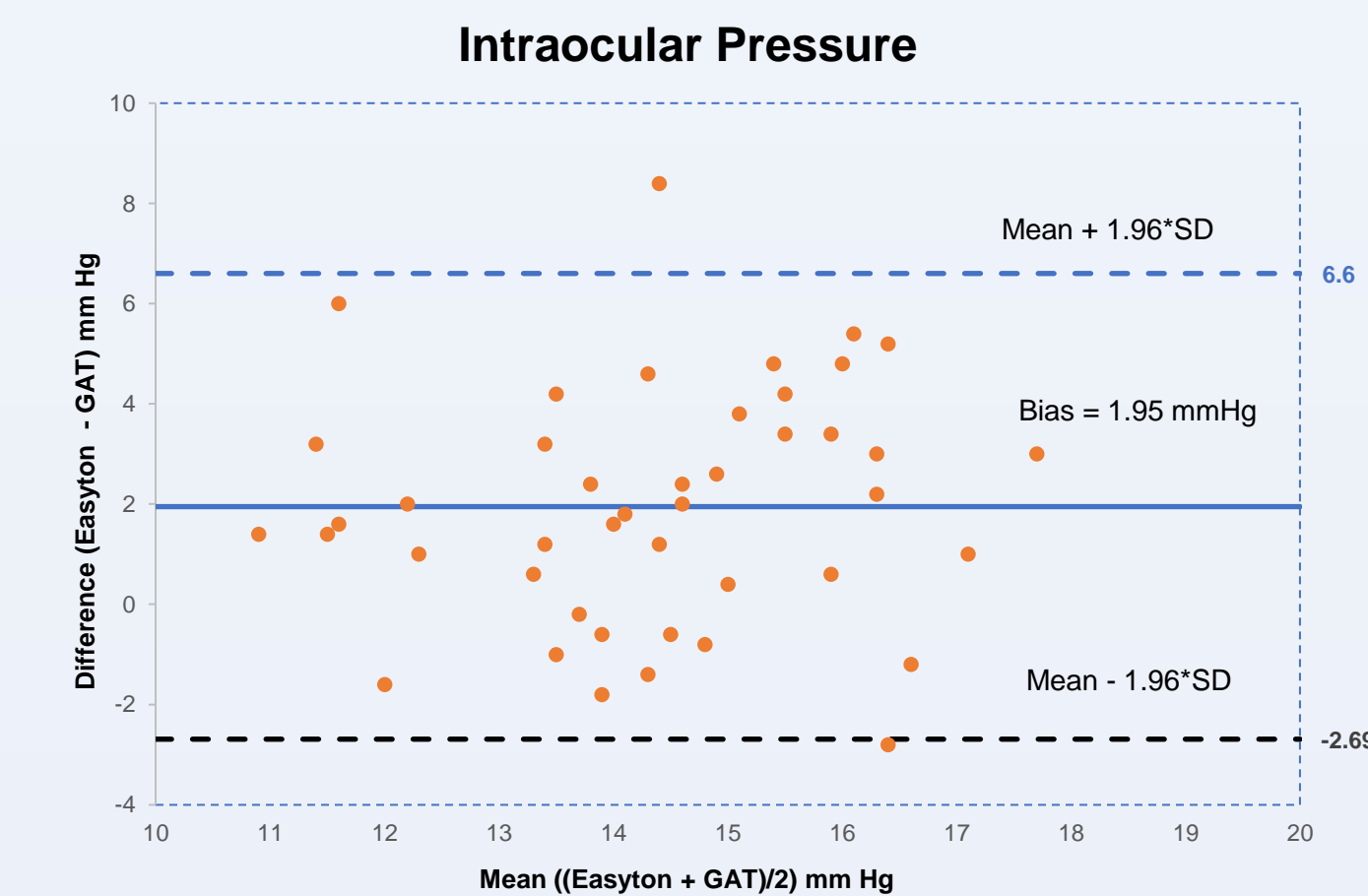


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