

# Acute Renal Failure & Malaria

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# Definitions

- Inability of kidney to maintain homeostasis leading to a buildup of nitrogenous wastes
- Different to renal insufficiency where kidney function is deranged but can still support life

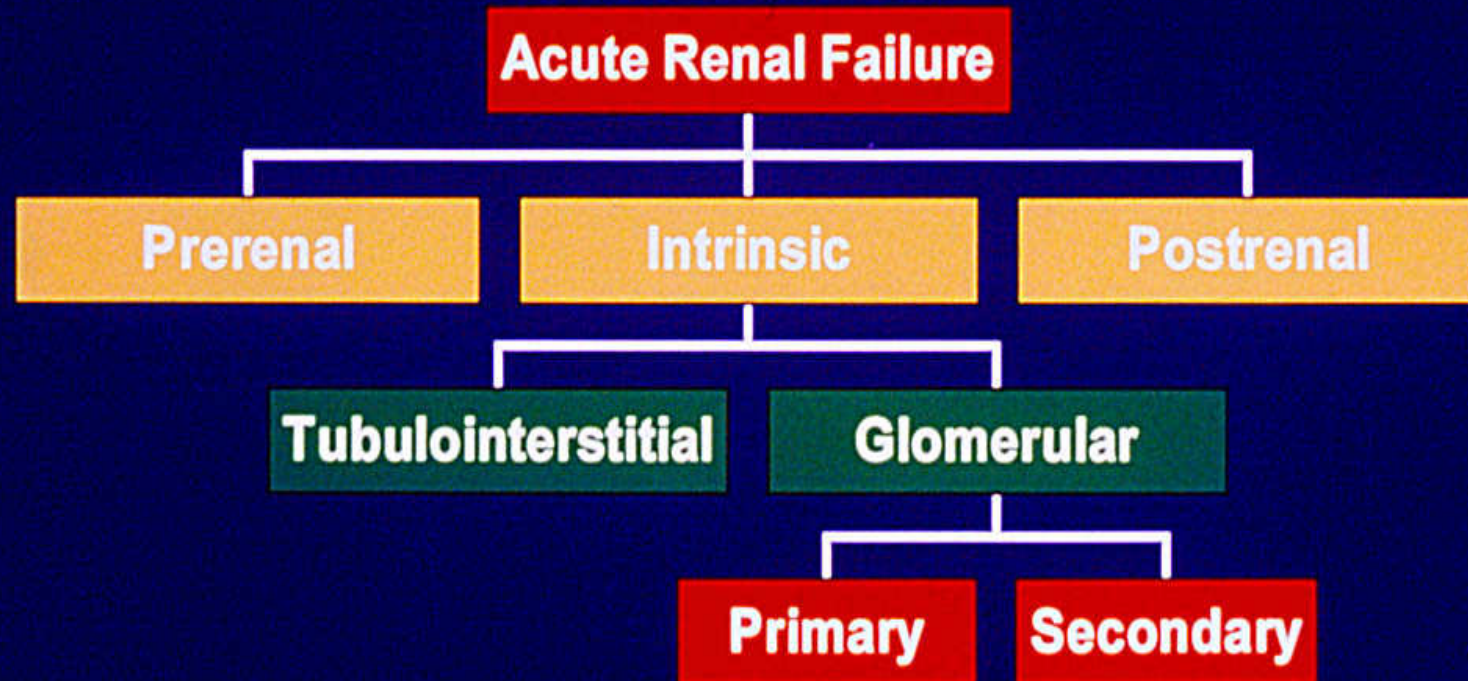
# Definitions

- Occurs over hours/days
- Lab definition
  - Increase in baseline creatinine of more than 50%
  - Decrease in creatinine clearance of more than 50%
  - Deterioration in renal function requiring dialysis

# Classification of ARF

- Pre renal (functional)
- Renal-intrinsic (structural)
- Post renal (obstruction)

