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Research Article

Study of Best Corrected Visual Acuity and Macular Thickness After Bevacizumab or Bevacizumab with Laser in Acute Central Serous Chorioretinopathy

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Summary

Objective: Determining the improvement of best corrected visual acuity in Snellen Chart and the decrease of macular thickness in microns by optical coherence tomography (OCT) in Acute Central Serous Chorioretinopathy treated with intravitreal bevacizumab or intravitreal bevacizumab and laser.

Methods: Retrospective observational study of 9 eyes (8 patients) with acute central serous chorioretinopathy, uni or bilateral. Best corrected visual acuity was measured with Snellen Chart and macular thickness in microns at fovea with optical coherence tomography before and untill 68 days maximum after getting treatment with intravitreal bevacizumab or intravitreal bevacizumab and laser.

Results: Average best corrected visual acuity before treatment was 0.78 (2 patients did not have this data). Neurosensory detachment was found in 8 of 9 eyes and retinal pigment epithelium detachment (RPED) was found in 3 eyes. Average macular thickness by OCT before treatment was 431.55 microns.

Treatment was: just intravitreal bevacizumab in 4 eyes and intravitreal bevacizumab with focal laser in 5 eyes.

Average best corrected visual acuity after treatment was 0.88. Average macular thickness by OCT before treatment was 198.77 microns. Last OCT control was performed between 17 and 68 days after treatment.

Eyes with complete resolution of neurosensory detachment and/or retinal pigment epithelium detachment by OCT were 7.

Conclusions: Treatments with intravitreal bevacizumab or intravitreal bevacizumab and laser achieve significant decrease of macular thickness in acute central serous chorioretinopathy as well as maintenance or increase in best corrected visual acuity in most of cases. Best corrected visual acuity is not directly related with macular thickness.

Keywords: *Central serous chorioretinopathy; Bevacizumab; Optical coherence tomography*

Introduction

Central serous chorioretinopathy (CSC) is an idiopathic disorder characterized by the accumulation of clear fluid at the posterior pole. There are three types: Typical or classic CSC is seen in younger patients and causes acute and located neurosensory detachment with acute visual loss. The second type is an alteration of the retinal pigment epithelium (RPE) associated with chronic presence of subretinal fluid. A third form of CSC presents bullous retinal detachment.

The pathophysiology of CSC is not yet fully understood. Fluorescein angiography suggests that fluid emanates from choroid into the subretinal space. Indocyanine green angiography reveals multifocal areas with choroidal vascular hyperpermeability. Excessive hydrostatic pressure in the choroid tissue due to vascular hyperpermeability could lead to mechanical disruption of RPE barrier, damage to RPE cells and abnormal discharge of fluid under the retina.

Demographically, CSC is predominantly considered a disease of men between 30 and 50 years old. Despite this, it is more common, than traditionally thought, in women and older adults. Clinically, patients have often had a previous stressful event and it is more likely for them to have type A personality. Patients report slightly blurred vision followed by metamorfopsia, micropsia, discromatopsia, hipermetropización, as well as central scotoma, loss of contrast sensitivity and increased farsightedness. OCT reveals serous detachment and sometimes there are one or more RPE detachments. OCT is the most effective method to identify and measure serous or RPE detachments. Fluorescein angiography typical finding is the presence of one or more RPE filtrations.

CSC usually resolves spontaneously three to six months after the onset of symptoms, and most of them with recovery of visual acuity. After healing you can see a scar at the retinal pigment epithelium, with no signs of leakage. Recurrences can occur even 10 years after the original episode. Laser photocoagulation shortens the course of the disease, but this has no effect on the final visual acuity. If macular detachment has not been resolved after the 3 months and the leakage point is away from the center of the fovea, it is reasonable to treat a symptomatic patient. If the leakage point is within 500 um from the center of the fovea, it is reasonable to observe for 6 months prior to treatment. Guided photodynamic therapy for the treatment of chronic CSC has shown promising results, especially in cases with decompensation of the RPE. Bevacizumab is a monoclonal antibody that selectively binds to vascular endothelial growth factor (VEGF), a key factor of vasculogenesis and angiogenesis, inhibiting the union to its receptors on the surface of endothelial cells which neutralizes its biological activity reducing vascularization. The mechanism of bevacizumab in CSC it is not known precisely, but is believed to be related to the impairment of vascular permeability. It is administered intravitreally for this condition. The goal of this treatment is to decrease the frequency of possible consequences of this disease as reduction of visual acuity due to irreversible scars.

