

Training system for visual improvement: RevitalVision

Sistema de treinamento para melhora visual: RevitalVision

Juliana Almodin¹, Flavia Almodin², Edna Almodin³, Maria Helena Lopes Amigo⁴, Marlon Bruno Furoni⁵, Tadeu Cvintal⁶

ABSTRACT

Objective: Evaluation of patients undergoing sequential sessions of RV and report its benefit in improving visual acuity (VA). **Methods:** Cross sectional study with a sample of 10 patients who underwent sequential sessions of the RV. Patients were treated at a rate of 2-3 sessions per week for a period of 2 to 3 months and was completed after 20 to 40 sessions. The main inclusion criteria were post cataract surgery (without complications) and multifocal IOL until +3.00 D, astigmatism <-1.00 D, amblyopia, glaucoma, post corneal transplant, Axenfeld Rieger syndrome, congenital cataract and post lasik. **Results:** The sample of ten patients comprised 30% female, 70% male with an average of 29 years and 38.6 sessions per patient. There was statistical significance in relation to pre and post AV sequential RV sessions ($p = 0.0135$) and improved contrast sensitivity. **Conclusion:** An improvement of VA and contrast sensitivity in patients after the RV sessions was observed.

Keywords: Visual acuity; Visual córtex; 'Software'

RESUMO

Objetivo: Avaliação de pacientes submetidos a sessões sequenciais do RevitalVision (RV) e relatar seu benefício na melhora da acuidade visual (AV). **Métodos:** Estudo transversal com uma amostra de 10 pacientes submetidos a sessões sequenciais do RV. A terapia foi realizada em um ritmo de 3 sessões por semana durante um período de 2 a 3 meses, sendo concluída depois de 20 a 40 sessões. Os principais critérios de inclusão foram pós-cirurgia de catarata (sem complicações) com LIO multifocal e até +3,00 D, astigmatismo < -1,00 D, ambliopia, glaucoma, pós-transplante de córnea, síndrome de Axenfeld Rieger, catarata congênita e pós-lasik. **Resultados:** A amostra de dez pacientes foi composta por 30% do sexo feminino, 70% masculino em uma média de 29 anos e de 38,6 sessões por paciente. Houve significância estatística em relação à AV pré e pós as sessões sequenciais do RV ($p = 0,0135$), assim como melhora da sensibilidade ao contraste. **Conclusão:** Observou-se melhora da AV e da sensibilidade ao contraste nos pacientes submetidos após as sessões do RV.

Descritores: Acuidade visual; Córtex visual; Software

¹ Glaucoma Department, Próvisão Eye Hospital, Maringá/PR, Brazil.

² 2nd-Year Resident in Ophthalmology, Tadeu Cvintal Ophthalmology Centre, São Paulo/SP, Brazil.

³ Próvisão Eye Hospital, Maringá/PR, Brazil.

⁴ 3rd-Year Resident in Ophthalmology, Tadeu Cvintal Ophthalmology Centre, São Paulo/SP, Brazil.

⁵ Nursing Department, Próvisão Eye Hospital – Maringá/PR, Brazil.

⁶ Tadeu Cvintal Ophthalmology Centre – São Paulo/SP, Brazil.

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INTRODUCTION

Revital Vision (RV) therapy is a training of the visual cortex using computer software. It is a non-invasive, patient-specific treatment designed to improve vision by modifying certain primary processes in the visual cortex. Gabor filters are used to stimulate and activate receptive fields in the visual cortex in order to improve visual acuity (VA) and contrast sensitivity by facilitating neuronal connections at the cortical level.⁽¹⁾ Precise stimulus control is critical for the onset of the neuronal modifications that form the basis of brain plasticity.⁽²⁾ RV therapy was originally developed in 1999.^(1,3) The U. S. Food and Drug Administration (FDA) monitored a blind prospective controlled study on the technique and approved it in August 2001.⁽⁴⁾ This technology has been used to treat over 3,000 patients in Europe, the USA and Asia with little or no regression, producing satisfactory visual outcomes in patients undergoing RV sessions.⁽⁴⁾

