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ORIGINAL ARTICLE

Study of Patients with Acute Visual Loss

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Abstract

Background: **Acute vision loss can be transient (lasting <24 h) or persistent (lasting >24 h). When evaluating a patient with acute vision loss, it is important to determine whether the vision loss affected one eye or both eyes. The World Health Organization (WHO) estimates that 90% of the 285 million visually impaired people in the world live in low-income countries.**

Aim: **To Study the possible neurological causes in the patients presented by acute visual loss.**

Patients and methods: **This prospective observational study included 60 patients with acute visual loss of different ages, and sex recruited from the Neurology department and out patients referred from ophthalmology departments of Al-Azher University Hospital (Assiut) from beginning of March 2021 to the end of August 2021.**

Results: **Our study revealed that the most common cause of acute visual loss in the studied patients was optic neuritis which observed in 22 (36.67%), followed by Non-arteritic -AION in 18 (30.00%) of patients, the least etiology was Functional (8.33%).**

Conclusion: **Among different diseases, vascular conditions may present monocularly or binocularly in the form of ischemic optic neuropathies or cerebral infarction. Diagnosis of functional vision loss must be considered after excluding all other organic causes of acute vision loss.**

Keywords: Acute vision loss, Neurological causes, Ophthalmologic presentations

1. Introduction

Acute visual loss is a common symptom brought to the attention of the practicing neurologist. It is critical to identify whether the visual loss is due to an optic neuropathy or an ocular disorder. This study addresses the elements of the history and examination that are useful in evaluating a patient with visual loss, with the goals of correctly localizing the lesion and constructing a likely differential diagnosis.[1]

Neurologists must be familiar with common and dangerous causes of vision problems for several reasons. it can be difficult to differentiate neurologic and ophthalmologic presentations in emergent settings. Due to the time-sensitive nature of stroke diagnosis and treatment, neurologists may be the specialist initially evaluating patients with visual symptoms.[2]

A good clinical history is important. Patients with acute onset visual loss and those with central loss of vision are aware of their dysfunction early in the course of the disease. On the other hand, visual loss may go undetected because of the preservation of binocular visual acuity. In a disease like multiple sclerosis, the impaired visual loss may be subclinical.[3]

Blindness is a crippling financially draining disease in developed countries and even more so in the developing countries not only due to untreatable ophthalmic diseases but also due to treatable ones.[4]

Data on the causes of vision impairment and blindness form an important basis for recommendations in public health policies, such as planning of national budgets and health services. They are important for scientific research. Visual changes and vision loss in the elderly population is a common and often life-altering condition. It is estimated that

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1 in 3 elderly persons suffers from some form of vision loss by the age of 65. In addition, loss of vision is often associated with a subsequent decreased ability to perform activities of daily living, a loss of independence, and an increased risk of depression.[5]

Although visual impairment and blindness among children are much less common than among adults, the potential life span of a child means that the lifelong impact of such impairment is very large.[6]

Visual impairment (VI) significantly impacts the affected child's psychological, educational, and socioeconomic experiences during childhood and beyond.[7]

Therefore, this study aims to document the possible neurological causes of patients presented with acute visual loss.

2. Patients and methods

This prospective observational study included 60 patients with acute visual loss recruited from the Neurology department and out patients referred from ophthalmology departments of Al-Azher University Hospital (Assiut) from beginning of March 2021 to the end of August 2021.

Acute visual loss diagnosed patients, both sexes and all ages were included. Patients with acute onset of visual loss due to local Ophthalmological causes: Anterior chamber diseases, Retinal detachment, Acute glaucoma, Lens dislocation and Eye trauma, Patients with chronic visual loss and Patients who refuse to share in the study were excluded.

All patients were subjected to the following: History taking includes: Age, Sex and Address. History of visual loss, cranial nerve affection, Symptoms of increase intracranial tension and Other neurological system affection.

Neurological Examination included; Mental state, Cranial nerves, Motor system, Sensory system and Cerebellar examination, Eye examination, Fundus Examination, Ophthalmological examination using a slit lamp. The anterior chamber is examined for cells and flare in eye pain or conjunctival injection patients. Laboratory tests included; Complete blood picture, Erythrocyte sedimentation rate, C- reactive protein, Lipid profile, Random glucose level and/or hemoglobin A1C and Liver and kidney functions tests. Imaging examinations included; CT and MRI brain, Vertebrobasilar and carotid duplex. Non-arteritic Ischemic optic neuropathy and Arteritic AION.