The following paper aims to determine the improvement in best corrected visual acuity on the Snellen chart and decrease of macular thickness in microns by optical coherence tomography in Acute Central Serous chorioretinopathy treated with intravitreal bevacizumab or intravitreal bevacizumab and laser photocoagulation.

Materials and Methods

A retrospective observational study of 9 eyes (8 patients) with acute central serous chorioretinopathy, uni- or bilateral was performed. Patients were examined at the Retina Service of Molina Eye Institute during the period from May 1, 2013 to June 30, 2014. For the study, the best corrected visual acuity taken with Snellen chart and measurement of macular thickness with optical coherence tomography (SD-OCT Cirrus spectral domain - Version 6.02) at the fovea before and after treatment were considered. The last controls of the patients were performed between 17 and 68 days after treatment. The measurement of macular thickness with OCT is done manually with markers from Bruch's membrane to the inner limiting membrane. Treatments administered were intravitreal bevacizumab or intravitreal bevacizumab and laser.

Inclusion criteria were:

- Male patients.
- Ages between 20 to 60 years old.
- Diagnosis of acute idiopathic central serous chorioretinopathy by OCT and fluorescein angiography.
- Not having neurosensory detachment diagnosis of other causes such as choroidal neovascularization or diabetic retinopathy.
- Treatment with intravitreal bevacizumab or intravitreal bevacizumab and laser.
- Not having received any treatment in 3 months previous to intravitreal bevacizumab or intravitreal bevacizumab and laser.
- Exclusion criteria were:
- Female patients.

- Patients over 60 or under 20 years old.
- Chronic and recurrent central serous chorioretinopathy cases.
- Other causes of neurosensory detachment such as infectious, inflammatory, age-related, diabetic retinopathy or others.
- Having received treatments different to bevacizumab or bevacizumab and laser.
- Having had any treatment in the three months prior to entering the study. Averages of each variable were determined.

Results

Our case series consists of 9 eyes in total, 4 right eyes and 5 left eyes. The age range of the group studied was 25-56 years old, with an average of 40.5 years old. 100% of patients were male.

Best corrected visual acuity before treatment was in the range of 0.4 to 1.0 with an average of 0.78. Neurosensory detachment alone was found in 6 eyes, neurosensory detachment with RPED in 2 eyes and RPED alone in one eye. Average macular thickness measured at center of the fovea prior to treatment was 431.55 microns. 4 eyes were treated with intravitreal bevacizumab alone 5 eyes were treated with intravitreal bevacizumab and laser.

Best corrected visual acuity after treatment was found in the range of 0.5 to 1.0 with a mean of 0.83. Two of the patients maintained visual acuity of 1.0 before and after treatment, 2 decreased their acuity after treatment, 3 improved best corrected visual acuity and the remaining 2 did not have prior treatment data.

Average macular thickness was 198.77 microns after treatment. Decrease in macular thickness after treatment was found in all patients. The last OCT control was performed between 17 and 68 days after treatment. 7 eyes had complete resolution of neurosensory detachment and/or RPED. Although the 2 remaining eyes did not have complete resolution, they had a significant decrease in macular thickness.

Patient	Sex	Age	Eye	VA Pre	OCT Pre	Treatment	VA Post	OCT Post
1	M	56	R	1	468	Bevacizumab + Laser	0.8	241
2	M	48	R	0.6	321	Bevacizumab + Laser	0.8	160
3	M	36	L		705	Bevacizumab	1	169
4	M	43	L	1	360	Bevacizumab	1	315
5	M	35	L	0.4	632	Bevacizumab + Laser	1	188
6	M	38	L		324	Bevacizumab	0.5	152
7	M	25	R	1	312	Bevacizumab	1	164
8	M	42	R	0.5	308	Bevacizumab + Laser	0.6	208
9	M	42	L	1	454	Bevacizumab + Laser	0.8	192

Table 1: *Data Of Patients.*

VA pre: Best corrected visual acuity before treatment; OCT pre: Macular thickness in microns measured by OCT before treatment; VA post: Best corrected visual acuity after treatment; OCT post: Macular thickness in microns measured by OCT after to treatment.

