

Feasibility and validity of AS-OCT capture of drainage structure landmarks in children

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Introduction

- Secondary glaucoma accounts for up to 45% of childhood glaucoma and is associated with ocular and systemic conditions including but not limited to uveitis, anterior segment dysgeneses and the phakomatoses.^{1,2}
- At present, evaluation of the drainage angle requires ‘contact’ approaches with gonioscopy or ultrasound biometry. Whilst AS-OCT approaches in children have been described in the literature, there is a lack of reporting on the validity of metrics derived from this modality.

Purpose

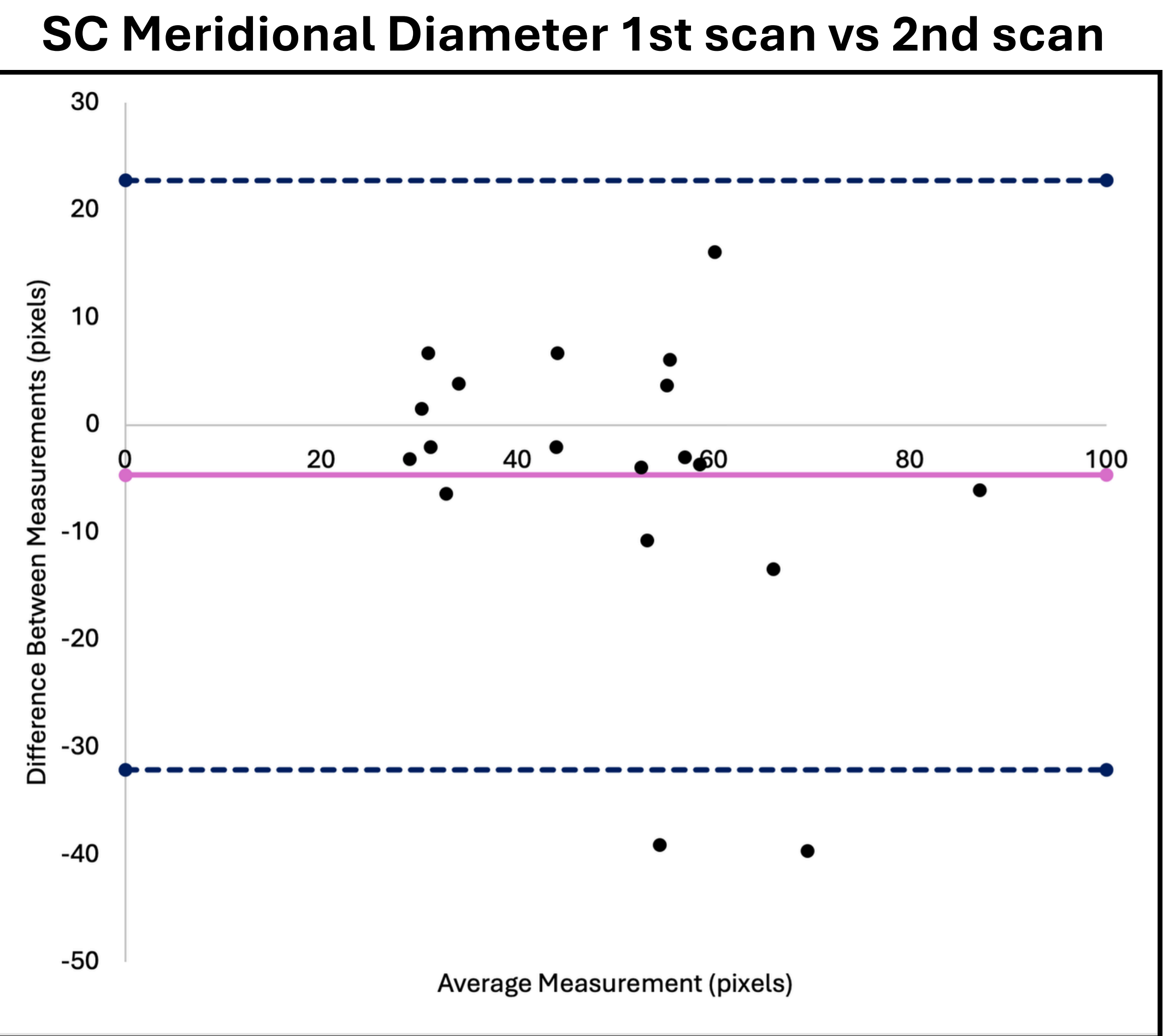
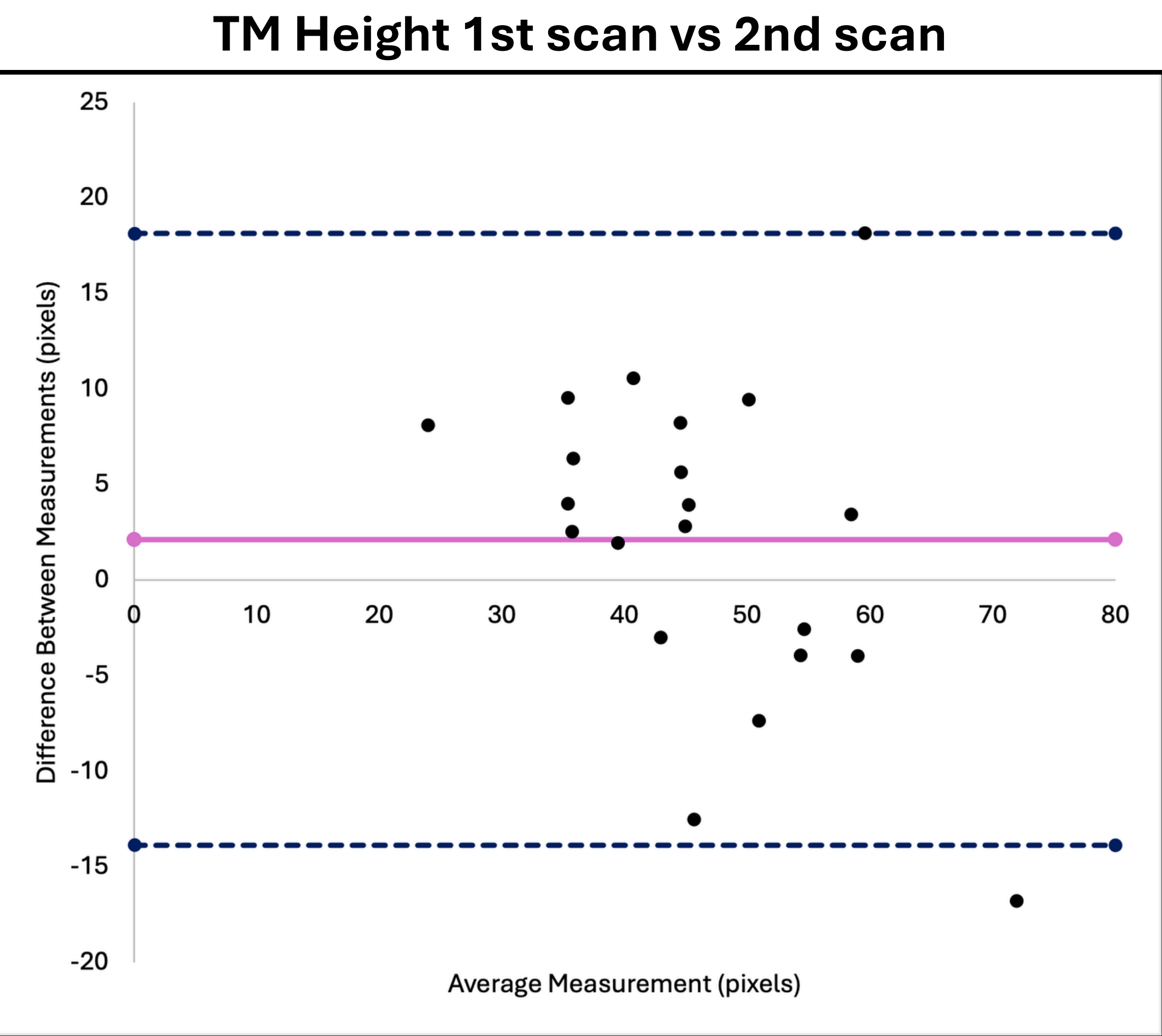
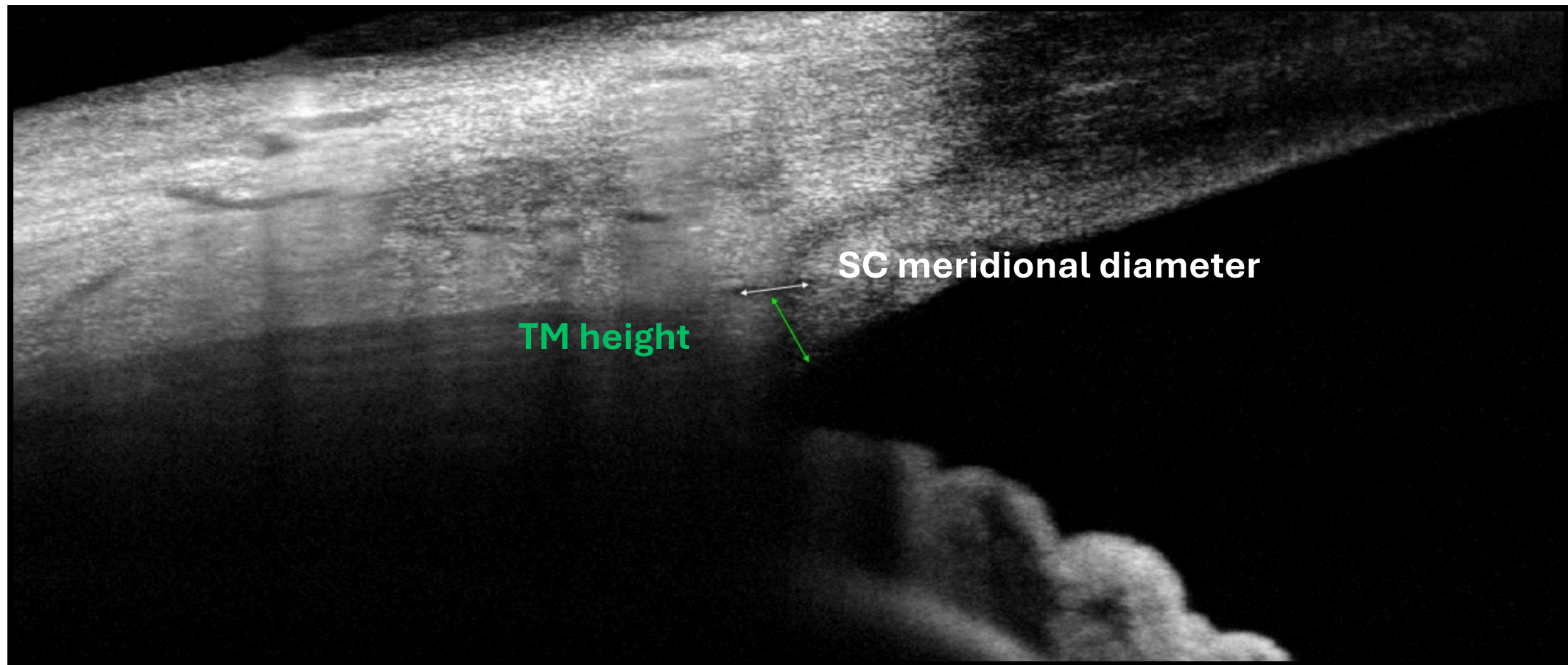
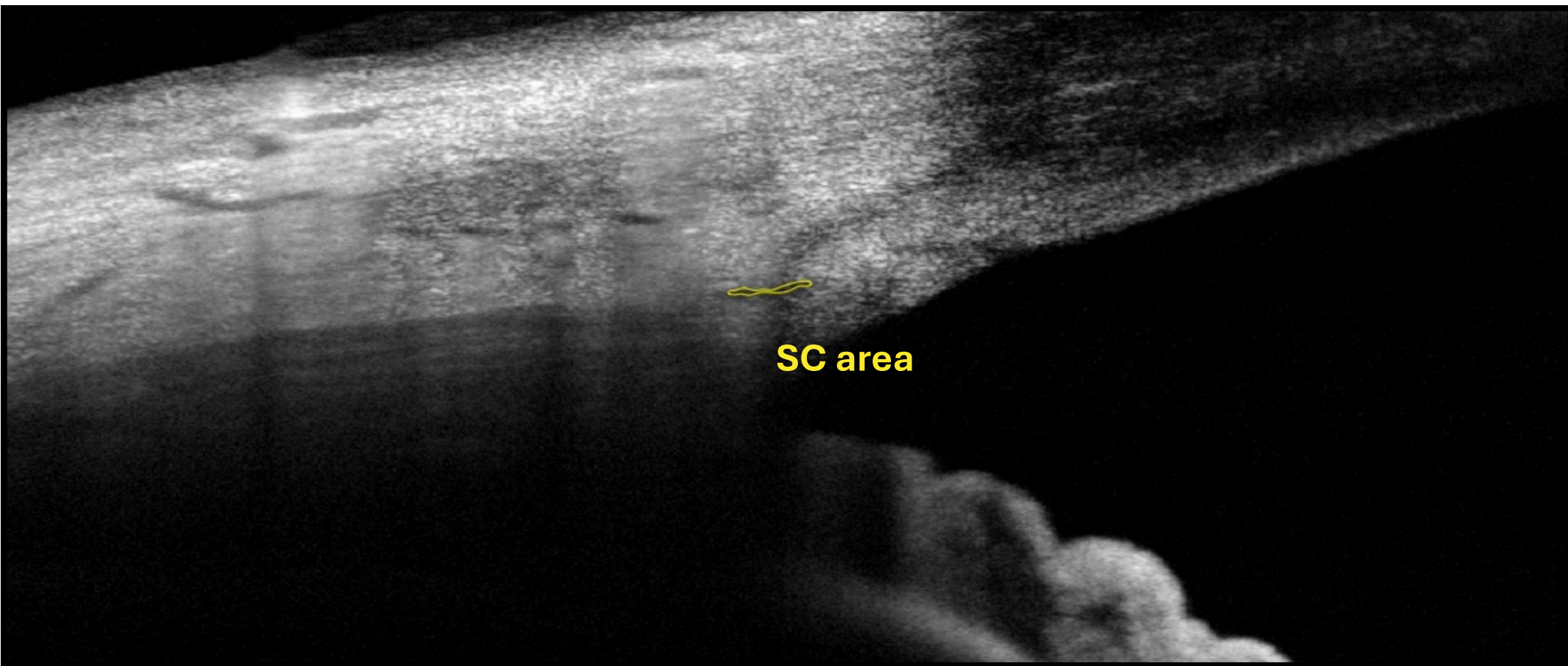
- To assess the feasibility and repeatability of AS-OCT capture of drainage structures in children.

