ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Posthumous Diagnosis of Plasmodium Vivax Infection Causing Death: A Rare Entity.

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ABSTRACT

The malarial infection leading to morbidity and mortality is common throughout the world. Sudden deaths due to malarial infection are not uncommon. These unexpected sudden deaths pose a challenging task to the forensic pathologist. Such deaths are more commonly due to Plasmodium falciparum. However deaths due to Plasmodium vivax are also reported in the literature. The Plasmodium vivaxinfection can lead to cardiac functional abnormality in already compromised heart. We present a case of sudden death wherein post mortem analysis of blood revealed the Plasmodium vivax infection helping us to ascertain the cause of death.

Keywords: Malaria, *Plasmodium vivax,* Postmortem analysis

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ISSN: 0975-8585

INTRODUCTION

Malaria is derived from *mal* ("bad") *aria* ("air") inMedieval Italian. This idea came from the Ancient Romans who thought that this disease came from the horrible fumes from the swamps. Malaria is an acute febrile infectious disease of vector transmission, caused by parasitic protozoans of the genus *Plasmodium*. It is a major public health problem in India, wherein the total number of cases reported in 2012 was about 1.06 million, out of which 519 deaths [1] have been reported, which contributes significantly to the overall malaria burden in Southeast Asia. The two major malaria species in India are *Plasmodium falciparum* and *vivax. However, Plasmodium malariae* has been reported in state of Orissa, while *Plasmodiumovale* appears to be extremely rare if not absent. Deaths due to *Plasmodium vivax* is rare when compared to *Plasmodium falciparum*, however deaths due to *vivax* have been occasionally reported in literature due to various complications. Hereby, we are presenting one such case wherein death occurred due to complications of *vivax* malaria, which was a result of exacerbation of pre existing disease found by postmortem examination.

Case Report

History

A 32 year old male with alleged history of high grade fever for 3 weeks was treated symptomatically by a local physician. In view of his poor response to the treatment; he was referred to a tertiary care hospital for further management. On arrival to the hospital he was declared as brought dead. The body was subjected to post-mortem examination to ascertain the cause of death.

At Autopsy

On external examination, yellowish discoloration of sclera and palms were present. There were no injuries over the body.

On Internal Examination, heart weighed 295 gm. The walls were unremarkable. The left ventricular wall and the right ventricular wall thickness were 1.4 cm and 0.3 cm respectively. All the coronaries showed atherosclerotic changes with left anterior descending artery showing more than 90% occlusion of its lumen on cut section. Spleen weighing 340 gm waspulpy and congested on cut section. All the other organs were unremarkable.

Histopathological Examination

Left anterior descending artery showed more than 90 % occlusion of its lumen by atheromatous plaque (Fig.1). Tricuspid valve area showed neutrophilic infiltration of the underlying cardiac muscle fibres (Fig. 2). Spleen showed expanded red pulp with congestion, extra medullary hematopoiesis and interspersed white pulp (Fig. 3).

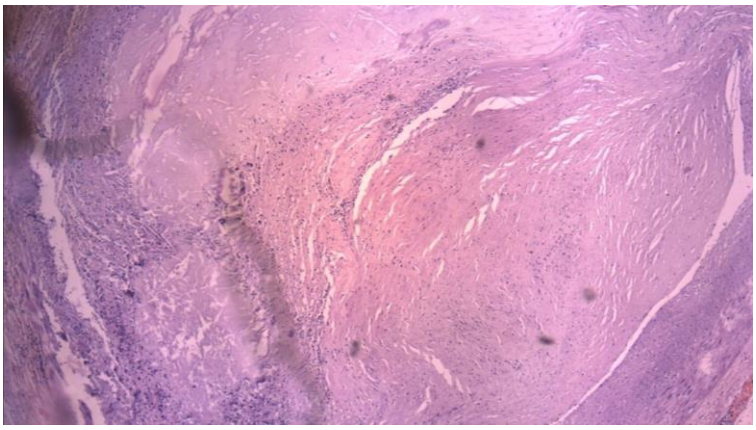

Figure 1: Left anterior descending artery showing >90 % occlusion of its lumen by atheromatous plaque (Haemotoxylin & Eosin stain, 5X)

ISSN: 0975-8585

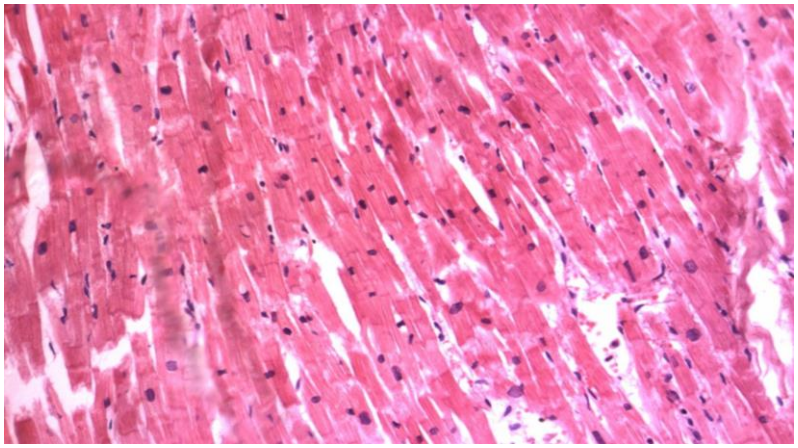

Figure 2: Tricuspid valve area showing neutrophilic infiltration of the underlying cardiac muscle fibres (Haemotoxylin & Eosin stain, 20X)