VA Pre	VA Post
1	0.8
0.6	0.8
NO DATA	1
1	1
0.4	1
NO DATA	0.5
1	1
0.5	0.6
1	0.8

Table 2: *Best Corrected Visual Acuity Before and After Treatment.*

VA pre: Best corrected visual acuity before treatment; VA post: Best corrected visual acuity after treatment.

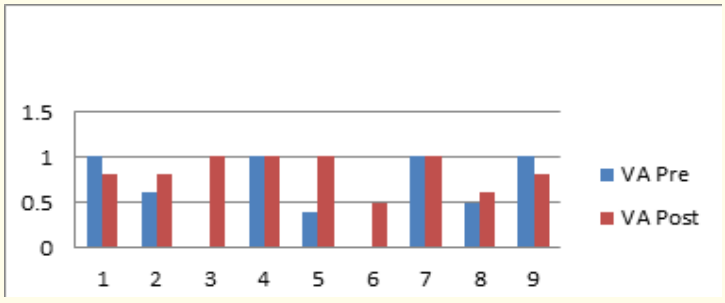

Figure 1: *Best Corrected Visual Acuity Before and After Treatment.*

Average VA Pre	0.78
Average VA Post	0.83
Difference	0.05

Table 3: *Comparison of Average Best Corrected Visual Acuity Before and After Treatment.*

Average VA Pre: Average best corrected visual acuity before treatment; Average VA Post: Average best corrected visual acuity after treatment; Difference: Difference between Average VA Pre and Average VA Post.

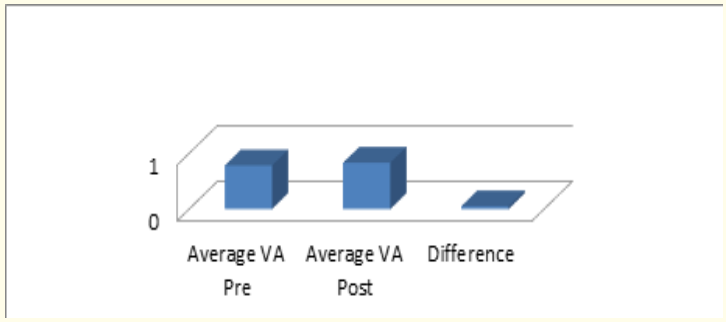

Figure 2: *Comparison of Average Best Corrected Visual Acuity Before and After Treatment.*

OCT Pre	OCT Post
468	241
321	160
705	169
360	315
632	188
324	152
312	164
308	208
454	192

Table 4: *Macular Thickness Before and After Treatment.*

OCT pre: Macular thickness in microns measured by OCT before treatment; OCT post: Macular thickness in microns measured by OCT after to treatment.

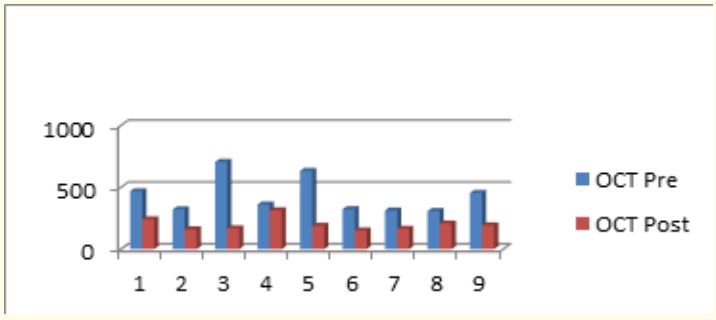

Figure 3: *Macular Thickness Before and After Treatment.*

Average OCT Pre	431.55
Average OCT Post	198.77
Difference	232.78

Table 5: *Comparison of Average Macular Thickness Before and After Treatment.*

Average OCT Pre: Average macular thickness in microns measured by OCT before treatment; Average OCT Post: Average macular thickness in microns measured by OCT after treatment; Difference: Difference between Average OCT Pre and Average OCT Post.

