Section: Otorhinolaryngology

Original Research Article

A PROSPECTIVE STUDY OF OPHTHALMIC MANIFESTATIONS OF COMMON HEMATOLOGICAL DISORDERS

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Abstract

Background: Hematological malignancies frequently exhibit ophthalmic signs, which can be broadly classified into two categories: those resulting from the disease's invasion of the eye and those resulting from aberrant blood clotting. The purpose of this study is to ascertain the frequency of ocular symptoms and how they relate to the various subgroups of hematological diseases. **Material and Methods:** This prospective non-interventional study was conducted in the Department of Ophthalmology from October 2023 to January 2024. 50 patients suffering from hematological disorders were evaluated in the ophthalmology department. Exclusion criteria were patients having diabetes, hypertension, dense cataractous changes, and other media opacities that prevented posterior segment examination. **Results:** The study was male-dominated with 28 (56%). Blood disorders are more prevalent in the age group from 21-to 40 years but ocular manifestations are more from 41-60 years both in males and females. The most common hematological disorder having ocular manifestations was found to be Leukemia seen in 42% of cases and among them, 86% of leukemia cases had ocular manifestations. Among Leukemia, AML (48%) was found to be the most common category having Ocular issues (50%). Lymphoma was 38% having 47.3% of ocular manifestations. The most common ocular manifestation was found to be Dry eye which was categorized as per DEWS, followed by Retinal hemorrhage and roth spots. Ptosis was the least common ocular manifestation. And this association was statistically significant ($p<0.05$). **Conclusion:** It is crucial to recognize ocular pathology in hematological malignancies since it may indicate a relapse or come before a systemic diagnosis. The adverse consequences of treatments, primarily for dry eye illness, should also worry us. Therefore, it is essential to support early identification and treatment, hence enhancing long-term results, as well as interdisciplinary coordination of care, including periodic ocular assessments throughout the disease.

INTRODUCTION

A vast range of illnesses that might appear as ocular symptoms are included in the category of hematological diseases. Eye symptoms could be the first sign of a hidden hematological condition. One of the main health issues that might have a variety of clinical presentations is blood diseases. The most prevalent hematological anomaly, particularly in third-world countries, is still nutritional anemia. In anemia, the retinal metabolism cannot withstand this prolonged lack of vital supplies without consequences, ultimately succumbing to hypoxic damage.[1]

Therefore, anemia may indicate a retinal injury that presents as pallor or hemorrhage.[2] Even though it is less common, leukemia can cause ocular symptoms such as Roths spots, arteriolar pallor, and proptosis 9–90% of the time. These symptoms can be caused by an opportunistic infection, direct infiltration of the ocular tissue, or accompanying hematological abnormalities.[3] With thrombocytopenia, subconjunctival and retinal hemorrhages can happen regardless of the cause. According to earlier observations, there is a connection between ocular symptoms and hematological abnormalities.[4]

Up to 90% of individuals with hematological disorders may experience eye symptoms.[5] There is currently little information available in the literature about hematological disorders and ocular involvement. This could be a result of the rarity of other ocular illnesses and their low likelihood of serious consequences. These anomalies could be present during the disease's progression or therapy,

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or they could be the first sign of an underlying hematological condition.

MATERIALS AND METHODS

This prospective non-interventional study was conducted in the Department of Ophthalmology from October 2023 to January 2024. 50 patients suffering from hematological disorders were evaluated in the ophthalmology department.

Exclusion criteria were patients having diabetes, hypertension, dense cataractous changes, and other media opacities that prevented posterior segment examination.

Methodology

A proforma was created that had the following information: a brief medical history, an ocular history, anterior and posterior segment exams, and a hematological profile of the patient. Every patient received a thorough examination of the anterior and posterior segments, which included measurements of intraocular pressure, best-corrected visual acuity, slit lamp assessment of the anterior segment, dilated retinal examination with an indirect, direct ophthalmoscope, and slit lamp biomicroscopy with a Volk 78 D lens. In cases when fundus photography was performed, good results were obtained. Complete hematological profile, including peripheral blood smear, bone marrow study (for leukemia and paraproteinemias), lymph node biopsy (in case of lymphoma), total leucocyte count, differential count, erythrocyte sedimentation rate, platelet count, and hemoglobin levels were obtained and recorded.

