



## Lecture – 5

# Cerebral Malaria

Microbiology Team - 430



Done by:

Aos Aboabat

Ghadeer AlWuhayd

Khawla Alothman

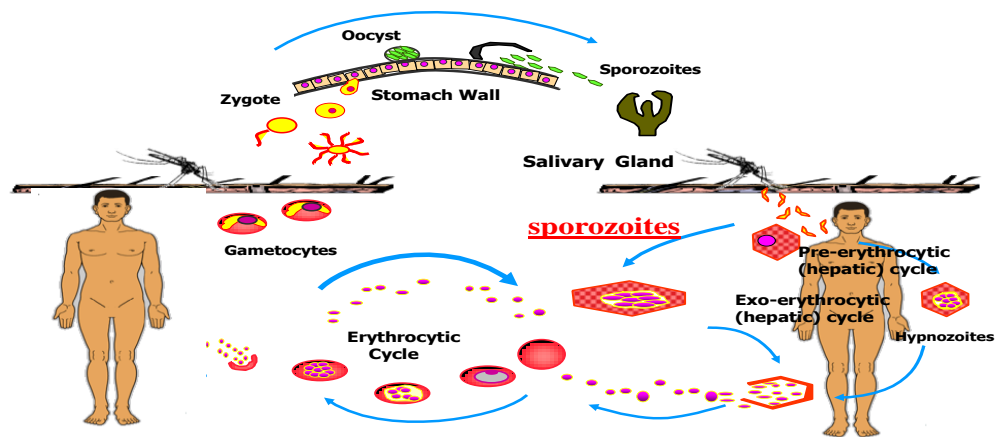
Hanan Alrabiah

Hanan Al-salman

### ❖ Malaria Species:

- ***Plasmodium falciparum***: malignant tertian malaria (tertian meaning that the fever appears in the 3<sup>rd</sup> day).
- ***Plasmodium vivax***: benign tertian malaria
- ***Plasmodium ovale*** : benign tertian malaria
- ***Plasmodium malariae***: quartan malaria (fever appears in the 4<sup>th</sup> day).

### ❖ LIFE CYCLE OF MALARIA

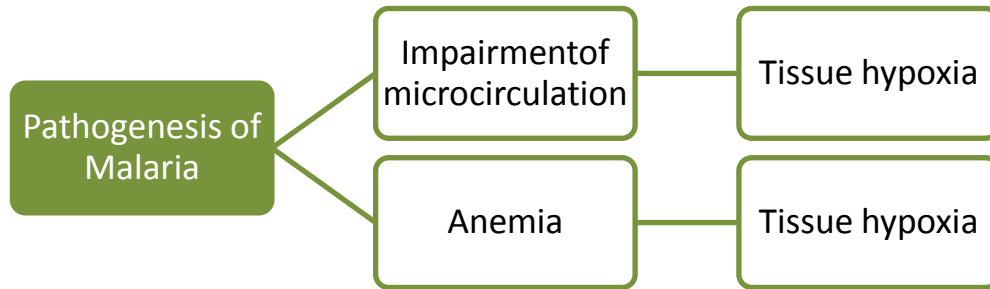


The parasite bit → goes to the liver → multiply → liver rupture → goes to the blood (the main pathological stage) → Invasion of the parasite.

### ❖ Components of the Malaria Life Cycle:

- Mosquito vector.
  - Incubation period.
  - Infective period.
- Human Host.
  - Incubation period.
  - Clinical Illness period.

### ❖ Pathogenesis of Malaria:



P.falciparum → surface changes in RBCs → Adherence of RBCs to endothelium  
→ Decreased in the microcirculation. → Tissue hypoxia.

Anemia is due to:

- 1- Metabolism of hemoglobin by the parasite → anemia.
- 2- Formation of Ag – Ab binding → immune mediated → lysis of infected cells → anemia.

### ❖ Tissue hypoxia leading to Cerebral malaria complications:

- Adrenal → shock.
- Bacterial sepsis.
- Cerebral coma or hyperpyrexia.
- Gastrointestinal → dysentery.
- Hepatic → jaundice.
- Pulmonary → Edema.
- Renal failure.

