

Detection of Spectacle Assembly Error Using PlusoptiX® Over Spectacles: A Report of Two Cases

Deteção de Erro de Montagem de Óculos com o Uso de PlusoptiX® Sobre Óculos: Relato de Dois Casos

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ABSTRACT

Photoscreening with PlusoptiX® is widely used to detect amblyopia risk factors and is typically performed in children without their eyeglasses on. We present two clinical cases that highlight the utility of PlusoptiX® over spectacles in objectively assessing refractive status, providing valuable information on the adequacy of the prescribed correction.

We report two recent cases in which PlusoptiX® detected errors in the assembly of glasses. In the first case, PlusoptiX® over spectacles detected a spectacles assembly error that worsened amblyopia in a 4-year-old child despite refractive and occlusive treatment. In the second case, the photoscreener revealed an error in the cylinder transposition axis of the right eye lens that was causing a decrease in best-corrected visual acuity of this eye.

These case reports endorse the integration of a measurement with a photoscreener over spectacles as a valuable adjunct to clinical examinations at the beginning of ophthalmologic assessments.

KEYWORDS: Amblyopia/diagnosis; Child; Eyeglasses; Refraction, Ocular; Vision Screening.

RESUMO

O foto-rastreio com o PlusoptiX® é amplamente utilizado para identificar fatores de risco de ambliopia, sendo aplicado em crianças sem os óculos postos. Apresentamos dois casos clínicos que destacam a utilidade do PlusoptiX® sobre os óculos na avaliação objetiva do estado refrativo, fornecendo informações valiosas sobre a adequação da correção prescrita.

Relatamos dois casos recentes nos quais o PlusoptiX® detetou erros na montagem de óculos. No primeiro caso, o PlusoptiX® sobre os óculos detetou um erro de montagem que agravava a ambliopia numa criança de 4 anos, apesar do tratamento refrativo e oclusivo. No segundo caso, o foto-rastreio revelou um erro no eixo de transposição do cilindro na lente do olho direito, o que causava uma diminuição da melhor acuidade visual corrigida desse olho.

Estes casos clínicos apoiam a integração de medições com foto-rastreadores sobre os óculos como um complemento valioso ao exame clínico no início das avaliações oftalmológicas.

PALAVRAS-CHAVE: Ambliopia/diagnóstico; Criança; Óculos; Rastreio da Visão; Refração Ocular.

INTRODUCTION

The PlusoptiX Vision Screener® (copyright PlusoptiX GmbH) is one of the most common amblyopia risk factor screening devices used worldwide.¹ When performed in children without eyeglasses, PlusoptiX® has already been demonstrated to have high accuracy in detecting amblyopia risk factors, with a high sensitivity in detecting myopia, astigmatism and anisometropia, while usually underestimating hyperopia.^{2,5} Its utility in predicting myopic changes in children wearing glasses has been published recently.^{6,7}

Matta NL *et al* performed PlusoptiX® screening in 103 children with amblyopia while wearing their optical correction.⁸ Results suggest that when combined with visual acuity testing, the device offers high sensitivity and specificity, supporting its potential role in remote management and telemedicine-based follow-up of amblyopia. We routinely use PlusoptiX® in children at our center while they wear their prescribed spectacles, to evaluate whether refractive errors persist with the prescribed correction.

In these case reports, we demonstrate the usefulness of using PlusoptiX® over spectacles to uncover spectacle assembly errors which had not been noticed by the child or family.

CASE REPORT

CASE 1

A 4-year-old child presented to the pediatric ophthalmologic clinic for an evaluation. He was born prematurely at 34 weeks' gestation, weighing 1125 g. There was no history of systemic illness or relevant family history, and he had not undergone any ocular examination in the past. Retinopathy of prematurity screening was performed and showed no abnormalities.

In the first visit, the two measurements of PlusoptiX® were: +3.75-3.75x173 and +2.50-3.00x178 in the right eye (OD); +3.25-1.25x163 and +2.00-1.25x6 in the left eye (OS). Visual acuity without correction was 0.2 in OD and 0.4 in OS (Crowding 'E'), with 400 seconds of arc in the Randot stereotest. No strabismus was detected. Slit lamp and fundus examination were unremarkable. The child was submitted to cycloplegic refraction with instillation of 3 drops of cyclopentolate 1.0% in each eye, with 10 10-minute interval, followed by an autorefractometer measurement after 40 minutes. Autorefractometer under cycloplegia was: +2.50+3.25x80 in OD and +3.50+1.25x90 in OS. The refraction was confirmed with retinoscopy and a refractive correction: +3.25x80 in OD and +1.00+1.25x90 in OS was prescribed.

On the second visit, after 3 months, best-correct visual acuity (BCVA) with the prescribed spectacles was 0.5 in OD and 0.7 in OS, with 200 seconds of arc in the Randot stereotest. Although the amblyopia diagnostic threshold was not met, borderline amblyopia was assumed, and occlusive treatment of the left eye was prescribed for 2 hours per day.

At the third visit, after two months of occlusive therapy, the child returned wearing a new pair of spectacles, report-

edly identical to the previously prescribed prescription (+3.25x80 in OD and +1.00+1.25x90 in OS), as the original pair had been broken. However, he now complained of blurred vision. Surprisingly, his BCVA with the new spectacles was 0.1 in OD and 0.7 in OS. The measurement of PlusoptiX® over spectacles revealed a significant asymmetry in refraction between eyes (+3.00-5.00x177° in OD and +0.25-0.25x176° in OS) (Fig. 1A). Spectacles were examined and we realized there was an error in the cylinder axis of the right lens (+3.25x180 instead of +3.25x80 that had been prescribed).