Research Ethical Committee will approve the detailed protocol of the Al-Azhar Faculty of Medicine study. Informed Consent. taken from all patients; this consent will be identical to the international standards that include not bearing the patients any expenses whether to research or complications.

Data entry, processing, and statistical analysis were carried out using SPSS version 26 (USA Statistical Package for the Social Sciences). Data were presented, and suitable analysis was done according to Chi-square test. *P* values less than 0.05 (5%) were statistically significant.

3. Results

Demographic data showed that number of patients was equal as regarded sex, more than half of patients were employees and about one third of the patients were smokers. Two-thirds of patients have unilateral visual loss 44 (73.3%), and ocular pain 23(38.3%) and hypertensive 17 (28.3%), diabetes mellitus 15 (25%) then cardiovascular patients were 7 (11.67%). Fundus examination most of patients of non-artiritic AION and optic neuritis had optic disc edema. Disc edema 37 (61%), other neurological examinations were normal, including sensory and other cranial nerves examinations. MRI and CT results were similar in studied patients, abnormal VEP 22 (36.67%). The patients had normal liver and kidney function test values, but ESR and CRP were raised in about more than one-third of patients followed by dyslipidemic patients. Cause of acute visual loss in the studied patients was optic neuritis which observed in 22 (36.67%), Non-arteritic -AION in 18 (30.00%) of patients, the least etiology was Functional (8.33%). History of jaw claudication and temporal pain were found only in arteritic AION. There was history of bilateral visual loss in all patients of functional and occipital infarction. Meanwhile, eye pain was observed mostly in optic neuritis patients. More than one third of patients of non arteritic AION have associated head ache (39%) (Tables 1–12).

4. Discussion

Acute vision loss can be transient (lasting <24 h) or persistent (lasting >24 h). When evaluating a patient with acute vision loss, it is important to determine whether the vision loss affected one eye or both eyes as described by **Bagheri and Mehta**.[8]

The main objective of this study was to study the possible neurological causes in patients presented with acute visual loss. Some authors suggested that typical optic neuritis (ON) is the most common type

Table 1. Demographic data of the studied patients.

Age	
Range	**20–75**
Mean ± SD	**48.62 ± 13.17**
	***N* (60) (%)**
Gender	
Female	30 (50)
Male	30 (50)
Occupation	
Student	5 (8.33)
Employer	32 (53.33)
House wife	23 (38.33)
Marital Status	
Single	16 (26.67)
Married	44 (73.33)
Smoking	
No	43 (71.67)
Yes	17 (28.33)

of optic neuropathy **Abel *et al.*,**[9] which similar to the present study.

In this study, patients with acute visual loss were optic neuritis in 22 (36.76%), non-arteritic AION in 18 (30%), arteritic in 8 (13.33%), occipital infarction in 7 (11.67%), functional visual loss in 5 (8.33%). Optic neuritis was seen more in young adult

Table 2. Clinical history in the studied patients.

Duration		
Range	2–4	
Mean ± SD	2.57 ± 0.59	
Laterality		
Bilateral	16	26.66
Unilateral	44	73.33
Ocular Pain		
No	37	61.67
Positive	23	38.33
Colure Vision		
Impaired	5	8.33
No	55	91.67
Local eye manifestations (Eye redness and swelling)		
Yes	3	5
No	57	95
Preceding Fever		
Yes	2	3.33
No	58	96.67
Headache		
Yes	13	21.67
No	47	78.33
Risk factors		
Cardiovascular disease	7	11.67
Hypertension (HTN)	17	28.33
Diabetes mellitus (DM)	15	25
Similar condition	8	13.33
Drug intake		
NO	58	96.7
Sildenafil	2	3.3
Other symptoms		
No	56	93.33
Temporal pulsation and jaw claudication	4	6.67

Table 3. Clinical examinations in the studied patients.

	N (60) (%)
Eye examination	
Visual Acuity (VA)	
Counting Fingers up to 3 m (CF)	12 (20)
Hand motion	23 (38.33)
No Perception of Light (NPL)	25 (41.67)
Pupil	
Intact (RRR)	23 (38.33)
RAPD	37 (61.66)
Visual Field	
Intact	43 (71.67)
Impaired	17 (28.33)
Fundus examination	
Pale disc	5 (8.33)
Optic disc edema	37 (61.67)
Other findings (Hemorrhage and exudate)	6 (10)
Motor system examination	
Impaired	2 (3.33)
Intact	58 (96.67)

Table 4. Investigations of the studied patients (CT, MRI and VEP).

