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Original Research Article

Observation of the different patterns of Central Serous Chorioretinopathy (CSCR) on Fundus Fluorescein Angiography (FFA)

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Abstract

Present study was done to observe the different patterns of central serous chorioretinopathy (CSCR) on fundus fluorescein angiography (FFA).This prospective study was conducted on 56 eyes of 54 patients attending the outpatient department of a tertiary care centre in North India. All those cases which were diagnosed clinically as having central serous chorioretinopathy (CSCR) were taken up for fundus fluorescein angiography (FFA) to observe the angiographic pattern , which revealed a total of 65 leakage points, seen as hyperfluorescent spots. These spots assumed a characteristic shape and were accordingly classified as ink-blot or smoke-stack type. In present study, ink-blot pattern was seen in 57 (87.69%) and smoke-stack pattern was seen in 8 (12.31%) out of total 65 leakage points. Thus, ink-blot pattern appeared 8 times more frequent than smoke-stack pattern on fundus fluorescein angiography.

Keywords: Central serous chorioretinopathy, fundus fluorescein angiography, ink blot pattern, smoke stack pattern.

1. Introduction

Central serous chorioretinopathy is characterized by an accumulation of transparent fluid at the posterior pole of the fundus, causing a circumscribed area of retinal detachment at the posterior pole. Fundus fluorescein angiography (FFA) demonstrates that the fluid accumulating under the neurosensory retina originates from the choriocapillaries and reaches the sub-retinal spaces through a defect in the retinal pigment epithelium i.e. leakage point.

Various theories have been put forward to explain the mechanism of central serous chorioretinopathy**.** The origin of fluid is from the choroid which then seeps under the neurosensory retina [1]. The pigment epithelium is not in a position to reabsorb the fluid back; as a result the fluid accumulates below the neurosensory retina**.** Central serous chorioretinopathy commonly occurs in young adults, mostly men, between 20 to 50 years [1]. By definition, it is an idiopathic disease, however, its incidence is said to be more in type-A personalities, patients having psychological distress [2] and with corticosteroids intake [3]. Few authors have also reported infection with Helicobacter pylori as a risk factor for CSCR [4]. Common symptoms of central serous chorioretinopathy are diminished or blurred vision with distortions including metamorphopsia, micropsia, scotomas, chromatopsia and prolonged after-images. The visual acuity, somewhat improvable with mild hyperopic correction, is usually reduced to between 20/30 and 20/60 but can decline to worse than 20/200 in severe or recurrent disease. Superior field defects can occur in patients with inferior detachments from gravitating fluid. Younger central serous chorioretinopathy patients usually have unilateral involvement, while older patients are more likely to have bilateral involvement [5]. Patients with central serous chorioretinopathy can be asymptomatic if the detachment does not involve the central point of fovea.

The diagnosis is made ophthalmoscopically or upon examination with a fundus contact/non-contact lens. These techniques reveal a transparent blister at the posterior pole. The normal light reflex at the foveal edge is usually absent and replaced by a reflex marking the limits of the elevated area. The diagnosis is confirmed by FFA. Typically one or more leakage points can be identified, through which fluorescein dye enters into the blister and stains its contents.

As FFA is an important diagnostic modality to differentiate central serous chorioretinopathy (CSCR) from other similar macular conditions, we conducted this study to confirm the clinical diagnosis of central serous chorioretinopathy and to observe the pattern of fluorescein leakage on angiography.

2. Material and methods

This prospective study was conducted on 56 eyes of 54 patients attending outpatient department of a tertiary care hospital in North India. Patients included in the study, were of all ages and of either sex, presenting with a history of blurred vision, metamorphopsia, positive central scotoma and a demonstrable ring reflex on ophthalmoscopy. Patients with hazy media or impaired visualization of fundus, patients suffering from diabetic retinopathy, any other macular pathology or any vascular occlusive disease affecting macula, patients with uncontrolled hypertension, patients with previous history of hypersensitivity to fluorescein were excluded from the study.

