THE DIFFERENT TYPES OF MALARIA

The four types of malaria are split into two categories; there are three types that are benign forms: Plasmodium vivax, malariae and ovale, and one malignant form: Plasmodium falciparum.

The latter parasite is responsible for the majority of deaths caused by malaria, whereas the malaria caused by the first three do not usually cause death, but only debilitating disease, which in some cases can recur over many years.

One reason for the difference in severity can be attributed to the preference of the different parasites for red blood cells at different stages of maturation: P. vivax and P. oval invade the younger red blood cells, while P. malariae prefers mature blood cells; P. falciparum on the other hand is indiscriminate in its choice of red blood cells, hence its form of attack is all encompassing. This substantially broadens the scope and potential severity of its attack.

The life cycles of the four malarial parasite types are broadly similar, with difference stages of development occurring in appropriate female Anopheles mosquito hosts as well as in the human host.

The least dangerous form of the disease causes periodic chills and fevers but is rarely fatal, hence the term 'benign", vivax malaria can be fatal in patients who suffer traumatic rupture of the spleen and in those who develop severe anaemia, especially malnourished and debilitated patients.

PLASMODIUM VIVAX

After P. faciparum, P. vivax is the second most widely experienced form of malaria. A serious complication in untreated infections is rupture of the spleen. Vivax occurs mostly in the temperate zone as well as in the tropics. It is common in Central America and China where it is responsible for most malaria cases, whereas in the West Africa and East Africa it causes only about 2% of malaria cases.

To demonstrate how benign it is, of the more than five million cases of vivax malaria epidemic in Sri Lanka in 1969, not one person died. Moreover, this type of malaria is associated with people of a certain blood type not usually found in Africans.

Characteristically, it causes malaria with frequent relapses if not treated properly. The pattern of which varies in relation to the various strains of P. vivax. The incubation period between the time of the first infected bite to first onset of symptoms is between 12 and 17 days or even up to a year, depending on the strain involved. The severity of the first attack ranges from mild to severe depending on the immune responses of the host and the degree of parasite infection, i.e. for victims with no immunity severity is likely to be marked.

PLASMODIUM OVALE

This type of malaria is more commonly encountered in the sub-Saharan Africa than the vivax type. It has mostly been found in West Africa.

Its symptoms are indistinguishable from those of vivax and malariae, the other benign types of malaria.

Characteristically, it produces fever spikes every 48 to 50 hours but this may differ markedly with different cases. If left untreated, or treated inadequately, the infection typically lasts from 18 months to three years although periods of recurrence may be lengthy between attacks.

The severity of the first attack is typically mild with fever attacks lasting from eight to 12 hours.

Incubation from the time of the first infected bite until onset symptoms is typically from 16 to 18 days or even longer.

PLASMODIUM MALARIAE

Also known as malariae quatrain as its fevers sometimes spike every 72 hours. Its course is not unduly severe but it is notorious for its long persistence in the body if adequate treatment is not given. Its geographical range extends over both tropical and subtropical arears.

The incubation period between the time of the first infected bite and first onset of symptoms ranges between 18 and 40 days or even longer.

This can present problems in those who, for instance, get bitten on the last day of their holiday and develop malaria symptoms some five weeks later.

Unless one was looking out for malaria, it would be difficult to immediately link the illness with the holiday. This is compounded because the severity of the first attack is usually so mild that it may arouse little suspicion.

The fever cycle usually occurs every 72 hours while the fever lasts for an average of eight to ten hours.

Malariae does not relapse as happens with vivax and ovale but rather 'recrudesces' or 'breaks through' again. With the malariae parasite it seems that the infection persists in very low concentrations in the blood. When the concentration increases we say that the infection has 'recrudesced'. The incidence of break throughs is high and these can last for between three and 50 years

It is possible for the host to be infected and not develop symptoms for 50 years.

It is not known what the reason is for such a long, symptom-free period nor has it been confirmed that stress or illness may have a part to play in triggering the disease.

PLASMODIUM FALCIPARUM

Malignant malaria, the killer disease, is caused by the species named Plasmodium falciparum, which nearly always causes severe, life-threatening malaria in non-immune hosts.

The greater the amount if immunity possessed by the host, the milder the disease is when it does strike. Over 90% of malaria cases and 90% of deaths in Africa are due to P.falciparum whereas about 40% of total cases in Asia are due to it.

P.falciparum malaria is the fatal form of malaria that can kill a non-immune person within less than a week or two of a primary attack, unless appropriate treatment is given in time.

