Renal cortical necrosis and thrombotic microangiopathy caused by Plasmodium vivax- a case series

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INTRODUCTION

- Malaria is one of the world's major infectious diseases, especially in endemic developing countries
- Estimated 241 million malaria cases and 627, 000 malaria deaths were reported worldwide in 2020
- In last two decades, there have been changing trends of plasmodium vivax from benign to severe life-threatening complications
    - multiorgan dysfunction,
    - thrombocytopenia,
    - haemolytic anaemia, and
    - renal impairment
- Herein, we present three cases of renal cortical necrosis and thrombotic microangiopathy (TMA) in young females having Plasmodium vivax (P. vivax) infection

CASE REPORT

Case 1:

- 25/F with fever for 10 days and anuric for 3 days. Tested positive for Vivax on malarial card test
- Clinical investigations showed anaemia, thrombocytopenia, haemolytic anaemia & renal impairment with Sr Cr 5.7mg%

Case 2:

- 35/F diagnosed with P.vivax malaria presented with fever, headache, abdominal pain , & high coloured urine, followed by anuria. She had thrombocytopenia and hemolysis and underwent six sessions of haemodialysis but Sr Cr remained elevated (6.1mg%)

Case 3:

- 22/F diagnosed with P. vivax malaria presented with anuria for 4 days. On Lab investigation LDH was 3200IU/L and Sr Cr of 5.8mg%. She had thrombocytopenia and was transfused packed red blood cells & platelets with initiation of haemodialysis

-All the 3 patients underwent renal biopsy in view of clinical suspicion of thrombotic microangiopathy

Light Microscopy

Case 1:

- Renal cortical necrosis with infarcted glomeruli & tubules
- Entrapped malarial schizonts with peripheral haemozoin pigment in the infarcted glomeruli
- Myoglobin casts

Case 2:

- 20/23 glomeruli showed mesangiolysis
- Presence of entrapped malarial schizonts in thrombosed glomerular capillary loops
- Multiple infarcted tubules & microvascular thrombi in arterioles

Case 3:

- Diffuse cortical necrosis with malarial schizonts and haemozoin pigment in thrombosed glomeruli.
- Fibrinoid necrosis, microvascular thrombi & entrapped schizont forms in artery