## ❖ Severe malaria:

- Severe malaria is defined as symptomatic malaria in a patient with *P. falciparum* asexual parasitaemia with one or more of the following complications:

- Cerebral malaria (*unrousable coma* not attributable to other causes).
- Generalized **convulsions** (> 2 episodes within 24 hours)
- Severe anemia ( $Ht < 15\%$  or  $Hb < 5 \text{ g/dl}$ )
- Hypoglycemia (blood glucose  $< 2.2 \text{ mmol/l}$  or  $40 \text{ mg/dl}$ )
- Metabolic acidosis with respiratory distress (arterial  $pH < 7.35$  or bicarbonate  $< 15 \text{ mmol/l}$ )
- Fluid and electrolyte disturbances
- Acute renal failure (urine  $< 400 \text{ ml/24 h}$  in adults;  $12 \text{ ml/kg/24 h}$  in children)
- Acute pulmonary edema and adult respiratory distress syndrome
- Abnormal bleeding
- Jaundice
- Haemoglobinuria
- Circulatory collapse, shock, septicemia (algid malaria)
- Hyperparasitaemia ( $\geq 10\%$  in non-immune;  $\geq 20\%$  in semi-immune). (Semi-immune pt. Is a Pt who lives in an area where *P. Falciparum* is spread wildly).

## ❖ Cerebral malaria:

- Severe falciparum malaria with coma .
- Malaria with coma persisting for >30 minutes after a seizure is considered to be cerebral malaria.

## ❖ Clinical Features:

- 1- **Opisthotons** is an unrousable coma. The CSF cell count is normal.
- 2- Decelerate **rigidity** complicated by hypoglycemia.
- 3- **Disconjugate gaze [Abnormal eye movement]** → Optic axes are not parallel in vertical & horizontal planes.
- 4- **Sustained upward deviation of the eyes** accompanied by labored & noisy breathing which is complicated by hypoglycemia.
- 5- Subtle convulsion (**mild convulsion**).

- 6- **Profound anemia** (Cerebral malaria, disseminated intravascular coagulation & spontaneous bleeding from the gums).

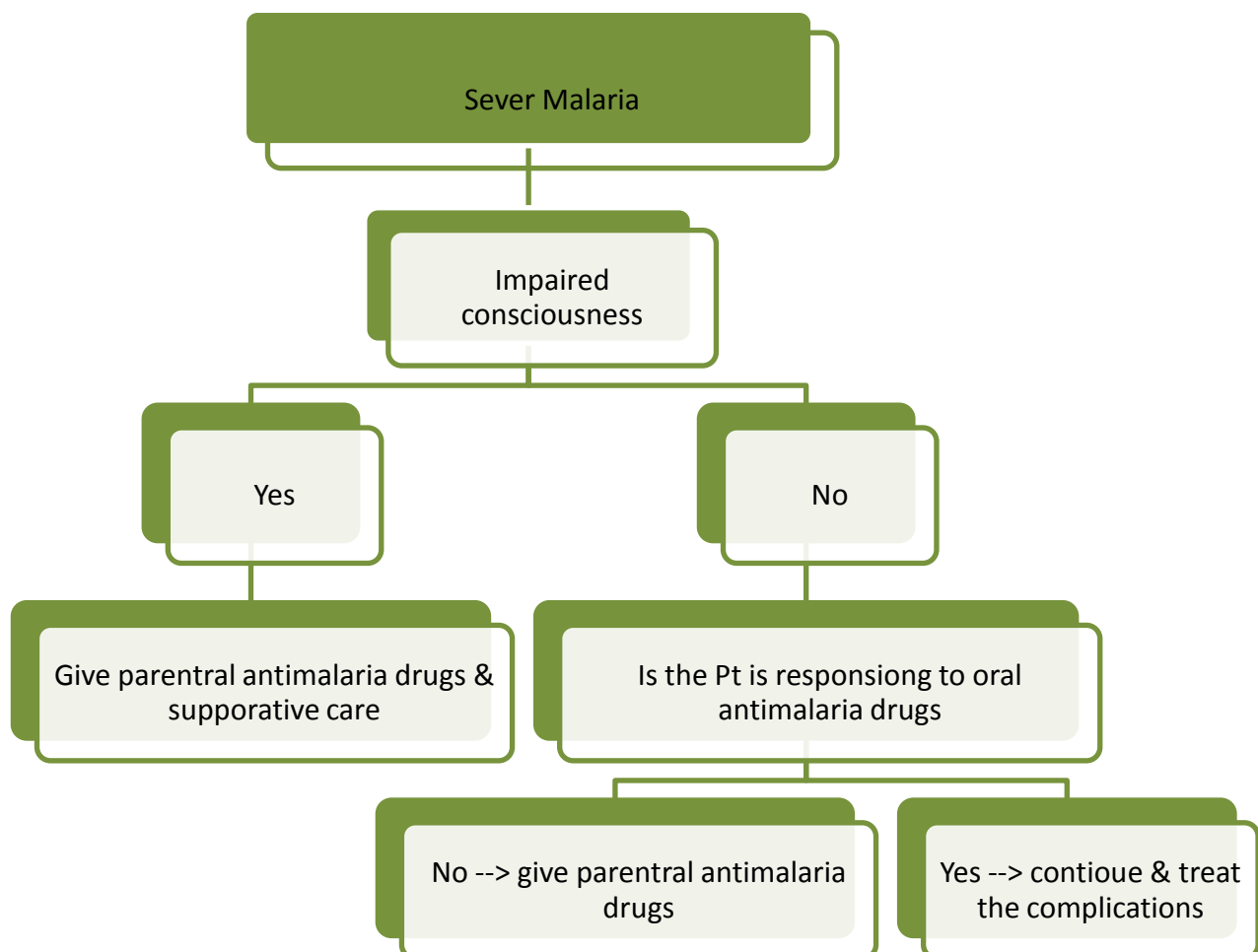
### ❖ Management of Cerebral Malaria:

1- **Diagnosis** → by excluding other conditions with similar feature

- **Hypoglycemia** → Do blood glucose.
- **Meningitis** → Do CSF analysis → if it is:
  - \_ Turbid → meningitis
  - \_ Clear → Cerebral Malaria.

2- Treatment :

- **Sever malaria with impaired consciousness** → give parenteral Artemether, Artesunate or Quinine + supportive care. (Artemether, Artesunate & Quinine are antimalaria drugs).
- If there is no impaired consciousness → Give an oral administration of antimalaria drugs & treat main complications → if this didn't feasible (work) → give antimalaria drugs parenteral.





## ❖ Cerebral malaria general management:

Any comatose patient should be managed in general as following:

- \_ Insert a urethral catheter
- \_ Keep an accurate record of fluid intake and output.
- \_ Monitor & record the level of consciousness using the Glasgow coma scale.
- \_ Treat convulsion by giving anti convulsion drugs.

## ❖ Summary of adjunctive Treatment:

- \_ Coma (cerebral malaria) → maintain airway, nurse on side (because he might vomit), exclude other treatable causes of coma (such as hypoglycemia & bacterial meningitis) and avoid harmful drugs such as corticosteroid.

## ❖ Summary :

- \_ Malaria Species: ***Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale* & *Plasmodium malariae***
  - \_ The main complications of malaria are
    - **Coma**, Convulsion, Renal failure, cerebral malaria, **Anemia** & Pulmonary edema.
  - \_ Cerebral malaria is an unrousable coma with Positive blood film → you will see some bodies of P.falciparum (Falciparum malaria).
  - \_ **There is 2 main pathophysiological mechanism:**
    - Anemia
    - Impairment of microcirculations.
- Both of them lead to tissue hypoxia.
- \_ **The main pathological stage is blood stage.**
  - \_ The main clinical features of Cerebral Malaria are:
    - **Opisthotons [ Hyper-extension ]**
    - **Disconjugate gaze.**
  - \_ **Cerebral Malaria management is done by:**
    - Diagnosis → by excluding **Hypoglycemia & Meningitis.**
    - Treatment
      - Antimalaria drugs
      - General management of coma → nursing on side, insert urethral catheter, fluid intake & monitor level of consciousness.