Central Serous Choroidopathy-An Overview

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Introduction

Central serous chorioretinopathy (CSCR) is a disease in which a serous detachment of the neurosensory retina occurs over an area of leakage from the choriocapillaris through the retinal pigment epithelium (RPE).It is usually unilateral, may be associated with pigment epithelial detachment (PED). The visual function is relatively preserved despite prolonged separation of neurosensory retina and retinal pigment epithelium.

History

Von graefe in 1866, first described the disease as recurrent serous retinitis. Further in 1955, Bennett termed it as "central serous retinopathy". In 1960's Maumenee and Gass studied FFA appearance of CSC and in 1967, Gass termed it as "central serous choroidopathy" 1,2,3,4

Types

1. Typical or Classic CSC - Seen in younger patients and causes an acute localized detachment of retina with mild to moderate loss of visual acuity associated with one or few focal leaks seen during FFA.
2. Chronic CSC or Diffuse retinal pigment epitheliopathy - Wide spread alteration of pigmentation of the RPE related to the chronic presence of shallow subretinal fluid.
3. Atypical CSC - Bullous retinal detachments usually located inferiorly.

According to duration, it can be classified as Acute or Chronic. Some authors have defined chronicity as persistent fluid for at least six months26 whereas recent clinical trials have referred chronicity as persistent fluid for three months27. The acute form can sometimes be recurrent, but it generally resolves spontaneously with minimal sequelae. Chronic CSC, however, can result in widespread RPE damage, sometimes referred to as diffuse retinal pigment epitheliopathy (DRPE), and sometimes as choroidal neovascularization(CNVM).

Pathogenesis

The layer of choriocapillaris- Bruch's membrane-RPE complex plays an important role in the pathogenesis. The widely fenestrated endothelium of the choriocapillaris allows leakage of small protein molecules and fluid into the intercellular space. But the RPE represents an impermeable barrier to the diffusion of fluid into the subretinal space. The RPE pump acts in a vitreous choriocapillaries direction to keep the subretinal space dry. The various theories to explain the pathogenesis are

I - RPE dysfunction theory

- *The intact RPE creates a barrier between the neurosensory retina and choroid.*
- *In areas of chorioretinal scar tissue, as occurs after inflammation or photocoagulation, the pigment epithelial diffusion barrier remains permanently destroyed.*
- *Choroidal capillaris exert a suction on the surrounding fluid.*
- *The intact RPE absorbs fluid in a retinochoroidal direction.*
- *Under certain condition, the function of the RPE is reversed, so it secretes in a chorioretinal direction.*

II- RPE damaged via immunologic infections circulatory and neuronal mechanism ?

RPE secretes ions in chorioretinal direction (towards retina) ?

Choroidal fluid gets attracted into this area ?

Strong flow disrupts the diffusion barrier in this area

Since the defective area is so small (in the RPE), only a tiny leakage point is visible during the earliest phase of FFA. Subsequently, there is rapid increase in fluorescein stained liquid in the subretinal blister during the following stages of angiography.

II Choroid dysfunction theory 5,6,7

Psychogenic, pregnancy, transplantation, type A,

raised cortisol levels ?

Adrenergic reaction causes damage to the choriocapillaries ?

Hyperpermeability of choriocapillaries ?

RPE cell degeneration ?

Secondary changes in RPE causes leaks ?

Serous retinal detachment

CLINICAL FEATURES

It affects young to middle aged individuals 20 - 45 years of age. Age tends to be higher in women. There is a male predominance with male to female ratio of 8 to 10:1.It commonly affects Whites, Hispanics, Asians and Japanese mostly. African- Americans are affected very less.

It is associated with various factors such as migraine like headache, Type A personality, hypochondrial behavior, hysteria, conversional neurosis, increased cortisol levels in patients with Cushing's disease and long term corticosteroid treatment in organ transplants and respiratory allergies8.

Symptoms

Small pigment epithelial detachments (PEDs) may be present in macular or para-macular area before the onset of symptoms. This is followed by detachment of the neurosensory retina in the surrounding area. If detachment is not involving the centre of macula, patient remains asymptomatic and detachment resolves spontaneously. If the neurosensory detachment involves the fovea, the various symptoms are metamorphopsia, micropsia, dyschromatopsia, central scotoma (relative), loss of contrast sensitivity, and hyperopia - corresponding to anterograde displacement of fovea.

