

The Characteristics of Static Visual Fields in Children with Psychogenic Visual Disturbances

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Purpose: It is well-known that patients with psychogenic visual disturbances (PVD) exhibit characteristic kinetic visual fields. Even when the kinetic fields are normalized, the static fields of PVD children frequently remain abnormal. To verify this finding, we performed static perimetry on those children whose kinetic fields were initially normal or which normalized during the follow-up period, and compared the results with those of children with psychosomatic disorders (PSD) and normal children.

Methods: We examined 9 PVD children (17 eyes), 16 PSD children (32 eyes), and 16 normal children (16 eyes). Program 30-2 or 24-2 of the Humphrey Field Analyzer was used in the examinations on all subjects.

Results: The average mean deviation (MD) of the PVD group was significantly lower than that of the other groups ($P < .01$). False negative errors and short-term fluctuations were significantly higher in the PVD group than in the other groups ($P < .05$).

Conclusion: Although PVD and PSD children possess a similar underlying psychological dysfunction, their performances in visual field testing proved to be quite different. In the PVD group, even when kinetic fields were normal, functional visual field loss in the static fields was common and had characteristic response properties. **Jpn J Ophthalmol 2000;44:516–519** © 2000 Japanese Ophthalmological Society

Key Words: Functional visual field loss, Humphrey Field Analyzer, psychogenic visual disturbance, psychosomatic disorder, reliability index.

Introduction

Visual dysfunction without organic cause has been called by various names, such as psychogenic visual disturbance (PVD), hysterical amblyopia, functional visual loss, and visual conversion reaction.¹⁻⁴ The predominant symptom of PVD is decreased vision, although the results of a thorough ophthalmological examination are inconclusive.

Patients with PVD exhibit characteristic kinetic visual fields, such as generalized constriction and spiral visual fields. Although the nature of static fields

in PVD is not well-known, some authors^{5,6} reported that irregular peripheral limits and focal depression displayed on static perimetry most likely corresponded to constricted or spiral changes of the kinetic visual fields.

From our experience, we suspect that even when the kinetic fields normalize, the static fields of PVD children frequently remain abnormal. To verify this finding, we performed Goldmann kinetic field tests on children with PVD, and subsequently the Humphrey Field Analyzer program 30-2 or 24-2 on those children whose kinetic fields were initially normal or which normalized during the follow-up period.

Psychosomatic disorder (PSD), in which there is physical dysfunction in the absence of an organic cause, represents the systemic equivalent to PVD. In our study, we also performed static perimetry on

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children with PSD and on normal children, and compared the results with those of children with PVD in order to study the influence of psychogenic factors on visual field test performance.

Materials and Methods

Nine children with PVD (17 eyes, mean age: 12.2 ± 2.4 years), 16 children with PSD (32 eyes, mean age: 12.4 ± 2.6 years), and 16 normal children (16 eyes, mean age: 11.9 ± 2.7 years) were included in this study. There was no statistically significant difference in the mean ages between the PVD, PSD, and normal groups. Informed consent was obtained from all subjects and their parents before testing.

All children with PVD were found to have decreased visual acuity in school screening programs, and were subsequently referred to the Department of Ophthalmology at Tokyo Medical University. Normal results in the ophthalmological examinations and the lack of objective refractive errors in these children led to the diagnosis of functional visual loss. This was confirmed by the demonstration of a visual acuity of 1.0 or better by the use of plano or "trick" lenses, or by persuasion. Equal power plus and minus lenses (overall power, plano) were combined in the trick lens method. Children suspected of having PVD, but in whom a visual acuity of at least 1.0 could not be demonstrated, were excluded from our study because of the possibility of an organic lesion.

Children with PSD were diagnosed by pediatricians on the basis of recurrent physical symptoms, such as headache, abdominal pain, and refusal to attend school, in the absence of an organic cause following an extensive work-up. All these children showed normal results in ophthalmological examinations with best-corrected visual acuities of 1.0 or better (refractive errors, if present, were within 5 diopters of spherical power). Normal children who had no ophthalmic or psychological disease were recruited for the control group.

On the initial visit, Goldmann kinetic perimetry was performed on each child with PVD. Static perimetry using the Humphrey Field Analyzer was subsequently performed on some of those children who showed normal kinetic visual fields on initial testing, and on some of those children whose kinetic visual fields normalized during the follow-up period. Static perimetry was also performed on all children in the PSD and normal groups whose Goldmann kinetic visual fields were considered to be normal.

The Humphrey Field Analyzer program 30-2 or 24-2 (target size: III) was used for static visual field

testing. The mean deviation (MD) and reliability indices in static perimetry were compared between the groups. A Humphrey visual field was considered unreliable when there was a short-term fluctuation (SF) of greater than 2.5 dB, false positive errors (FPE) or false negative errors (FNE) of 33% or greater, or fixation losses (FL) of greater than 20%.