Statistical Analysis

The statistical analysis was performed using SPSS for Windows version 22.0 software. The findings were present in numbers and percentages analyzed by frequency, and percent. The chi-square test was used to find the association among variables. The critical value of *P* indicating the probability of significant difference was taken as <0.05 for comparison.

RESULTS

As per table 1 the most common hematological disorder having ocular manifestations was found to be Leukemia seen in 42% of cases and among them, 86% of leukemia cases had ocular manifestations. Among Leukemia, AML (48%) was found to be the most common category having Ocular issues (50%). Lymphoma was 38% having 47.3% of ocular manifestations. Among Lymphoma NHL was the most common with 100% ocular manifestations. 16% had anemia with almost all having ocular manifestations. The study was male-dominated with 28 (56%). Blood disorders are more prevalent in the age group from 21-to 40 years but ocular manifestations are more from 41-60 years both in males and females. [Table 1]

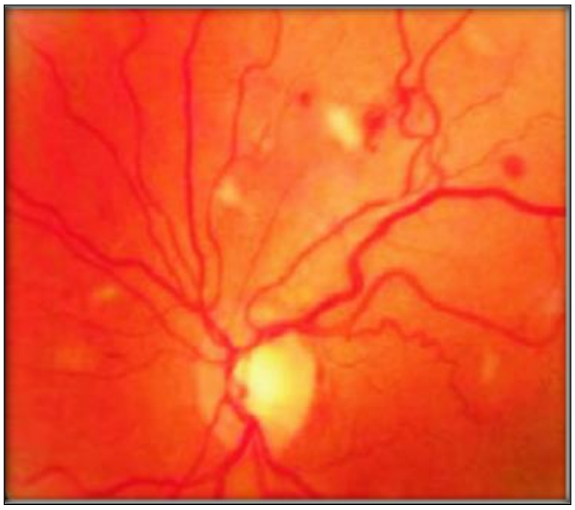

Figure 1: Retinal Haemorrhages in Anemia

As per table 2 with Figure 1, the most common type of hemorrhage was Flame-shaped in both Leukemia and Anemia. Those cases having flame had hemoglobin levels <8g%. Roth Spots are more common in Leukemia as compared to anemic patients. [Table 2]

As per table 3 the most common ocular manifestation was found to be Dry eye which was categorized as per DEWS, followed by Retinal hemorrhage and roth spots. Ptosis was the least common ocular manifestation. And this association was statistically significant (p<0.05). [Table 3]

Table 1: Distribution of Hematological disorders and Ocular manifestations (N=50)

Hematological disorder	Number (%)	Ocular manifestation
Leukemia	**21 (42)**	**18 (86)**
ALL	5 (24)	4 (22)
AML	10 (48)	9 (50)
CML	3 (14)	2 (11)
CLL	2 (10)	2 (11)
Plasma cell leukemia	1 (4)	1 (6)
Lymphoma	**19 (38)**	**18 (95)**
Non-Hodgkins Lymphoma	11 (58)	11 (100)
Hodgkins Lymphoma	7 (37)	6 (86)
T-cell lymphoma	1 (5)	1 (100)
Anemia	**8 (16)**	**7 (88)**
Multiple myeloma	**2 (4)**	**2 (100)**

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Table 2: Types of Retinal Haemorrhage in study subjects

Types	Leukemia (N=18)	Anemia (N=7)
Flame	100%	72%
Roth Spots	50%	42%
Deep	75%	57%
Pre-retinal	12.5%	28%
Sub-hyaloid	12.5	15%

Table 3: Ocular Manifestations among Blood Disorders

Ocular Manifestations	Blood Disorders*							
	AML	ALL	CML	CLL	NHL	HL	Anemia	MM
Dry eye	5	2	1	0	3	1	1	1
Retinal H	3	0	1	1	3	1	3	1
Roth Spots	0	2	0	1	3	1	1	0
Ptosis	0	0	0	0	1	0	0	0
Strabismus	0	0	0	0	1	0	0	0
Nystagmus	0	0	0	0	0	1	1	0
Exophthalmos	0	0	0	0	0	1	0	0
Conjunctivitis	1	0	0	0	0	1	1	0

DISCUSSION

Hematological diseases encompass abnormalities of plasma proteins, coagulation, erythrocytes, leukocytes, and platelets. These conditions can either directly impact the eye or cause ophthalmic symptoms that develop later on in the illness. Ocular symptoms can frequently be the first sign of hematological disorders. The majority of individuals who present with ocular symptoms are symptomatic and need to see an ophthalmologist. Any area of the eye can be affected by hematological illnesses, and each disease may have a different set of symptoms.

