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# CLINICAL ANALYSIS OF CASES OF OCULAR ISCHEMIC SYNDROME

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**ABSTRACT** **Background:** Ocular Ischemic Syndrome (OIS) is a rare but vision-threatening condition caused by chronic ocular hypoperfusion, most commonly due to significant stenosis or occlusion of the carotid arteries. Because of its varied clinical presentation, OIS is frequently misdiagnosed as other retinal vascular disorders. **Objective:** To analyse the clinical profile, ocular findings, fluorescein angiographic features, and systemic associations of patients diagnosed with Ocular Ischemic Syndrome. **Methods:** This retrospective observational study included patients presenting with clinical features of OIS at Yashshree Retina Care and Laser Centre between January 2021 and December 2023. Inclusion criteria comprised internal carotid artery stenosis greater than 50%, presence of at least one ocular clinical sign, and characteristic fundus fluorescein angiography (FFA) findings such as prolonged arm-to-retina time (>15 seconds) and delayed arteriovenous transit. Patients with other confounding ocular pathologies were excluded. Demographic data, ocular symptoms, intraocular pressure (IOP), FFA findings, and systemic comorbidities were analysed. **Results:** A total of 8 patients (11 eyes) were included, with an equal male-to-female ratio. The majority of patients were aged between 60 and 75 years. Five patients had unilateral OIS, while three had bilateral involvement. Common ocular symptoms included diminution of vision, ocular or periorbital pain, photophobia, and diplopia. Systemic comorbidities were prevalent, including diabetes mellitus, hypertension, cardiovascular disease, cerebrovascular disease, and long-term smoking. IOP ranged from 10 to 50 mmHg, with three patients exhibiting hypotony. FFA demonstrated delayed arm-to-retina time in five patients, prolonged arteriovenous transit in four and late vessel wall staining in three patients. **Conclusion:** Ocular Ischemic Syndrome often presents with isolated ocular symptoms and is strongly associated with systemic vascular disease. Early recognition through careful clinical evaluation and FFA is crucial, as timely referral for systemic management may be vision and life saving.

**KEYWORDS :** Ocular Ischemic Syndrome, Carotid Artery Stenosis, Fundus Fluorescein Angiography, Chronic Ocular Hypoperfusion

## 1. INTRODUCTION

Ocular ischemic syndrome is a rare condition, which is caused by ocular hypoperfusion due to stenosis or occlusion of the common or internal carotid arteries. Atherosclerosis is the major cause of changes in the carotid arteries. Ocular ischemic syndrome is manifested as visual loss, orbital pain and, frequently, changes of the visual field, and various anterior and posterior segment signs. Anterior segment signs include iris neovascularization and secondary neovascular glaucoma, iridocyclitis, asymmetric cataract, iris atrophy and sluggishreaction to light. Posterior eye segment changes are the most characteristic, such as narrowed retinal arteries, perifoveal telangiectasias, dilated retinal veins, mid-peripheral retinal haemorrhages, microaneurysms, neovascularization at the optic disk and in the retina, a cherry-red spot, cotton-wool spots, vitreous haemorrhage and normal-tension glaucoma.

Differential diagnosis of ocular ischemic syndrome includes diabetic retinopathy and central retinal vein occlusion. Carotid artery imaging and fundus fluorescein angiography help to establish the diagnosis of ocular ischemic syndrome. The treatment can be local, for example, ocular (conservative, laser and surgical) or systemic (conservative and surgical treatment of the carotid artery). Since the condition does not affect the eyes alone, patients with ocular ischemic syndrome should be referred for consultation to the neurologist, vascular surgeon and cardiologist.[1]

## 2. Patients and Methods

In this retrospective study who visited with clinical symptoms of Ocular Ischemic Syndrome in Yashshree Retina care and laser centre were considered for inclusion. The cases were collected from January 2021 to December 2023.

- The patients of OIS were included according to the following criteria
- The patients who are willing to participate
- Ipsilateral Internal carotid artery stenosis >50 % and Internal carotid artery velocity abnormal
- At least one ocular clinical sign
- FFA sign like prolonged arm to retina time >15 seconds, prolonged arteriovenous transit time >11 seconds, staining of retinal vessels in late stage, poor perfusion and hypo fluorescence of peripheral retina, mid to late phase leakage abnormal ocular symptoms and sign that can't be explained by other ocular diseases

- The following patients excluded from study(Exclusion criteria)
- The patients who were not willing to participate patients having other ocular diseases including age-related macular degeneration, diabetic retinopathy, choroidal detachment, retinal detachment, primary glaucoma, uveitis, ocular tumour, ocular trauma- Informed consent was acquired from all of the participants before the collection of clinical materials.

