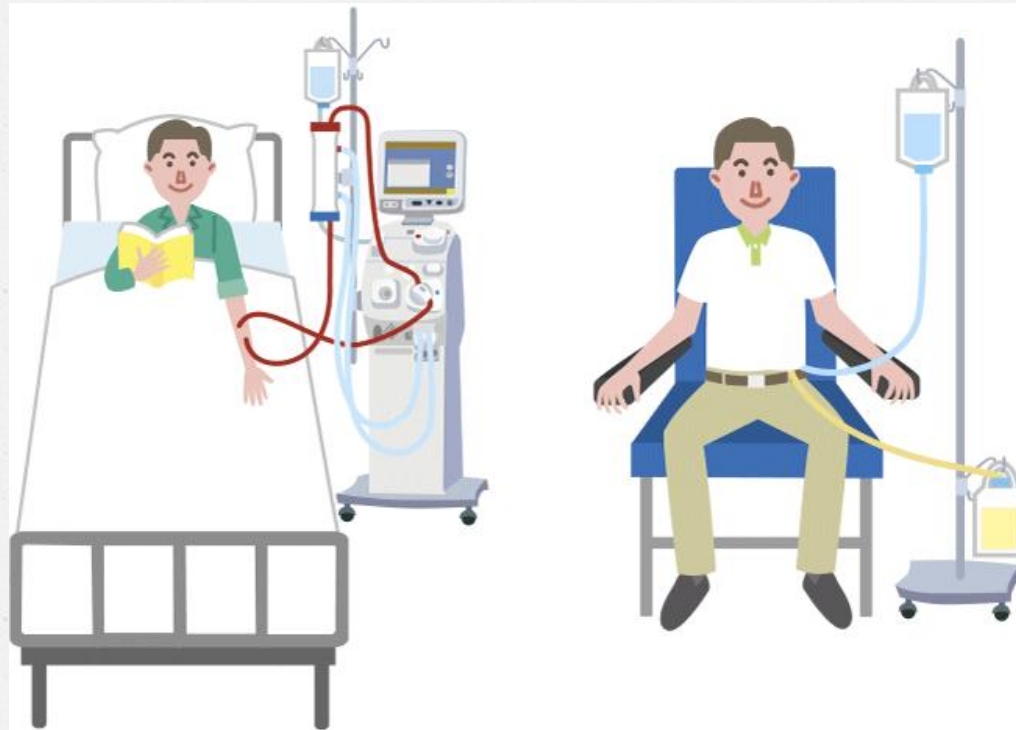


DIALYSIS



DEFINITION

- Dialysis is the movement of fluid and molecules across a semipermeable membrane from the compartment to another.
- dialysis is a technique in which substance move from the blood through a semipermeable membrane and in to a dialysis solution.

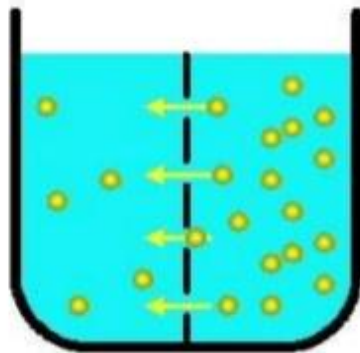
PRINCIPLES

- **Diffusion** : It is the movement of solutes from an area of greater concentration to an area of lesser concentration.
- **Osmosis**: It is the movement of fluid from an area of lesser to an area of greater concentration of solutes.

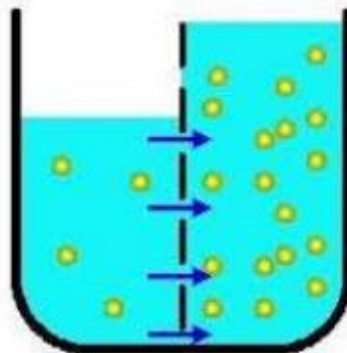
- **Ultrafiltration:** It is the movement of fluid across a semipermeable membrane as a result of artificially created pressure gradient.

□ Principles of dialysis:-

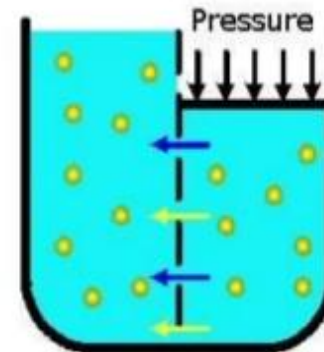
- ▶ The principles of **diffusion**, **osmosis**, & **ultrafiltration** are involved in dialysis.