Patients fulfilling the inclusion criteria underwent a comprehensive systemic and ocular examination including visual acuity, diffuse torch light examination with special reference to pupillary reactions, slit lamp examination, measurement of intraocular pressure (IOP) using a Goldman applanation tonometer/ non-contact tonometer (NCT), direct ophthalmoscopic examination after fully dilating the pupil using 0.8% tropicamide + 5% phenylephrine drops, slit lamp biomicroscopic examination using a fundus non-contact lens (+90D). Patients with positive fundus findings were subjected to fundus fluorescein angiography by fundus camera (Topcon TRC 50DX).

2.1 Fundus Fluorescein Angiography

An informed consent was taken by all patients before undergoing fundus fluorescein angiography. Pupils were dilated using 0.8% tropicamide + 5% phenylephrine eye drops. A test dose of 0.05 ml sodium fluorescein dye was injected intra-dermally in the forearm and patient was observed for any adverse reactions for 20-30 minutes. Color and red-free fundus photographs were taken with fundus camera before injecting the dye (Fig 1). If there were not any adverse reactions of the test dose, 3 ml of 20% sodium fluorescein was injected as bolus at a rate of 1 ml/sec into the anti-cubital vein. Serial photographs were taken for up to 3 minutes and then after 5 minutes and 10 minutes.

The angiographic findings were recorded with regard to laterality, number, site and shape of leak and were classified and analyzed. Analysis of the observed data was done at the end of the study.

Figure 1: Color fundus photograph showing ring reflex in the macular area

2.2 Statistical Analysis

Data was expressed as tables, graphics and percentages.

3. Results

A total of 56 eyes of 54 patients were studied and analyzed. Forty five out of 54 (83.33%) patients presented with the disease were between the ages of 20 and 40 years. Patients presenting with the disease younger than 20 years were 5 (9.26%) and above 40 years were 4 (7.41%). The youngest and the oldest patient in our study were 19 and 43 years old, respectively. The mean age of presentation was 29.65 years as shown in table 1.

Table 1: Age-wise distribution of CSCR:

Age groups	No. of patients	Percentage
< 21 years	05	9.26
21-30 years	24	44.44
31-40 years	21	38.89
>40 years	04	7.41
Total	54	100

In our study, 52 out of 54 patients presented with the disease were males (96.3%) and 2 were females (3.7%), the male to female ratio was 26:1 as shown in table 2.

Table 2: Sex-wise distribution of CSCR

Sex	No. of patients	Percentage
Males	52	96.3
Females	2	3.7
Total	54	100

In our study, 52 out of 54 patients (96.3 %) presenting with CSCR had unilateral involvement. Only 2 (3.7 %) presented with bilateral disease. (Table 3)

Table 3: Laterality in CSCR

Laterality	No. of patients	Percentage
Unilateral	52	96.3
Bilateral	02	3.7
Total	54	100

The most common complaints of patients presenting with the disease were diminution / blurring of vision in 54 out of 56 cases (96.43%) and central scotoma in 38 (67.86 %); 16 cases also complained of metamorphopsia (28.57 %) and eyeache /headache (28.57 %) whereas only 3 cases (5.36 %) complained of micropsia. Most of the patients had more than one presenting complaints. (Table 4)

Table 4: Presenting complaints:

Complaint	No. of patients	%
Diminution / Blurring of Vision	54	96.43
Scotoma	38	67.86
Metamorphopsia	16	28.57
Micropsia	03	5.36
Eyeache / Headache	16	28.57

In our study, 34 out of 56 cases (60.71%) were having visual acuity at presentation between 6/9 and 6/12; 13 had visual acuity between 6/18 and 6/24 (23.21%) and 4 (7.15%) had visual acuity at presentation6/36 or less. 5 out of 56 cases (8.93%) had visual acuity 6/6 or 6/6p. Therefore, visual acuity of most of the patients presenting with central

serous chorioretinopathy (CSCR) was in the range of 6/9 to 6/12 (61.71%) in our study.(Table 5)

Table 5: Visual acuity at presentation:

Visual Acuity	No. of patients	Percentage
6/6 or 6/6p	05	8.93
6/9 or 6/9p	18	32.14
6/12 or 6/12p	16	28.57
6/18 or 6/18p	07	12.5
6/24 or 6/24p	06	10.71
6/36 or 6/36p	03	5.36
6/60 and less	01	1.79
Total	56	100

3.1 Fundus fluorescein angiography

Fundus Fluorescein Angiography (FFA) was done in all the 56 eyes diagnosed clinically as having central serous chorioretinopathy (CSCR). This revealed a total of 65 leakage points, which were seen as hyperfluorescent spots. These spots assumed a characteristic shape and were accordingly classified as ink-blot or smoke-stack type. In our study, ink-blot pattern was seen in 57 (87.69%) and smoke-stack pattern was seen in 8 (12.31%) out of total 65 leakages spots. Thus ink-blot pattern appeared 8 times more frequent than smoke-stack pattern on fundus fluorescein angiography as shown in figures 2-4.

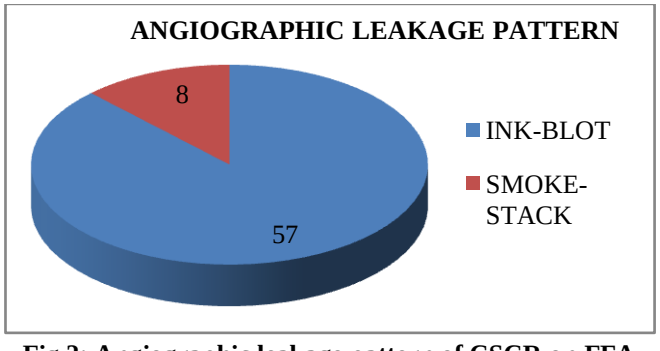

Fig 2: Angiographic leakage pattern of CSCR on FFA

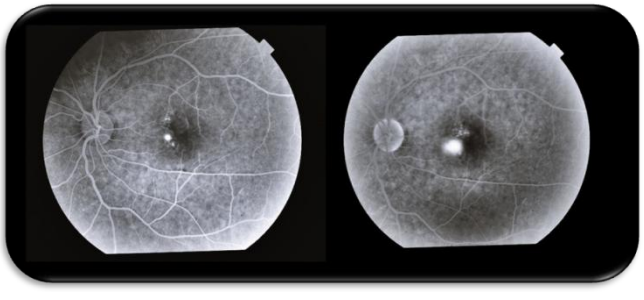

Fig 3: Ink-blot pattern of leakage on fluorescein angiogram

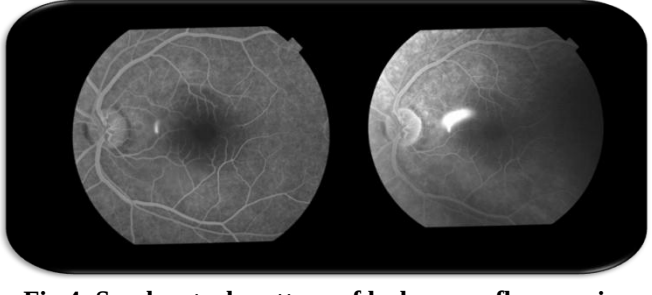

Fig 4: Smoke-stack pattern of leakage on fluorescein angiogram

In our study, 49 out of 56 eyes (87.5%) showed a single leakage point, 5 eyes (8.93%) showed double leaks and only 2 eyes (3.57%) showed 3 leaks each.

In our study, most of the leakage points i.e. 55 out of 65 (84.61 %) appeared in the perifoveal region.

