Protozoal infection

1- Malaria

It is a common worldwide disease commonly in tropical and subtropical countries .There are 250 million infection annually ,more than one million death per year worldwide .

It is caused by Plasomdium Falciparum ,plasmodium Ovale ,Plasmodium vivax and Plasmodium Malariae .It tramsmited to human by female mosquito anopheline.

Incubation period : Plasmodium vivax , ovale and falciparum 8 -25 days .

Plasmodium malariae 15 -30 days

Pathophysiology :The human get infection when infected female anopheline mosquito bite human, sporozoites in salivary gland of the mosquito reach human blood which remain half hour then invade the liver where it grows to Hypnozoite then hypnozoite lyses to liberate merozoites (exo-erythrocytic cycle) which invade red blood cells (erythrocytic cycle) the merozoite develops to ring stage then trophozoite stage then to schizont where it lyses to merozoites with red blood cell lyses then merozoites either it grow to gametocytes or reenter new RBCs , when the mosquito bite the patient it takes the gametocytes the sexual cycle begin where gametocytes grows in stages to form the sporozoites in salivary gland and the circle reoccur again .

The main effect of malaria is causing haemolysis of RBC leads to anemia which is aggravated by dyserythropoiesis ,splenomegally and folate deficiency, anemia more sever with Plasmodium Falciparum because it infect all stages of RBCs while P.vivax and ovale infect reticulocytes and P. malariae infect normoblast . In each rupture of schizont the patients complains of fever and rigor (periodicity) this periodicity depend on the species of malaria(erythrocytic cycle) every 48 hours for Plasmodium vivax and ovale (tertian) and every 72 hours for Plasmodium malariae (Quartan) while <48 hours (A periodic)for Plasmodium Falciparum .Hypnozoite stage can be remain dorminant for two years in the liver for Plasmodium vivax and ovale so relapse of malaria is common if erythrocytic not hepatic cycle is treated ,while plasmodium falciparum and malariae attack the liver once only and dorminant hypnozoite not present but chronic parasitaemia leads to recrudescence of infection many years later .The infected RBCs of plasmodium falciparum attach to endothelium of blood vessels lead to these vessels congestion and ischemia of affected organs (brain ,kidneys ,liver

and lungs) . Patient with thalassemia ,sickle cell anemia ,G6PD deficiency are less like to be infected with malaria ,this in west Africa .

Clinical features

Malaria is suspected in any patient with feature of infection in or returning from endemic area ,all patients will have fever headache ,nausea ,cough .In

a- P. vivax and P. ovale : The patient has bouts of fever reach 40 °C with rigor the patient feeling cold for half to one hour then the patient feels hot and flush for several hours then the patient has profuse sweating and gradual decrease in temperature , the cycle repeated every 48 hours (tertian) .The liver and spleen enlarge gradually which is tender ,the patient develop anemia slowly .The patients has relapse after two years .

b- P. falciparum : This is the most serious type of malaria and the patient either cure or die from the disease .The onset of malaria here is insidious with headache ,nausea ,vomiting ,diarrhea ,periodicity of fever and rigor, hot and sweating is irregular ,the patient has tender hepatosplenomegally ,patient develop jaundice due to haemolysis or hepatic dysfunction ,anemia develop rapidly and may develop thrombocytopenia ,the patient is not dangerous unless develop serious complication like cerebral malaria where the patient complains of confusion ,fit ,coma without localising signs .Children may die rapidly with falciparum malaria . Sever haemolysis may occur lead to haemoglobinurea (black water fever)and may lead to renal failure . Patient may develop shock ,cardiac failure (Algid malaria) . Pulmonary oedema and secondary bacterial infection may occur . In pregnancy immunity decrease so malaria will parasitise the maternal side of placenta lead to abortion and intrauterine growth retardation .

c- P. malariae :This mild type of malaria fever every end of 72 hours chronic parasitaemia may occur and this lead to glomerulonephritis and long term nephrotic syndrome in children .