It takes between six and 14 days for malaria to develop from the time of the first infected bite to the first sigh or symptom. In this time the parasite has been multiplying in the liver before being released into the bloodstream and invading the red blood cells.

The typical cycle between fever spikes is usually 48 hours, but with different batches of parasite maturing at different times, these fever spikes are likely to become less obvious and interspersed with other fever spikes.

The severity of the first malaria attack is always the worst in those who have no immunity to malaria. In others with partial immunity the severity of the attack may be less.

Should a relapse occur as a result of inadequate or incorrect treatment of the malaria attack, it will break out again relatively soon, i.e. a few weeks.

THE SYMPTOMS OF MALARA

The symptoms of malaria are the same today as they were more than 2 000 years ago when they were first described. The static nature of these symptoms contrasts with other diseases whose symptoms have varied over time.

GENERAL SYMPTOMS

The symptoms are basically similar for all four types of malaria, although the clinical manifestations may differ significantly.

In general, the infection is characterized by bouts of fever occurring at regular intervals, alternating with periods of partial recovery with the patient becoming weaker as time goes on.

It is important to note that the classic description is characteristic but not universal, and that variations may be found, which typically serve to confuse diagnosis.

In primary attacks, i.e. during the first-ever attack of malaria, bouts of fever may occur daily for the first few days before the fever settles into the characteristic tertian quartan pattern (every 48 or 72 hours).

As bouts continue, the spleen becomes enlarged and tender, and herpes labialis (cold sores on the mouth) may appear.

In children the manifestations are often atypical and may be alarming. Paroxysms of fever are not as common as with adults, while headache, nausea, vomiting, abdominal pain, diarrhoea, a sustained fever and convulsions make up a much less characteristics clinical picture.

WHAT CAN MAKE DIAGNOSIS DIFFICULT?

Diagnosis is particularly difficult with children who may have high blood levels of parasite infection but relatively mild symptoms.

Conversely, there may be little or no sign of parasites in the blood and symptoms may be severe.

Misdiagnosis is a serious problem in areas where health workers are not familiar with malaria, or with patients in whom the range of symptoms may not clearly point to malaria.

THE THREE STAGES OF THE MALARIA CRISIS

The malaria crisis or paroxysm classically comprises a cold stage, hot stage and a sweating stage.

The cold stage

This can last from 15 minutes to more than an hour. An abrupt onset of chills with distinctive uncontrollable shivering will develop. There is a feeling of intense cold and the patient shivers from head to foot despite putting on all available clothing and blankets. The teeth may also chatter uncontrollably.

Children may be prone to convulsive fits, and vomiting may occur in adults. If vomiting does happen, remember that dehydration may occur and must be countered with extra fluids. Diarrhoea may also be an accompanying symptom.

Note whether any medicines takes have had time to be absorbed - good rule of thumb should be about 30 minutes on an empty stomach or up to 45 minutes on a stomach with some food in it. However, medical opinion is divided on this subject.

The hot stage

Shivering is characteristically followed by the 'hot stage', which lasts for between two and six hours, during which the patient suffers a sensation of great heat. Clothes are discarded and the pulse becomes strong and bounding. There is high fever (40-41°C), intense headache, malaise and often abdominal pain, vomiting, thirst and frequent urination, as well as muscle, joint back pains.

The sweating stage

This stage lasts for between one and four hours during which the patient may sweat profusely, saturating clothes and bedding. He or she often falls into a deep sleep and awakens exhausted but otherwise quite well. The temperature falls back to normal and the symptoms disappear.

Strength returns slowly, and until the next attack. Should the malaria continue over a number of days, a cyclic pattern will emerge with symptoms occurring every third day or so. However, most people obtain treatment before this cyclic pattern has a chance to emerge.

In some malaria infections, the fever can be more or less continuous without the cyclic paroxysm. Symptoms may be minimal or absent in persons who have developed a strong immunity against malaria. They may exhibit only fever.

SYMPTOMS OF PLASMODIUM FALCIPARUM

The incubation period of P.falciparum malaria is usually between seven and 12 days and is seldom over 28 days (although cases of longer duration have been recorded).

The onset of malaria may be distinctive and unmistakable in some persons while in others it may be slow and non-specific, causing medical care not to be sought for several days. However, the first attack of falciparum in non-immune patients is the most serious and dangerous, as the host has no immunity against the disease ad is at his or her most vulnerable. These patients may have a 'flu-like' illness, with fever, headache, dizziness, malaise, aches, pain but shaking chills and high fever are not always present.