	Brain insult	*N* (60) (%)
Imaging		
CT	Occipital infarction	7 (11.67)
	Other vascular insults	5 (8.33)
MRI	Occipital infarction	7 (11.67)
	Other vascular insults	5 (8.33)
Neurophysiology		
Visual evoked potential (VEP)	NAD	8 (13.33)
	Abnormal (delayed p100 latency)	22 (36.67)

Table 5. Laboratory investigations of the studied patients.

	N (60) (%)
Complete blood count (CBC)	
Normal	45 (75)
Anemia	15 (15)
C-reactive protein (CRP)	
Normal	41 (68.33)
Raised	19 (31.67)
Erythrocyte sedimentation rate (ESR)	
Normal	41 (68.33)
Raised	19 (31.67)
Hemoglobin A1c	
Normal	45 (75)
Raised	15 (25)
Lipid Profile	
Normal	44 (73.33)
Dyslipidemia	16 (26.67)
Liver Function tests	
Normal	58 (96.67)
Raised	2 (3.33)
Kidney Function tests	
Normal	58 (96.67)
Raised	2 (3.33)

Table 6. Causes of acute visual loss of the studied patients.

Causes	*N* (60) (%)
Optic neuritis	22 (36.67)
Anterior Ischemic Optic neuropathy (AION)	
Non-arteritic	18 (30)
Arteritic	8 (13.33)
Occipital infarction	7 (11.67)
Functional	5 (8.33)

patients 20–40 years old [19, (86.4%)], followed by middle adult patients between 40 and 60 years of age [3, (13.6%)]. In addition, it was more frequent in females [13, (59.1%)] compared to males [9, (40.9%)]. Optic neuritis was more common in patients who presented with color vision affection [5, (22.7%)] and was mostly associated with ocular pain [20,(90.9%)], optic disc edema (18, 81.8%), and RAPD [22,(100%)]. By investigations mostly associated with VEP abnormalities [12, (54.55%)].

In a study by **Kim and Kim**[10] had a 1 : 1 ratio of females to males. In contrast, the ratio of male patients increased in Asian studies **Du *et al.*, Wakakura *et al.***[11] However, a previous ON treatment trial documented a female predominance (2.7 : 1) **Beck *et al.***[12]

The second most common cause in the present study is non-arteritic AION it was seen more in patients who were in age 40–60 years old [14,

Table 7. Comparison of demographic data between the patients subgroups.

		AION				
	Optic neuritis *N* = 22 *N* (%)	Non arteritic -*N* = 18 *N* (%)	Arteritic *N* = 8 *N* (%)	Occipital infarction *N* = 7 *N* (%)	Functional *N* = 5 *N* (%)	*P* value
Age						
20-40	19 (86)	1 (5.6)	0 (0)	0 (0.0)	5 (10)	0.001
40-60	3 (13.6)	14 (77.8)	2 (25)	3 (42.9)	0 (0.0)	
>60	0 (0.0)	3 (16.7)	6 (75)	4 (57)	0 (0.0)	
Gender						
Female	13 (59)	5 (27)	6 (75)	2 (28.6)	4 (80)	0.05
Male	9 (41)	13 (72)	2 (25)	5 (71.4)	1 (20)	
Smoking	5 (23)	8 (44.)	1 (12.5)	2 (28.6)	1 (20)	0.15

Table 8. Comparison of the clinical history between the patients subgroups.

		AION				
	Optic neuritis *N* = 22 *N* (%)	Non arteritic *N* = 18 *N* (%)	Arteritic *N* = 8 *N* (%)	Occipital infarction *N* = 7 *N* (%)	Functional *N* = 5 *N* (%)	*P* value
Bilateral	0 (0)	2 (11)	2 (25)	7 (100)	5 (100)	0.001
Eye pain	20 (90)	3 (16)	0 (0)	0 (0)	0 (0)	0.001
Local eye manifestations (redness and swelling)	2 (9)	1 (5.6)	0 (0)	0 (0)	0 (0)	0.76
Headache	2 (9)	7 (39)	2 (25)	1 (14)	1 (20)	0.24
Other symptoms						
Preceding fever	2 (9)	0 (0)	0 (0)	0 (0)	0 (0.)	0.002
Jaw claudication	0 (0)	0 (0)	2 (25)	0 (0)	0 (0)	
Temporal pain	0 (0)	0 (0)	2 (25)	0 (0)	0 (0)	

Table 9. Comparison of risk factors between patients subgroups.

