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Please read this section first

The HPCSA and the Med Tech Society have confirmed that this clinical case study, plus your routine review of your EQA reports from Thistle QA, should be documented as a "Journal Club" activity. This means that you must record those attending for CEU purposes. Thistle will not issue a certificate to cover these activities, nor send out "correct" answers to the CEU questions at the end of this case study.

The Thistle QA CEU No is: MTS 18/059

Each attendee should claim ONE CEU point for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

DIFFERENTIAL SLIDES LEGEND

CYCLE 51 SLIDE 6

Malaria Mixed Infection – P. falciparum and P. Ovale

Malaria is an important cause of morbidity and mortality. Malaria is caused by the parasite Plasmodium, and is transmitted by the Anopheles mosquitoes. Plasmodium parasites have five species affecting humans. These are Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae and Plasmodium knowlesi. These species cause approximately 225 million infections and over 600 000 deaths per year. Among them,
P. falciparum is the most prevalent and common malaria species worldwide, especially in Africa. It causes the most severe form of the disease and is responsible for over 90% deaths.

Classification

Malaria can occur in single and mixed infections. Mixed infections involving more than 1 species of Plasmodium may occur in high endemic areas of multiple circulating malarial species. In these cases, clinical differentiation and decision making will be important, as mixed infection can easily lead to misdiagnosis. Occasionally, morphologic features do not permit distinction between P. falciparum and other Plasmodium species. In such cases, patients from a P. falciparum endemic area should be presumed to have P. falciparum infection and be treated accordingly.

Diagnosis

Clinical diagnosis of Plasmodium species by microscopy is not precise. However, it is still the basis of therapeutic care and plays a key role in the diagnosis of febrile patients in malaria endemic areas. Laboratories in malaria endemic areas needs accurate and precise diagnosis of mono-infection and mixed species infections in order to assure proper treatment decision. This helps to prevent the advent of drug resistant parasite population. Accurate and effective diagnosis is the only way of assuring rational treatment and therapy. Microscopic observation of P. falciparum infection is influenced by its parasite density. Parasite density of infections by non-falciparum Plasmodium species is usually low compared to P. falciparum. Therefore, other Plasmodium species are easily missed, particularly in the absence of symptoms. Moreover, in mixed infections, the background of large numbers of P. falciparum parasites makes the observation difficult to differentiate other species.

Mixed species infection can not only complicate diagnosis, but also alter the severity and morbidity of the disease. Co-existence of P. falciparum and P. ovale in a single human host suppress each other. P. falciparum can suppress P. ovale parasitaemia by interspecies inhibition. Severity of malaria, in mixed species infection, depends on whether it is a P. falciparum or a P. ovale super infection. P. ovale super infection over an existing P. falciparum infection leads to the rise of P. falciparum parasitaemia and causes severe malaria. In contrast, P. falciparum super infection over an existing P. ovale infection reduces P. falciparum parasitaemia. Therefore, it prevents the development of severe malaria.

Pathogenesis

Mixed infection incidence is less than the prevalence of individual species and it is also seasonal. Malaria transmission occurs more in wet season than dry season. The seasonal variation is due to the spread of various mosquito species in wet season. The spread of various mosquitoes in malaria areas causes high incidence of both single and mixed infections in wet season than dry season. Relatively high prevalence of individual species occurs in malaria areas where Anopheles mosquito

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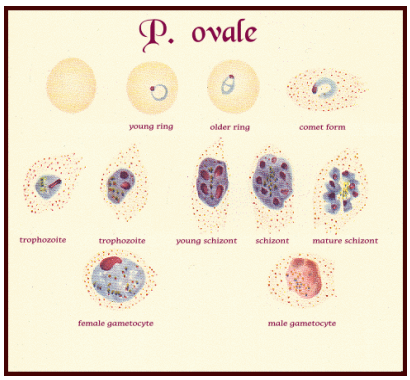
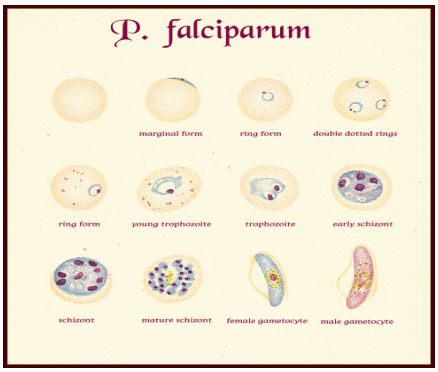
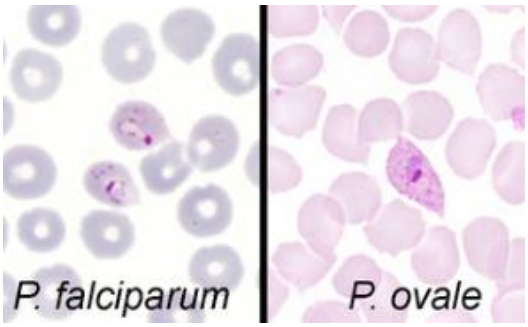
population is high, but the prevalence level of mixed infection is usually less compared to single infection prevalence because mixed infection occurs either by simultaneous inoculation of different Plasmodium species at a time or inoculation of Plasmodium species at different times on a single host. Simultaneous inoculation rarely occurs, therefore, the rate of mixed infection is less than the rate of single infection. If mixed-species malaria is misdiagnosed as a single P. vivax infection, treatment of P. vivax increases P. falciparum parasitaemia. Mixed-species infections increase the possibility of anti-malarial drug resistance. Hence, a drug-resistant population of Plasmodium parasites will emerge. Therefore, accurate diagnosis or species identification of mixed-species malaria is critical for therapeutic decisions. It helps to manage the selection, dose, and timing of anti-malarial drugs. Mistreatment of single or multiple species have serious clinical consequences.





P. ovale and P. falciparum in its immature and mature states



Difference between P. falciparum and P. ovale

Descriptions

1. Plasmodium falciparum
- Red cells are normal
- Rings appear fine and delicate and there may be several in one cells
- Some rings may have two chromatin dots
- Presence of marginal or applique forms
- It is unusual to see developing forms in peripheral blood films
- Gametocytes have a characteristic crescent shape appearance; however, they do not usually appear in the blood for the first four weeks of infection
- Mauer's dots may be present

2.Plasmodium ovale
- Red cells enlarged
- Rings are large and coarse
- Comet forms common
- Schuffner's dots, when present may be promiment
- Mature schizonts are present

Treatment

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The following is a summary of general recommendations for the treatment of malaria:

- P. falciparum malaria - Quinine-based therapy is with quinine (or quinidine) sulfate plus doxycycline or clindamycin or pyrimethamine-sulfadoxine; alternative therapies are artemether-lumefantrine, atovaquone-proguanil, or mefloquine
- P. falciparum malaria with known chloroquine susceptibility (only a few areas in Central America and the Middle East) - Chloroquine
- P. ovale malaria - Chloroquine plus primaquine;

References

1. http://malariajournal.biomedicalcentral.com/articles/10.1186/1475-2875-13-411

Questions

1. In which season does malaria transmission occur more?
2. Name the dots present in P. falciparum and in P. ovale
3. What treatment is recommended for P. ovale?