Teller test with functional vision evaluation in children with low vision

Teste com Cartões de Teller e avaliação da visão funcional em crianças com baixa visão

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ABSTRACT

Objective: To know the effectiveness of Teller card test along with the functional vision evaluation in low vision preschool children presenting normal or delayed development. **Methods:** *Transversal study comprising patients from the children visual stimulation Ambulatory Service of the Faculty of Medical Sciences, University of Campinas Teaching Hospital, Campinas (SP)(FCM/HC/ Unicamp). The best corrected visual acuity was obtained using Teller cards and functional vision evaluation, independent from the child development.* **Results:** *From a total of 143 evaluated children, 65% did not respond to the Teller card test, only to, the functional vision evaluation. Among 143 children, 99 (70%) presented development delay and 44 (30%), normal development.* **Conclusion***: The Teller card test was not enough to evaluate the children visual acuity with development delays, since more than half of them were not responsive to it, making it necessary that they were submitted to a complementary functional visual evaluation.*

Keywords: Visual acuity; Low vision; Vision; Child development; Vision disorders

RESUMO

Objetivo: Conhecer a eficácia do teste com Cartões de Teller em complemento a avaliação da visão funcional em crianças pré-escolares com baixa visão e desenvolvimento normal ou atrasado. **Métodos**: Estudo transversal em pacientes do ambulatório de estimulação visual infantil do Hospital de Clínicas da Faculdade de Ciências Médicas da Universidade Estadual de Campinas (HC/ FCM/Unicamp). A acuidade visual com a melhor correção óptica foi medida com Cartões de Teller e avaliação da visão funcional, independente do desenvolvimento da criança. **Resultados**: De um total de 143 crianças avaliadas 65% não responderam ao teste de Teller, porém, em complemento à avaliação da visão funcional pôde ser conhecida a acuidade visual das mesmas. Dentre as 143 crianças, 99 (70%) apresentaram atraso no desenvolvimento e 44 (30%) desenvolvimento normal. **Conclusão:** O Teste com Cartões de Teller para se conhecer a acuidade visual de crianças com atraso em seu desenvolvimento não se apresentou suficiente, pois mais da metade das crianças avaliadas não foi responsiva ao mesmo, necessitando de complementação de avaliação da visão funcional para a medida da acuidade visual.

Descritores: Acuidade visual; Baixa visão; Visão; Desenvolvimento infantil; Transtornos da visão

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INTRODUCTION

Teller card test – visual acuity test – is being applied in preschool children presenting committed development or not, for measuring their angular visual acuity[1]. Patterned for the evaluation of visual acuity in babies, starting from approximately 1 month old, it can be used until the age needed for children with development delays, with or without associated comorbidities or deficiencies[1,2].

Children with development delays can present neuroperceptive and cognitive difficulties to respond to ophthalmological tests; therefore, psicophysical tests should be provided to them, with the children cooperation and colaboration for the establishment of assertive diagnoses and conducts.

The best functional vision is one of the main objectives of the ophthalmological service. This represents a big challenge in the ophthalmological area[3], once the comprehension of the visual infant behavior is necessary.

Functional vision is a relatively new concept[4], meaning visual capacity on its potentialities. Once vision is a learned function, with its possible qualities to be developed, mainly during the first months of life, when the plasticity of the nervous system is maximum[5] it is interesting for children to be offered situations with visual stimulation, so they can have the opportunity to develop themselves[6-8].

The functional vision evaluation, as a psychophysical test, is based on the observation of the child spontaneous behavior in ambulatory environments, where the observer presents and suggests evaluative activities. The observer/evaluator, with the knowledge of the infant visual development, interprets their visual behavior[9-12].

Regarding vision evaluative conditions, the child cognitive capabilities should be considered, so specific incentives can be interpreted[13]. Children with development delay may take longer to answer or make it difficult for the evaluator to observe their visual responses.

This study aimed to evaluate the effectiveness of the visual acuity measurement, using the Teller card test along with the functional vision evaluation in children with low vision, with a committed development or not.

METHODS

This is a transversal study developed during the period from december 2010 to june 2012, at the Children Visual Stimulation Ambulatory Service of the Unicamp Teaching Hospital, approved by the Research Ethics Committee under number 1025/2010.

The total sample comprised 143 children with low vision, of which 78 (55%) were male. There was an age variation between zero months old and 5 years and 11 months old, according to their scheduling in the ambulatory service, with no sampling or random selection of cases, having as inclusion criteria the age group mentioned above and the consent term signed by the responsible for the child. The exclusion criterion was total blindness.

The visual acuity was measured using the best optical correction, in a photopic environment, with natural light, separated eyes, by a pedagogue professional, specialized in visual disability and infant visual stimulation, using Teller cards with 38 centimeters of distance. In some cases, it was necessary for the cards to be nearer, according to what is established in the test manual. In the case of unsatisfactory responses, the test was repeated in another occasion.

In complementation to the Teller card test, the functional vision evaluation (table 1) was applied. The information about the children development was obtained from their hospital documentation. Patients with committed development were followed by the neurological pediatric team of the same hospital.