# Work-up of Acute Renal Failure



# Causes of ARF

- **Pre-renal:**

Inadequate perfusion

– *check volume status*

- **Renal:**

ARF despite perfusion & excretion

– *check urinalysis, FBC & autoimmune screen*

- **Post-renal:**

Blocked outflow

– *check bladder, catheter & ultrasound*

# Causes of ARF

| <b>Pre-renal</b>        | <b>Renal</b>            | <b>Post-renal</b>    |
|-------------------------|-------------------------|----------------------|
| Absolute hypovolaemia   | Glomerular (RPGN)       | Pelvi-calyceal       |
| Relative hypovolaemia   | Tubular (ATN)           | Ureteric             |
| Reduced cardiac output  | Interstitial (AIN)      | VUJ-bladder          |
| Reno-vascular occlusion | Vascular (atheroemboli) | Bladder neck-urethra |

# Clinical Presentation

- Anuria: No UOP
- Oliguria: UOP < 400-500 mL/d
- Azotemia: Incr Cr, BUN
  - May be prerenal, renal, postrenal
  - Does not require any clinical findings



# Clinical Signs & Symptoms

- Hyperkalemia
- Nausea/Vomiting
- HTN
- Pulmonary edema
- Ascites
- Asterixis
- Encephalopathy

# Laboratory Diagnosis

- UEC
- Acid-Base balance
- Urine analysis
- BUN
- LFT
- FBC & blood slide
- Others – USS (?obstruction).

# Malaria & ARF

- Malaria is one of top 10 killer diseases in world
- ARF occurs in <1% of pf malaria, but mortality up to 45%
- Common in adults than children, recent trends- high incidence
- Diagnosed when sr. creat. >3mg/dl or urine output <400ml/24 hrs
- Renal involvement varies from mild proteinuria to severe azotemia
- Malarial ARF is associated with cerebral malaria, Jaundice, Anaemia, ARDS/Pulm. edema & Hypoglycaemia

# Pathology & Pathogenesis

- *In mild cases*- not much change in renal parenchyma- may be minimal tubular degeneration, mild renal parenchymal change & presence of vacuoles
- *In severe cases*- Tubular degeneration with distal tubular necrosis, Proximal tubules are often loaded with malarial pigments, Hb granules may be seen in the tubular cells

## Pathology & Pathogenesis 2

- Most patients have little or no proteinuria & urinary sediment contains occasional granular and hyaline cast but no RBC.
- Absence of hypertension, Rapid resolution without residual impairment & predominant in adults rather than children with urinary findings suggests- ARF results from ATN & not glomerulonephritis

