Visual Field Testing During the COVID-19 Pandemic

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Introduction: The COVID-19 pandemic has had an impact on the delivery of eye care within all settings. One way to improve patient safety in glaucoma clinics is to reduce testing time by choosing the Swedish Interactive Threshold Algorithm (SITA) Faster strategy. Studies show this strategy significantly reduces testing duration and has good comparability to the SITA Fast algorithm.[1] One issue with visual field testing during the COVID-19 pandemic is the wearing of face masks by patients. Previous studies show that the wearing of an improperly fitted face mask during visual field testing may cause a visual field artefact.[2,3,4]

Purpose: To ascertain the reliability in visual field testing in patients wearing face masks during the COVID-19 pandemic.

Methods: This was a retrospective study carried out at the Princess Alexandra Eye Pavilion in Edinburgh, Scotland over three months. Seventy-five eyes of 75 subjects (66 glaucoma, 2 suspected glaucoma and 7 normal) underwent visual field testing using the Swedish Interactive Threshold Algorithm (SITA) Faster strategy while the subject was wearing a face mask during the COVID-19 pandemic.

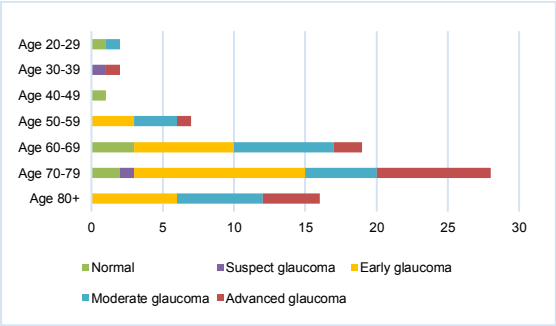

Figure 1. Subjects by age and disease severity.

The results were compared to the subject's two previous SITA Fast testing results which were carried out without subjects wearing face masks. Visual field parameters tested include test duration, false positive rate (FPR), mean deviation (MD), pattern standard deviation (PSD), visual field index (VFI), and glaucoma hemifield test (GHT). Agreement between data sets was calculated using Bland-Altman plots.

Results: The SITA Faster testing strategy significantly reduced testing time compared to the SITA Fast algorithm, by an average of 85.1 seconds ($p < 0.001$). The parameters FPR, MD, PSD, and VFI were all similar between testing strategies ($p > 0.05$). This was true for FPR, MD, and PSD within all age groups and glaucoma categories. VFI was significantly lower only in the subjects with moderate glaucoma (76.5 vs 78.9%, $p = 0.05$) and those in the in the 70-79 age group (76.4 vs 79.1%, $p = 0.03$ and 76.4 vs 78.4%, $p = 0.02$). There was also good agreement between GHT classification (84% and 86.7%).

Subject Group	p value	
	SITA Fast 1	SITA Fast 2
ALL SUBJECTS	0.74	0.91
Normal (no glaucoma)	0.45	0.73
Suspect and early glaucoma	0.41	0.19
Moderate glaucoma	1.00	0.05
Advanced glaucoma	0.92	0.16
Age 20-39	0.16	0.68
Age 40-59	0.88	0.39
Age 60-69	0.67	0.28
Age 70-79	0.03	0.02
Age 80+	0.20	0.91

Figure 2. Agreement in VFI between COVID-19 testing protocol and normal protocol.

Discussion: Test duration was 32.4% shorter when using the SITA Faster algorithm ($p < 0.001$). A previous study by Heijl et al. reported that FPR, MD and PSD were all similar between SITA Faster and SITA Fast testing protocols, and that disease severity had no effect on visual field parameters.[1] It is encouraging that the use of face masks in our study did not appear to reduce comparability between tests. However, Thulasidas et al. found that MD values were lower with SITA Faster compared to SITA Fast, which may cause problems with early disease detection.[5] Young et al. reported that poorly fitted face masks caused inferior visual field artifacts[2], while Bayram et al. identified that unsuitable face masks caused low test reliability due to fixation losses and false-positive errors.[3] It is therefore important that an appropriate face mask is fitted correctly before visual field testing.

Conclusion: Visual field parameters of our COVID-19 testing strategy (SITA Faster, with mask wear) show good agreement with that of the previous strategy (SITA Fast, no mask wear). The results suggest that this testing protocol can be used to monitor patients in glaucoma clinics during the COVID-19 pandemic.

References:
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2. Young SL, Smith ML, Tatham AJ. Visual Field Artifacts From Face Mask Use. J Glaucoma. 2020 Oct;29(10):989-991.
3. Bayram N, Gundogan M, Ozsaygili C, et al. The Impacts of Face Mask Use on Standard Automated Perimetry Results in Glaucoma Patients. J Glaucoma. 2021 Jan7;Publish Ahead of Print.
4. El-Nimri NW, Moghimi S, Fingeret M, et al. Visual Field Artifacts in Glaucoma With Face Mask Use During the COVID-19 Pandemic. J Glaucoma. 2020 Dec29(12):1184-1188.
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