Neuroplasticity is defined as the ability of the nervous system to modify its structure and function in response to experience (stimuli).^(5,6) A consensus in the literature on brain plasticity is that motor tasks induce plastic, dynamic changes in the central nervous system (CNS).⁽⁷⁾ Motor activity and learning skills can change synapses or reduce molecular events in areas adjacent to a lesion or in more remote areas of the cortex.^(7,8) The influence of motor activities on a brain injury is complex due to neurocellular dynamics and metabolic changes that occur after an injury, which may affect the effects of such activities.^(9,10)

The function of contrast sensitivity is an excellent representation of the spatial vision of an individual. Several studies show that contrast sensitivity is significantly related to skills that affect a patient's quality of life, such as reading speed,^(11,12) locomotion and driving^(13,14), and using a computer⁽¹⁵⁾. Contrast sensitivity may be reduced in patients with ocular abnormalities⁽¹¹⁻¹⁵⁾ and after refractive surgery⁽¹⁶⁻²¹⁾, thus hindering daily activities.

The aim of this study was to assess patients undergoing RV sessions and to discuss its benefits in improving visual acuity and contrast sensitivity.

METHODS

Cross-sectional study with a sample of ten patients (30% female, 70% male), mean age 29 years, undergoing RV sessions at the Próvisão Eye Hospital in Maringá/PR, Brazil. Patients underwent 20-40 RV sessions (average, 38) depending on their medical condition. During the sessions, patients were positioned in front of a computer screen in a dark room and used a mouse to respond to tasks. As the software is web-based, the training was designed to be conducted at home; in our study, however, the first two sessions were conducted by a technician in the medical practice to ensure the learning effect before starting the sessions at home. The patients underwent 3 training sessions per week for a period of 2 to 3 months, totalling 20-40 sessions. Before starting the 20 training sessions, patients complete 2 computerized evaluation sessions with the system to setup the baseline of individualized neural inefficiencies for the training progrBefore starting the 20 training sessions, patients underwent two evaluation sessions using the basic RV system to determine their individual neural deficiencies. After each training session, the patient's performance in each visual perception task was

recorded and submitted online to the RV servers (Annex 1).

Inclusion criteria were: patients submitted to cataract surgery (without complications) with multifocal IOL implantation and up to +3.00 D; astigmatism <-1.00 D; patients who successfully completed RV training; and patients with amblyopia, glaucoma, post-corneal transplantation, Axenfeld Rieger syndrome, congenital cataract, or post-LASIK. Exclusion criteria were: dry eyes; LogMAR visual acuity lower than 1.3; posterior capsule opacity; diabetic retinopathy; and age-related macular degeneration (AMD).

VA was assessed before and after the RV sessions. Statistical analysis was done using SPSS software for Windows version 15.0. The Wilcoxon test for related samples was used to assess changes (pre vs. post) in LogMAR VA. A significance level of 0.05 ($\alpha=5\%$) was adopted, and descriptive levels (p) below this value were considered significant and represented by an asterisk. Contrast sensitivity was assessed using the form shown in Annex 2.

DISCUSSION

We found a statistically significant difference between assessments before and after RV sessions ($p = 0.0135$) (Table 2) as well as improved contrast sensitivity in all patients after three months of therapy. These results are consistent with the literature. In a study in Singapore, Fam and Lim reported the case of

Annex 1

Questionnaire for initial patient assessment

REVITALVISION[®] SPORTS VISION EXAM

PATIENT NAME LABEL (required): _____

Patient Name: _____ Email Address: _____

Address: _____ Best Contact Phone (home or cell): _____

City: _____ State: _____ Zip: _____

Ship to Address: _____ Best Time to Call: _____

City: _____ State: _____ Zip: _____

Date of Birth: ___/___/___ Examination Date: ___/___/___ Gender: Male Female

Doctor Name: _____

BASELINE EXAM

Present Rx Glasses Contact Lenses None

Habitual Distance VA Habitual Near VA

OD VA OS VA

OS VA OS VA

TO ACTIVATE, FAX FORM TO: 1.877.856.9818

FOLLOW-UP EXAM

Present Rx Glasses Contact Lenses None

Habitual Distance VA Habitual Near VA

OD VA OS VA

OS VA OS VA

FOLLOWING COMPLETION, FAX FORM TO: 1.877.856.9818

1617 St. Andrews Drive • Lawrence, Kan. 66047 • (p) 866.954.1619 • (f) 877.856.9818 • www.revitalvision.com

Treatment Criteria

Age
13 and older

Target Population
Every one who wants to improve their quality, clarity and/or breadth of vision - no matter the prescription.

