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Acute Vision Loss: Aetiology, Clinical Profile and Prognosis

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Abstract: Vision is one of the essential and important senses of human body. Loss of vision leaves a significant handicap in a person and so it compels the treating physician to analyse and find the potentially treatable cause for this visual deficit. This study focuses on the non-traumatic causes of acute vision loss which are admitted in medical or ophthalmological wards. Total 106 patients with vision loss were examined and 40 patients out of them participated by serial recruitment in this study and they underwent various investigations and treatment with the purpose to study different aetiologies of vision loss, their clinical profiles and outcomes of the treatment they received. There were 17 females and 23 males in the study. Females were observed to be affected in the age group of 12-40 year and males in 41-60 years. Hypertension and diabetes were the most common pre-morbidities in these patients. Optic neuritis was observed to be the most common cause of acute vision loss followed by cerebrovascular accidents. Steroids were the most commonly used drug followed by antihypertensives. All patients except acute visual loss due to cerebrovascular accidents showed improvement. Patients with retinal arterial occlusions also showed very poor prognosis. Table 2 shows pain was the most common associated symptom with acute vision loss. 16 patients presented with associated pain, 8 with lacrimation and 3 with redness of eyes. Table 3 shows the number of patients presenting with monocular involvement and binocular involvement was almost similar i.e. 21 and 19 respectively. Table 4 shows out of 40 patients 33 underwent neuroimaging, either CT or MRI scans. The various diagnoses found on these studies are as depicted in the table below. Table 5 shows treatment used for various diagnoses were Corticosteroids, antihypertensives, central dehydrants, immunosuppressants and surgery.
Keywords: Acute vision loss, optic neuritis, cortical blindness, CRAO, diabetic retinopathy, vision loss in pregnancy.

INTRODUCTION

Vision is one of the very important senses of human body and loss of vision entails a major disability and handicap to a person. So utmost efforts are necessary to diagnose and treat the condition whenever possible.

In this dissertation the main focus is on the non-traumatic causes of vision loss which are admitted in medical wards like Optic Neuritis, Cortical venous thrombosis, Demyelinating disorders and Cerebrovascular accidents giving rise to cortical type of blindness. It is seen that many major systemic diseases e.g. Multiple sclerosis many times manifest only with isolated ophthalmic symptoms before they show up themselves with other systemic symptoms.

There is very little work done on the ophthalmological symptoms of common systemic diseases commonly affecting vision, their incidence and clinical profiles.

The mainstay of diagnosis of cause of acute vision loss is good history, a thorough ophthalmologic evaluation, and neuroimaging if indicated. But many times, specific tests like serological tests, CSF studies are needed to establish the diagnosis and to know the extent of progression of disease process.

Treatment of various conditions leading to acute vision loss depends upon the patient's clinical profile, severity of symptoms, and possibility of side effects of the therapy.

The prognosis depends upon the cause of vision loss. Degenerative and autoimmune cases have worse prognosis than acute cases of vision loss like malignant hypertension, cortical venous thrombosis.

MATERIALS AND METHODS

This was an observational, prospective open study to determine various aetiological factors, clinical profile and prognosis of patients of acute vision loss coming to outpatient department or admitted in a tertiary care public hospital over a period of 18 months.

Inclusion criteria

- All patients coming to outpatient or admitted in inpatient department with acute vision loss
- All patients with history of vision loss in last 15 days

Exclusion criteria

- All the patients having acute vision loss due to trauma
- Patients presenting with vision loss of more than 15 days

Sampling method: - All patients with age ≥12 years admitted in general medical wards and Medical intensive care unit (MICU) or following on outpatient basis, were screened and patients with history of acute vision loss were included after consent. Detailed history regarding demographic data, presenting complaints, co-morbidities, treatment received, and relevant family history were noted. Each patient underwent detailed clinical examination including complete CNS examination. Each patient underwent formal assessment of acuity of vision and fundus examination. These patients were subjected to a set of haematological and biochemical investigations. Neuroimaging (CT, MRI, MR venography or angiography) and CSF studies done when indicated. Patients were followed daily for acuity, improvement and deterioration.

After establishing the aetiology of vision loss patients were subjected to standard treatment modalities. Patients with optic neuritis received steroids as per ONTT guidelines. Patients with cerebrovascular accidents received central dehydrants as well as antiplatelet agents whenever indicated. Cortical venous sinus thrombosis patients were started on central dehydrants and anticoagulants. Patients with diabetic retinopathy and vitreal haemorrhage needed surgical intervention and LASER phototherapy.

