The Role of Virtual Reality in Visual Field Testing when Standard Automated Perimetry is Not Available

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Disclosures

- No relevant financial disclosures

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Synopsis

Visual field monitoring is crucial in monitoring glaucoma progression. While standard automated perimetry remains the gold standard, portable VRVF devices may be a reasonable and practical alternative screening tool for actionable visual field changes when automated perimetry is not available or feasible. In addition, VRVF may become a useful tool in remote telehealth model of glaucoma care.

The purpose of this study was to assess the utility of using a portable virtual reality visual field (VRVF) device when access to standard automated perimeters is limited.

VRVF and HVF Perimeters

Materials and Methods

Glaucoma patients at the Bascom Palmer Eye Institute who had automated perimetry within the past 6 months and at least 2 previous tests on record were offered portable VRVF testing at routine clinic visits. Data collection and patient enrollment occurred between November of 2019 and October of 2020. VRVF test results were compared to most recent Humphrey visual field (HVF) results for each patient. Agreement between VRVF and HVF was quantified with weighted kappa. Weighted kappa may be interpreted as follows: ≤0.4 poor; >0.4 - <0.75 fair to good; ≥0.75 excellent[1] .

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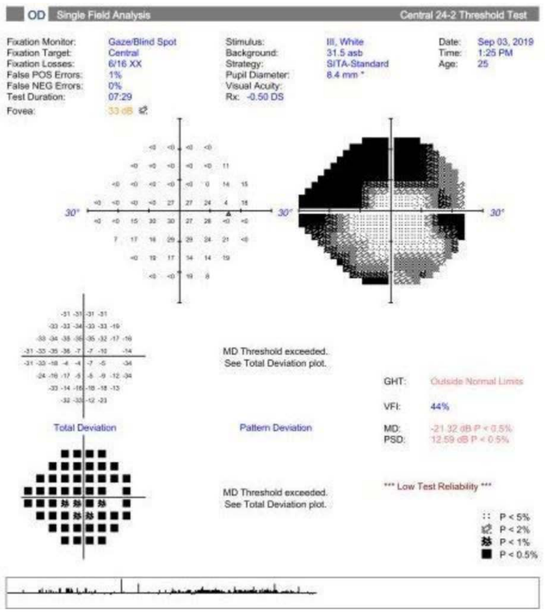
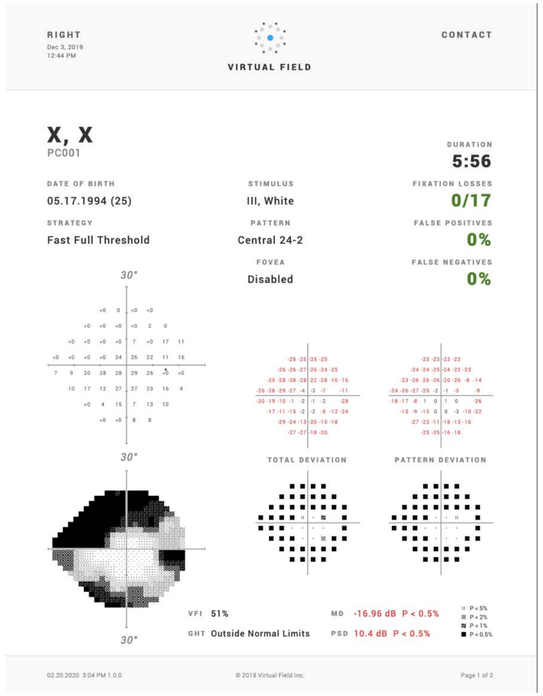
Outcome Measures
VRVF vs HVF

OD





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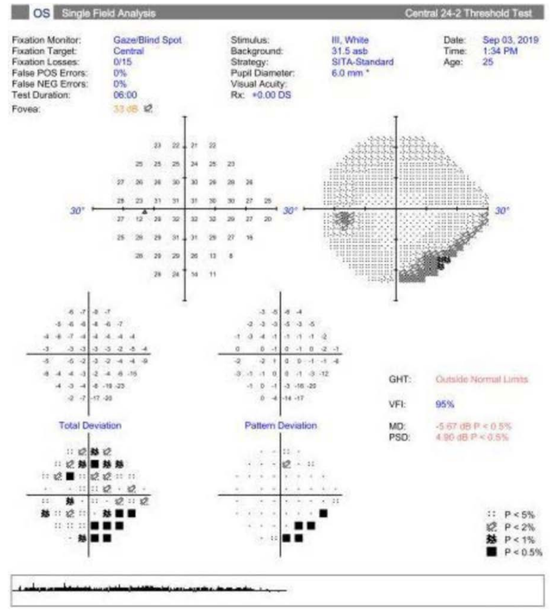

