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Hyperviscosity Syndrome Revealed by White-Centered Retinal Hemorrhages (Roth Spot)

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Abstract **Case Report**

White-centered retinal hemorrhages, also known as Roth spots, have long been considered pathognomonic of infective endocarditis but can be associated with several pathologies. They can be a presentation of a blood hyperviscosity syndrome in the context of multiple myeloma, light chain gammopathy, or cryoglobulinemia through a mechanism of retinal venous stasis, potentially progressing to vein occlusion. We present the case of a 55-year-old woman with no significant medical history who presented a gradual bilateral decline in visual acuity. Fundoscopic examination revealed multiple white-centered hemorrhages, and further investigation promptly linked them to a blood hyperviscosity syndrome.

Keywords: White-Centered Hemorrhages, Blood Hyperviscosity Syndrome, Multiple Myeloma, Fundoscopy.

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INTRODUCTION

White-centered retinal hemorrhages, also known as Roth spots, were first described by Moritz Roth, a Swiss physician, in 1872. However, it was not until 1878 that this condition was officially named "Roth spot" by Moritz Litten. Roth spots have long been considered pathognomonic of infective endocarditis but can be associated with several pathologies [1]. They represent a manifestation of retinal capillary rupture and the reparative process leading to the formation of a central white thrombus, composed of a mixture of white blood cells, platelets, and fibrin [2].

CASE REPORT

We present the case of a 55-year-old female, a homemaker with no significant medical history, who presented to our ophthalmology department at the Mohammed V Military Instruction Hospital (HMIMV) in Rabat with rapidly progressive bilateral visual acuity decline over the past month. On clinical examination, visual acuity was 6/10 in the right eye (OD) and 4/10 in the left eye (OS). Anterior segment examination was unremarkable in both eyes. Intraocular pressure was within normal limits in both eyes. Fundus examination revealed bilateral diffuse white-centered retinal hemorrhages (Roth spots) in all four quadrants. Fluorescein angiography demonstrated masking effects of the multiple retinal hemorrhages. Urgent complete blood count revealed thrombocytopenia at 20,000/mm³, normocytic anemia at 6.8 g/dL, and leukopenia at 2800/mm³. Due to this pancytopenia, the patient was referred to the hematology department where a diagnosis of multiple myeloma with blood hyperviscosity syndrome was made after performing serum protein electrophoresis and immunofixation, revealing a kappa IgG light chain myeloma confirmed by a bone marrow aspirate showing 21% infiltration of dystrophic plasma cells. Treatment consisted of bortezomib, lenalidomide, and dexamethasone combination therapy, with additional plasma exchange therapy administered to the patient.