Investigations

Diagnosis of malaria is done by Giemsa stain thick and thin blood film . thick film for diagnosis and thin film for species and to confirm diagnosis .

Immunochromatography test for malaria antigen, OptiMal and Parasight F they sensitive and specific for plasmodium falciparum malaria and other species .

QBC malaria test fluorescence microscopy based malaria diagnosis .

PCR detection of malaria DNA .

Management :

1- Treatment of P. vivax ,P. ovale ,P. malariae by chloroquine tablets 600 mg orally then 6hours later 300 mg then 150 mg twice daily for two days this eradicate erythrocytic cycle , the Hypnozoite in liver is eradicated by primaquine 15 mg daily for 14 days the side effect of primaquine is haemolysis in G6PD deficiency patient and cause cyanosis in methaemoglobinaemia it common condition but not dangerous .
2- Treatment of P. falciparum by chlorquine and Fansidar (sulfadoxine – pyrimethamine) but now a lot of countries worldwide P. falciparum are resistant to these two drugs so artemisinin based treatment is recommended like Co-artemether (CoArtem ,Riamet) which contain artemether and lumefantrine ,it is given 4 tablets in 0 ,8,24,36,48 and 60 hours .Alternative treatment is quinine drug orally 600 mg of quinine salt 3 times daily 5-7 days together with or followed by doxycycline 200 mg once daily for 7 days or clindamycine 450 mg 3 times daily for 7 days or atovquone –proquanil (Malarone 4 tablets once daily for 3 days) . Other regimen include artesunate 200 mg| day orally for 3 days and mefloquine 1gm daily on day 2 and 200 mg on day 3 .
3- Complicated P. falciparum : It occur when parasites load exceed 2% it is medical emergency it associated with complications like coma ,hyperpyrexia, convulsions ,hypoglycemia ,severe anemia , acute pulmonary oedema ,acute renal failure ,spontaneous bleeding and coagulopathy ,metabolic acidosis ,shock and aspiration pneumonia all these conditions are treated accordingly and parenteral anti-malarial drugs are used till the patient can take oral medication the treatment of choice artesunate intravenously 2.4 mg |kg IV at 0,12 and 24 hours then once daily for 7 days then when patient recovered oral artesunate 2 mg| kg to complete total cumulative dose 17-18 mg |kg .Now rectal administration is available . Another drug is used quinine salt intravenous loading dose of 20 mg| kg over 4 hours at maximum 1.4 gm then followed by maintenance dose of 10 mg| kg at maximum 700 mg per dose until the patient can take orally quinine has risk of cardiac arrhythmias torsa des de pointes ventricular tachycardia arrhythmia so cardiac monitor must be done and must be avoided if patient used mefloquine ,quinidine or quinine for previous 24 hours . Mefloquine better to be avoided in these condition because not available parenterally and cause post malaria neurological syndrome . In high parasitaemia > 10 % (parasite load) may be treated by exchange transfusion of blood .

Prevention

The prevention of malaria is important now because of travel of the people to endemic areas like India ,east Asia ,Africa …etc . No vaccine for malaria(still under trial) so the prevention by drugs called chemoprophylaxis this medication is used according to incidence of drug resistance of malaria . In non resistant area chloroquine 300 mg weekly and proguanil 100-200 mg daily started 1 week before and 4 weeks after arrival . If drug resistant malaria area prophylaxis by mefloquine 250 mg weekly contraindicated in first trimester of pregnancy or doxycycline 100 mg daily it is contraindicated in pregnancy both used 2 weeks before and 4 weeks later and Malarone 1tablet daily 2 days before travel and 1 week after arrival . Prevention in pregnancy and lactation by proguanil or chloroquine where are safe .

Malaria control in endemic area :

Control the vector female Anophiline mosquito by insecticide and protect human from vector by insecticide bed nets , intermitant chemoprophylaxis in pregnant women and children especially of immunity is not long lived and incomplete .