Signs

Usually a small hyperopic correction can be improved by refraction. Anterior chamber (AC) and vitreous are normal. Fundus shows the following findings:

a) Serous Detachment - Round to oval well delineated shallow serous retinal detachment is present in the macula (Figure-1)

b) Serous Detachment of the RPE - One or more discrete yellow to grey, round to oval, well demarcated areas of detached RPE may be observed. These areas are often present under the superior half of the macular detachment when gravity forces the subretinal fluid (SRF) inferiorly. These detachments are often less than ¼ of disc diameter in size and have a grayish halo around them.

c) Subretinal precipitates - Multiple, variably sized yellow dot like precipitates probably caused by subretinal fluid turbidity may be noticed at the level of the RPE.

d) Extramacular atrophic points may be seen in recurrent CSR.

e) Multiple Bullous Subretinal and RPE detachments may be seen in atypical cases.

Figure 1

FFA(Fundus Fluorescein Angiography)

Types of leakages seen 9

Smoke stack pattern

It is seen in 7-20% cases of CSR. Also known as mushroom or umbrella configuration, The leakage first ascends superiorly and spreads laterally(Figure-2).

Ink blot pattern

It is more commonly seen in 93% cases of CSR. Leakage point is seen with uniform dye filling (Figure-3). Most common location is the upper nasal quadrant, whereas, lower temporal quadrant is the least common quadrant seen. Most leakage points are seen within 1 mm of fovea but can be till 3 mm of the Foveal Avascular Zone (FAZ). Sometimes the PED may be present superiorly as the SRD as the fluid collects inferiorly d/t gravity.

Multiple leaking points may be seen in old chronic CSR.