Functional Benefit
improved performance by seeing clearer, sharper, less fatiguing with your daily activities - it's all.

The Best Candidates
Those who are high demands for exceptional vision:
• Sports - golf, tennis, handball, bowling, etc.
• Pilots, Pilots-in-Training

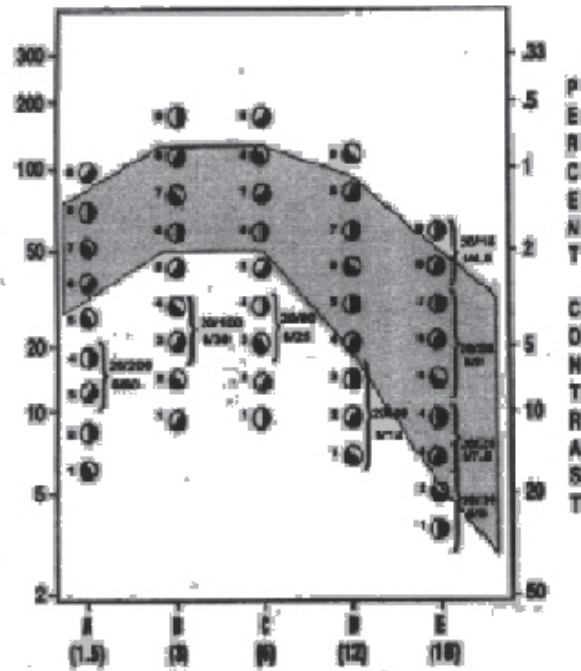
Clinical Benefit
Average improvement in functional vision:
• 10% in distance visual acuity
• 10% in contrast sensitivity

Annex 2

Contrast Sensitivity Test

Name: _____ Date: ___/___/___
 Indication: _____ Glasses CLs No correction

Lin	VA	RE	LE	Lin	VA	BE
5	20/160	RVCSH	DRCHV	5	20/160	SCNZV
6	20/125	CKDZR	CKNRD	6	20/125	CSHDN
7	20/100	OVRHK	SHZDO	7	20/100	ONKCH
8	20/80	NRVKO	RODVC	8	20/80	CVZHO
9	20/63	KSNDK	KRHSD	9	20/63	VCHON
10	20/50	VHCRD	COSZH	10	20/50	RDCZK
11	20/40	DSRKH	ZCVOR	11	20/40	HOSDR
12	20/32	KRSND	CRDVH	12	20/32	RSOVH
13	20/25	SZVHO	DCVHS	13	20/25	NOKDR
14	20/20	HRCNS	KVSCR	14	20/20	ZHSOK
15	20/16	ZCVNO	OCNKD	15	20/16	CDKVH
16	20/12,5	OKZHC	DKCVZ	16	20/12,5	HKDC



1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
↓	←	↓	↑	↑	←	→	←	→	12	5	26	6	16	

Table 1
Sex, age and number of RV sessions

Variable	n = 10
Sex – n (%)	
Female	3 (30,0%)
Male	7 (70,0%)
Age (years)	
Mean (SD)	29,4 (18,0)
Median	25
Minimum – Maximum	9 – 55
Number of sessions	
Mean (SD)	38,6 (19,7)
Median	35,5
Minimum – Maximum	20 – 80