Results

In the PVD group, Humphrey static perimetry was performed on 9 eyes, in which the initial Goldmann kinetic field was normal, and on 8 eyes in which the kinetic fields normalized during the follow-up period.

The average MD of all static fields in the PVD, PSD, and normal groups (mean \pm SD) was -6.5 ± 3.6 dB, -3.4 ± 1.8 dB, and -3.6 ± 1.4 dB, respectively (Figure 1). The differences in the average MD between the PVD and the PSD groups, and between the PVD and normal groups, were statistically significant ($P < .001$, *t*-test). The difference in the average MD between the PSD and normal groups was not statistically significant.

In the PVD group, the average MD in those children who exhibited normal kinetic fields at the first visit, and in those children whose fields normalized during follow-up, was -6.3 ± 4.4 dB and -6.8 ± 2.6 dB, respectively. This difference was not statistically significant.

Fourteen of the 17 PVD eyes (82%), 16 of the 32 PSD eyes (50%), and 9 of the 16 normal eyes (56%) performed worse than the lowest 5% probability level for the normal population in the Statpac program. The normal value for threshold in the Statpac program was lower than appropriate for our pediatric population, leading to a high incidence of abnor-

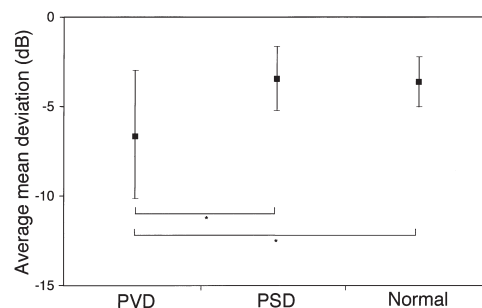


Figure 1. Average mean deviation (MD) of static visual fields. Differences in average MD between psychogenic visual disturbance (PVD) and psychosomatic disorder (PSD) groups, and between PVD and normal groups, were statistically significant ($P < .001$, *t*-test).

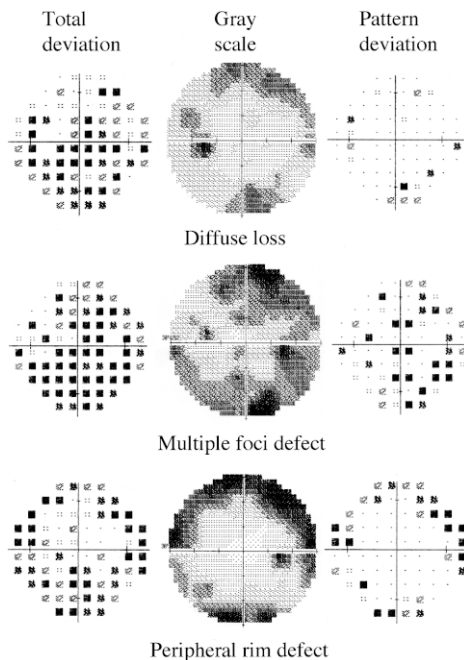


Figure 2. Pattern of static visual fields in psychogenic visual disturbance (PVD) children. Examination of total and pattern deviations in 10 abnormal static fields in PVD children. Patterns of static fields were classified as diffuse loss (top) in 6 eyes, multiple foci defect (middle) in 2 eyes and peripheral rim defect (bottom) in 2 eyes.

mal findings. The 95% confidence interval of the MD (mean \pm 2 standard errors) for the PSD group and the normal group was -4.07 to -2.78 dB and -4.37 to -2.87 dB, respectively. In contrast, the 95% confidence interval of the MD for the PVD group was -8.39 to -4.71 dB. Thus, an MD value of -4.5 dB could differentiate most PVD patients from normal children. Using this criterion on 17 PVD eyes with normal kinetic fields, the static fields of 10 eyes could be classified as abnormal.

The pattern of the static fields in these 10 PVD eyes was classified as diffuse loss in 6 eyes, multiple foci defect in 2 eyes, and peripheral rim defect in 2 eyes (Figure 2)

The mean percentages of the reliability indices FL, FPE, and FNE on static perimetry in the PVD group were $19.5 \pm 15.3\%$, $5.5 \pm 6.8\%$, and $22.1 \pm 19.2\%$, respectively. The values for the PSD group were $13.2 \pm 12.4\%$, $3.9 \pm 5.9\%$, and $8.5 \pm 11.9\%$, respectively; and for the normal group, they were $12.6 \pm 12.9\%$, $4.4 \pm 8.3\%$, and $5.7 \pm 8.4\%$, respectively. The mean SF in the PVD, PSD, and normal groups was 2.6 ± 1.4 dB, 1.8 ± 0.7 dB, and 1.7 ± 0.7 dB, respectively. The differences in mean FNE and SF

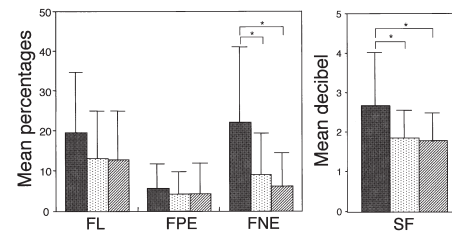


Figure 3. Averages of reliability indices. Graph on left shows mean percentages of fixation losses (FL), false positive errors (FPE), and false negative errors (FNE). Graph on right shows mean short-term fluctuation (SF). Averages of FNE and SF were significantly higher in psychogenic visual disturbance (PVD) group than in other groups ($*P < .01$, *t*-test). □ PVD, ■ PSD, ▨ Normal children.

were statistically significant between the PVD and PSD groups, and between the PVD and normal groups (Figure 3).