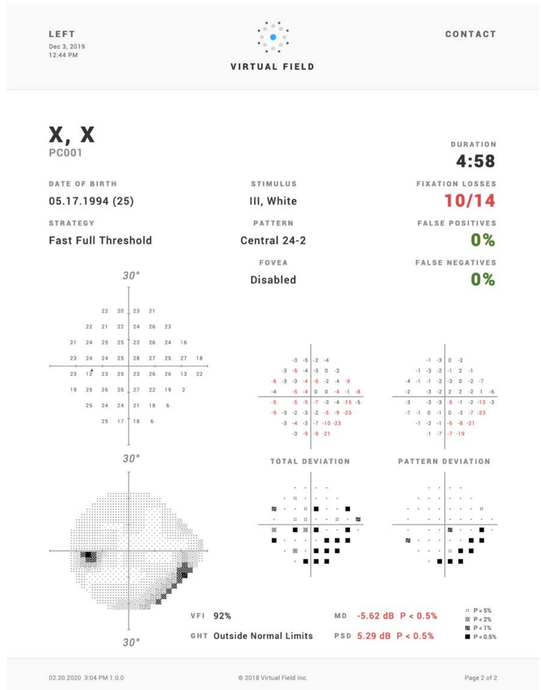

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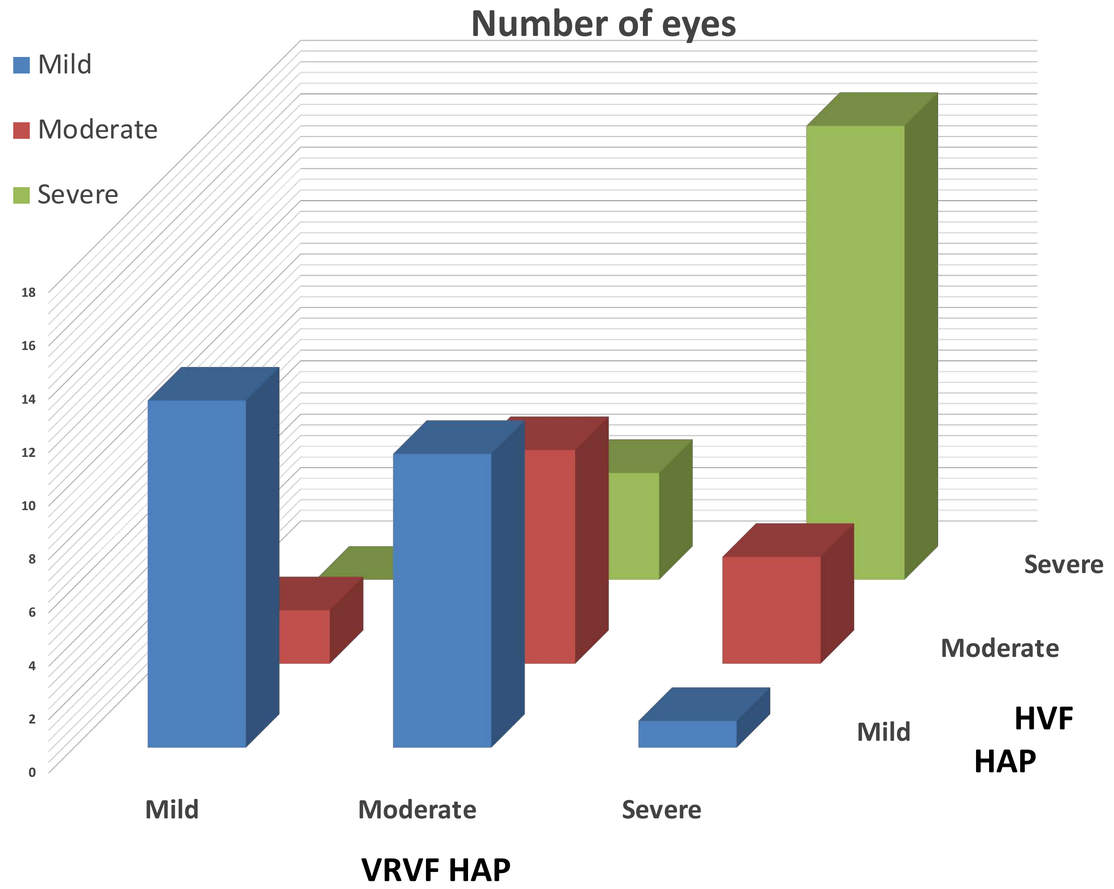
Results