Diffusion
(Solvent moves by concentration gradient)



Osmosis
(Water moves by concentration gradient)



Ultrafiltration
(Solution moves by pressure gradient)

PURPOSES

- To aid in the removal of toxic substances and metabolic wastages.
- To assist in regulating fluid electrolyte balance of the body.
- To remove excessive body fluids.
- ◊ To replace or compliment the works of the body

INDICATIONS

- Acute or chronic renal failure
- Electrolyte imbalance
- Excessive fluid balance
- Intoxication with poison
- High blood urea, serum creatinine and hyperkalemia
- Therapy of peritonitis

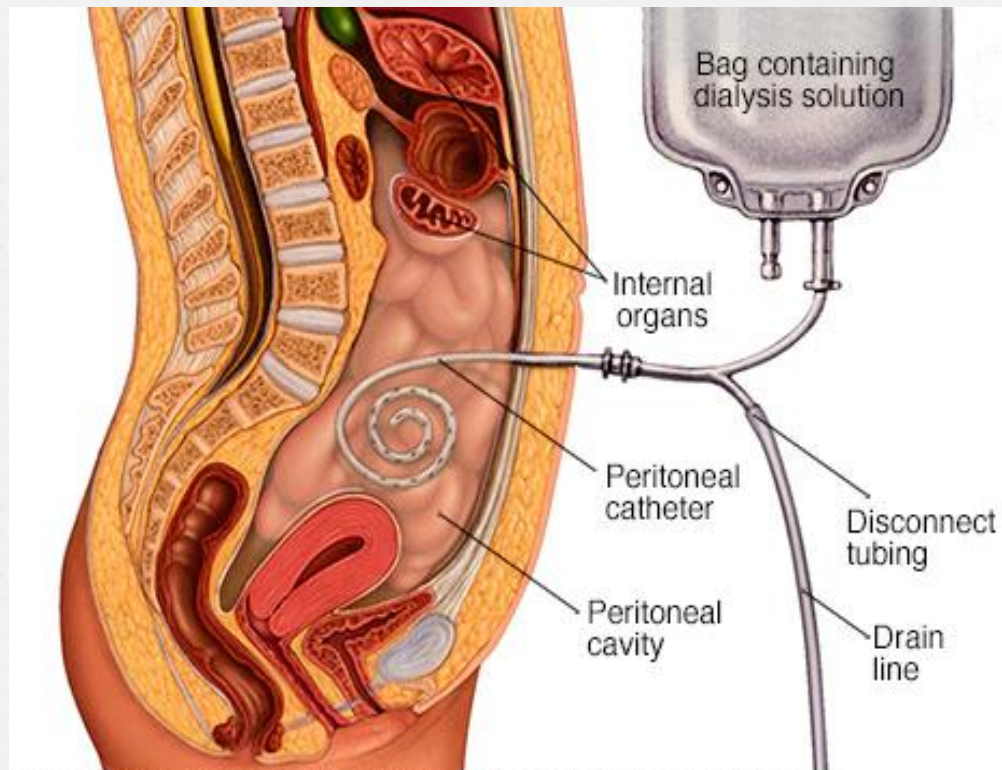
TYPES

- Peritoneal dialysis
- Hemodialysis

Peritoneal dialysis

o It is a type of dialysis which uses the peritoneum as the membrane through which fluid and dissolved substances are exchanged with the blood.

Conti..



© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.

Types

- Continuous Ambulatory Peritoneal Dialysis(CPAD):1.5-3 L of dialysate is instilled into the abdomen and left in place for a prescribed period of time. The solution is then dialyzed y gravity flow.

Conti..

- Automated peritoneal dialysis: This method can be performed as continuous cycle , intermittent or nightly intermittent peritoneal dialysis by using peritoneal cycling machine.
- Continuous cyclic peritoneal dialysis: usually 3 cycles at night one cycle with an 8 hr dwell in the morning.

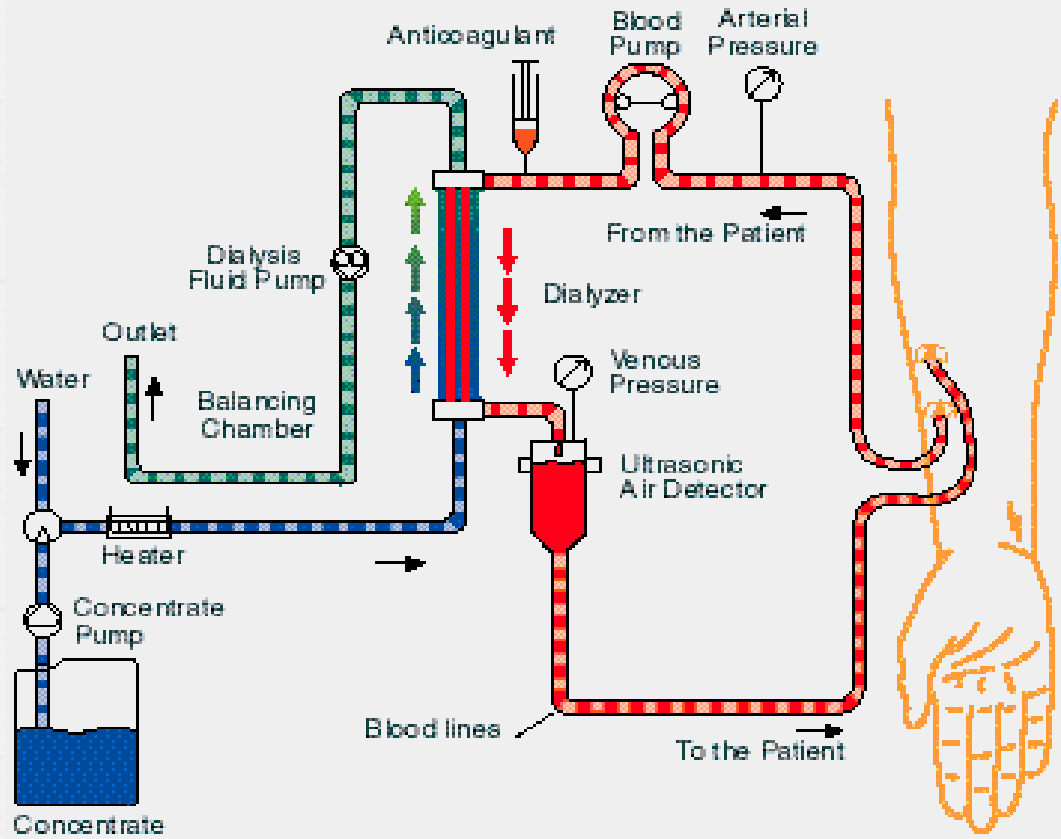
Conti..