4. Discussion

Present study was done to determine the angiographic pattern in patients of central serous chorioretinopathy. Patients who were clinically diagnosed as having central serous chorioretinopathy were taken up for fundus fluorescein angiography (FFA). The majority of patients in our study were males (52 out of 54) and the male to female ratio was 26:1. Forty five (45) out of 54 patients (83.33%) presented with the disease were between 20 and 40 years of age. Castro-Correia *et al* [6] studied the evolution of the retinal pigment epithelial lesions in the central serous retinopathy in 150 patients with ages between 20 and 49 years at the first examination, during periods varying between 6 months and 14 years. It was seen that the disease was predominantly found in males (83.3%). Thus the male preponderance was quite similar to that in our study. Fifty two (52) out of 54 patients (96.3 %) presenting with the disease had only unilateral involvement; only 2 (3.7 %) presented with bilateral disease. Siddiqui *et al* [7] conducted a hospital based descriptive study on 34 eyes of 30 patients of which 26 had unilateral presentation and 04 had bilateral disease. This study also showed higher prevalence of unilateral cases. Visual acuity of most of the patients presenting with central serous chorioretinopathy (CSCR) was in the range of 6/9 to 6/12 (61.71%) in our study. MirzaShafiq Ali Baig *et al* [8] also ascertained the role of fundus fluorescein angiography (FFA) in the diagnosis of central serous chorioretinopathy and reported various patterns of central serous chorioretinopathy on FFA. In their study, 33 patients were diagnosed as having central serous chorioretinopathy on the basis of careful history taking and thorough clinical examination; the visual acuity was 6/12 or better in 25 (75.75%) cases and 6/18 or less in 8 (24.25%) cases. Fundus Fluorescein Angiography (FFA) done in our study revealed a total of 65 leakage points, which were seen as hyperfluorescent spots. These spots assumed a characteristic shape and were accordingly classified as ink-blot or smoke-stack type. In ink-blot pattern, the leakage spot increased in size symmetrically to all sides, whereas in smoke-stack pattern, instead of spreading evenly to all directions, the dye first ascended and upon arrival at the upper limit of the blister, expanded laterally in a mushroom like or umbrella like fashion. Ink-blot pattern was seen in 87.69% (57 out of 65) whereas smoke-stack pattern was seen in 12.31% (8 out of 65) of the leakages, the former thus being 8 times more common than later. Mutlak and Dutton [9] studied a series of 69 patients angiographically identified as having central serous chorioretinopathy. Ink-blot lesion was seen in

87% of cases and smokestack in 13% of cases. The findings were quite similar to that in our study. Jamil *et al* also studied FFA characteristics in 86 eyes of 64 adult patients and reported ink block pattern in 72.1% of eyes; 42 (65.6%) cases had unilateral and 22 (34.4%) cases had bilateral involvement [10].

In our study, the quadrantic distribution of the leakage points was also characteristic. The supero-nasal quadrant was most frequently involved with 17 leakage points (26.15%) followed by supero-temporal with 15 leakage points (23.08%), infero-temporal with 13 leakage points (20 %) and infero-nasal quadrant with 10 leakage points (15.38%). 7 leakage points (10.77%) appeared in 1mm zone around the fovea i.e. parafoveal area, whereas only 3 (4.62%) leakage points appeared in the foveal region. Spitznas and Huke [11] also analyzed the location of leakage points in their study and found that these occurred most often in the supero-nasal quadrant (32.2%), followed by infero-nasal quadrant (21.2%), supero-temporal quadrant (19%) and infero-temporal quadrant (14.8%). In 25.4% of cases, the leakage points were located in the papillomacular bundle. The majority of points were within 1 mm zone around the fovea but less than 10% were found actually within the foveal area. In 11.8% of cases, leakage points were found in an area more than 3 mm from the foveal centre. In these cases they were most often found in the upper nasal quadrant. These authors also studied the location points in patients with a recurrence of central serous chorioretinopathy and found 62% of the new leakage points to be within 0.5 mm and 80% within l mm of the old leakage points. The locations of leakage spots of their study were quite similar to that in our study. Shahin *et al* analyzed fluorescein angiograms of 86 patients in an Egyptian population. The age range of patients was 24-49 years, with a mean of 38±6 years compared to 29.65 years in our study. Thirty five percent of patients had more than one point of leakage compared to 12.5% in our study. The macula was the most common site of fluorescein leakage seen in 79% of patients as seen in our study [12].

5. Conclusion

Ink-blot leakage pattern appeared more frequently than smoke-stack pattern on Fundus fluorescein angiography (FFA) in patients of Central serous chorioretinopathy. Single leak was seen in most of the cases and peri-foveal area was the site of predilection of leakage in majority of cases.

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