Table 2
Diagnosis and visual acuity (LogMAR) before and after RV sessions

Patient	Diagnosis	LogMAR VA, pre-RV	LogMAR VA, post-RV	LogMAR VA pre-RV minus post-RV
1-	Corneal transplantation and glaucoma	RE: 1,3	RE: 1,3	0,0
2-	Axenfeld Rieger syndrome and corneal transplantation	RE: 1,0	RE: 0,4	0,6
3-	Post-LASIK	RE: 0,2 LE: 0,0	RE: 0,0 LE: 0,0	0,2 0,0
4-	Amblyopia	RE: 0,6	RE: 0,4	0,2
5-	Amblyopia	LE: 1,3	LE: 1,2	0,1
6-	Keratoconus and corneal transplantation	RE: 0,2	RE: 0,0	0,2
7-	Post-LASIK	RE: 1,0	RE: 0,3	0,7
8-	Albinism	RE: 0,9 LE: 0,9	RE: 0,7 LE: 0,7	0,2 0,2
9-	Amblyopia	RE: 1,3	RE: 1,2	0,1
10-	Nistagmus and Post-LASIK	RE: 0,5 LE: 0,4	RE: 0,3 LE: 0,6	0,2 -0,2
Mean (SD)		0,74 (0,45)	0,55 (0,46)	0,19 (0,24)
Median		0,9	0,4	0,2
Minimum / Maximum		0,0 / 1,3	0 / 1,3	-0,2 / 0,7

a 45-year-old patient submitted to LASIK five years earlier who, after 35 RV sessions over a period of 10-12 months, showed an improvement of 2.8 lines and 1.6 lines on logMAR charts in the RE and LE, respectively.⁽²²⁾ Durrie et al., in a multicentre, prospective, randomised, placebo-controlled study, assessed the RV programme after LASIK (Neuro LASIK) in 98 eyes. They found an improvement of 0.8 lines on Snellen's chart and 79% in contrast sensitivity in the treatment group.⁽²³⁾ In our study, post-LASIK patients submitted RV had the following results: One patient had a LogMAR VA of 0.2 before and 0.0 after RV in the RE, while the other had 1.0 before and 0.3 after RV in the RE. The patient with nystagmus and post-LASIK had a LogMAR VA of 0.5 before and 0.3 after RV. Similar to the two studies cited above, our post-LASIK patients had a significant improvement in VA after the RV sessions, as well as improved contrast sensitivity.

Polat U. et al. in a prospective study compared a group of 54 adult amblyopic patients (strabismus and anisometropia) with a placebo group of 16 patients, both submitted to 2-4 RV sessions per week, totalling 45 ± 15 sessions. They found an improvement of 2.5 lines in logMAR VA and improved contrast sensitivity in the group undergoing RV sessions.⁽²⁴⁾

Hou F. et al. compared two groups of adult amblyopic patients (mean age, 22 years) submitted or not to RV sessions. The 9 patients undergoing RV for 10 consecutive days achieved a 44.5% improvement in VA and improved contrast sensitivity.⁽¹¹⁾ The amblyopic patients in our study also improved: two patients had an improvement of 0.1 in LogMAR VA (1.3 before, 1.2 after) and one patient had an improvement of 0.2 (0.6 before, 0.4 after), as well as improved contrast sensitivity.

In our study we found improvement in VA among post-LASIK patients and young amblyopic patients; we also found

significant improvement in patients submitted to corneal transplantation, in a patient with Axenfeld Rieger syndrome, and in an albino patient. The patient with Axenfeld Rieger syndrome and post-corneal transplantation had an improvement of 6 lines in LogMAR VA (1.0 before and 0.4 after RV in the RE), while the patient with keratoconus and post-corneal transplantation had an improvement of two lines (0.2 before 0.0 after RV in the RE). The albino patient had a LogMAR VA of 0.9 before and 0.7 after RV in both eyes (BE). There are no reports in the literature on the use of Revital Vision for the latter two conditions.

CONCLUSION

We found an improvement in VA and contrast sensitivity in patients undergoing RV sessions. The RV training system can be an effective alternative for improving VA in patients with amblyopia, glaucoma, post-corneal transplantation, post-Lasik, Axenfeld Rieger syndrome and keratoconus, improving contrast sensitivity and thus the quality of life. Further studies with larger samples and longer follow-up periods are needed to confirm these findings. It is still unclear whether the observed improvement would be maintained after one year.

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Corresponding author:

Juliana Almodin – juliana_almodin@hotmail.com
 Rua Xavier Curado, 351 – AP 131, Ipiranga, São Paulo/SP
 CEP 04210-100, Brazil
 Provisão Eye Hospital – Maringá/PR and
 Tadeu Cvintal Ophthalmology Centre – São Paulo/SP 2011