

Characteristics of acute central serous chorioretinopathy on optical coherence tomography — a retrospective study

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Abstract

Central Serous Chorioretinopathy is a common chorioretinal disease which is characterized by serous detachment of the neurosensory retina from the Retinal Pigment Epithelium (RPE) in the macular area. The purpose of this study was to find out the characteristics of acute central serous chorioretinopathy on optical coherence tomography. This study was conducted at Lahore General Hospital and Yaqin Vision from January 2016 to June 2018. The retrospective analysis of all optical coherence tomography scans of 50 patients with acute central serous chorioretinopathy was done. Patients having wet macular degeneration producing similar findings were excluded. Each optical coherence tomography scan was carefully studied using the line scan, radial scan and 3-D scan. Central foveal thickness, foveal contour, status of ellipsoid layer, retinal pigment epithelium and Sub-retinal fluid was analyzed by a single observer.

Out of total 50 patients, 37 were males and 13 were females. Serous macular detachment was observed in all the patients, pigment epithelial detachment was found in 13 patients, brush border pattern was present in 31 patients, retinal pigment epithelium bulge was found in 36 patients, dipping pattern was identified in 9 patients and intra-retinal hyper-reflective dots was observed in 3 patients. Hence, optical coherence tomography may be helpful in diagnosing the characteristics of central serous chorioretinopathy and understanding the mechanisms of the disease.

Keywords: Central Serous Chorioretinopathy, Optical Coherence Tomography, Pigment epithelial detachment.

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Introduction

Central Serous Chorioretinopathy (CSCR) is a common chorioretinal disease which is characterized by serous detachment of the neurosensory retina from the Retinal

Pigment Epithelium (RPE) in the macular area. It is a benign and self-resolving disease with a recurrence rate of 30%. It has a male preponderance and usually occurs in the age group of 20 to 50 years.¹⁻³ The etiopathogenesis of the disease is yet to be fully determined. It has been considered that pachychoroid (increased choroidal thickness), defect in RPE or choroidal ischaemia may have a causative role. Risk factors of CSCR include male gender predominance, psychological stress, Type-A personality, smoking, systemic steroid intake, hypertension and pregnancy.^{4,5}

Swept source optical coherence tomography (OCT) has been shown to be an accurate and non-invasive imaging modality for diagnosis and follow up of various macular diseases including CSCR. OCT is a very helpful tool for studying the progression of disease over time.⁶⁻⁸ This tool shows a detailed histological picture of the retina enabling the researchers to find certain characteristic features seen in CSCR. This helps us to differentiate patients with other pathologies from CSCR.

Many studies have been published that focus on risk factors, pathogenesis and treatment modalities in CSCR. But no local study has been done to find out the characteristics of CSCR using OCT in the population. So, the purpose of the study was to evaluate the characteristics and demographic profiles of patients diagnosed with CSCR.

Methods

This was a retrospective study conducted at Lahore General Hospital and Yaqin Vision from January 2016 to June 2018, after taking approval from ethical review committee of Lahore General Hospital. The study was designed in accordance to the Helsinki Declaration. However it was a retrospective data based study so no formal sample size was calculated. Total of 50 patients of aged 30-80 years of either gender with diagnosis of acute CSCR on OCT were included in the study using convenience sampling technique. CSCR was defined as the accumulation of serous fluid between the outer segments of the photoreceptor layer, the RPE, and serous macular detachment (SMD) of the neurosensory retina which resolves without any intervention within 6 months

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of symptomatic disease. Patients having wet macular degeneration producing similar findings were excluded. Patients with media opacities leading to subpar scans, diabetic retinopathy and choroidal neovascularization or images of patients with low quality and low signal strength were also excluded.

OCT examinations were performed using 3-D OCT-1 Maestro swept source OCT. During examination the macula was scanned using line scan and radial scan to evaluate horizontal, vertical and oblique planes. The images that were acquired were evaluated by the same vitreoretinal consultant.

The statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) version 23 which included descriptive statistics for demographic data and clinical findings. The chi-square test was used to compare the characteristics of CSRS with respect to gender and age. P-value less than and equal to 0.05 was considered as statistically significant.

Results

In the present study, the mean age of the patients was calculated as 42.82 ± 7.49 years. Majority of the cases were males (74%) and 13 were females (Table-1).

Serous macular detachment was observed in all 100% of

Table-1: Demographic data.

Variables	n (%)
Age (years)	
30-45	36 (72%)
46-60	6 (12%)
Above 60	8 (6%)
Mean $\pm$ SD	42.82 $\pm$ 7.49
Gender	
Male	37(74%)
Female	13(26%)

Table-2: Relationship of age and gender with oct features.

Variables	SMD	PED	Brush Border Pattern	RPE Bulging	Dipping	IHRD
Age Groups						
30-45 years	36(72%)	9(69.2%)	22(71%)	27(75%)	5(55.6%)	3(100%)
46-60 years	6(12%)	2(15.4%)	3(9.7%)	3(8.3%)	0	0
>60 years	8(16%)	2(15.4%)	6(19.4%)	6(16.7%)	4(44.4%)	0
P-value	N/A	0.909	0.621	0.441	0.026	0.538
Gender						
Male	37(74%)	11(84.6%)	23(74.2%)	28(77.8%)	6(66.7%)	3(100%)
Female	13(26%)	2(15.4%)	8(25.8%)	8(22.2%)	3(33.3%)	0
P-value	N/A	0.518	0.998	0.329	0.581	0.704

SMD: Serous Macular Detachment, PED: Pigment Epithelium Detachment, RPE: Retinal Pigment Epithelium, IHRD: Intra-retinal hyper-reflective dots.

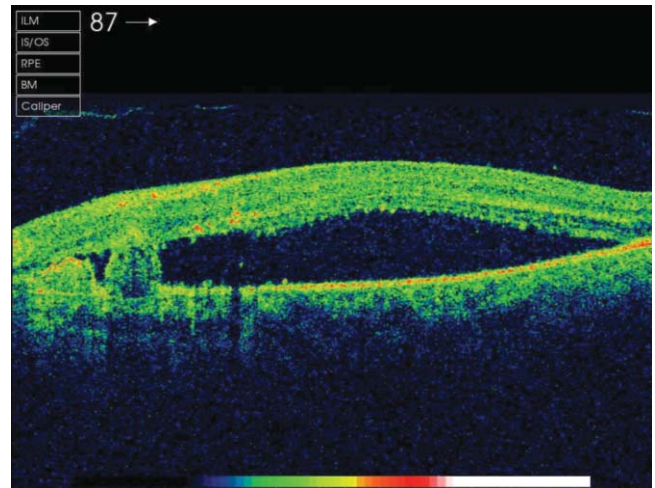


Figure-1: OCT showing Brush border pattern and RPE bulge.

the patients, pigment epithelial detachment (PED) was found in 13 (26%) patients, brush border pattern was found in 31 (62%) patients, retinal pigment epithelium bulge was found in 36 (72%) patients, dipping pattern was identified in 9 (18%) patients and intra-retinal hyper-reflective dots (IHRD) was observed in 3 patients only (6%) (Figure-1).

OCT findings among patients with age range of 30-45 years revealed that SMD was present in 36 (72%) patients, PED was seen in 9 (69.2%) cases, and brush border was seen in 22 (71%) patients, RPE bulging in 27 (75%) patients, dipping was seen in 5 (55.6%) patients and IHRD in only 3 (100%) patients. OCT findings among age group of 46-60 years showed that SMD was present in 6 (12%) patients, PED was seen in 2 (15.4%) cases, brush border pattern was seen in 3 (9.7%) patients, RPE bulging in 3 (8.3%) patients. OCT findings among patients with age above 60 years showed that SMD was present in 8 (16%) patients, PED was seen in 2 (15.4%) cases, brush border and RPE bulging were seen in 6 patients each, dipping in