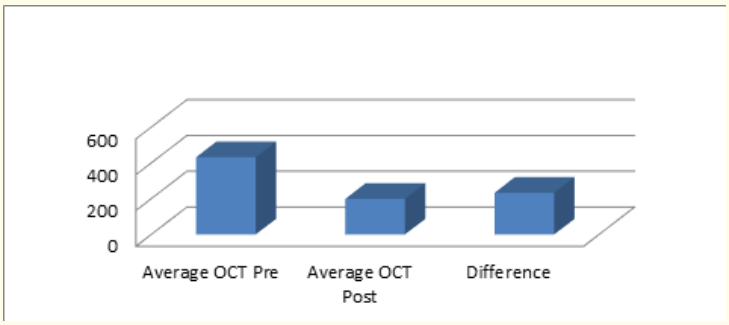

Figure 4: *Comparison of Average Macular Thickness Before and After Treatment.*

	Eyes	Percentage
Bevacizumab	4	44%
Bevacizumab and laser	5	56%

Table 6: *Treatment.*

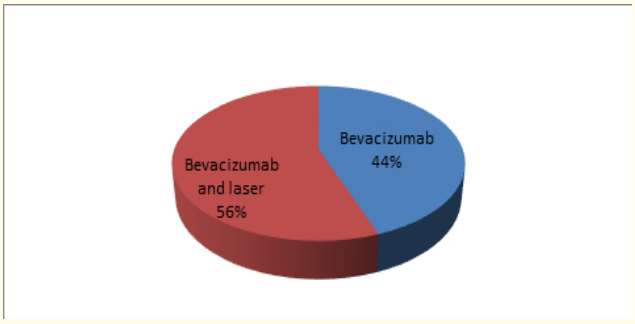

Figure 5: *Treatment.*

Treatment	Average OCT Pre	Average OCT Post	Difference
Bevacizumab	425.25	200	225.25
Bevacizumab and laser	436.6	197.8	238.8

Table 7: *Comparison of Average Macular Thickness Before and After Treatment with Bevacizumab or Bevacizumab and Laser.*

Average OCT Pre: Average macular thickness in microns measured by OCT before treatment;

Average OCT Post: Average macular thickness in microns measured by OCT after treatment; Difference: Difference between Average OCT Pre and Average OCT Post.

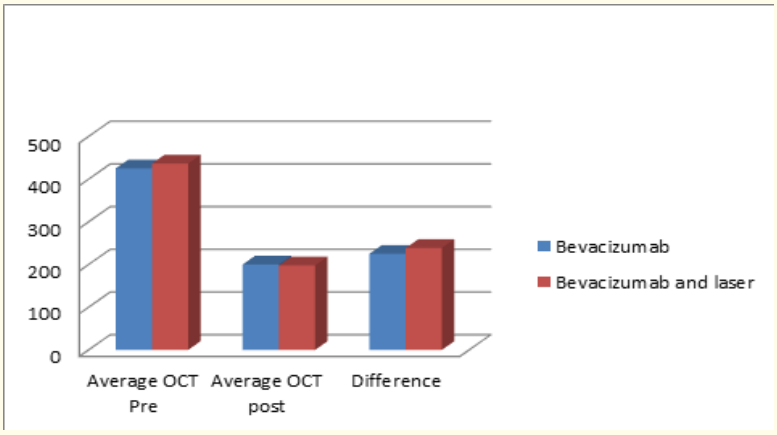

Figure 6: *Comparison of Average Macular Thickness Before and After Treatment with Bevacizumab or Bevacizumab and Laser.*