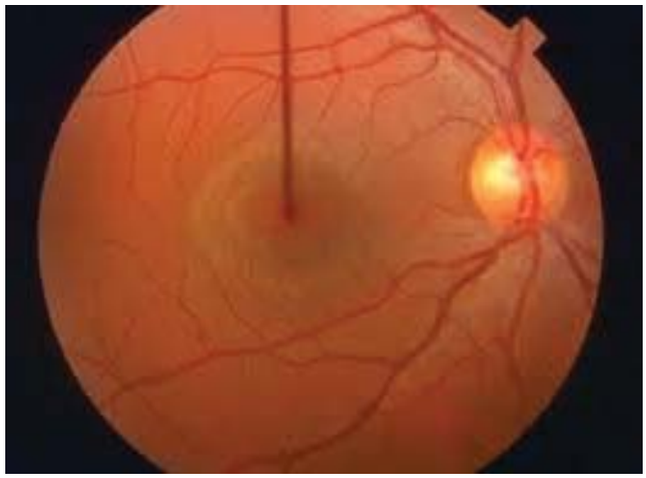
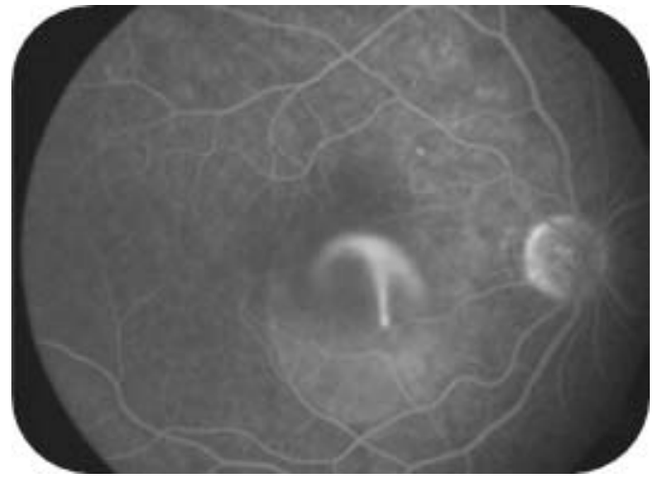
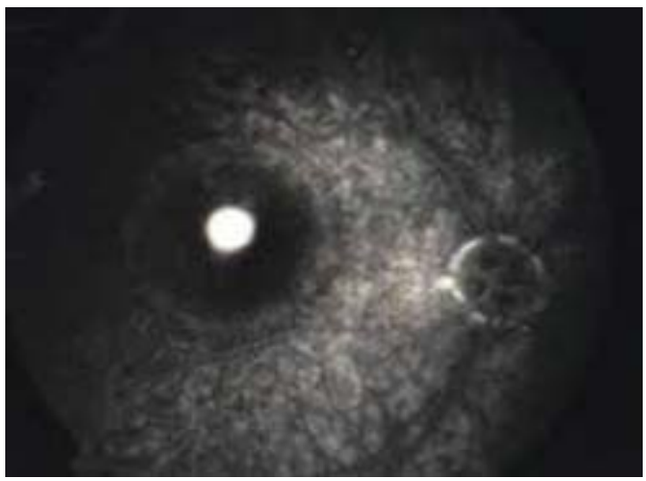
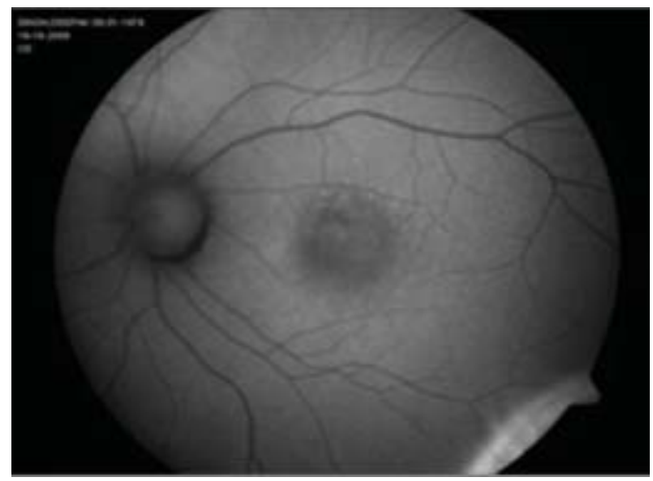
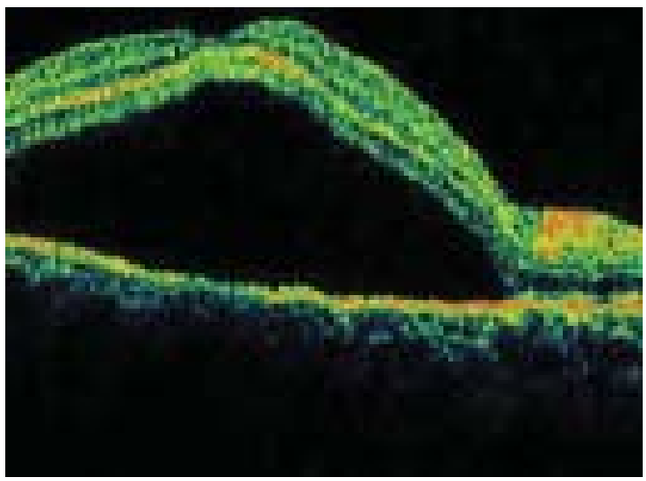
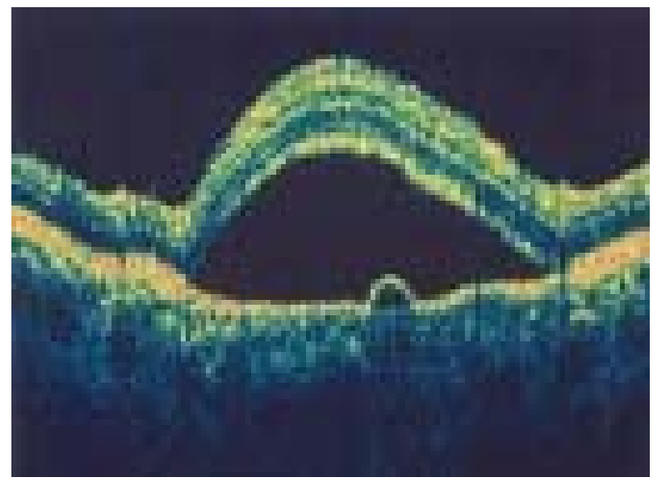
Small PED may be seen with pooling of the dye (hyperfluorescence increasing in intensity but not in size)

Autofluorescence photography

o The autofluorescence characteristics of the fundus in CSC are clearly different from healthy eyes10,11. In

acute CSC, hypoflourescence has been demonstrated at the very point of leakage (Figure-4) . Acute CSC that has persisted for some time often shows granular or semiconfluent hyperfluorescence throughout the area of detachment.

o In chronic CSC, irregular patterns of mixed hyper and hypofluorescence can be seen. After reattachment, the autofluorescent subretinal deposits disappear slowly over a period of several months.

If leakage point is within 500 microns from the center of fovea, wait for 6 months before treating.

Complications

- o Inadvertent photocoagulation of the fovea.
- o Persistent scotoma after treatment (should be told to the patient before giving treatment).
- o Secondary CNVM.
- o Progressive enlargement of the area of RPE atrophy.

Photodynamic Therapy -

Use of verteporfin and PDT was first reported in 2003 in the setting of CSCR22.Yannuzzi et al described using ICG angiography to first identify areas of choroidal hyperpermeability that were then targeted with PDT.