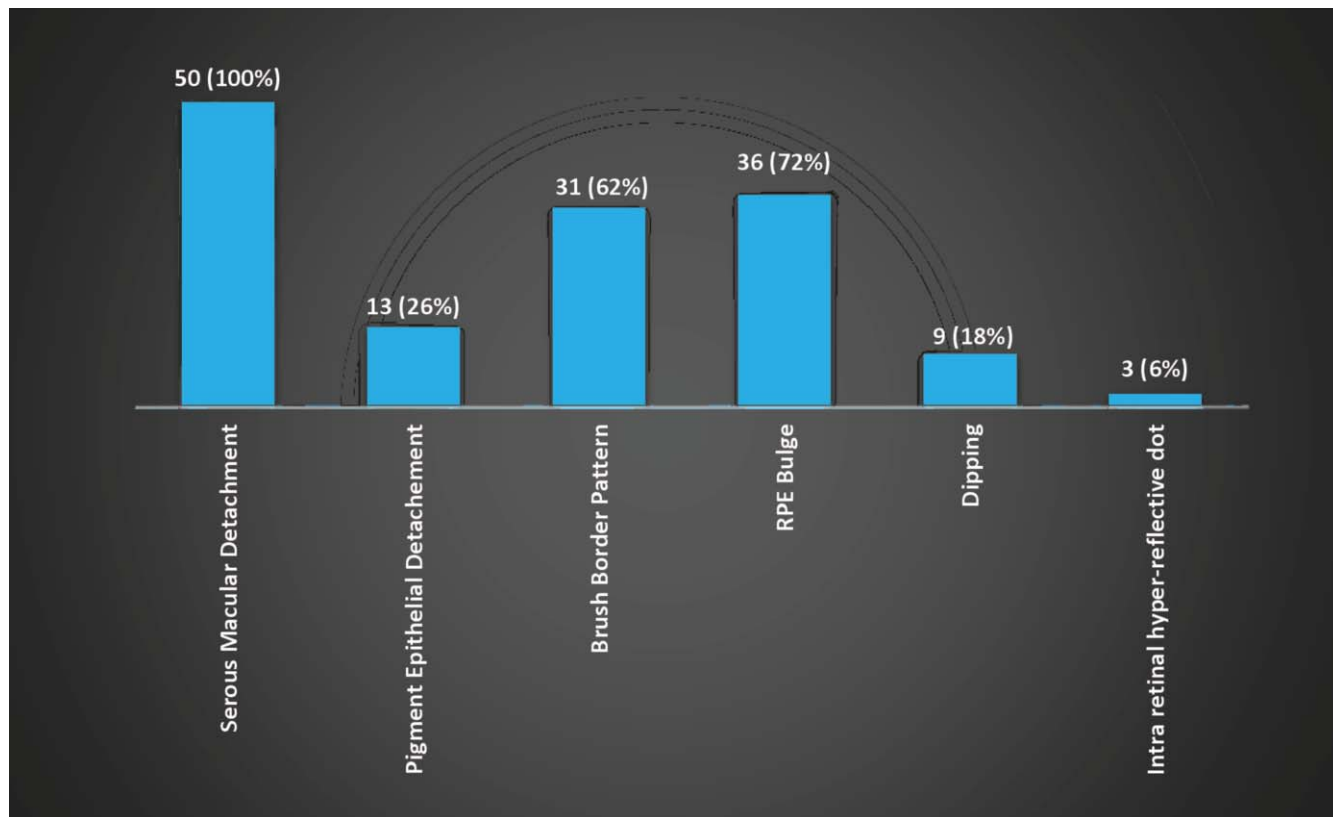


Figure-1: Characteristics of CSCR.