# Pathology & Pathogenesis 3

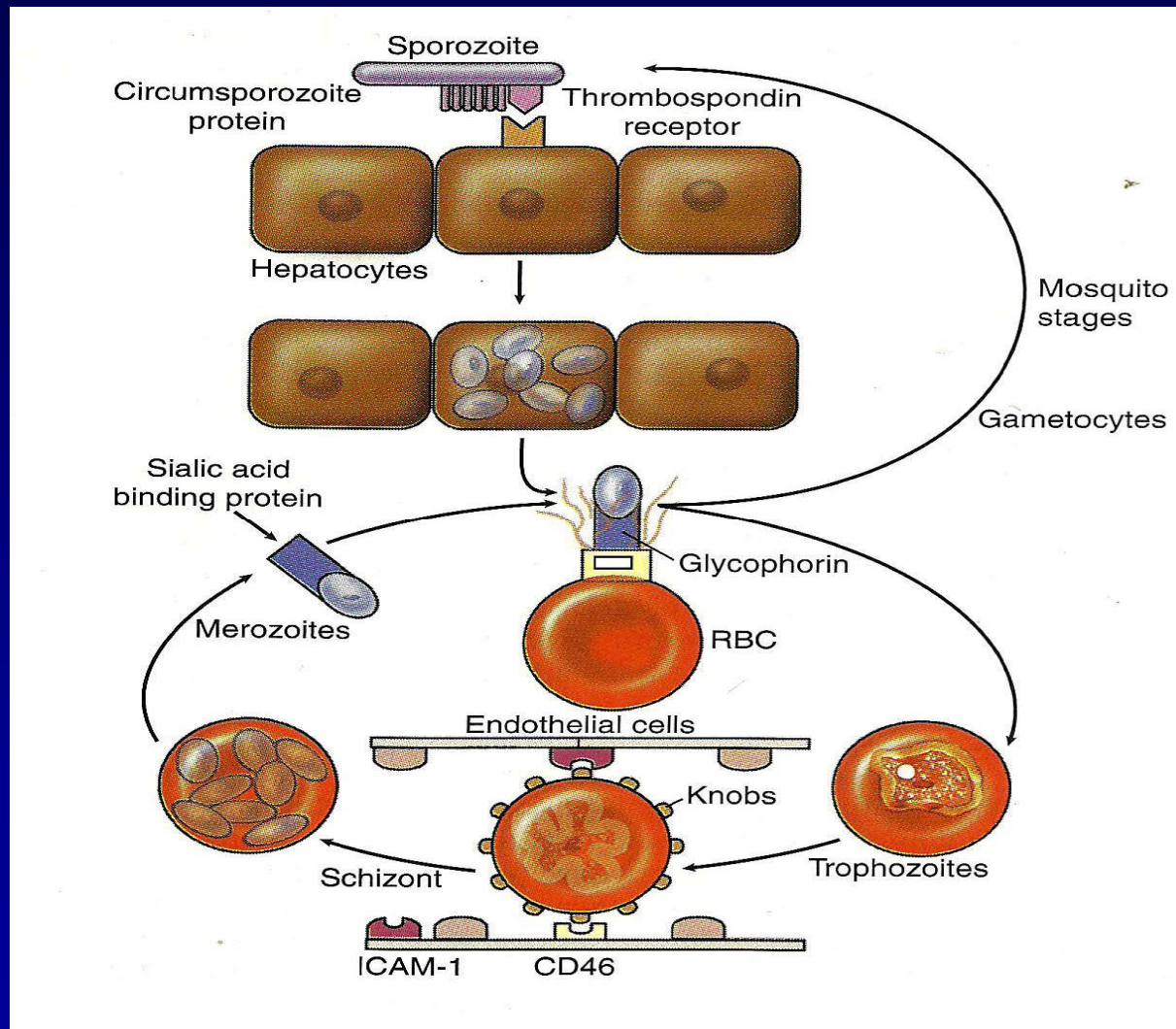
- ARF- mediated thro' several mechanisms

1. Effect of pRBC on microcirculation- knob like processes formation on surface of RBC which helps in anchoring to the endothelium

Cytoadherence- due to thrombospondin formation from vascular endothelium- specific to pf ( not in pv/pm) so ARF only in pf.

Loss of deformability of pRBC according to need of microcirculation- sluggish circulation- renal ischemia

# Mechanism of cytoadherence



Ref: Robins Pathological Basis of Diseases, 6<sup>th</sup> Ed.

# Pathology & Pathogenesis 4

2. Hypovolemia may occur due to Fever (hyperpyrexia), sweating, decreased intake of fluid, vomiting etc.
3. DIC
4. Increased plasma viscosity due to infection
5. Release of chemical mediators- TNF, cachectin, cytokines, interleukines etc causes- vasoconstriction, increased vascular permeability, catecholamine release (SIADH) hemoconcentration, shock & tubular necrosis
6. Hyperbilirubinaemia due to hemolysis, Black water fever in G6 PD deficiency patients is also associated with ARF



# Laboratory Diagnosis & Monitoring

- Blood slide
- As in ARF (BUN, etc..)
- Bilirubin
- Urine output monitoring

# End

Main Reference: Robins Pathological Basis of Diseases, 6<sup>th</sup> Ed. Chapter on renal failure and infectious diseases.

Others (www): Deb Goldstein teaching slides, 2005.

Cherelle Fitzclarence teaching slides, 2010

Dr Saroj K Mishra & Dr Kishore C Mahanta, teaching slides, India.

Download seminar notes on:

[www.pathologyatmhs.wordpress.com](http://www.pathologyatmhs.wordpress.com)

File in PDF and PPT format

# Feedback

What was presented well and you understood concepts?

What was not presented well and not understood well?

How can seminar be improved?

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and leave feedback comments