After discharge patients were followed up after one week, one month and 3-month intervals. Every time patients underwent visual acuity testing for determination of any improvement or any deterioration or development of any complications. If any complications found were noted.

Data interpretation was done by comparing our results with results of similar studies conducted in past. Data analysis was done by an independent and neutral bio-statistician.

RESULTS

Males affected with acute vision loss were predominantly in the age group of 41-60 years and females affected were from the age group 12-40 years.

Table-1: Demographic Data

Age (Years)	Males	Females
12-40	7	14
41-60	15	2
>60	1	1
Total 40	23	17

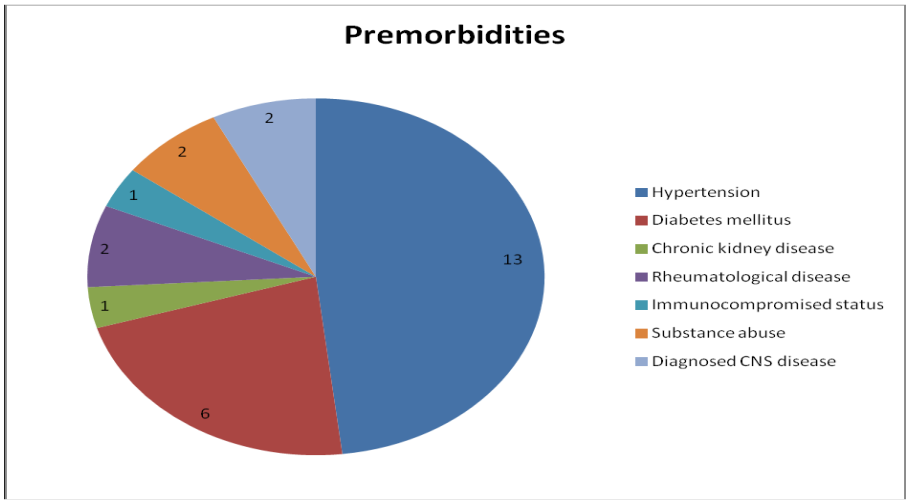

Fig-1: Pre-morbidities associated with acute vision loss

Out of 40 patients enrolled in study 26 had pre-morbidities as depicted in figure 1. Hypertension and diabetes were the most common pre- morbidities. The causes in these pre-morbidities were vitreal haemorrhage, Acute ischaemic optic neuropathy.

Pain was the most common associated symptom with acute vision loss. 16 patients presented with associated pain, 8 with lacrimation and 3 with redness of eyes.

The number of patients presenting with monocular involvement and binocular involvement was almost similar i.e. 21 and 19 respectively (Table-3).

Table-2: Associated symptoms with acute vision loss

Symptom	Number of patients
Pain	16
Lacrimation	8
Redness of eyes	3

Table-3: Type of eye involvement

Eye involvement	Number of patients
Monocular	21
Binocular	19

Out of 40 patients 33 underwent neuroimaging, either CT or MRI scans. The various diagnoses found on these studies are as depicted in the table 4 below.

Treatment used for various diagnoses were Corticosteroids, antihypertensives, central dehydrants, immunosuppressants and surgery (Table-5).

Table-4: Neuroimaging findings

Imaging Findings	Number of patients
Optic neuritis	11
Occipital infarcts	4
Normal	3
Cortical venous sinus thrombosis	2
Intracerebral bleed	2
Demyelination	2
Posterior reversible encephalopathy syndrome	2
Carotico- cavernous fistula	1
Cortical ribboning	1
CNS Toxoplasmosis	1
Metastases (soft tissue masses)	1
Occipital neoplasms	1
Ophthalmic artery occlusion	1
Optic atrophy	1

Table-5: Treatment profile in patients

Treatment modality	Number of patients
Steroids	15
Antihypertensives	8
Surgical	8
Anticoagulation	7
Central dehydrant medications	6
Immunosuppressants	3
Antibiotics +/- Dehydrants	2
Others	2
Transfusion	1

The outcome analysis was done after these treatments as shown in table 6. Optic neuritis and multiple sclerosis had the best prognosis. Visual prognosis in case of hypertensive and diabetic retinopathy was unsatisfactory as compared to above cases. Cases with cerebrovascular accidents with cortical blindness had poor prognosis with no improvement in visual acuity. Criterion for

improvement in the vision was taken as improvement in visual acuity by 50% of the visual acuity at the time of presentation.