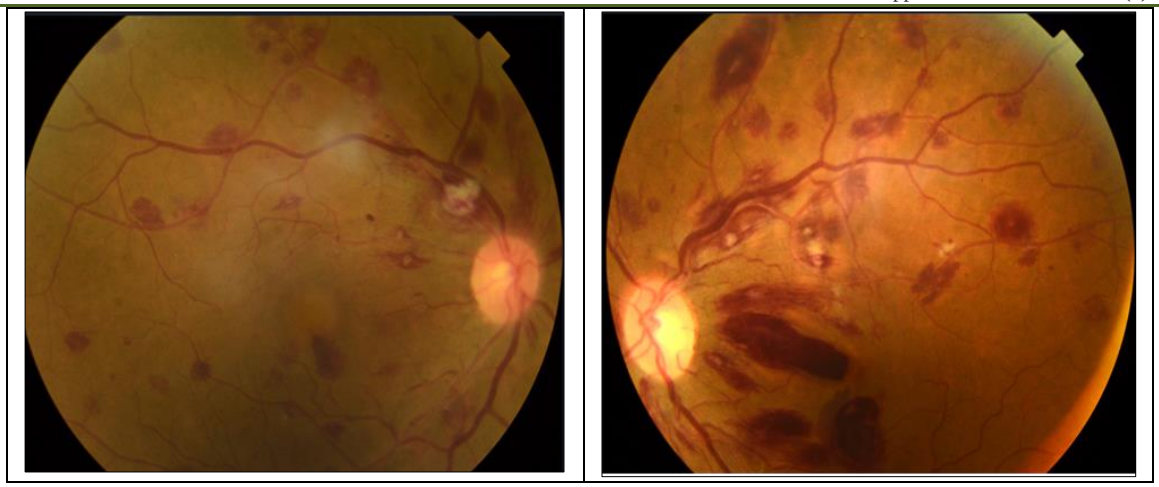

Figure 1: Retinography showing the presence of multiple diffuse white-centered hemorrhages (Roth spots) in all four quadrants in ODG

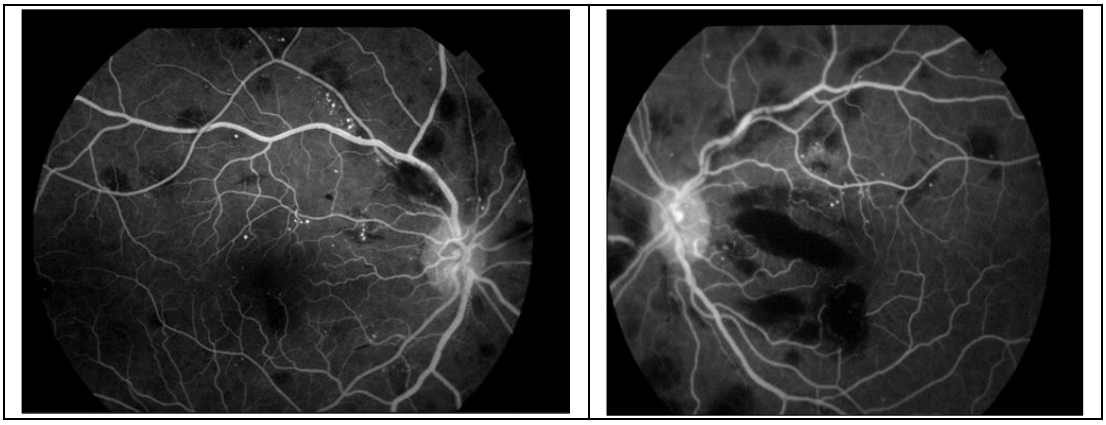

Figure 2: Late-phase fluorescein angiography showing masking effects of multiple retinal hemorrhages in ODG

DISCUSSION

White-centered retinal hemorrhages, also known as Roth spots, are a nonspecific ophthalmological finding seen in various systemic conditions of diverse etiologies, with retinal endothelial dysfunction playing a central role among the various causes of Roth spots [1]. They can serve as an indicator of a blood hyperviscosity syndrome in the context of multiple myeloma, light chain gammopathy, or cryoglobulinemia through a mechanism of retinal venous stasis, which can progress to vein occlusion [3]. Typical features on fundoscopic examination include tortuous and dilated veins, as well as retinal hemorrhages in the form of spots or flame-shaped lesions, including white-centered hemorrhages. Fluorescein angiography confirms venous stasis by showing a marked delay in venous circulation, and these abnormalities are usually bilateral [4]. Blood hyperviscosity syndrome represents a medical emergency characterized by the onset of symptoms and clinical manifestations resulting from increased blood or plasma viscosity, leading to tissue oxygenation impairment [5]. Roth spots can appear and disappear rapidly. Visual prognosis depends on the location of these hemorrhages (macular or non-macular) and associated lesions, as well as the underlying etiology [6]. Spontaneous resolution of preretinal hemorrhages can sometimes extend over several months, posing a risk of visual function deterioration due to toxic damage to macular photoreceptors from prolonged contact with hemoglobin and iron [7].

CONCLUSION

Roth spots represent a retinal manifestation that can occur in various pathologies, some of which are life-threatening. This underscores the importance of conducting a through etiological investigation when encountering these spots during fundoscopic examination.

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