4 (44.4%) patients. OCT findings among males revealed that there was SMD present in 37 (74%) patients, PED was seen in 11 (84.6%) cases, brush border was seen in 23 (74.2%) patients, RPE bulging in 28 (77.8%) patients, dipping was seen in 6 (66.7%) patients and IHRD in 3 (100%) patients. OCT findings in females with CSCR revealed that SMD was present in 13 (26%) patients, PED was found in 2 (15.4%) patients, brush border pattern and RPE bulge was present in 8 patients each. Dipping was found in 3 (33.3%) patients. IHRD was not present in any female patient (Table-2).

Discussion

The role of OCT as a non-invasive way of studying the retina is well known. The OCT can show detailed findings such as sub-retinal fluid, hyper-reflective and small PEDs in the cases of CSCR. Numerous research articles have been published describing OCT findings in patients with CSCR.⁷⁻⁹ In our study, SMD is present in all cases (100%), followed by RPE bulge (72%), brush border pattern (62%), PED (26%), dipping (18%) and IHRD only 6%. In a recent comprehensive review article by Daruich et al. presented the frequencies of these OCT findings in acute CSCR as follows, SMD 100%, RPE bulge 19 to 68%, PED 32 to 71%,

sub-retinal hyper reflective dots (SHRD) 20.3 to 52%, dipping 13 to 43%, brush border 65 to 82%, and IHRD 11 to 21%.^{2,9-11} However SHRD was not shown in any of the cases in our study.

Kim HC et al.¹⁰ in his retrospective study enrolled 63 eyes of 63 patients with unilateral acute CSCR showed that average age of the patients was 44.7 ± 8.4 years. In another similar study by Daruich A et al.,² the mean age of patients was reported as 40 ± 8.9 years. In our study the mean age of the patients was 42.82 ± 7.49 years which is almost similar to previous studies. Majority of the patients of age 28-68 years presented with CSCR.¹² In a study conducted by Spaide RF et al.¹³ showed that RPE loss was common among the age >50 years as compared to patients with age <50 years (28.4%). In our study the SMD was frequent followed by RPE bulging among the age group of 30-45 years as compared to patients with age >45 years.

Fundus Angiography (FA) and OCT studies show that PED and RPE bulge are both consistent with leakage points in the retina. Hirami et al.¹⁴ reported that RPE bulge was present in patients and these were located in areas of hyper permeability. Montero et al.¹⁵ reported that hyper

reflective RPE bulge was present in 90% of the cases and they were related to leaky spots in FA. Our study showed that RPE bulge was present in 22.2% females and 77.8% males and that is consistent with findings of previous studies.^{9,11,14,16,17}

Hyper reflective dots (HRD), a new finding, previously unseen in OCT was demonstrated first by Coscas et al.⁶ The HRDs are scattered, punctiform, small in size and mainly located intraretinally or at the inner region of the detached retina. Although pathology of HRD is not very clear, they may be caused by focal accumulation of pigment or lipofuscin granules, exudates, deposits, extravasation due to breakdown of blood retinal barrier. It has been also suggested that HRD might be a marker of the inflammatory response or the breakdown of blood retinal barrier.¹⁸ In our study IHRD was found only in 3 of the male patients and no such finding was seen in the female group. While SHRD was neither found in the males or the female patient groups.

Dipping pattern may be observed in some acute patients with CSCR. It is caused by the accumulation of subretinal fibrin or fibrinous exudate. In our study dipping pattern was seen in 66.7% male and 33.3% females.

Brush border pattern is due to the accumulation of waste products of photoreceptors, which are usually removed by RPE via phagocytosis, however in CSCR due to serous macular detachment, loss of contact between the neurosensory retina and RPE causes the waste products to accumulate and cause the bulging of the detached neurosensory retina. It is the most common OCT finding in patients with CSCR after SMD and this is also shown in our study; as 77.8% males and 22.2% of the female patients showed this finding.'

Conclusion

OCT may be helpful in diagnosing the characteristics of CSCR and understanding the mechanisms of the disease. Limitation of our study was the small sample size due to the rarity of the disease. More data needs to be collected to find the generalizability of these findings in the population.