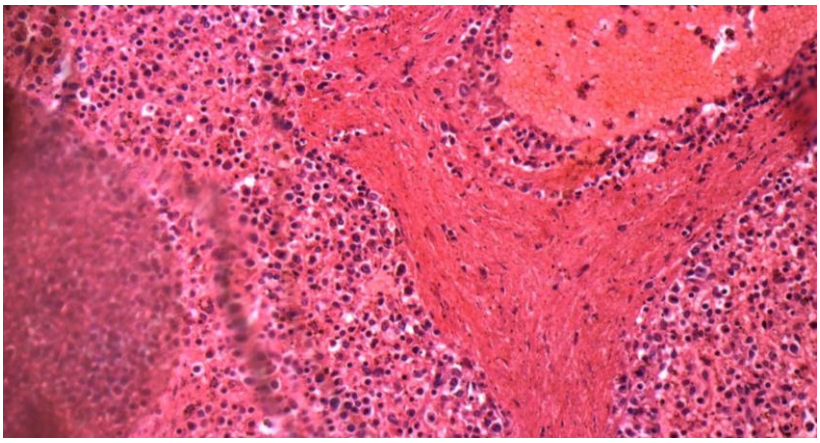

Figure 3: Spleen showing expanded red pulp with congestion, extra medullary hematopoiesis and interspersed white pulp (Haemotoxylin & Eosin stain, 20X)

Postmortem Peripheral Smear Examination

Postmortem blood (Thin smear) sample was sent for peripheral smear examination. It revealed the presence of schizonts of *Plasmodium vivax*(Fig. 4).

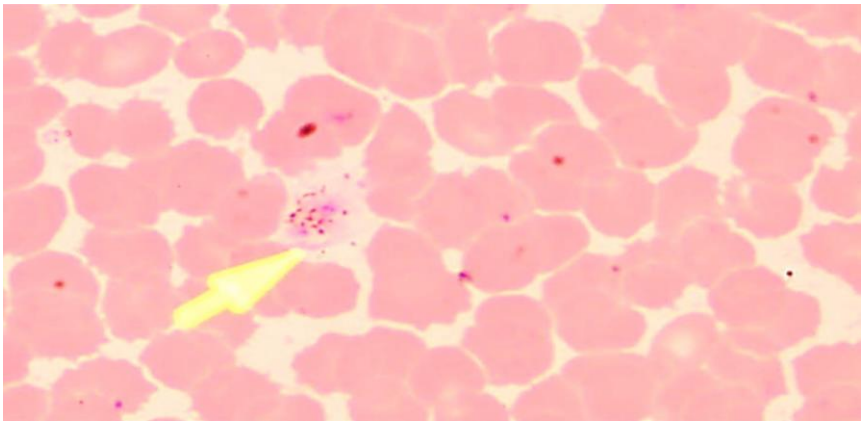

Figure 4: Peripheral smear examination showing the presence of schizonts of *Plasmodium vivax* (Haemotoxylin & Eosin stain, 100X)

Cause of Death

The cause of death is opined, as the deceased died due to complications of coronary artery disease, exacerbated by Malaria, a natural disease.

DISCUSSION

Adherence of parasitized erythrocytes to activated endothelium associated with impaired bioavailability of endothelial nitric oxide causes microvascular obstruction and tissue ischemia [2].The mechanism behind the endothelial activation is not clear. The angiogenic factors like angiopoietin-2 (Ang-2) and Vascular endothelial growth factor (VEGF) are modulators of activation of endothelium, with weibel-palade bodies (WPBs) releasing angiotensin-2 which is regulated by endothelial nitric oxide [3].Cytokines like tumor necrosis factor α can impair myocardial function via negative inotropic effects [4].Several process involved in the pathogenesis of severe malaria, such as the rapid increase in the number of infected erythrocytes, destruction of infected RBCs, inflammatory process and obstruction of microvasculature by the products released during cellular injury, which ultimately leads to reduction in the tissue perfusion [5]. Intercellular adhesion molecule 1(ICAM-1) and chondroitin sulfate A (CSA) are the two endothelial receptors participating in *Plasmodium falciparum* infection, which are also involved in the pathogenesis of *Plasmodium vivax*. In *Plasmodium vivax*, there are other proteins which are expressed on the surface of infected erythrocytes and these are variant genes, which are called as "VIR" family. They are known to mediate the cytoadhesion process [5]. Occlusion of Left anterior descending artery more than 90 % per se due to malaria in short duration is unlikely. Co-morbidities like chronic liver disease, coronary artery disease can contribute to the outcome. Hence, in this case the effects of malaria have exacerbated the pathology of pre-existing coronary artery disease which has resulted in death.

CONCLUSION

Deaths due to *Plasmodiumvivax* malaria is a rare entity, one should be aware of certain rare complications like Acute respiratory distress syndrome (ARDS) [6], Acute kidney injury (AKI) [7], Pericardial effusion [8], Myocarditis [9] and complications like in the above mentioned case. This would be of great value to the physicians in treating a case of *Plasmodiumvivax* malaria.

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