## 3. RESULTS

Total 8 patients (11 eyes) were included in study including 4 male (5 eyes) and 4 female (6 eyes).Out of which 5 patients have uniocular OIS. Rest patients have bilateral OIS (3 cases). The age of onset ranged from 50 to 80 years with majority of patients aged between 60 to 75 years of age. Out of 8 patients total 5 patients suffering from diabetes mellitus-2 were suffering from hypertension, 4 patients was having both diabetes and hypertension, 4 suffering from cardiovascular diseases, 3 having cerebrovascular diseases and 4 are long term smokers. Only one patient was not having any co morbidities. All the 8 patients had initially ocular symptoms only. The ocular symptoms include diminution of vision (5 cases), photophobia(4 cases), loss of vision (3 cases), floaters (3case), amaurosis fugax (2 case), and ocular or periorbital pain (5 cases), diplopia (4 cases). Out of 8 patients 2 patients had vision CF 1 meter, 2 patients had vision CF 2 meters, while 3 patients had vision CF close to face while 1 patient had vision 6/60. The IOP ranges from 10 to 50 mm hg measured with rebound tonometry out of which 3 patients had IOP <10 mm hg. On anterior segment examination, 11 eyes had congestion, 4 eyes had corneal edema, 3 eyes had cells in anterior chamber, 3 eyes had rubeosis iridis and 1 eye had neovascular glaucoma. On posterior segment examination 11 eyes had narrowed retinal arteries,11 eyes had dilated nontortuous retinal veins, splinter and punctuate retinal hemorrhage seen in10 eyes while cotton wool spots was seen in 7 eyes, neovascularisation of disc had seen in 2 eyes and neovascularisation elsewhere seen in 3 eyes. In Fundus Fluorescence Angiography (FFA), prolonged arm to retinal time >15 seconds seen in 5 patients, prolonged arteriovenous transit time > 11 seconds seen in 4 patients and staining of retinal vessels in late phase seen in 3 patients.

- Demography and symptomatology

| | |
|---|---|
| Total number of patients | 8 |
| Male: female ratio | 1:1 |
| Onset of age | |
| <45<br>45- 60<br>60- 75<br>>75 | 1<br>1<br>4<br>2 |
| Ocular symptoms –<br>Diminition of vision Loos of vision Amaurosis fugax Photo phobia<br>Occular or periorbital pain<br>Floaters<br>Diplopia | 5<br>3<br>2<br>4<br>5<br>3<br>4 |
| Intraocular pressure<br>< 10<br>10-20<br>20-30<br>30-40<br>40-50 | <br>3<br>1<br>1<br>1<br>2 |
| FFA findings<br>-Arm to retina time >15 seconds<br>-Prolonged arteriovenous transit (AVTT)<br>>11 seconds<br>-Staining of retinal vessels in late phase | No. Of eyes Out of 11 eyes 11<br>10<br>11 |
| Systemic diseases<br>Patients with diabetes Mellitus<br>Patients with hypertension<br>patients having both Diabetes mellitus and hypertension<br>Patients with cardiovascular diseases Patients with cerebrovascular diseases | <br>5<br>2<br>4<br>4<br>3<br>4 |
| Smoker >10 yrs | 4 |

- Anterior segments findings

| Anterior segment findings | No of eye out of 11 eyes |
|---|---|
| Congestion | 10 |
| Corneal edema | 4 |
| Anterior chamber cells and flare | 3 |
| Rubeosis iridis | 3 |
| Neovascular glaucoma | 1 |

- Posterior segment findings

| Posterior segment findings | No of eyes out of 11 eyes |
|---|---|
| Narrowed retinal arteries | 11 |
| Dilated but non tortuous retinal veins | 11 |
| Punctuate and splinter Retinal hemorrhage | 10 |
| Microaneurysm | 10 |
| Cotton wool spots | 7 |
| Neovascularization of disc(NVD) | 2 |
| Neovascularization elsewhere (NVE) | 3 |