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Conflict of Interest: None to declare.

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References

1. Karanfil FÇ, Turgut B. Comparison of optical coherence tomography findings in males and females with acute central serous chorioretinopathy. *New Front Ophthalmol.* 2017; 3:1-4.
2. Daruich A, Matet A, Dirani A, Bousquet E, Zhao M, Farman N, et al. Central serous chorioretinopathy: recent findings and new physiopathology hypothesis. *Prog Retin Eye Res.* 2015; 48:82-118.
3. Liegl R, Ulbig MW. Central serous chorioretinopathy. *Ophthalmol.* 2014; 232:65-76.
4. Islam QU, Hanif MK, Tareen S. Frequency of systemic risk factors in central serous chorioretinopathy. *J Coll Phys Surg Pak.* 2016; 26:692-5.
5. Nicholson B, Noble J, Forooghian F, Meyerle C. Central serous chorioretinopathy: update on pathophysiology and treatment. *Surv Ophthalmol.* 2013; 58:103-26.
6. Coscas G, De Benedetto U, Coscas F, Calzi CIL, Vismara S, Roudot-Thoraval F, et al. Hyperreflective dots: a new spectral-domain optical coherence tomography entity for follow-up and prognosis in exudative age-related macular degeneration. *Ophthalmologica.* 2013; 229:32-7.
7. Costanzo E, Cohen SY, Miere A, Querques G, Capuano V, Semoun O, et al. Optical Coherence Tomography Angiography in Central Serous Chorioretinopathy. *J Ophthalmology.* 2015; 2015:134783.
8. Lehmann M, Wolff B, Vasseur V, Martinet V, Manasseh N, Sahel JA, et al. Retinal and choroidal changes observed with 'En face' enhanced-depth imaging OCT in central serous chorioretinopathy. *Br J Ophthalmol.* 2013; 97:1181-6.
9. He S, Wang W, Li X, Tang R. Optical coherence tomography features of central exudative chorioretinopathy. *Zhonghua Yan Ke Za Zhi.* 2003; 39:669-72.
10. Kim HC, Cho WB, Chung H. Morphologic changes in acute central serous chorioretinopathy using spectral domain optical coherence tomography. *Korean J Ophthalmol.* 2012; 26:347-54.
11. TURGUT B, ERGEN İ. Santral Seröz Koryoretinopatinin Optik Koherens Tomografik Paternleri. *Firat Tıp Dergisi.* 2013; 18: 39-43.
12. Manayath GJ, Ranjan R, Shah VS, Karandikar SS, Saravanan VR, Narendran V. Central serous chorioretinopathy: Current update on pathophysiology and multimodal imaging. *Oman J Ophthalmol.* 2018; 11:103-12.
13. Spaide RF, Campeas L, Haas A, Yannuzzi LA, Fisher YL, Guyer DR, et al. Central serous chorioretinopathy in younger and older adults. *Ophthalmology.* 1996; 103:2070-9.
14. Hiram Y, Tsujikawa A, Sasahara M, Gotoh N, Tamura H, Otani A, et al. Alterations of retinal pigment epithelium in central serous chorioretinopathy. *Clin Exp Ophthalmol.* 2007; 35:225-30.
15. Montero JA, Ruiz-Moreno JM. Optical coherence tomography characterisation of idiopathic central serous chorioretinopathy. *Br J Ophthalmol.* 2005; 89:562-4.
16. Matsumoto H, Kishi S, Otani T, Sato T. Elongation of photoreceptor outer segment in central serous chorioretinopathy. *Am J Ophthalmol.* 2008; 145:162-8.
17. Turgut B, Demir T. The new landmarks, findings and signs in optical coherence tomography. *New Front Ophthalmol.* 2016; 2:131-6.
18. Turgut B, Yildirim H. The causes of hyperreflective dots in optical coherence tomography excluding diabetic macular edema and retinal venous occlusion. *Open Ophthalmol J.* 2015; 9:36-40.