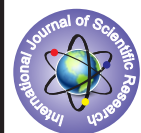


A CASE OF CEREBRAL MALARIA WITH MALARIAL RETINOPATHY IN PEDIATRIC PATIENT



Pediatrics

KEYWORDS: malaria; retinopathy; cerebral malaria

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ABSTRACT

Malarial retinopathy is recently described set of retinal signs diagnostic of severe malaria. This case highlights the importance of detailed binocular fundus examination to detect the presence of malarial retinopathy in cerebral malaria. 5year male was diagnosed as case of cerebral malaria with malarial retinopathy. On admission patient had temperature of 102F, Pulse-110/min, Hepatosplenomegaly with anaemia, altered sensorium, brisk deep tendon reflexes with B/L plantar extensor. Investigations: Hb-8.4mg%, PS-Plasmodium falciparum, USG-Hepatosplenomegaly, CT-generalized cerebral Oedema. Fundoscopy-bilateral normal optic disks, multiple intra-retinal hemorrhages in central retina, subhyaloid hemorrhage in both eyes masking the fovea with retinal whitening and vessel changes. Child was started on IV artesunate for 7 days followed by oral Artemether-lumefantrine combination. Convulsions were controlled with intravenous phenytoin. Over the next 3 days he improved, regained normal sensorium but complained of diminution of vision. Best-corrected vision: RE-6/36, LE-6/60 on discharge. The vision in RE-6/18 and LE- 6/24 at 6-week follow-up. Fundoscopy showed absorbing subhyaloid haemorrhages & intra-retinal hemorrhages disappeared completely.

INTRODUCTION

Cerebral malaria, one of the most severe syndromes caused by infection with *Plasmodium falciparum*, is still a major cause of death in children in India(1). It is defined as an acute, symmetric encephalopathy associated with sequestration of parasite infected erythrocytes in the cerebral vessels and capillaries in patients with falciparum malaria (2). The clinical diagnosis of severe malaria based on WHO criteria requires *Plasmodium falciparum* parasitemia and a measure of severe disease, such as impaired consciousness or severe anemia, with the exclusion of other potential causes of the disease. This is an inclusive definition that relies on accurate assessment of blood films, and the reliable exclusion of other causes of severe disease. In malaria-endemic areas both of these facets of the definition are difficult to achieve (3).

The retina is embryologically part of the central nervous system having similar cellular structure and blood-tissue barrier. Therefore, examination of the retina provides an insight into effects into effects on vasculature of brain and neurological tissue. (4). Retinal whitening and vascular changes are features specific to cerebral malaria which can be used to diagnose cases with cerebral malaria. Retinal hemorrhages, seen in 15% of patients with cerebral malaria is the most common ophthalmoscopic finding in these patients (5,6). They are multiple, bilateral and increase in number with severity of malaria.(7)

CASE REPORT

A 5 year old male was admitted in our hospital with impaired consciousness of 10 to 12 hours duration with chief complaints of:

- Convulsions, high grade fever with chills & rigors and altered sensorium since 4 days.
- Intermittent high grade fever with chills & rigors.
- Abdominal pain and vomiting for last four days.
- Convulsions
- Altered sensorium

Past history:

- There was no history of diabetes mellitus, hypertension, TB, asthma, IHD.
- There was full term normal delivery. Baby cried at birth and no signs of any delayed milestones.
- No history of any long term medication or fever in past.

Drug history: Patient was given antipyretic drugs. No other

treatment was given.

Examination

General:

Pulse: 110/min

Temperature: 102F

BP: 150/100 mmHg

Marked Pallor, mild icterus

Per abdominal: hepatosplenomegaly with anaemia

Rest NAD

CNS : Patient was not oriented for time place & person (altered sensorium)

- Motor system: DTR-brisk +++
B/L – planter extensor
- CVS: bi-basilar crepts on auscultation of chest

Fundus Examination: Done after dilatation with mydriatic.

Right Eye (fig. 1):

- Media was clear
- Disc: WNL
- Retinal Peripheral whitening: in mosaic pattern in the peripheral fundus
- Vessel Changes: whitish discoloration of retinal vessels was found in peripheral fundus involving peripheral trees, with narrow blood column.
- Haemorrhages: Flame Shaped, blot and boat shaped hemorrhages were seen in periphery. Multiple intra-retinal hemorrhages scattered in the central retina.

Left Eye (fig. 2):

- Media was clear
- Disc: WNL
- Retinal Peripheral whitening: in mosaic pattern in the peripheral fundus
- Vessel Changes: whitish discoloration of retinal vessels was found in peripheral fundus involving peripheral trees, with narrow blood column.