The most common ocular symptom in the current investigation was dry eye disease (DED), which ranged in severity from mild to moderate instances; no severe cases were discovered. DED is a crippling illness that can pose a threat to vision. The Tear Film & Ocular Surface Association just released the Dry Eye Workshop II (DEWS II) report.6 DED is described by the Surface Society (TFOS) as a multifactorial ocular surface illness that is typified by a disruption in the homeostasis of the tear film. A major feature of the definition is the presence of ocular symptoms, such as discomfort or vision disruption, or both, together with the etiological roles of hyperosmolarity, injury, inflammation, and abnormalities of the ocular surface.[2,6]

In the present study posterior segment manifestations—such as central retinal vein blockage, Roth spots, cotton wool spots, and retinal hemorrhage—were also more common, especially in leukemia patients. The most frequent symptoms for referral were eye floaters, visual loss, and ocular history of scotomas. The symptoms listed above were either the initial indication of the illness, an early deterioration of the condition, or a warning of a relapse. Leukemic ophthalmopathy can be "primary" due to direct infiltration or "secondary" due to systemic diseases, opportunistic infections, or chemotherapy-related side effects.

Occasionally, proptosis, cranial nerve palsy, significant choroidal infiltration, and exudative retinal detachment can be caused by leukemic cells invading the ocular tissue. Opportunistic infections can result from immunosuppression brought on by disease or its treatment, such as chemotherapy and bone marrow transplantation.[7]

Retinal hemorrhages accounted for the vast majority of leukemia patients (100%) who responded to our survey. This is consistent with the findings of a retrospective cross-sectional study that included 81 patients with acute leukemia, 60% of whom had ocular symptoms.[8] Men revealed a higher propensity, presumably as a result of estrogen's ability to protect women against retinopathy.[9] Furthermore, rheological alterations in blood were the primary cause of most ocular symptoms, primarily affecting the posterior structures more frequently than the anterior section. Ocular symptoms may be influenced by variables like age, bone marrow transplantation or systemic chemotherapy response, leukemia type, staging, and other factors. Furthermore, compared to chronic and lymphoid subtypes, leukemic ophthalmopathy was shown to be more prevalent in acute and myeloid instances.

Compared to AML patients, ALL patients are more likely to experience involvement of the central nervous system (CNS), namely cranial nerve palsy.[10] Furthermore, a significant percentage of individuals suffering from acute leukemia also have ocular symptoms, most of which can be avoided by keeping Hb levels above 7 g/L and platelet counts above 50,000 cells/mm3.[11]

Systemic lymphoma can cause ocular symptoms through direct infiltration into the optic nerve or vitreoretinal space, inflammation of the cornea or conjunctiva, paraneoplastic retinopathy, or drug-induced lesions.[12] Furthermore, intraocular or adnexal regions may be the site of ophthalmic lymphomas. It is rare that ocular appendages, which include visual accessory structures, are connected to malignant hematopoietic proliferation. Non-Hodgkin's lymphomas (NHL) account for the great majority of ocular adnexal lymphomas (OALs), while any type of lymphoma can damage the orbit.

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It is very uncommon in ophthalmologic practice to encounter Hodgkin's lymphoma. OAL's non-specific clinical symptoms and indicators can be confused with those of various other orbital disorders, leading to a delay in diagnosis. Despite the low death rate of OAL patients, blindness can occur in situations that go untreated.[13]

Our study has a few limitations, the sample size of the present study is very small due to which the study cannot generalize the results, followed by the exclusion of patients due to frailty may hinder our ability to fully report the ocular manifestations in our series. These observations require more investigation within the framework of a prospective study.

CONCLUSION

The ocular pathological findings in individuals being monitored for hematological malignancies are reported and evaluated in this study. Numerous cases demonstrate the potential for ocular involvement in these hematological illnesses as well as significant clinical symptoms that may be noted in each. The existence of posterior segment lesions in leukemia patients served as a notable example of this. Males had a higher predisposition to Ocular damage as compared to females.

Furthermore, these cases highlight the need of eye care for patients with hematologic malignancies, especially dry eye illness, given the development of innovative antineoplastic medicines that may increase life expectancy. Our results thus encourage periodic ocular evaluation before, throughout, and after therapy to maximize supportive care and enhance quality of life.

Conflict of Interest: None declared.

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