Indications: -

- * Juxtafoveal lesion.
- * Subfoveal lesion.
- * Lack of a clearly defined leakage hot spot.
- * CNVM

However, it is not approved by the Food and Drug Administration for the treatment of CSCR and has a number of side effects, including photosensitivity to intravenous dye and choroidal hypoperfusion following treatment. Lai et al described the use of half dose verteporfin in the treatment of CSCR.21 They proposed 3 mg/m2 of verteporfin infused over 8 minutes, followed 2 minutes later with ICG guided PDT. Of the eyes treated, 85% showed complete resolution of the neurosensory retinal detachment and/or pigment epithelial detachment by 1 month after treatment. Subthreshold diode laser and TTT has also been tried in the treatment16

Intravitreal Anti - Vegf

Intravitreal bevacizumab (Avastin) has been used to successfully to treat the rare complication of choroidal neovascularization following CSCR23,24. Anti-VEGF agents such as bevacizumab and ranibizumab are also being used to treat the neurosensory detachment of chronic CSCR in the absence of choroidal neovascularization25. It can speed up the visual recovery and resolution of subretinal fluid but is not useful in maintaining the longterm effectiveness28.Further studies in this context are needed in future.

Conclusion

CSCR is a multifactorial disease that is not completely understood. Recent advances in retinal imaging and recent studies have made it possible to understand the disease to a certain extent, but more trials and researches are needed to state the gold standard treatment of CSR.

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ICGA (Indocyanin Angiography)

o The application of ICGA to the study of CSC has expanded the knowledge of the disease12. Common findings in patients with CSC are multi focal areas of hyperfluorescence in the early and midphases of the study, which then fade in the late phase of the study.

o Basically, these areas of hyperfluorescence are found not only in congruence with the leaking point seen with FA, but are also found in fundus areas that appear clinically and angiographically normal, and in normal fellow eyes of patients with CSC. Multiple occult presumed RPE detachments are also seen

OCT(Optical Coherence Tomography)

The use of OCT in CSR shows

1. Subretinal fluid - OCT may also detect the shallow subretinal fluid. Also, the amount of fluid detected in CSR is of prognostic value and helps in educating the patient(Figure-5)
2. RPE detachment(Figure-6)
3. RPE atrophy
4. Choroidal Novascular Membrane - a dreaded complication of CSR

MULTIFOCAL ERG (mfERG)

During acute CSR, retinal dysfunction is shown by reduction in mfERG response amplitudes and delay in implicit times. With the use of mfERG, it has also been demonstrated that the fellow eye of the patients with CSR may also have abnormal mfERG responses13,14. It has been demonstrated that mfERG abnormalities may continue to persist even after the resolution of the subretinal fluid clinically. Thus, mfERG may therefore have a useful role in providing an objective measure of retinal function in research on the treatment for CSR.

Microperimetry

MP1 has already helped us and will in the future help us to follow and to understand retinal diseases. It has also shown that despite clinical resolution of CSC, there is lower retinal sensitivity in the macula even once visual acuity returned to 20/2015.

Natural Course

If left untreated - CSC heals spontaneously within 12 weeks with full recovery of visual acuity or scar formation. Recurrence in 1/2 to 1/3rd patients is seen with 3 or more recurrence in 10% of patients. Recurrence seen mostly with in 1 yr of disease but may recur up to 10 yrs. Even a small single episode of CSC may be followed by chronic slowly progressive disturbances of RPE at post pole. Small percentage may develop CNV, perifoveal RPE atrophy or cystic macular degeneration with severe and irreversible loss of central vision.

Treatment

Lifestyle counseling and discontinuation of corticosteroids as first line options. If detachment persists for more than 3 months, photocoagulation or PDT should be considered. Systemic acetazolamide promotes the resorption of SRF.Role of anxiolytics is unknown.Beta blocker or Propranolol has a hypothetical role in treating CSR17.

Other drugs that have been used for the treatment for CSR and have been found to be beneficial are mifepristone, rifampicin, finasteride, methotrexate, mineralocorticoid antagonist like spironolactone 18,19,20,21.

Aspirin and H.Pylori treatment also helps in visual recovery and reduces recurrence.

Laser Photocoagulation - It accelerates the resolution of detachment as well as reduces the recurrence rate to one-fifth. Indications of laser include

* Persistence of serous detachment for more than 3 months.
* Recurrences in eyes with visual deficit from previous episodes.
* Presence of permanent visual deficit from previous episodes in fellow eye.
* Development of chronic signs i.e, cystic changes in neurosensory retina or widespread RPE abnormalities.
* Occupational or other patient needs that require prompt restoration of vision or stereopsis.

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