		AION				
	Optic neuritis *N* = 22 *N* (%)	Non arteritic *N* = 18 *N* (%)	Arteritic *N* = 8 *N* (%)	Occipital infarction *N* = 7 *N* (%)	Functional *N* = 5 *N* (%)	*P* value *N*
Similar condition	1 (4.5)	4 (22)	2 (25)	0 (0)	1 (20)	0.29
Risk factors						
Diabetes mellitus (DM)	2 (9)	7 (39)	2 (25)	1 (14)	1 (20)	0.24
Hypertension (HTN)	2 (9)	10 (55)	2 (25)	3 (43)	0 (0)	0.05
Cardiovascular disease (IHD)	0 (0)	4 (22)	0 (0)	3 (43)	0 (0)	0.01
Drug intake						
Sildenafil	0 (0)	2 (11)	0 (0)	0 (0)	0 (0)	0.30

Table 10. Comparison of neurological examination between the patients subgroups.

		AION				
	Optic neuritis $N = 22$	Non arteritic -$N = 18$	Arteritic $N = 8$	Occipital infarction $N = 7$	Functional $N = 5$	*P* value
	N (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N*
Visual Acuity at admission						
NPL	6 (27)	3 (17)	5 (62)	6 (85)	5 (100)	0.008
Hand motion	10 (45)	10 (55.6)	2 (25)	1 (14)	0 (0)	
Counting fingers up to 3 M	6 (27)	5 (27)	1 (12)	0 (0)	0 (0)	
Visual Field defect	6 (27)	3 (16)	1 (13)	7 (100)	0 (0)	0.001
Colure vision affection	5 (23)	0 (0)	0 (0)	0 (0)	0 (0)	0.05
Fundus examination						
Optic disc edema	18 (82)	18 (100)	1 (13)	0 (0)	0 (0)	0.001
Optic disc pallor	1 (4.5)	0 (0)	4 (50)	0 (0)	0 (0)	
Hemorrhage and exudate	3 (14)	5 (28)	3 (38)	0 (0)	0 (0)	
Pupil examination						
RRR	0 (0)	3 (17)	6 (75)	7 (10)	5 (100)	0.001
RAPD	22 (100)	15 (84)	2 (25)	0 (0)	0 (0)	
Other neurological examination						
Motor deficit	0 (0)	0 (0.)	0 (0)	2 (28)	0 (0)	0.004

(77.8%)] followed by in old adult age patients >60 years old [3, (16.7%)]. It was more frequent in males [13, (72.2%] than females [5, (27.7%)] also associated by significant value in fundus examination as optic disc edema found in all of the cases.

Non-arteritic AION was more common in patients with, Diabetes mellitus and hypertension were identified as risk factors for NAION ($P = 0.24$ and 0.051, respectively),also headache was more frequent in non artertic AION, it observed in 7 patients (38.9%). Nonarteritic AION is also more common in patients who presented by hyperlipidemia [7, (38.9%)] with highly significant value ($P = 0.003$). it also was observed in some cases with a history of sildenafil intake [2, (11.1%)].

In the study of **Hayreh and Zimmerman,**[13] non-arteritic AION was found to be in the majority of the patients were of age 40–60 years, also in terms of gender it was seen to affect the males (58%)more than females which similar to the present study, and also has similar results for associative symptoms as hyperlipidemia, hypertension and diabetes mellitus (70%,43%, and 34% respectively). In contrast, in the study of **Preechawat *et al.*,**[14] many patients were young.

Thirdly, arteritic AION was found in eight cases (13.33%). It was more common in old age people >60 years [6,(75%)]. It was more commonly seen in females six (75%), also it was more frequent in patients who presented with headache, jaw claudication and temporal pain ((2,25%), and elevated ESR and CRP in all cases.

As per previous study **van der Geest *et al.*,**[15] reported that patients presented with arteritic AION

Table 11. Comparison of neuroimaging investigations between patients subgroups.

Investigations		AION				
	Optic neuritis $N = 22$ *N* (%)	Non-arteritic $N = 18$ *N* (%)	Arteritic $N = 8$ *N* (%)	Occipital infarction $N = 7$ *N* (%)	Functional $N = 5$ *N* (%)	*P* value
Imaging						
CT						
Occipital infarction	0 (0)	0 (0)	0 (0)	7 (100)	0 (0)	0.001
Other vascular insults	0 (0)	2 (11)	1 (13)	0 (0)	0 (0)	
MRI						
OccipitalInfarction	0 (0)	0 (0)	0 (0)	7 (100)	0 (0)	0.001
Other vascular insults	0 (0)	2 (11)	1 (13)	0 (0)	0 (0)	
Neuro-physiology						
VEP						
Abnormalities (delayed p100 latency)	12 (54)	10 (55)	0 (0)	0 (0)	0 (0)	0.001
NAD	2 (9)	1 (6)	0 (0)	0 (0)	5 (100)	

Table 12. Comparison of laboratory investigations between patients subgroups.

