

Lecture of Renal replacement therapy {2}

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- HEMODIALYSIS -

- Provides an excellent extracorporeal mode for renal replacement.

- Advances in technical aspects and availability of pediatric size dialyzers have made it possible to offer hemodialysis to children in end stage renal disease.

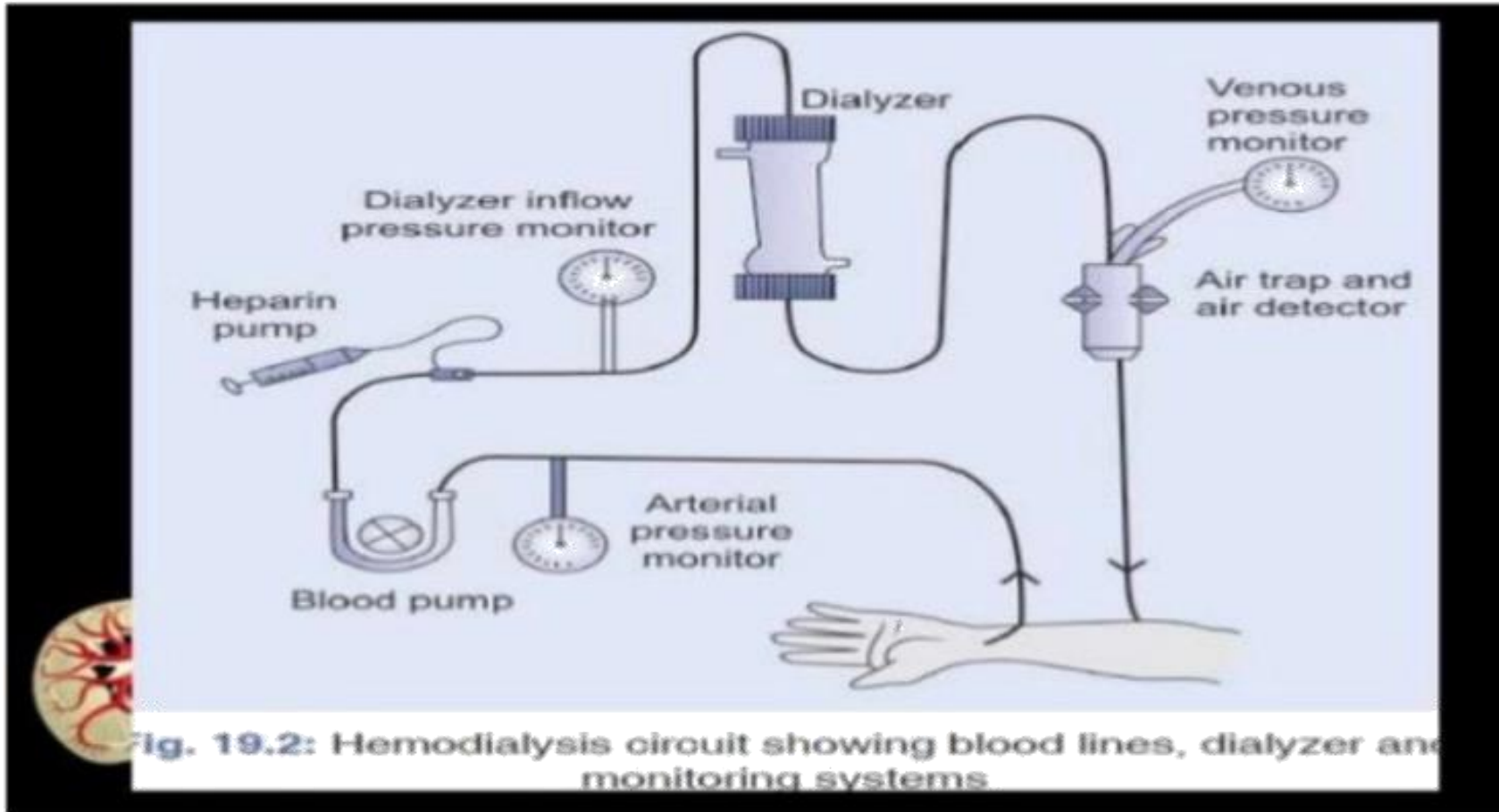
Principles

- The basic principles of HD are the same as for PD :-
 - A) Ultrafiltration
 - B) Solute Removal (by convective transport and diffuse transport)

- What differentiates HD from PD is :
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- A) The driving force between the two processes
 - B) Technical aspects of the procedure
 - C) Duration/Frequency of the treatments.
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MECHANISM



- The rate of transfer of substances depend upon :
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- The surface area and the permeability of the dialyzer membrane
- The solute concentration gradient
- Rates of blood flow and dialysate flow
- Composition of dialysate.

- **Vascular Accesss:**

- A) Tunneled cuffed catheter
- B) Arteriovenous (AV) fistula
- C) AV graft.

1) Catheters

- Percutaneous temporary dual lumen catheter
- Cuffed central venous catheter (Permacath)

2) Fistulas include the Radiocephalic and Brachiocephalic fistula.

3)AV Grafts

- Similar to fistulae except that an artificial graft made of Teflon is used to join artery and vein.

Dialyzers and Blood Tubing

- Most dialyzers currently are hollow fiber dialyzers.
- Most modern dialyzers are made of modified cellulose or entirely made of synthetic material.
(Advantage of being more permeable and efficient solute removal.)
- The choice of dialyzer is based on the size of the dialyzer.

Length & Frequency of Dialysis

- The aim is for 30% reduction in BUN during the 1st dialysis(1.5-2hrs).
- 50% during the 2nd treatment. (3hrs)
- >70% reduction during subsequent treatments (3.5-4hrs).

Complicaions during Hemodialysis

1. Dialysis disequilibrium syndrome:
Manifested as seizures
2. Muscle Cramps
3. Hypotension.
4. Nausea & Vomiting
5. Itching.

Advantages

- Maximum solute clearance
- Best tx for severe hyper- K^+
- Ready availability
- Limited anti-coagulation time
- Bedside vascular access

Disadvantages

- Hemodynamic instability
- Hypoxemia
- Rapid fluid + solute shifts
- Complex equipment
- Specialized personnel
- Difficult in small infants

CONTINUOUS RENAL REPLACEMENT THERAPY

- Variant of HD therapies that are continuous and prolonged.(for days to weeks).

2 types :

- a) CVVH (Continuous venovenous Hemofiltration)

Only convective transport without adding dialytic compound.

b) **CVVHD** (Continuous venovenous hemofiltration dialysis)

Dialytic compound added.

- The choice of CVVH or CVVHD is center dependent and also on the need for solute removal , which is usually greater with CVVHD.

Indications for CRRT

- Modality of choice in patients who are critically ill and hemodynamically unstable patients.
- Neonates and infants with cardiovascular or abdominal surgery.
- Trauma
- Shock & multi-system failure.
- Children with inborn errors of metabolism such as urea cycle disorders

Disadvantages of CRRT

- Same as seen in Hemodialysis.
- Continuous nature – risk greatly multiplied.
- Continuous vascular access, very close monitoring
 - very expensive

Thank You