At the fourth visit, after 3 months using spectacles with a correct prescription, BCVA increased to 0.6 in OD and 0.8 in OS, with 140 seconds of arc in the Randot stereo test. PlusoptiX® over spectacles confirmed emmetropia (Fig. 1B). The child maintained occlusive treatment in the left eye, 4 hours/day for 2 months. Due to a BCVA increase in the following months, we tapered down occlusive treatment and stopped after 9 months with a final BCVA of 0.9 in both OD and OS.

CASE 2

We present the case of a 6-year-old child with esotropia associated with a high AC/A ratio. The child had no significant past medical history. The patient underwent bilateral medial rectus recession 8 months earlier, followed by a reoperation with lateral rectus resection in the left eye 6 months after the initial surgery. Postoperatively, orthophoria was achieved for both distance and near vision. However, orthoptic evaluation revealed alternating suppres-

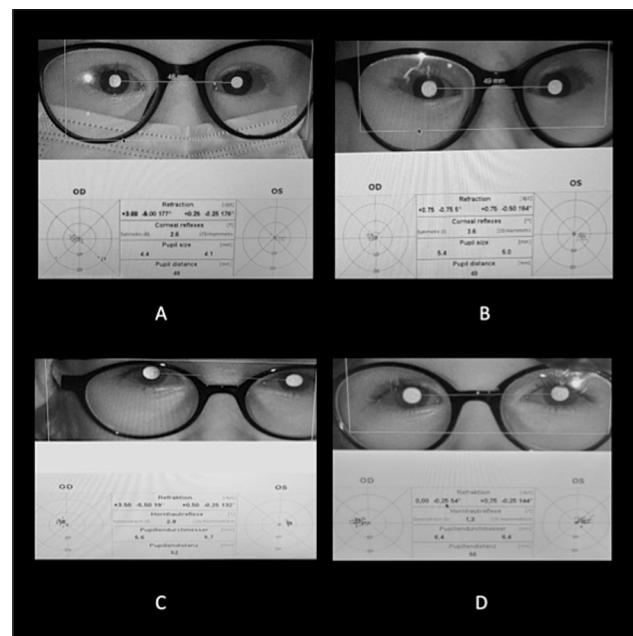


Figure 1. PlusoptiX® measurements over spectacles. (A) Case 1 - High asymmetry in refractive error due to a mistake in the assembly of OD spectacle lens; (B) Case 1- Correct refraction assembly after change to the correct prescription. (C) Case 2 - High asymmetry in refractive error due to a mistake in the assembly of OD spectacle lens; (D) Case 2- Correct refraction assembly after change to the correct prescription.

sion, absence of fusion, and reduced stereopsis, measured at 3000 seconds of arc on the Titmus test. The patient had not undergone occlusive treatment.

Autorefraction after cycloplegic refraction with instillation of 3 drops of cyclopentolate 1.0% in each eye, with 10 10-minute interval, after 40 minutes was: +3.25-3.25x15 (OD) and +4.25-4.50x165 (OS) confirmed with retinoscopy. The child was prescribed bifocal glasses with a prescription of +2.75-3.25x15 in the right eye (OD) and +3.50-4.50x165 in the left eye (OS), with an additional +3.00 for near vision in both lenses. Best-corrected visual acuity (BCVA) was 0.8 in both eyes (OU). On a follow-up visit two months later, the child reported blurred vision in the right eye. BCVA in the right eye had decreased to 0.3, and a Plusoptix® over spectacles revealed significant asymmetry in refraction between the eyes (Fig. 1C). There was an error in the axis transposition of the cylinder in the right eye lens (+2.75-3.25x105 instead of +2.75-3.25x15 that had been prescribed), resulting in a measurement of +3.50-6.50x19. After correcting the lens prescription, a follow-up appointment two weeks later showed a rectified refraction assembly using Plusoptix® (Fig. 1D), with the BCVA in the right eye improving to 0.8.

CONCLUSION

Within seconds, a Plusoptix® measurement over the child's spectacles can provide valuable information at the start of the consultation. Although prescription verification could be achieved with a full ophthalmological examination, including lensometry, the use of Plusoptix® at the start of the consultation allowed for the immediate detection of significant refractive asymmetry, prompting suspicion of a spectacle assembly error even before subjective visual acuity testing or lens verification. This approach may be particularly valuable in younger or non-verbal children who cannot reliably report symptoms or cooperate with visual acuity testing. As a rule, we have been doing Plusoptix® measurement over glasses for many years in all our patients. Here, the employment of Plusoptix® over spectacles has detected these spectacle assembly errors.

It is already published that Plusoptix Vision Screener®, a worldwide available photoscreener used for amblyopia screening, is able to predict myopic changes in children wearing glasses.^{6,7} However, to our knowledge, no prior studies have reported the use of Plusoptix® over spectacles to identify prescription or assembly errors, which we believe may be an underexplored application of this widely available device. Based on the insights gleaned from these cases and our 20 years of experience with the Plusoptix®, we strongly endorse the integration of a measurement with a photoscreener over spectacles as a valuable adjunct to clinical examinations at the beginning of ophthalmologic assessments. Other brands of photoscreeners may also have their value, for which we recommend other studies in the future.

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PBS, MJV, and SG: Writing, design, and revision.

PBS and SG: Writing and revision.

All authors approved the final version to be published.

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PBS e SG: Escrita e revisão.

Todos os autores aprovaram a versão final a ser publicada.

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