Labs		AION				
	Optic neuritis $N = 22$ N (%)	Non arteritic -$N = 18$ N (%)	Arteritic $N = 8$ N (%)	Occipital infarction $N = 7$ N (%)	Functional $N = 5$ N (%)	P value
Complete Blood count (CBC)						
Anemia	2 (9)	9 (50)	2 (25)	1 (14)	1 (20)	0.42
Normal	20 (91)	9 (50)	6 (75)	6 (86)	4 (80)	
C-Reactive Protein (CRP)						
Normal	20 (91)	10 (56)	0 (0)	6 (86)	5 (100)	0.001
Raised	2 (9)	8 (44)	8 (100)	1 (14)	0 (0)	
Erythrocyte Sedimentation Rate (ESR)						
Normal	22 (100)	9 (50)	0 (0)	5 (71)	5 (100)	0.001
Raised	0 (0)	9 (50)	8 (100)	2 (29)	0 (0)	
Hemoglobin A1c (HbA1C)						
Normal	20 (91)	9 (50)	6 (75)	6 (86)	4 (80)	0.42
Raised	2 (9)	9 (50)	2 (25)	1 (14)	1 (20)	
Lipid Profile						
Normal	21 (96)	11 (61)	5 (63)	2 (29)	5 (100)	0.003
Dyslipidemia	1 (4.5)	7 (39)	3 (37)	5 (71)	0 (0)	
Liver Function Test						
Normal	22 (100)	17 (94)	7 (87)	7 (100)	5 (100)	0.743
Raised	0 (0)	1 (6)	1 (13)	0 (0)	0 (0.)	
Kidney Function Test						
Normal	22 (100)	17 (94)	7 (87)	7 (100)	5 (100)	0.743
Raised	0 (0%)	1 (6)	1 (13)	0 (0.0%)	0 (0.0%)	

more common in males, it was reported to occur in more than half of patients. In the present study, arteritic AION was more predominant in female patients. Findings similar to the present study in terms of gender, age, headache, jaw claudication, temporal pain, elevated ESR, and CRP were reported by **El-Dairi *et al.*,**.[16]

The fourth common finding was occipital infarction observed in 7 (11.67%) was slightly more frequent in males than females, i.e., five (71.4%) and two (28.6%), respectively. It also found mostly in old age patients >60 [4,(57.1%)]. Bilateral acute loss of vision was found in all patients with a visual defect in the form of contralateral homonymous hemianopia. It was more frequent in hypertensive and hyper lipid emic patients, 3, 5 (42.9%) (71.4%) respectively. And the diagnosis is supported by CT and MRI brain in all patients.

Findings from the study of **Rowe *et al.***, revealed similar prevalence rates in terms of age, gender, and visual defect in the form of contralateral homonymous hemianopia. However, the study of **Zhang *et al.*,**[17] showed that occipital infarction was in young and old age patients.

Lastly, functional visual loss was found common in young adults aged from 20 to 40 years old [5 (100%)] and more predominant in females [4 (80%)].

In the present study, one case complained from the past history of a similar condition (20%). In addition, findings from the study of **Scott and Egan**[18] revealed a similar prevalence in gender as females are more predominant than males. Also, Findings from the study of **Lim *et al.*,**[19] revealed similar prevalence in age, gender, laterality, visual acuity, and visual field defect.

4.1. Conclusion

Knowledge of common and dangerous presentations of neuro-ophthalmologic conditions, supported by an accurate examination, allows for appropriate testing for these patients, which may prevent further vision loss or neurologic injury. Visual symptoms are common, and benign disorders must be quickly differentiated from emergent neurologic conditions, which can be vision or life-threatening. Among afferent diseases, vascular conditions may present monocularly or binocularly in the form of ischemic optic neuropathies or cerebral infarction. In monocular cases, there must be an appropriate suspicion of GCA. Diagnosis of functional vision loss must be considered after excluding all other organic causes of acute vision loss.

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Conflicts of interest

The authors declared that there were NO conflicts of Interest.

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