Table 1

Data Gathering for the Children Functional Vision Evaluation

Age
( ) 0 – 5 months old
( ) 6 months – 11 months old
( ) 1 year – 1 year 11 months old
( ) 2 years – 3 years 11 months old
( ) 4 years – 5 years 11 months old

Development
( ) Normal development
( ) Development delay

(1) Light Perception (PL): _____m (2.0)
0-50cm = 0.0/ 50cm-1m = 0.5/1m-2m = 1.0/2m-3m = 2.0
( ) With tracking (2.0)
( ) Without tracking (0.0)
( ) Environment with artificial light (1.0)
( ) Environment with low light (0.0)
( ) Does not present (0.0)
(2) People Perception: _____m (2.0)
0-50cm = 0.0/ 50cm-1m = 0.5/1m-2m = 1.0/2m-3m = 2.0
( ) With tracking (2.0)
( ) Without tracking (0.0)
( ) Does not present (0.0)

(3) Visual Fixation
( ) Central (4.0)
( ) Temporal (1.0)
( ) Does not present (0.0)
(4) Nystagmus
( ) Moderated (1.0)
( ) Intense (0.0)
( ) Does not present (4.0)
(5) Object perception: _____ m (1.0)
0-50cm = 0.0/50cm-1m = 0.5/1m-2m = 0.5/2m-3m = 1.0
( ) Does not present (0.0)
( ) Only backlighted objects: _____ m (0.5)
0-50cm = 0.0/ 50cm-1m = 0.5/1m-2m= 0.5
( ) With tracking (0.5)
( ) Without tracking (0.0)
( ) With a 5-cm diameter (1.0)
( ) With a 10-cm diameter (0,5)
( ) Visual motor coordination (1.0)
( ) Tridimentional visual response (0.5)
(6) Color Perception
( ) Recognizes colors (5.0)
( ) Does not recognize colors (0,0)
Teller cards: _____cm (5.0)
Right eye: _____
Left eye: _____
( ) NR – Nonresponsives (0.0)

RESULTS

From the total 143 studied children, 92 (65%) were not responsive to the Teller card test. Regarding their development, 44 (30%) presented normal development, and 99 (70%), development delays.

The responsiveness to the Teller card test ranged according to the child development, described in table 2.

Table 2

Responsiveness to the Teller card test x Development

Responsiveness to the test	Normal neurological development	Neurodevelopment delay	Total
Teller cards	44 (30%)	99 (70%)	
Responsive	31 (70%)	20 (20%)	51 (36%)
Non-responsive	13 (30%)	79 (80%)	92 (65%)
Total	**44**	**99**	**143(100%)**

From the 44 children with normal development, 31 (70.4%) responded to the Teller card test. From the 99 with development delay, only 20 (20.2%) were responsive to the Teller card test.

The visual functional evaluation was held as a complement to the Teller card test, creating a special score, in a graduation of score 0 to 5.0 for each topic from the vision functional evaluation.

It was considered score above or equal 18, high intensity punctuation, and the visual stimulation was not considered necessary. Score below 18, with low intensity, the visual stimulation was indicated, oriented and followed by an able pedagogue professional (table 3).

DISCUSSION

In this population, there was a significant prevalence of development delay cases, with comorbidities, cerebral damage sequels, with or without other associated deficiencies, low responsiveness to the Teller card test, with little collaborative behaviors, making it necessary the use of the complementary functional vision evaluation, as presented in other studies [14,15].

After being submitted to the Teller card test and functional vision evaluation, 105 children, representing 74% from the total, have received indication for visual stimulation.

Considering these data, it was observed that the functional vision evaluation, as a complement of the Teller card test, can orientate visual therapeutic conducts, being understood that the earlier the visual stimulation intervention is, the better the possibilities of visual development are going to be for each age group researched in this study.

The cognitive, neurological and motor compromise, as well as the difficulty in comprehending the child visual behavior by the evaluator, restraining the communication and interpretation of visual responses, were also observed by other researchers[6,16] in their studies with children in the same age group received in similar environments.

Visual responses are individual processes and the visual improvement depends on the vision integrity[17]. During the child development, vision promotes their social and environmental integration; while vision decrease or its non-existence reduces the child capacities to develop themselves in other sensorial aspects, which may affect their psychological, physical, emotional and social behavior[16,18-22].

Some authors present the Teller card test as a good option to evaluate the visual acuity of children with development delay [1,6,23-26]. However, it was observed in this study that using such a test alone was not enough, since more than half of the children were not responsive to it, making it necessary that they were submitted to a complementary psychophysical test.

According to other studies[6,16], there is a wide difficulty in defining the visual compromise or incapacity of these children for their cognitive, neurological or motor limitations, as well as for the difficulty they have in communicating their visual responses, making it difficult the understanding by the involved ophthalmologists and therapeutic professionals.

Table 3

Result from the vision functional evaluation from the studied group (n = 143)

Score	Intensity	0 months 5 months 2 children	6 months 11 months 7 children	1 year - 1 year and 11 months 32 children	2 years -3 years and 11 months 51 children	4 years -5 years and 11 months 51 children	Normal Development	Development Delay
Higher or Equal to 18	High		1 Normal development 1 Development delay	1 Normal development 5 Development delay	7 Normal development 3 Development delay	6 Normal development 14 Development delay	15	23
Score Below 18	Low	1 Normal development 1 Development delay	1 Normal development 4 Development delay	6 Normal development 20 Development delay	12 Normal development 29 Development delay	9 Normal development 22 Development delay	29	76
Visual Stimulation Suggestion		**2**	**5**	**26**	**41**	**31**		
					Total with suggestion for visual stimulation			**105**

Sometimes, for a better diagnostic acumen, the follow-up of electrophysiological evaluation in children becomes necessary[27]

Furthermore, considering the aspects of the infant development as a way of knowing the expected behaviors for each age group, ophthalmological services are suggested to infants, aiming to broaden the comprehension of the expressions in the evaluated child and their responses to psychophysical tests.

Another interesting aspect to be observed is that, when it comes to children, the ludic must be explored, so the child feels comfortable and collaborative during tests and evaluations, as well as in visual stimulation follow-ups.

AUTHOR CONTRIBUTIONS

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