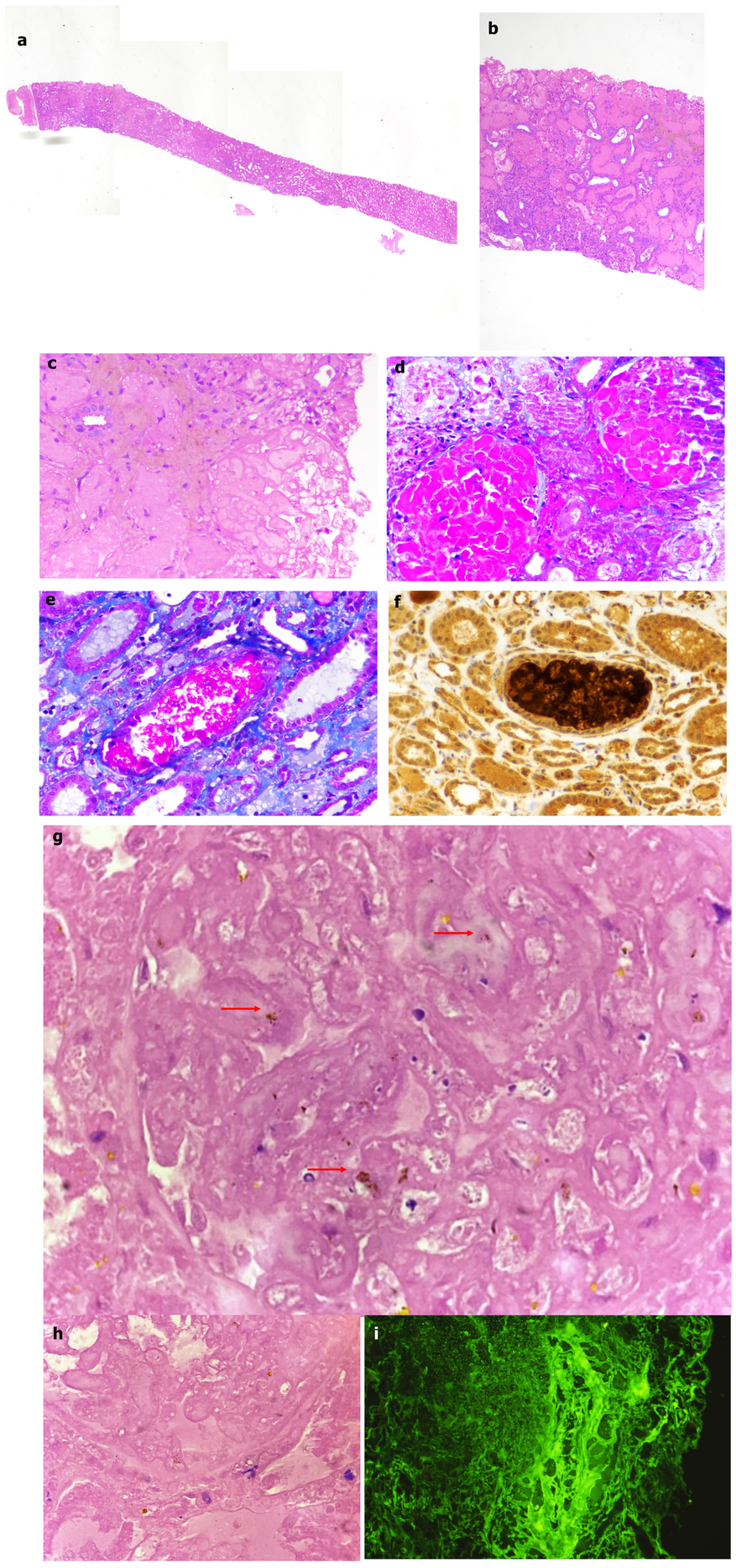

Figure a) shows patchy cortical necrosis of the biopsied core (H&E x40) b)Coagulative necrosis of tubules (H&E x100),c) The tubular & glomerular basement membranes are visible without any viable nuclei (H&E x400), d) The glomerulus shows fibrin thrombi (PAS x400),e) Occasional tubules show fragmented casts, brick-red in colour on masson's trichrome x400, f) Immunohistochemistry for myoglobin highlights the casts x400, g) & h) Many ring forms of malarial schizonts (red arrows) are seen in the infarcted glomerular capillary loops (H&E, oil immersion), i) Fibrinogen highlighted fibrinoid necrosis of the vessel on immunofluorescence microscopy x200

DIAGNOSIS

- Acute Cortical Necrosis
- Thrombotic microangiopathy
- Schizonts of P. vivax in thrombosed glomeruli
- Myoglobin casts

DISCUSSION

- P. vivax malaria is usually uncomplicated
    - Rarely fatal
- P. vivax is capable of inducing fever at levels of parasitemia lower than those causing fever in P. falciparum infection
- Host inflammatory response is activated to a greater extent
- Plasma levels of fever-inducing cytokines such as TNF-α is higher in vivax malaria compared to P. falciparum with similar parasitemia
- TNF-α is a myotoxin
- Red-cell sequestration in skeletal muscle, toxins derived from parasite, and lactic acidosis may cause myositis, myonecrosis, and rhabdomyolysis
- All three in our series developed severe complications
- They showed a spectrum of patchy to diffuse cortical necrosis with TMA along with entrapped malarial parasite schizonts within thrombosed and necrosed glomeruli & blood vessels
- Cases have been reported connecting TMA caused by p.vivax as part of an atypical hemolytic uremic syndrome(a HUS)
- The previous case reports mentioned in recent literature are majorly young females similar to our series

Article	Case- age/gender	Renal biopsy findings
V.B Kute et al. 2012	29/F	7/10 glomeruli necrosed, ACN
R kumar et al, 2014	17/f	9/15 glomeruli coagulative necrosis.
M.P Patel et al, 2015	1.20/f, 2. 24/f	PCN, organizing thrombi PCN, subintimal fibrin thrombi, endothelial swelling
R.K. Nair et al, 2019	24/f	PCN, TMA
Kaur et al, 2020	1.23 2.20 3. 22 4.30 5.50	Patchy ACN ACN Patchy ACN Multifocal cortical necrosis, scarring, chronic TMA Acute cortical necrosis, TMA
Our cases	1. 25/F 2.35/F 3.22/F	Focal ACN, TMA, myoglobin cast nephropathy Patchy ACN, TMA, ATI Diffuse cortical necrosis

CONCLUSION

To the best of our knowledge, this is the first case series displaying the presence of P. vivax schizonts in the thrombosed glomeruli & capillary loops, confirming their role in the development of TMA and related complications in infected individuals

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