Hemorrhages: Flame Shaped, blot and boat shaped hemorrhages were seen in periphery. Multiple intra-retinal hemorrhages scattered in the central retina. Subhyaloid hemorrhage was noticed masking

the fovea.

Investigations

- Severe normochromic normocytic anaemia :Hb-8.4mg%, Hematocrit12%
- WBC: 9,800/mm³
- Platelets: 1.05 lac/mm³
- Marginally deranged liver enzymes : SGOT-150U/L and SGPT-86U/L Ps/MP- ring stage of plasmodium falciparum with crenated RBCs and schizonts
- USG examination showed hepatosplenomegaly (fig. 3) On CT, brain showed generalized cerebral edema with effacement of sulci and gyri suggestive of cerebral edema. (fig. 4) CECT was not performed due to previous history of sensitivity to contrast agent.
- Cerebrospinal fluid examination was normal

Treatment

- Child was started with IV anti malarial (artesunate, IV) for 7 days.
- Followed by oral artemether-lumefantrine combination.
- Condition improved after the treatment.
- Convulsions were controlled with Phenytoin IV.
- Meticulous nursing care was given.
- Fluid intake and output charts were maintained and monitored along with temperature, respiratory rate and depth, blood pressure and vital signs.
- Over the next three days he steadily improved, regained normal sensorium but complained of diminution of vision.
- Best-corrected vision was 6/36 in RE and 6/60 in LE on discharge.
- The peripheral retinal examination was normal.
- The patient was reassured and kept on regular follow-up.
- The vision in right eye was 6/18 and in left was 6/24 at six-week follow-up visit.
- Funduscopy revealed absorbing subhyaloid hemorrhages. The intra-retinal hemorrhages disappeared completely.
- Right Eye (recovery stage): Macular whitening around inferior fovea and temporal macula. White-centered hemorrhages are temporal to the disc and on the superior macula. Peripheral whitening is outside the vascular arcades. (Fig. 5)
- Left Eye (recovery stage) Recovering from cerebral malaria shows multiple preretinal hemorrhages as well as superficial retinal hemorrhages. (Fig.6)

DISCUSSION

Malaria is a common parasitic disease in India associated with significant morbidity and even mortality in complicated cases. Early detection and treatment go a long way in preventing complications, thus, reducing the mortality. Cerebral malaria causing 2 million deaths annually worldwide, is the most dangerous complication of malaria. The pathogenesis of cerebral malaria appears to be decreased flow in microcirculatory vasculature caused by sequestration of parasitized erythrocytes, malarial toxins leading to neuronal injury and excessive cytokine production causing axonal dysfunction leading to neurological disability, coma and death(8).

Retinal and cerebral tissues are both neuroectodermal in origin, thus, there is striking similarity between their structure and function. Thus, it can be safely said that changes in retina can give an insight into damage produced in brain tissue. A detailed ophthalmoscopic examination with dilated pupils is therefore indispensable in patients with cerebral malaria.(9)

Detection of malarial retinopathy can be used as diagnostic test for cerebral malaria. Presence of retinal abnormalities and their severity is an indicator of prognosis in patients with cerebral malaria.

Various literatures have emphasized the diagnostic importance of malarial retinopathy in diagnosis of severe malaria. vessel changes and retinal whitening are two most specific signs of severe malaria. Autopsy data suggest that presence of malarial retinopathy provides a positive finding in diagnosing cerebral malaria rather than relying

on exclusion of other causes.

PATHOGENESIS:

The pathogenesis of P.falciparum malaria is characterized by cytoadherence, rosetting and agglutination. The diseased erythrocytes get sequestered in microvessels by cytoadherence due to the presence of high molecular weight adhesive proteins on erythrocytes' surface causing them to stick to the receptors on venular and capillary endothelium. Also, infected RBCs adhere to uninfected RBCs to form rosettes and agglutinate RBCs.

During ophthalmoscopy, only the red blood column of retinal vessels is seen. Tramlining, and orange and white appearance of vessels is due to sequestered erythrocytes whose hemoglobin has been consumed by parasites. It has been seen during fundoscopic examination that the number of retinal hemorrhages correlates with the number of cerebral hemorrhages in fatal cerebral malaria (10). In common with cerebral hemorrhages, fibrin thrombi are seen in the small vessel at the center of hemorrhages and hemorrhaged red blood cells rarely contain parasites.