Jaunice, which is not uncommon, may be mistaken for viral hepatitis. Associated symptoms vary, but may also include nausea, vomiting and a bronchitic cough. Diarrhoea is not uncommon.

The character of the fever, its symptoms and course are irregular and variable. At first, fever is intermittent and irregular; later it is characterized by numerous peaks representing the activity of different groups of parasites.

The rigor (sudden chill with shivering before fever) is definitely a danger signal, indicating the need for immediate treatment. Anaemia arises from the destruction of the red blood cells by the malaria parasite. The falciparum parasite shows no discrimination in blood cells and will destroy cells of any age as opposed to the vivax parasite that destroys only young or immature blood cells.

This blanket approach explains why the patient will deteriorate far more quickly than he would with the other forms of malaria. The destruction of the red blood cells causes them to stick together forming small clots that block capillaries, leading to areas of defective oxygenation in many tissues.

It is also thought that a toxic substance is produced by falciparum that may possibly adversely affect the metabolism of the tissue cells.

Taken together, the results of falciparum infection can be sudden, grave and can develop without warning. These complications include cerebral malaria.

THE RECURRING MALARIAS

Vivax and ovale types of malaria recur because the parasite incubates in the liver for long periods after infection and then appears in the blood, causing renewed symptom on relapse. This may explain why the patient can undergo attack long after he has left the malarious area.

The variable incubation lasts between nine and 15 days after which a classic three-stage attack cycle begins. Vivax is characterized by a primary attack followed by relapses until the patient is cured. It is a serious illness that can lead to anaemia and debility but it not life threatening.

In the primary attack, parasites mature on alternate days, causing a fever roughly every 24 hours, each time they mature.

In secondary or relapse attacks, the parasites mature on the same day causing fever at 48-hour intervals. By the second week, the spleen is enlarged and is often tender. The spleen may rupture as a result, but this is said to be rare.

Anaemia results from the destruction of the red blood cells and this may be severe in children. In severe cases, jaundice may develop. It has not been proved that this effect will be compounded when the patient may have had hepatitis or any other form of liver dysfunction.

Relapses usually fall into two categories: early (eight to 10 weeks after the attack) and late (between 30 and 40 weeks after the attack). It is unusual to see relapses more than three years after infection. The reason for this phenomenon is not known.

SYMPTOMS OF PLASMODIUM MALARIAE (QUARTAN)

Incubation is between 15 and 40 days and is followed by three-stage cycle of similar severity to that in vivax infection but which occurs at 72-hour intervals. Patients have been known to experience relapses up to 20 years after the primary infection.

This infection can be completely wiped out by adequate retreatment so that relapses do not occur. It is not life threatening although it can cause kidney complications.

SYMPTOMS OF PLASMODIUM OVALE (TERTIAN)

This is much milder than a vivax infection, and it exhibits similar symptoms. In the primary attack, the fever occurs at 48-hour intervals.

TREATMENT
THE MOST IMPORTANT ASPECTS OF TREATMENT

The following vital aspects of treatment cannot be stressed enough:

- prompt and effective treatment with antimalarials
- correct of fluid and electrolyte levels if there has not been a fluid loss
- correction of hypoglycaemia or low blood sugar, especially in diabetics and pregnant women
- correction of anaemia
- treatment of concurrent infection if one exists

Bear in mind that statistics show that nearly all deaths in short-term travellers afflicted by malaria are caused by the lack of prompt and appropriate medical care.

WHEN TO TREAT FOR MALARIA

If P. falciparum is suspected, even if test results are not yet available or are negative, if the patient has fever or any other signs of malaria, an antimalarial treatment must be given. If another illness is suspected at the same time, treat for that as well.

The most important aim in treatment is to bring the level of parasites present in the blood under control as quickly as possible by the administration of rapidly acting drugs. This presents little difficulty, except in P. falciparum malaria where the progression of the disease is extremely rapid.

Because of the complicated nature of the drug treatment, the subject will be covered in Appendix 1. It is intended that in all cases where medical help is available, the patient should attempt to obtain it and not treat himself.

However, situations may arise where medical help is not available and a limited amount of information regarding the right and wrong drugs to take is likely to be better than no information at all.

Similarly, even where medical care is available, conflicting advice offered to the patient may cause him to wish to read his own information regarding drug treatment without having to seek out vast medical tomes in doing his own research. This is where the information presented in the appendix is intended to assist the reader.

Reference: A Layman's guide to Malaria by Martine Maurel (1994), updated by Dr. Stephen Toovey and Dr. Andrew Jamieson (2001)