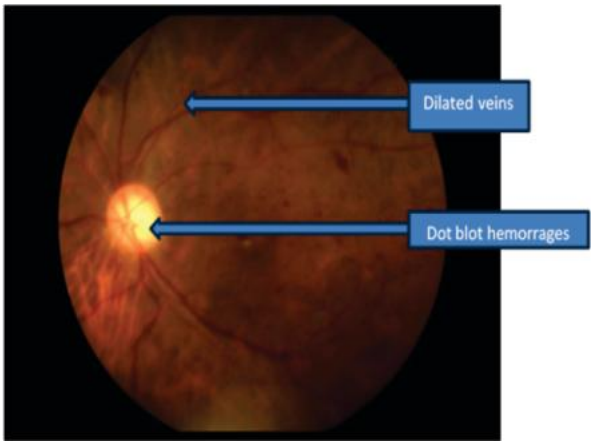


**Fig. no 3-Fundus Photography of 67-year-old Male (Left Eye)**

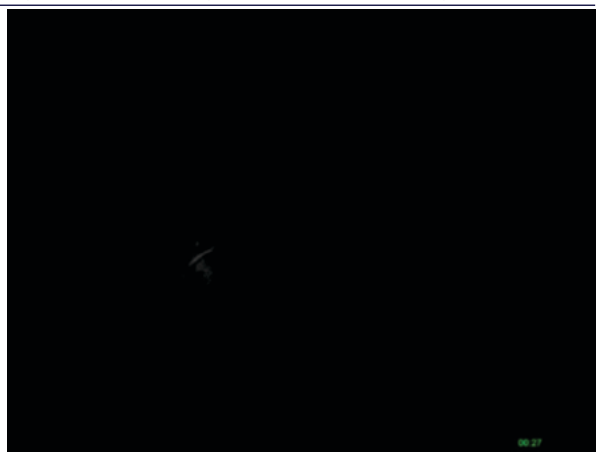

**Fig no 5 Late Appearance of Dye at 27 Seconds in 78-year-old Male (Left Eye)**

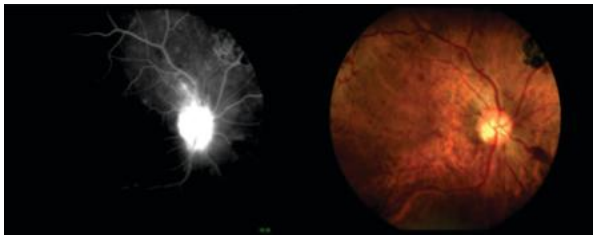

**Fig no. 6-a** **Fig no. 6-b**

**Fig no 6 a) Fundus Photograph of 71-year-old Female Showing Dot Blot Haemorrhage b) FFA of Same Patient Showing Vessel Wall Staining in Late Stage (Right Eye)**

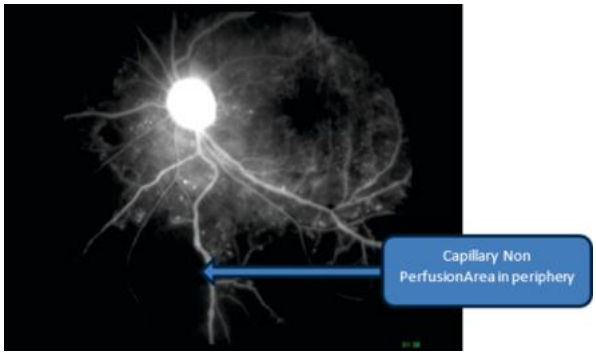


**Fig. No. 7 FFA Showing Capillary Non Perfusion Area in 72-year-old Female (Left Eye)**

## 4. DISCUSSION

The ocular ischemic syndrome is a rare condition characterized by chronic ischemia of the anterior and/or posterior segment of the eyes and is primarily caused by the stenosis of the carotid artery. Many studies have found that the prognosis of OIS is poor.The mortality rate in OIS patients is up to 40% within 5 years of onset[1]. OIS occurs when the perfusion pressure in the ophthalmic artery falls below the critical level.OIS is primarily caused by stenosis of the common or internal arteries ipsilateral to the affected eye. The clinicalcharacteristics of chronic ischemia primarily occur in patients with poor collateral circulation between the two internal carotid arteries or between the internal and external carotid arteries. In general, OIS is unilateral, but 20% of the cases are affected bilaterally. Bilateral OIS is more common found in patients with the aortic arch syndrome, hyperhomocysteinemia, and Takayasu arteritis. The major cause of OIS is atherosclerosis, and other common causes include giant cell arteritis, thrombogenesis, Takayasu arteritis, trauma, and different types of diseases involving the carotid arteries. As the pathogenesis of atherosclerosis is associated with the male sex, advanced age, systemic metabolic diseases, and a smoking addiction, the onset of OIS is positively correlated with these factors[1]. Gradual and painless loss of vision is the most common symptom out of all. Anterior segment signs include anterior chamber reaction, rubeosis iridis, secondary neovascular glaucoma, conjunctival chemosis, corneal oedema. In posterior segment findings dilated non tortuous veins, microaneurysm, cotton wool spots, dot blot haemorrhage.

Rate of misdiagnosis and failure to diagnose is high in OIS, we should take detailed medical history specially in patients having co morbidities. We should pay attention to transient symptoms like amaurosis fugax, photophobia, eye pain.Ophthalmologists need to be especially alert regarding this condition, as it is uncommon, and may present for thefirst time without any preceding ischemic events elsewhere in the body. A careful clinical examination combined with targeted ophthalmic investigations like FFA may clinch the diagnosis. Prompt referral to the concerned specialists for appropriate minimally invasive or surgical intervention may be lifesaving.[2]

OIS must be differentiated from Central Retinal Vein Occlusion, Diabetic Retinopathy and Hypertensive Retinopathy. For the treatment in our study, 5 patients had anti VEGF injection followed by pan retinal photocoagulation while 3 patients had Pan Retinal Photocagualtion only. All of them referred to cardiologist immediately. Ophthalmologists need to be especially alert regarding this condition, as it is uncommon, and may present for the first time without any preceding ischemic events elsewhere in the body. A careful clinical examination combined with targeted ophthalmic investigations like FFA may clinch the diagnosis. Prompt referral to the concerned specialists for appropriate minimally invasive or surgical intervention may be lifesaving.[2]

## 5. REFERENCES -

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