Table-6: Analysis of outcome

Diagnosis	Improved	No improvement
Optic neuritis	9	0
Cerebrovascular accidents (including CVST)	2	5
PRES	2	0
Multiple sclerosis with optic neuritis	2	0

DISCUSSION

Patients were enrolled as per the inclusion criteria. Out of 40 patients enrolled in the study 23 patients were males while 17 were females. Maximum numbers of males i.e. 15 were from the age group of 41-60 years. 7 males were from 12-40 age group and 1 patient was of age >60 years. On the contrary maximum numbers of females in this study i.e. 14 were from 12-40 years age group. Two females were between 41-60 years and only 1 female was of age >60 years.

Out of 17 female patients enrolled in the study 5 females were pregnant. This indicates that pregnant patients with PIH are at high risk of developing acute vision loss secondary to complications of PIH. Two patients had posterior reversible encephalopathy syndrome and their CT scans of brain showed Occipital lobe scattered hypodensities suggestive of cerebral oedema. In 1980, Grimes et al reported the first case in which reversible cortical lesion in a woman with preeclampsia and temporary blindness computed tomographic scanning was used to demonstrate hypodensities in occipital area [1, 2]. Such hypodensities tend to resolve within 3 to 5 days [3,4].

Twenty six out of 40 patients had pre-morbidities. Most common pre-morbidity was hypertension, while 5 patients had diabetes mellitus. The commonest cause of vision loss in patients with hypertension was cerebrovascular accident. In case of diabetics the common cause was diabetic retinopathy followed by Cerebrovascular accident. Hypertension has been found to be the single most important modifiable risk factor for stroke [7]. Diabetes mellitus and hyperglycaemia has also been established as an independent risk factor for stroke in Honolulu Heart programme [6]. There are no reliable studies in India for estimating the diabetic retinopathy in Indian population. However, a recent report from Madurai revealed that of the 1,863 new diabetic patients seen at a tertiary eye centre, 37% had overt diabetic retinopathy [8].

Two patients had history of Substance abuse; both of these patients were chronic alcoholics. Both these patients had optic neuritis. M Shimozono *et al*. [9] found that the acute vision loss in ethanol abuse was because of nutritional deficiency of vitamins. One of the patients in the study was a case of retroviral disease and the cause of his vision loss was found to be CMV retinitis. CMV retinitis had a very high incidence amongst AIDS patients before HAART. The incidence has decreased now after introduction of HAART and anti-viral agents [11]. If left untreated CMV retinitis almost always leads to blindness [12, 13]. Two patients in our study were diagnosed as case of cortical venous sinus thrombosis. Both of these patients had papilledema which had led to the visual impairment in these patients. One of these patients was a pregnant female. Pregnancy and the puerperium have long been recognized as periods of increased susceptibility [20, 21].

One of the patients had vision loss with paraparesis. This patient was found to have 'Antibodies to Aquaporin receptors' in his CSF which is a specific marker for Neuromyelitis optica [22]. All the patients in the study were also examined for associated ocular symptoms. Total of 27 patients out of 40 had associated ocular symptoms. 16 patients had pain on presentation, 8 patients had lacrimation while 3 patients had erythema. Again 27.5% cases of optic neuritis may be the cause of this finding as pain is common symptom in optic neuritis though it tends to disappear with disease progression [15].

Thirty-three patients underwent neuroimaging either CT brain or MRI scan of the brain. In cases with suspected Cerebrovascular accidents and PRES, CT brain was preferred as it was easily available and less time consuming and adequately sensitive. In case of suspected optic nerve disorders, in cases of suspected cortical venous thrombosis and in cases where CT brain was indecisive, MRI was preferred as an imaging modality. The commonest finding on Neuroimaging was Optic neuritis. This may be because optic neuritis was the commonest diagnosis in this study. But MRI established the diagnosis of Optic neuritis in all the 11 cases even the fundus examination was normal in 4 cases. So, in our study MRI helped in establishing the diagnosis in all the cases. MRI is a highly sensitive and specific imaging modality for diagnosis of optic neuritis. And the additional purpose behind the MRI was to rule out asymptomatic lesions of Multiple Sclerosis in brain parenchyma and judge the possibility of development of multiple sclerosis in patients presenting with optic neuritis. Two of our patients were found to have CNS lesions on MRI and were subsequently diagnosed as Multiple sclerosis. In ONTT,

25% of patients with no MRI lesions still developed MS, 50% of patients with 1 or more lesions developed MS within 5 years [18], and 72% of patients with 1 or more lesions developed MS within 15 years [17].