Detachment	Eyes
Neurosensory	6
Neurosensory + RPE	2
RPE	1

Table 8: *Types of Detachment.*

RPE: Retinal Pigment Epithelium

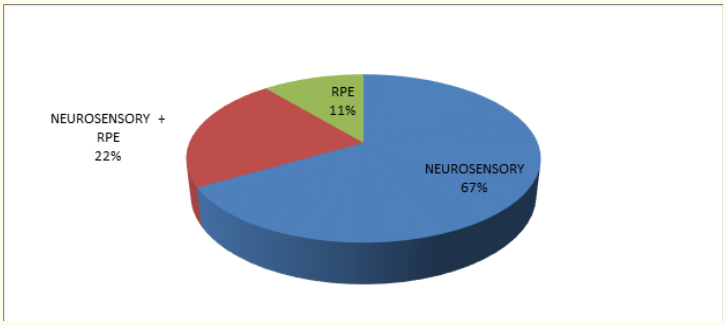

Figure 7: *Types of Detachment.*

	Eyes	Percentage
Complete	7	78%
Incomplete	2	22%

Table 9: *Resolution.*

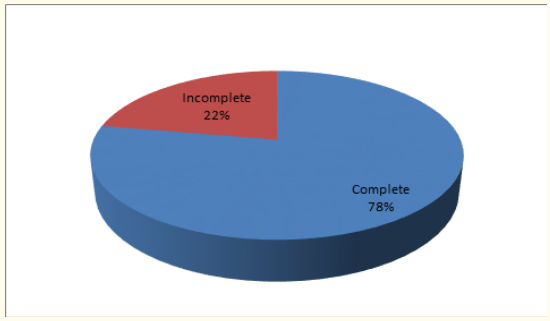

Figure 8: *Resolution.*

Discussion

Central serous chorioretinopathy is an idiopathic disease characterized by neurosensory detachment, although it can be associated with retinal pigment epitelium detachment (Figure 9a). In our series of cases, 6 eyes had only neurosensory detachment, 2 eyes had association of neurosensory detachment and RPE detachment and 1 eye had only RPE detachment.

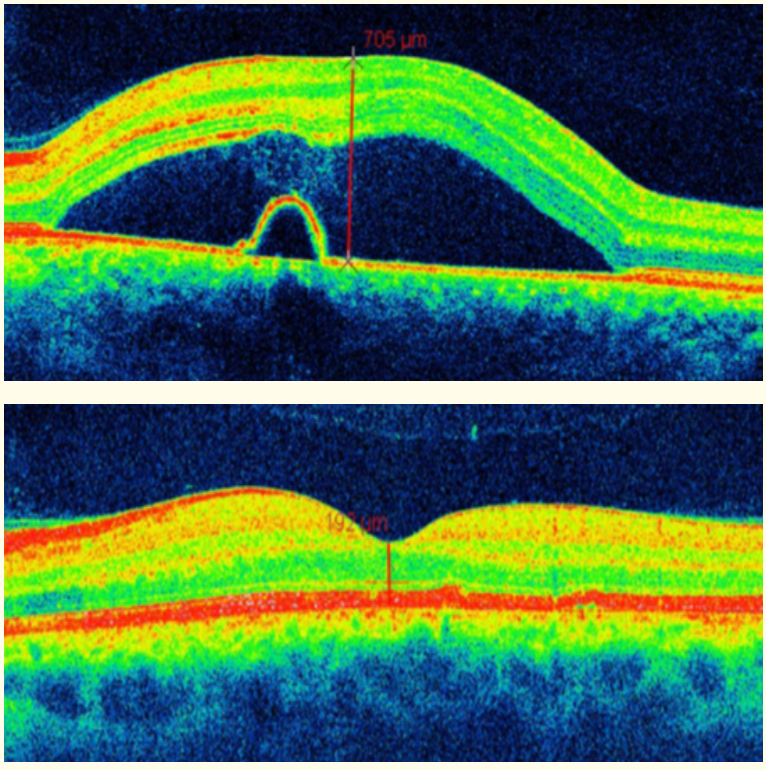

Figure 9: *Male Patient, 36 Years Old, Diagnosed with Acute Central Serous Chorioretinopathy In the Left Eye. No Data of Visual Acuity Prior To Treatment. OCT of The Macula Is Performed, Neurosensory Detachment Associated with RPE Detachment Is Found. Macular Thickness Of 705 Microns (1a) At Center of The Fovea Is Measured. The Patient Receives Intravitreal Injection of Bevacizumab as Treatment. 30 Days After Treatment BCVA Is 1.0 And Macular Thickness by OCT Is 169 Microns (1b) With Complete Resolution of Neurosensory And RPE Detachments.*

89% of our patients were between 25 - 55 years old, coinciding with the findings in the various bibliographies consulted.

In our series of 9 eyes, 7 of them had data of BCVA before treatment, and only 2 of them had a visual acuity less than 20/30 during the first consultation coinciding with the information provided by the American Academy of Ophthalmology.

Treatment guidelines for acute central serous chorioretinopathy show, as first option, the observation for 3-6 months, in which there is spontaneous resolution. If fluorescein angiography shows the leakage point, it is advisable to perform laser photocoagulation because it can lead to a faster remission, as long as this point is not in the fovea. Another therapeutic option is bevacizumab, a monoclonal antibody that binds to vascular endothelial growth factor (VEGF) neutralizing its biological action of vasculogenesis and angiogenesis. In central serous chorioretinopathy VEGF is suppose to act reducing vascular hyperpermeability found at choroid level. In our series of cases decrease in macular thickness in microns by OCT was found in 100% of patients whether treatment was done as intravitreal injection of bevacizumab alone or intravitreal injection and focal laser. After treatment, if was also found improvement, maintenance and, in 2 patients, decrease in best corrected visual acuity. This decrease in visual acuity in the literature is attributed to a possible atrophy or scarring (Figure 10b) of the affected area that cannot be appreciated clinically or by OCT.