These suggest that macular whitening is caused by oncotic swelling of second-order neurons in the inner retina due to metabolic or hypoxic stress. A study using fundus fluorescein angiography shows that metabolic steal by intravascular parasites may play a role, rather than capillary obstruction, which was not seen in association with macular whitening. The typical distribution of macular whitening, in sites of high metabolic demand and in vascular watershed zones, supports causation by metabolic steal or hypoxia over toxic malarial products, cytokines, or nitric oxide.

CONCLUSION

Through this case report we have tried to emphasize the importance of bilateral ophthalmoscopic examination in patient with cerebral malaria, thus, assessing the severity and prognosis of the disease. Treating physician should be well aware of this development and this examination should not be missed especially in complicated cases.

CONFLICT OF INTEREST

NIL

FIGURE LEGENDS

Figure 1: Right Eye: Large number of retinal hemorrhages with retinal whitening.

Figure 2: Left Eye: Large number of retinal hemorrhages-Dot, Flame Shaped and Subhyaloid haemorrhage

Figure 3: USG: Hepatosplenomegaly

Figure 4: CT brain: Cerebral edema

Figure 5: Right eye, recovery stage

Figure 6: Left eye, recovery stage

FIGURES

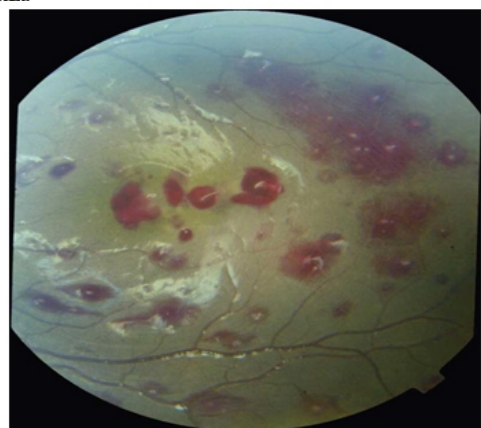


Figure 1: Right Eye: Large number of retinal hemorrhages with retinal whitening.

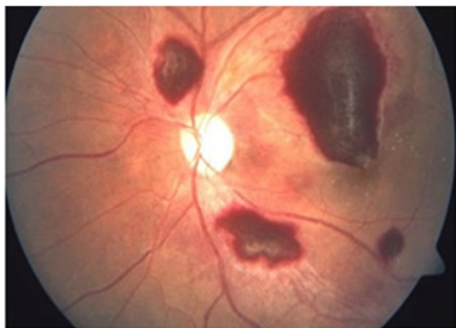


Figure 2: Left Eye: Large number of retinal hemorrhages-Dot, Flame Shaped and Subhyaloid haemorrhage



Figure 3: USG: Hepatosplenomegaly

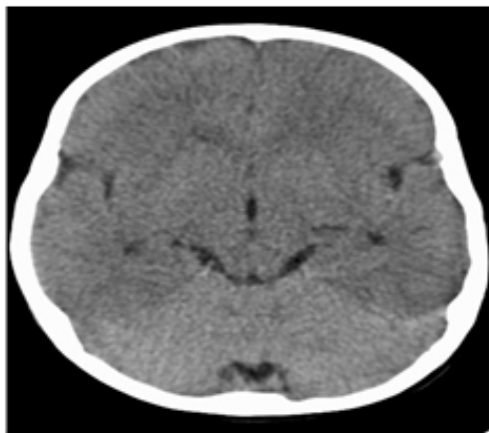


Figure 4: CT brain: Cerebral edema

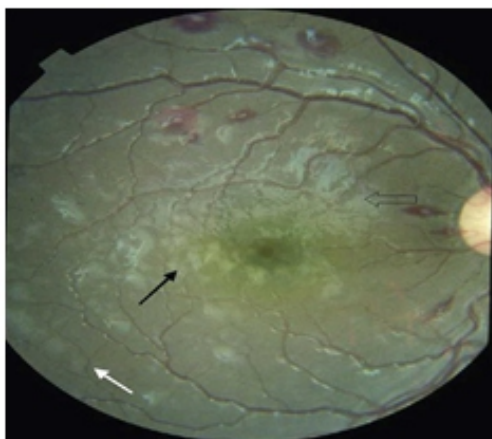


Figure 5: Right eye, recovery stage

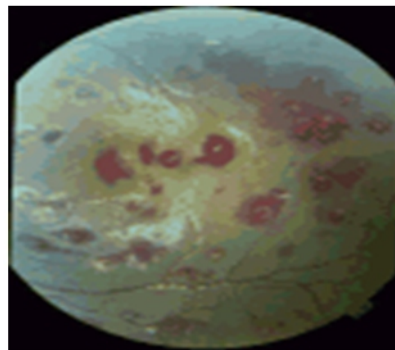


Figure 6: Left eye, recovery stage

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