CASE REPORT

Malaria and filariasis: An unusual coinfection in South East Asia

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SUMMARY

Coinfections are infrequently reported and rare in literature. Tropical infections such as malaria, leptospirosis and filariasis are endemic in a temperate country such as Malaysia. Most of the studies pertaining co-infections centres on Malaria, as it is one of the most prevalent infectious diseases in the world. All three disproportionately affect low-middle-income countries with poor sanitation and vector control. We report with us a Bangladeshi man who was infected with malaria and filariasis, with also serological evidence of previous leptospirosis infection. He was successfully treated with local protocols.

INTRODUCTION

In tropical countries, malaria and leptospirosis are typically characterised as acute infections. Patients typically present with fever and progress rapidly, with potential complications such as acute kidney injury, acute liver failure, acute respiratory distress syndrome and disseminated intravascular coagulopathy. Death is a real possibility. Diagnosis is easily made with Thick and thin blood films (BFMP) for malaria, while leptospirosis is typically screened via ELISA upon clinical suspicion, with MAT titre ≥400 or a demonstration of fourfold rise between acute and convalescent serum or PCR as follow-up confirmation. Filiariasis, on the other hand, while endemic in Malaysia, is uncommonly seen in day-to-day practice as it presents chronically and is identified by Clinicians only when complications such as elephantiasis have set in. Additionally, it can be difficult to diagnose as periodicity is typically exhibited by parasites, which can be difficult to pick up via microscopy. Generally, PCR has been advocated as a gold standard for leptospirosis and filariasis but is not feasible inresource-limited settings.

CASE PRESENTATION

A Bangladeshi man in his 30s presented with fever, chills, rigour, vomiting and lethargy for the past 3 days prior to admission. He is a migrant worker at a local oil palm plantation, his main occupation involving harvesting and gathering of the palm oil kernel, with frequent exposure to mosquitoes during dusk and dawn. He otherwise denies any ill contacts, travel history, chest pain, and shortness of breath. He is not known to have any medical illness and is not on any medications, with no previous hospitalisation or surgeries. Upon arrival, he was lethargic, but otherwise conscious, not in any respiratory distress. He is also hemodynamically stable. Cardiovascular and lung examination was unrevealing, but Splenomegaly of 2 finger breath (4 cm) was noted on abdominal palpation, with no hepatomegaly or lymph nodes appreciated. The patient has no meningismus or rashes and is fully cooperative with a normal neurological examination. FBC was significant for thrombocytopenia (Plt: 94 × 10^9/L), while Hb was 13 g/dL, as was WBC 8 × 10^9/L. Renal profile and liver function test were found to be normal (Table I). CXR is clear, and ECG revealed only normal sinus rhythm. He was then started on IV Drip for maintenance and IV Ceftriaxone 2g STAT and OD to cover for acute undifferentiated febrile illness and blood cultures drawn. Point of care testing for dengue, the most prevalent anthropod disease, proved negative.

In view of patients' clinical presentation and nature of occupation, atypical infections were at the forefront of suspicion. As such, blood film for malarial parasites, peripheral blood film (taken at 11 pm on admission), leptospiral IgM was sent. Few hours later, thin blood films confirmed the presence of Plasmodium Vivax (Asexual 708 counts; Sexual 2124 counts) (Fig. 1). The same blood film also confirmed the presence of 6 counts of *Wucherceria bancrofti* (Fig. 2). The laboratory also confirmed a positive Leptospiral IgM (MAT was sent to MKAK). Oral Riamet 4/4 Tabs were started immediately at 0, 8, 12 hours for the *Plasmodium vivax*, while oral albendazole 400 mg STAT and oral diethylcarbamazine (DEC) 6 mg/kg (total: 350 mg OD) were started for the filariasis. IV Ceftriaxone 2g OD was continued as a treatment for leptospirosis.

Fortunately, he responded well to therapy and was gradually then transitioned to Tablet Doxycycline 100 mg BD as a continuation of therapy for the leptospirosis. He was eventually discharged from our centre after 1 week. No malarial and wuchereria parasites were seen on blood film upon discharge. Discharge medications include tablet primaquine 30 mg OD, tablet diethylcarbamazine (DEC) 100 mg TDS and tablet doxycyline 100 mg BD for 2 weeks each for hypnozoite, filariasis and leptospirosis eradication, respectively. He was then referred to a local clinic for directed observed therapy under the supervision of a health inspector and completed treatment successfully.

