Journal Article Review

Reproducibility of SD-OCT inner macular layer thickness measurements in children with primary congenital glaucoma

Based on:
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Background and Purpose

Primary Congenital Glaucoma (PCG) is raised intraocular pressure accompanied by enlarged corneal diameter, Haab's striae and a glaucomatous optic nerve head appearance on clinical exam. Even though the definition of PCG does not include the use of optical coherence tomography (OCT), the authors of this study evaluated the reproducibility of segmented ganglion cell complex (GCC) of SPECTRALIS in a pediatric population (age: 7-10 years).

Methods

An experienced operator acquired three circumpapillary and macular scans consecutively, through dilated pupils with TruTrack Active Eye Tracking and follow-up option enabled, on 12 children with PCG and 24 healthy children. Written informed consent was obtained from parents or legal guardians of the children and each child gave verbal consent. Circular scans assumed an average 7.7 mm corneal curvature for 12-degree scanning angle. Macular scans acquired 25 B-scans separated by 242 microns and thicknesses were recorded for the Early Treatment of Diabetic Retinopathy Study (ETDRS) grid. Intra-operator repeatability was defined as coefficient of variation (CoV) and intraclass correlation coefficient (ICC) for the following average thickness measurements: circumpapillary retinal nerve fiber layer (cpRNFL), total macula, macular RNFL (mRNFL), ganglion cell layer (GCL), and inner plexiform layer (IPL). Additionally, CoV and ICC were calculated for volumes of each macular measurement.

Results

- The PCG group showed significantly reduced measurements of cpRNFL (mean thickness), GCL and IPL (mean thickness and volume) compared to the healthy group. No significant differences existed between the groups for mRNFL and total macular mean thicknesses and volumes.
- In both groups, cpRNFL-ICC was excellent (healthy: 0.995, PCG: 0.994) with low CoV (healthy: 0.52%, PCG: 1.50%). GCL volume had the best performance for macular measurements (healthy: 0.918 ICC/1.52% CoV, PCG: 0.997 ICC/0.72% CoV).
- In the PCG group, ICC was excellent (> 0.8) for all macular mean thicknesses and volume measurements except GCL mean thickness (0.584).
- In the healthy group, ICC was moderate (0.6 > ICC < 0.8) for all macular mean thicknesses and volume measurements except for mRNFL volume (0.272) and GCL mean thickness (0.263).
- Macular mean thickness ICCs were better in the PCG group (mRNFL-ICC 0.915 vs. 0.765; GCL-ICC: 0.584 vs. 0.263; IPL-ICC: 0.979 vs. 0.742, total-ICC: 0.957 vs 0.552).
- CoV was less than 2% in both groups for all parameters except for mRNFL (mean thickness and volume) and GCL mean thickness.
- CoV was lowest for total macular thickness (0.71%) and GCL volume (0.72%) in the PCG group and lowest for cpRNFL (0.52%) in the healthy group while highest for GCL mean thickness in both groups (healthy: 9.82%, PCG: 6.31%)

Conclusions

In a small sample size of young children with PCG, the SPECTRALIS repeatability of cpRNFL was excellent and mean thickness and volume measurements of the macula had excellent to average repeatability. SPECTRALIS can be useful in managing children with PCG.

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