A total of 60 eyes of 33 patients were tested. The distribution of HVF HAP scores in this cohort was 25 (42%) mild, 13 (22%) moderate, and 22 (37%) severe. This chart compares HAP scores between VRVF and HVF revealing a good kappa of 0.69 with exact agreement of 62% between instruments and agreement within 1 category of 37%. A single eye had complete disagreement between VRVF and HVF. VRVF had 77% sensitivity and 77% specificity in detecting HVFS with severe HAP scores[2].



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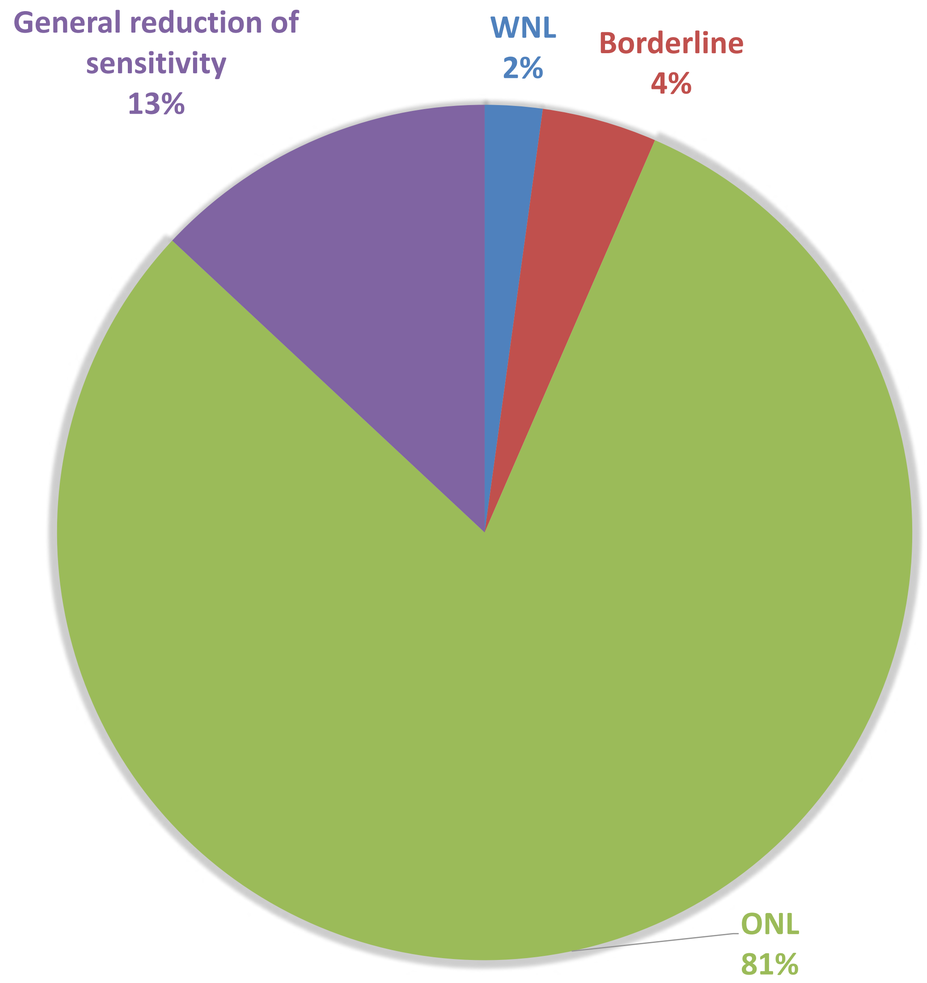
HVF ONL PATIENTS VRVF RESULTS



Results

The distribution of HVF GHTs in this cohort was: 4 (7%) WNL; 9 (15%) Borderline; 46 (77%) ONL; 1 (2%) General reduction of sensitivity. Because of the predominance of ONL results this cohort is not well suited for assessing agreement of GHT results. While the overall exact agreement was 65% and the agreement within 1 category was 23%, the weighted kappa was nearly zero, 0.05.

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Conclusion

Based on HAP criteria VRVF has the potential to detect moderate to severe visual field defect with acceptable sensitivity and specificity when standard automated perimetry testing is unavailable or infeasible.

The increased accessibility and affordability of virtual reality headset makes it a suitable platform for visual field testing.

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