DISCUSSION

Since 2000, Malaysia has aggressively tackled filariasis by initiating massive drug administration (MDA) upon identification of at-risk areas.[1] While Malaysia has not attained a lymphatic filariasis-free status, it is gradually getting there due to steadily reducing cases. The presence of *Wuchereria bancrofti* in our patient is thus unsettling. 90% of

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Table I: Summary of blood investigations

Day of admission	1 Admission	3	5	7 Discharge
Hb (g/dL)	13	13.2	12.2	12.2
WBC (/mm3)	8	4.5	5.6	10.7
Plt 10^3/µL	94	158	198	304
Htc (%)	-	40.3	37.9	37.2
Urea (mmol/L)	3.8	3.6	4.0	3.7
Cr (mmol/L)	67	83	81	83
Na (mmol/L)	141	140	142	138
K (mmol/L)	3.98	3.38	3.69	3.28
Cl (mmol/L)	103	97	101	99
Albumin (g/L)	39	42.7	36.6	38.3
Globulin g/L	43	42.3	36.3	34.6
Bilirubin (umol/L)	30.5	28.7	13	31
ALT (units/L)	22	24	-	-
ALP (units/L)	85	82	-	-
CK (units/L)	-	58	-	-
LDH (units/L)	-	375	-	-
ESR (ng/mL)	35	-	-	-
Malaria	Plasmodium Vivax Asexual : 708 Sexual : 2124	Not detected	Not detected	Not detected
Filariasis	6 counts of Wuchercia Bancrofti	2 counts of Wuchercia Bancrofti	Not detected	Not detected

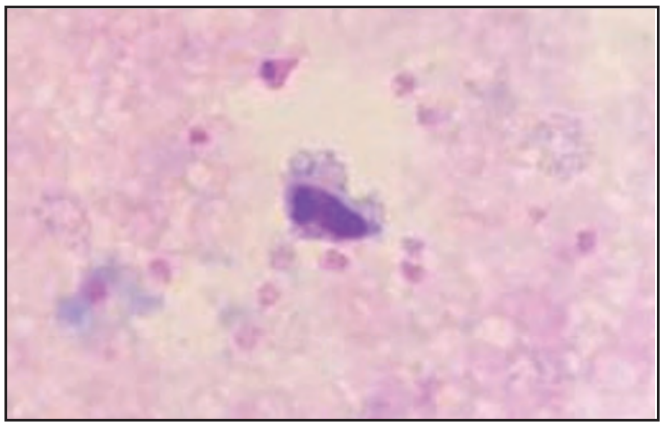

Fig. 1: Peripheral thin blood film confirmed the presence of Plasmodium Vivax

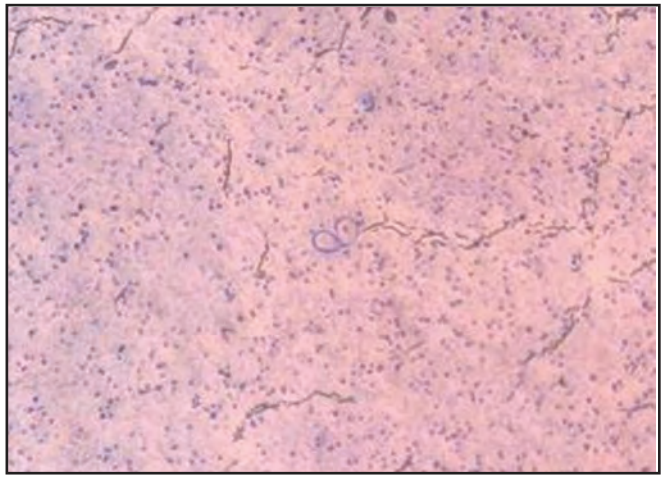

Fig. 2: The peripheral blood film confirmed the diagnosis of filariasis by identifying the presence of *Wucherceria bancrofti*

all filariasis worldwide is Bancroftian in origin. It is endemic in both Malaysia and Bangladesh. In Malaysia, however, WB constitutes only 2% of all filariasis cases reported. The predominant microfilaria is *Brugia malayi*.[2] It is thus likely our patient was first infected with *Wuchereria bancrofti* in his home country. Such cases are termed 'imported filariasis' and have previously been reported during health screening of incoming migrant workers.[3] Gatekeeping is thus imperative as immigrants have the potential to reintroduce pathogens that have been previously eradicated or controlled in the host country. This is paramount, as the vector for filariasis, the mosquito *Anopheles or Culex* is present in Malaysia.[1]

Our patient has resided in Malaysia for almost 2 years prior to presentation, with no previous medical illness and hospitalisation noted. Given the incubation period of Malaria, he was likely infected locally.[4] Comprehensive health screening is mandatory for all blue-collar foreign workers as per FOMEMA (Foreign Workers Medical Examination Monitoring Agency); this includes Malaria screening (but not filariasis). It is unlikely he would have been allowed to work in Malaysia were Malaria screening has proven to be positive.[5] While it is easy to assume that - infection portends more severe infection, co-infection of malaria with microfilariae is actually associated with lower parasite density and less severe anaemia. This is due to the upregulation of IFN g (a Th1 response) which is responsible for clearing malaria parasites. At the same time, upregulation of IL 10 (a Th2 response) is important for filarial parasite survival.[6,7] The net effect between these two responses, pro-inflammatory (Th1) versus anti-inflammatory (Th2), ultimately results in less inflammation, translating to less anaemia and parasitemia.[8]