Methods

- AS-OCT scans were performed in children aged under 16 years during routine clinic appointments.
- Images were obtained prior to any dilation using a spectral domain OCT (Optovue), in consistent indoor light conditions, with consistent eye positions, by a single operator. A minimum of two images were taken per scan.
- The visibility of Schlemm’s canal (SC), the trabecular meshwork (TM), Schwalbe’s line (SL) and the scleral spur (SS) in each image were graded on ordinal scales.
- Bland-Altman limits of agreement (LoA) were calculated for AS-OCT parameters across repeated images.

Results

- 34 children were recruited (age range 3 to 15 years).
- SC and TM were visible in 12.5% (95% CI 10.0%–15.0%) and 18.2% (95% CI 15.3%–21.1%) of images respectively. In 7.8% of images (95% CI 5.8%–9.8%) both the TM and SC were visible.
- Of images with a visible SC, SL was visible in 58.9% (95% CI 48.4%–69.3%) and the SS in 70.6% (95% CI 60.9%–80.3%).
- Mean TM height was 281.0 micrometres (SD = 74.4), mean SC meridional diameter was 271.5 micrometres (SD = 98.2) and mean SC area was 308.8 micrometres (SD = 186.6).



Discussion

- The results suggest an emerging role for the use of AS-OCT in the assessment of the drainage structures in the paediatric cohort.
- Where landmarks are successfully captured, the calculated Bland-Altman limits imply there is wide inter-individual variation on repeated imaging.
- Limitations of our proof-of-concept study include the small sample size, use of a single annotator, use of a single imaging platform, and no assessment of the impact of patient variables on image variability.

Conclusion

- AS-OCT provides a non-contact technique to visualise drainage structures, but successful capture of drainage structure anatomical landmarks is challenging in children.
- Further work is underway to refine the acquisition protocol for AS-OCT image capture in children, with the potential of more precise landmark capture with swept source approaches.

References

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2. Fung D, Kooner K, Whitson J, Cavanagh H, Roensch A. Epidemiology and characteristics of childhood glaucoma: results from the Dallas Glaucoma Registry. Clinical Ophthalmology. 2013 Aug 1;7:1739