In the PVD group, the percentage of static visual fields showing abnormal reliability indices for FL ($\geq 20\%$), FPE ($\geq 33\%$), FNE ($\geq 33\%$), and SF (≥ 2.5 dB), were 41% (7/17), 0%, 29% (5/17), and 47% (8/17), respectively. In the PSD group, the percentages for the same indices were 25% (8/32), 0%, 6% (2/32), and 6% (2/32), respectively. In the normal group, the percentages were 19% (3/16), 0%, 0%, and 19% (3/16), respectively. An abnormal FPE was not observed in any group. The percentage of visual fields showing abnormal FL, FNE, or SF, was higher in the PVD group than in the other groups (Figure 4).

Discussion

Kuroiwa⁵ reported that, using the Octopus automated static perimeter (program 21), irregular peripheral limits and focal depressions forming a pecu-

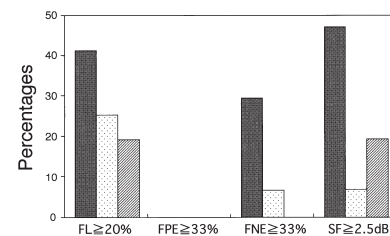


Figure 4. Percentages of visual fields showing abnormal reliability indices. Percentages of abnormal false negative errors (FNE) and short-term fluctuation (SF) were much higher in psychogenic visual disturbance (PVD) group than in psychosomatic disorder (PSD) group. See legend of Figure 3 for explanation of abbreviations. □ PVD, ■ PSD, ▨ Normal children.

liar "flower petal-like" pattern were seen in all patients who showed constricted or spiral visual fields in Goldmann kinetic perimetry. Yamade and Kono² also noted that "polka dot-like" defects displayed on the Humphrey screening program most likely corresponded to the spiral kinetic defects. We did not focus on cases with abnormal kinetic fields; of the 17 PVD eyes with normal kinetic fields, 10 (59%) showed abnormal static fields. Furthermore, depression of the static field in the PVD group was much more profound overall than that for the PSD group.

Chronicity of abnormal visual function in PVD has been reported in several follow-up studies.^{1,7} In general, adult patients tended to continue to have visual dysfunction because of long-standing, incurable emotional conflicts, while children had a better chance for visual recovery because their emotional problems were more amenable to resolution.⁴ We did not observe the children for very long periods, but we noted that 5 of the 8 PVD eyes (62.5%) in which Goldmann fields normalized during follow-up showed an MD less than -4.5 dB. This indicates that functional visual field loss continued for longer than could be detected by kinetic testing alone.

More than half the normal group was also defined as having abnormal static visual fields by an MD worse than the 5% probability level for the normal population in the Statpac program. Thus, we recognize the need to test more control subjects in order to produce an appropriate normal value for thresholds in our pediatric population.

Regarding the response properties in PVD children who exhibit abnormal kinetic fields, Kuroiwa⁵ reported that sensitivity in the static fields was quite variable with respect to spatial and temporal aspects, and that FNE were particularly common although FPE were not. In our study, even in cases with normal kinetic fields, the response properties in the static fields showed the same tendency as in cases with abnormal kinetic fields. Compared with the PSD and normal groups (Figures 3 and 4), a high FNE and abnormal SF were more likely to occur in the PVD group, perhaps a characteristic of the performance of these children. A high FPE rate was not

noted in any group despite a high FL rate. The abnormal reliability indices in the PVD group may reflect patient response properties of easy exhaustion, lack of concentration, and response variability. Although the cause of abnormal fields in PVD patients has not been well investigated, visual field loss may be partially due to these response properties observed in static perimetry. Kinetic field characteristics may also be related to these response properties.

In conclusion, although PVD and PSD children possess a similar underlying psychological dysfunction, the results of their visual field tests were quite different. In the PVD group, even when kinetic fields were normal, functional visual field loss in the static fields was common and had characteristic response properties. Static perimetry is a more objective and sensitive testing method than kinetic perimetry, and these characteristic response properties are related to psychogenic reaction exhibited only in static perimetry. Static perimetry is considered to be effective not only to detect the underlying abnormality, but also to evaluate quantitatively the efficacy of treatment during the follow-up period of PVD.

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