While co-infections of malaria and Wuchereria bancrofti are a possibility, they occur by chance (pooled prevalence of

0.7%, n = 83863). The Africa continent reports a higher prevalence coinfection (1.7%), while the prevalence in Asia is low (0.2%). The low prevalence of coinfection in Asia further lends weight to our suspicion that our patient was likely infected in stages, likely *bancroftian* filariasis first in his home country, followed by *Plasmodium Vivax* in Malaysia. In Malaysia, *Anopheles* species mosquitoes are a major concern, as they can transmit both pathogens. Our patient's nature of outdoor work likely predisposed him as such for *Plasmodium Vivax*. Blood film microscopy is cheap and effective in identifying *plasmodium species*; however not as effective in identifying *Bancroftian* parasites, as they exhibit periodicity, and patients are generally asymptomatic. A better tool for identifying the latter would include molecular methods (PCR) or even rapid test kits. To be cost-effective, screening should be limited to male foreigners originating from countries in which both pathogens and vectors are abundant.[6]

Despite the term coinfection, each pathogen is dealt with individually with specific antimicrobials. Mass Drug Administration (MDA) utilises weight-based diethylcarbamazine (DEC) 6mg/kg and a single dose of albendazole 400 mg to eradicate filariasis. This mode of therapy has been highly efficacious in many countries.[1] Plasmodium Vivax is treated with weight-based Chloroquine and Primaquine, with Riamet in lieu of Chloroquine in areas known to have high resistance. 14 days of primaquine is required as Plasmodium Vivax is known to produce hypnozoites in the liver, which can cause recurrence. G6PD testing is recommended prior primaquine to prevent haemolytic anaemia. Leptospirosis is typically treated with IV ceftriaxone or doxycycline. In our patient, we opted for the latter option as objective evidence of malaria and filariasis was demonstrated.[9] Additionally, ELISA IgM for leptospirosis remains elevated for 6 months since the onset of infection and is poorly discriminant of present or past infection. Our patient's final confirmatory MAT is only 1:100 and does not satisfy the criteria for Acute Leptospirosis (MAT 1:400).[10] Pragmatically, treatment should still be initiated upon a positive serology, particularly in resource-limited settings as confirmatory MAT istime-consuming. In a compatible clinical presentation, treatment delay might result in adverse outcomes.[11] Fortunately, clinical improvement was noted after the initiation of therapy.

CONCLUSION

Coinfection of atypical infections is most certainly possible in Malaysia. Gatekeeping via proper screening at borders is thus the backbone of disease management. Additionally, clinicians should have a high degree of suspicion of coinfections when investigating febrile patients, particularly male patients from endemic areas and treat them accordingly.

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CONFLICT OF INTEREST

This study has no conflict of interest.

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REFERENCES

1. Dickson BFR, Graves PM, McBride WJ. Lymphatic filariasis in Mainland Southeast Asia: a systematic review and meta-analysis of prevalence and disease burden. Trop Med Infect Dis. 2017; 2(3): 32.
2. Noordin R. Lymphatic filariasis and the global elimination program. Malays J Med Sci. 2007; 14(1): 1-3.
3. Ullah MM, Al Balushi AYMD, Al Aliyani NRS, Kalarikkal B, Miranda RIC, Sherif SM,et al. Imported bancroftian filariasis discovered in a patient infected with Plasmodium falciparum: First case of concomitant parasitism in the Al-Buraimi Governorate, Oman. Infect Dis Rep 2020; 12(1): 8304.
4. Hussin N, Lim YAL, Goh PP, William T, Jelip J, Mudin RN. Updates on malaria incidence and profile in Malaysia from 2013 to 2017. Malaria J 2020; 19(1): 55.
5. Loganathan T, Rui D, Pocock NS. Healthcare for migrant workers in destination countries: a comparative qualitative study of China and Malaysia. BMJ Open 2020; 10(12): e039800.
6. Wilairatana P, Kotepui KU, Mala W, Wangdi K, Kotepui M. Prevalence, probability, and characteristics of malaria and filariasis co-infections: a systematic review and meta-analysis. PLoS Negl Trop Dis 2022; 16(10): e0010857.
7. Graham AL, Lamb TJ, Read AF, Allen JE. Malaria-filaria coinfection in mice makes malarial disease more severe unless filarial infection achieves patency. J Infect Dis 2005; 191(3): 410-21.
8. Berger A. Science commentary: Th1 and Th2 responses: what are they? BMJ 2000; 321(7258): 424-4.
9. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.
10. Rosa MI, Reis MF dos, Simon C, Dondossola E, Alexandre MC, Colonetti T, Meller FO. (2017). IgM ELISA for leptospirosis diagnosis: a systematic review and meta-analysis. Ciencia Saude Coletiva 22(12): 4001-12.
11. Wang S, Stobart Gallagher MA, Dunn N. Leptospirosis. StatPearls Publishing; 2022.