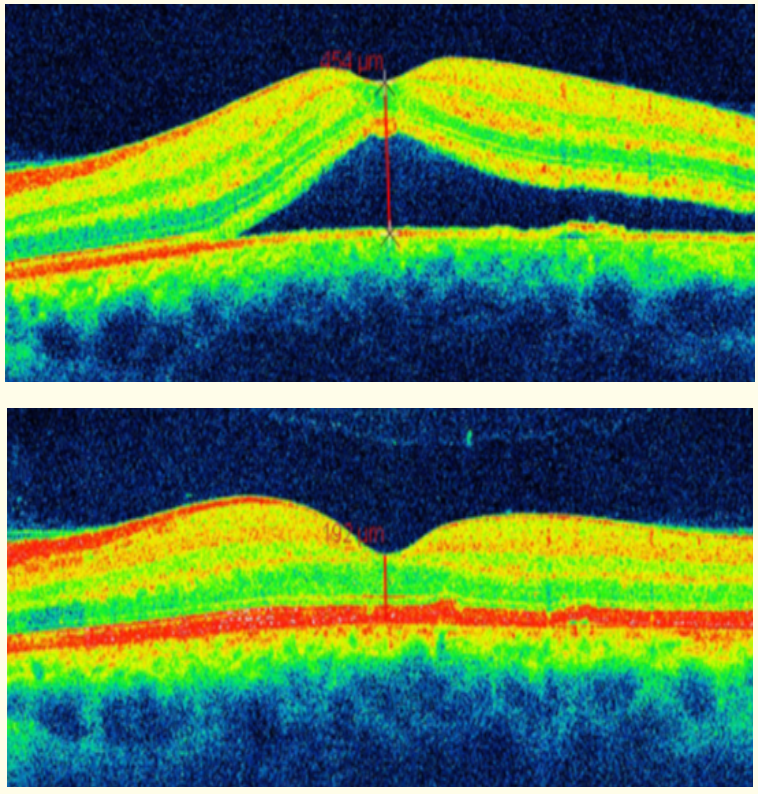

Figure 10: *Male Patient, 42 Years Old, Diagnosed with Acute Central Serous Chorioretinopathy In the Left Eye, Presenting A BCVA of 1.0. OCT of The Macula Is Performed, It Shows Neurosensory Detachment with A Macular Thickness at The Center of The Fovea Of 453 Microns (2a). The Patient Receives an Intravitreal Injection of Bevacizumab and Focal Laser as Treatment. 45 Days After Treatment BCVA Is 0.8, Being Less Than Found Before Treatment. A Control OCT Demonstrates Complete Resolution of Neurosensory Detachment Presenting A Macular Thickness Of 192 Microns (2b) With Some Degree Of Scarring At The Level Of RPE Which Was Not Observable Clinically And Which May Justify Lowering Of VA Despite Full Resolution.*

In the literature, some authors question whether the use of these treatments in acute cases is justified or whether it should be left for chronic cases. Given the shortening of the process of resolution of the detachment, in our opinion, it is justified to treat acute cases because it can reduce the risk of damage to RPE and visual repercussion by reducing the time of separation between the neurosensory retina and RPE. Furthermore, it has been proven that using focal laser, when is indicated, decreases the chance of subsequent recurrences, which is also beneficial for the patient. In our series of cases, the maximum time for complete resolution was 68 days post treatment, thus, justifying it. Also, due to the age of the patients, considering that they are productive people, they need to recover visual function as soon as possible to return to their activities normally.

Conclusions

Treatments with intravitreal bevacizumab or intravitreal bevacizumab and laser achieve a significant decrease in Macular thickness in acute central serous chorioretinopathy and maintenance or increase in BCVA, in most cases, as long as the patient is well evaluated and treatment is properly indicated. BCVA is not directly related with macular thickness.

This study is limited by the lack of control group and the number of patients, so it is recommended to take this into account for further studies.

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