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ACUTE RENAL FAILURE

ARF is a clinical syndrome in which a **sudden deterioration in renal function** results in the inability of kidneys to maintain fluid and

electrolyte homeostasis. **Et.**

 Prerenal *(or azotemia)* are due to ↓ renal perfution e.g. Dehydration,

Hemorrhage, Sepsis, Hypoalbuminemia, HF.

 Intrinsic (Renal) due to damage of renal parenchyma e.g. various types

of Glomerulonephritis, HUS, ATN, Cortical necrosis, Renal vein

thrombosis, Acute interstitial nephritis, Rhabdomyolysis, Tumor lysis syndrome, Tumor infiltration. ***Postrenal*** due to bilateral obstruction of urine outflow e.g. Posterior

urethral valves, Neurogenic bladder, Bilateral UPJ or UVJ obstruction,

Ureterocele, Urolithiasis, Tumor. **C.M.** It vary according to the etiology, but many causes of ARF (especially prerenal) are usually associated with **oliguria**, i.e. **↓ UOP < 0.5 ml/kg/hr**.

Note: *Normal UOP ≈ 1 ml/kg/hr*. **Inv. RFT, GUE, Renal US, Biopsy, CBP, CXR.** Metabolic disturbances in ARF include: **↑ serum urea, creatinine, uric**

acid, K, PO4; but ↓ Ca, Na, & pH.

Note: *In high-risk patient, very early detection of ARF can be done by measuring serum or urine Neutrophil gelatinase–associated lipocalin or Cystin level.* **GUE** may differentiate between **Prerenal** & **Intrinsic** ARF:- Cells usually Non RBC, WBC, Cellular casts Specific gravity > 1.020 < 1.010 Urine osmolality > 400 < 350 (mOsm/kg) Urine Na (mEq/L) < 20 > 40 Fractional excretion of Na < 1% > 1% **Rx.** According to the cause of ARF. In **prerenal failure,** patients should have chart of fluid input & output with determination of volume status by

CVP, then therapy should be done according to the following steps:-

1. **Restoration of volium status**; if there is no evidence of volume overload or HF, give **NS 20 ml/kg over 30 min & can be repeated**

untill blood volume is restored; hypovolemic patients will void within 2 hr, but failure to do so points toward the presence of renal or postrenal

ARF. 2. **Diuretics** should be used only after adequate blood volume. **Furosemide (2–4 mg/kg)** or **Bumetanide** (0.1 mg/kg) may be initially administered as a single IV dose. **Mannitol (0.5 g/kg)** is especially of benefit in Hb- or Mb-induced renal failure. 3. If patient still has anuia, give **continuous diuretic infusion +/_**

dopamine infusion (2–3 µg/kg/min) to ↑ renal cortical blood flow. 4. If still anuia, **stop diuretics & restrict fluids to 400 ml/m2/24 hr**

which is the insensible loss (≈ 1/3 of maintenance fluid) + UOP + extrarenal losses (if present). 5. If still anuia with evidence of volume overload, **restrict fluids further**.

6. If still anuia, do **renal dialysis**.

 Management of other sequelae of ARF:-

 Hyperkalemia; begin Rx when **serum K > 6 mEq/L** by the following:- 1. **Eliminate** exogenous sources of K.

2. **Give resin** e.g. sodium polystyrene sulfonate (Kayexalate) 1 g/kg, orally or by retention enema. If serum **K > 7 mEq/L**, it requires emergency Rx to prevent arrhythmia

by the following:- 3. **Calcium gluconate 10%** 1 ml/kg IV over 3–5 min. 4. **Sodium bicarbonate** 1–2 mEq/kg by infusion over 5–10 min. 5. **Insulin** (regular) 0.1 U/kg + **glucose** 50% solution 1 ml/kg over 1 hr. 6. **β- adrenergic agonists** can be used as adjunct Rx by nebulization. 7. **Dialysis** if there is persistent hyperkalemia. ***Metabolic acidosis;*** it should be treated when it **severe** (arterial pH <7.15 or serum bicarbonate <8 mEq/L) or contributes to

hyperkalemia. Sodium bicarbonate initially is given IV to raise pH up to 7.20 & the remainder is given orally because high IV dose may precipitate teteny due to ↓ ionized Ca.

 Hypocalcemia; it can be treated by lowering serum phosphorus level through **low phosphorus diet & oral phosphate binders** e.g. Ca carbonate. ***Note:*** *Calcium should* ***not*** *be given IV (except in cases of tetany) to prevent deposition of calcium phosphate salts into tissues.* ***Hyponatremia;*** it is mainly **dilutional**, so must be corrected by **fluid**

restriction. Hypertonic saline (3%) should be limited to those with symptomatic hyponatremia or when serum Na <120 mEq/L. ***Hypertentsion;*** it should initially treated by salt and water **restriction**,

then by **diuretics** or other antihypertensive drugs. ***Neurologic symptoms*** e.g. headache, seizures, lethargy, and confusion should be treated symptomatically with correction of the underlying cause which may include: hyponatremia, hypocalcemia, hypertension, cerebral hemorrhage, cerebral vasculitis, or uremia. ***GIT bleeding;*** it mainly due to stress ulcer or uremic platelet dysfunction, it can be prevented & treated by **H2 blockers**.

 Anemia; it usually due to hemodilution & ↓ RBC survival. If Hb < 7 g/dl,

give **packed RBC** or better by **fresh, washed RBC**. If there is risk of hypervolemia, give RBC in dose 10 ml/kg slowly over 4-6 hr. ***Nutrition;*** ↑ caloric intake, but **↓ intake of sodium, potassium, and**

phosphorus as well as protein (to ↓ production of urea & creatinine). In critically ill patient, give TPN with essential amino acids. **Pg.** It is entirely depend on the **cause of ARF**. Long term sequelae of ARF include: chronic renal insufficiency, hypertension, renal tubular acidosis, and urinary concentrating defect.