In the remaining 7 cases where neuroimaging was not done and only fundus examination established the diagnosis. These cases were diabetic and hypertensive retinopathy, retinal detachment and branch retinal venous occlusion. Cerebrospinal fluid analysis was done in 12 out of 40 patients enrolled in the study. Only 2 patients were found to have CSF abnormality. One patient had IgM toxoplasma antibodies in his CSF and was diagnosed as Toxoplasma chorioretinitis. The other patient had paraparesis and optic neuritis involving both the eyes who was shown to have 'Aquaporin' antibodies in his CSF suggesting the diagnosis of Neuromyelitis optica (Devic's Disease). The antibody is also positive in a significant proportion of patients deemed to be at high risk of NMO (that is, patients with single or recurrent optic neuritis or myelitis) [22, 23].

We found in our study that maximum number of causes of vision loss was related to the diseases primarily involving Central nervous system e.g. cortical venous sinus thrombosis, cerebrovascular accidents, optic neuritis. After CNS, the diseases involving Cardiovascular system were found to be responsible for the vision loss, followed by endocrinal e.g. Diabetes mellitus, then haematological system. Rheumatological causes like SLE and Behcet's syndrome were also found to be responsible for vision loss in 2 cases.

All the 40 patients in the study were treated with the standard latest treatment protocols. Patients received mostly medical management; but in some indicated cases surgical treatments like vitrectomy, LASER therapy were used. Commonest type of treatment that patients received was intravenous steroids. Steroids were used in cases of optic neuritis, multiple sclerosis and along with central dehydrants for reducing vasogenic oedema. Antihypertensives were the next commonly used drugs. Antihypertensives were used in stroke, hypertensive retinopathy and malignant hypertension leading to papilledema. Surgical management in the form of LASER photocoagulation was treatment of choice for diabetic retinopathy; vitrectomy was used for vitreal haemorrhage. Antiplatelet agents and anticoagulants were used in Cerebrovascular accidents and cortical venous sinus thrombosis. Immunosuppression was needed for patients with optic neuritis due to Rheumatological conditions like Behcet's syndrome and SLE. Antibiotics and antivirals were used for infective causes of acute vision loss in this study.

Out of 11 cases of optic neuritis all the patients received the intravenous pulse therapy with Methyl prednisolone. The most controversial and unanticipated outcome of ONTT was the finding that in patients with abnormal MRI results, intravenous steroids had a significant protective effect: 16% of intravenously treated patients and 30% of patients treated orally or with placebo developed MS at 2 years [19]. This finding still remains controversial and further studies are needed for its confirmation. But still this finding has significantly affected the management strategy of Optic neuritis in clinical practice.

Prognosis was good in all the cases of optic neuritis unlike the cases of permanent cortical blindness after CVA. There is a very reliable general rule in case of optic neuritis that all the first episodes of optic neuritis improve over time irrespective of the aetiology and treatment. But the intravenous pulse therapy with Methyl prednisolone makes no difference in final visual acuity (measured after 6 months of attack). But the recovery of vision may be rapid [16].

Prognosis was also good in case of cortical venous sinus thrombosis and papilledema in case of malignant hypertension. Cerebrovascular accidents and ophthalmic arterial occlusion carried the poorest prognosis in our study with final visual acuity after 3 months being very insignificant.

We would like to repeat this study in a larger group of individuals and in patients having optic neuritis for further confirmation of our results.

CONCLUSIONS

- Individuals with associated pre-morbidities like hypertension and diabetes mellitus are more at risk of vision loss due to the micro and macro vascular complications produced by these diseases.
- MRI is the imaging modality of choice in all suspected cases of optic neuritis. MRI is essential in case of Optic Neuritis for early diagnosis and judging the progression towards multiple sclerosis.
- Steroids were found useful in early recovery of vision in optic neuritis. Use of Methyl Prednisolone helps in reducing the duration of recovery but there is no difference in final acuity of vision.

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