

Agreement Between IOLMaster 700 and Pentacam AXL Biometry and Barrett IOL Recommendations in Cataract Surgery Planning



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BACKGROUND

- Accurate biometry underpins refractive cataract surgery. Small device-level differences in keratometry, axial length, or anterior chamber depth propagate to the calculated IOL power and lens choice.
- Swept-source optical biometers (IOLMaster 700) and Scheimpflug-based tomographers with built-in axial scanning (Pentacam AXL) sample different optical regions but feed the same Barrett formulas.
- Concordance between these devices for the Barrett-recommended IOL power, lens category, and toric model has not been systematically described in a Canadian community cataract cohort.

AIM: To compare IOLMaster 700 and Pentacam AXL biometric measurements and Barrett-recommended IOL outputs (power, lens category, and toric selection) in a paired eye-level analysis.

METHODS

- Retrospective paired eye-level review of cataract surgery evaluations performed Mar – Nov 2025 by a single surgeon.
- Biometric comparisons: K1, K2, axial length, anterior chamber depth, white-to-white, and pupil diameter.
- Mean paired differences with patient-clustered standard errors; agreement summarized with Bland-Altman limits of agreement.
- Barrett Universal / Toric outputs compared for IOL power, category, residual astigmatism, and toric model.

RESULTS – BIOMETRIC, IOL & TORIC MODEL AGREEMENT

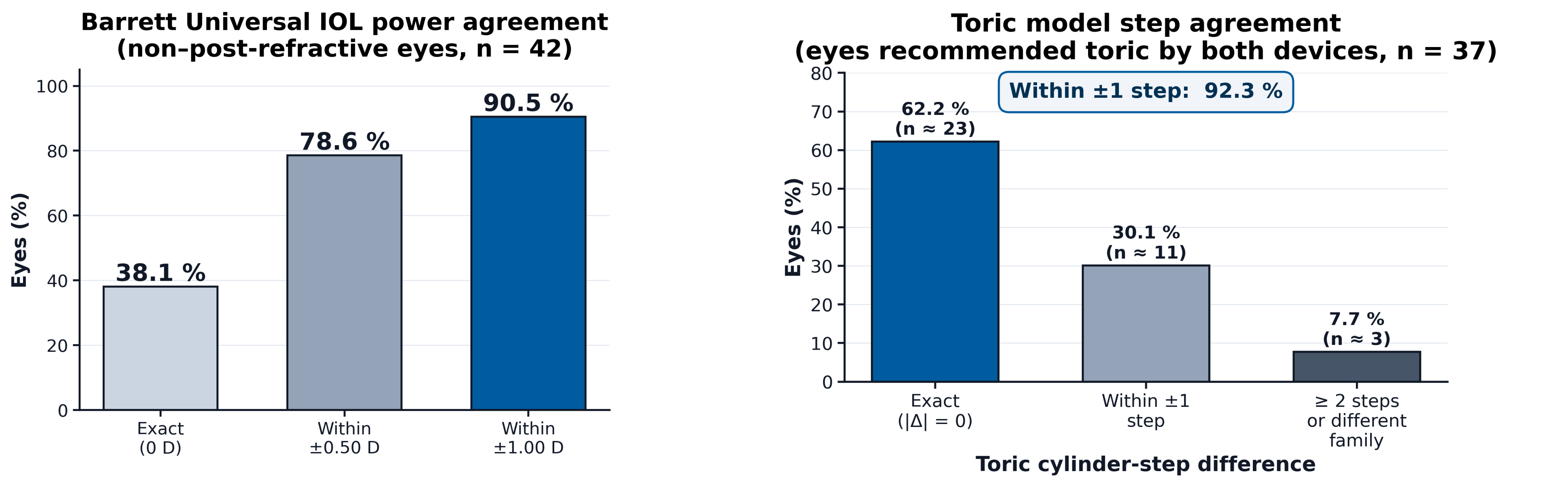
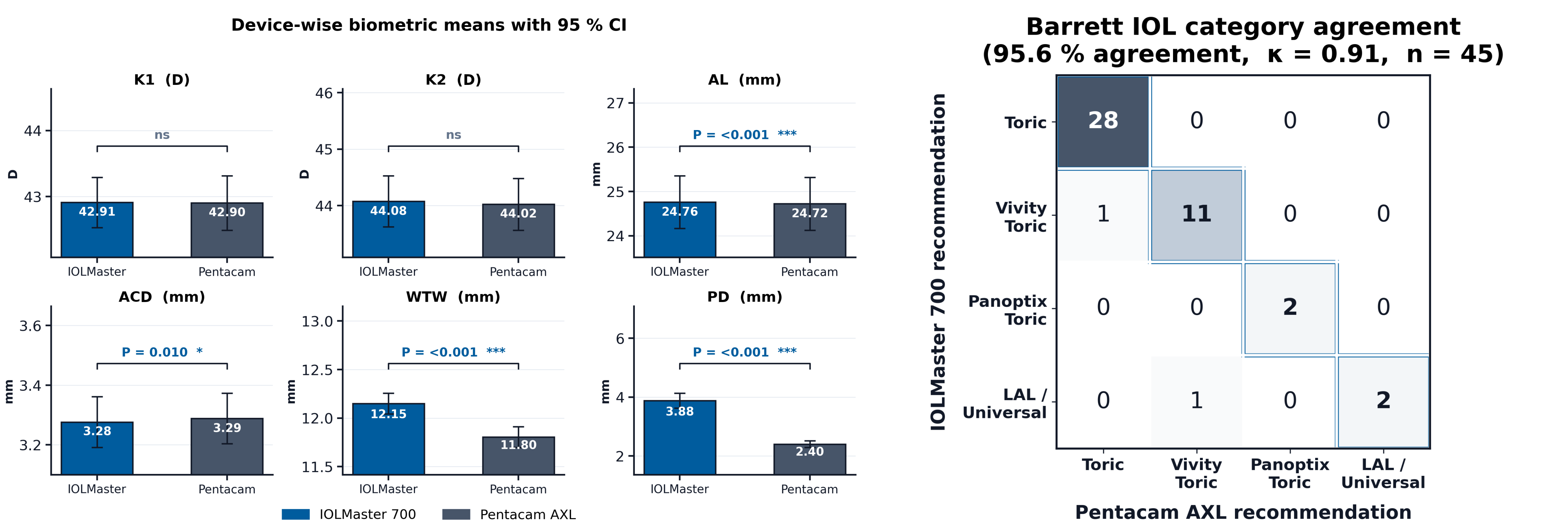
63
Eyes (34 patients)
Paired biometry sessions
Mar – Nov 2025; 5 post-refractive

$\kappa = 0.91$
Barrett IOL category
95.6 % exact category agreement (n = 45)

78.6 %
IOL power within ± 0.50 D
90.5 % within ± 1.00 D
(non-post-refractive, n = 42)

92.3 %
Toric model within ± 1 step
62.2 % exact (n = 37);
most disagreements adjacent

Devices broadly agree on IOL power and category. Toric cylinder-step is the main source of disagreement.



LIMITATIONS

- Single-centre retrospective cohort, thus generalizability to other populations and devices may be limited.
- Only 5 post-refractive eyes; subgroup analyses are exploratory.
- Toric step comparison limited to eyes recommended toric by both devices and to comparable Clareon families.

CONCLUSIONS

- IOLMaster 700 and Pentacam AXL produced similar Barrett IOL power and category recommendations.
- Toric model selection was the main discrepancy. Most disagreements reflected adjacent cylinder steps, not different lens families.
- Devices appear largely interchangeable for sphere selection; toric step choice should be cross-checked when they disagree.
- Larger prospective studies are warranted to confirm interchangeability and characterize the post-refractive subgroup.

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