- Intermittent peritoneal dialysis: Dialysis is performed for 10-14 hrs , 3-4 times in weeks.
- Nightly intermittent peritoneal dialysis: Dialysis is performed for 8-12 hours each night with no daytime dwell.

Hemodialysis

- o It is a technique of allowing blood from an artery on one side of the semipermeable membrane and dialyzing solution on the other side of the semipermeable membrane and returning the dialyzed blood to the patient's body through a vein.

Conti..



Catheter placement in peritoneal dialysis

- Peritoneal access is obtained by inserting a catheter through the anterior abdominal wall.
- Tenckhoff catheter (silicon rubber tubing) about 60cm long and have 2 Dacron cuffs on the subcutaneous and peritoneal portion of the catheter that act as anchors and prevent the microorganisms down the shaft from the skin.

Conti..



Standard Tenckhoff
catheter

Swan-neck catheter

Coil catheter

Conti..

- Fibrous tissue grows into the Dacron cuff and holding the catheter in place and preventing the bacterial penetration in to the cavity.
- The tip of the catheter is rest on cavity, which has many perforations in the distal end of the tube for allowing fluid to flow in and out of the catheter

Non surgical method

- Approximately 2 cm below the umbilicus is numbed with a local anesthetic & a stab wound is made. A stylet is inserted and the abdomen is distended with dialysis solution.

- The catheter is then placed into the peritoneal cavity, when the patient feels the pressure in the rectal area and has the urge to defecate, the catheter is in place.

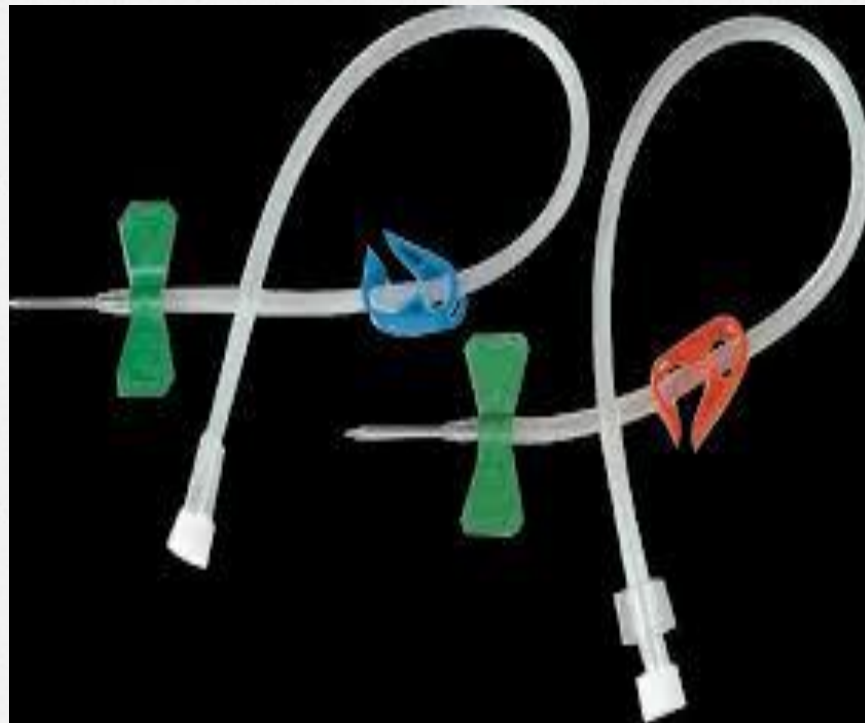
Vascular access Sites in hemodialysis

- Shunts: Implanted tube to an artery and vein .which provide larger than normal volume of blood flow for dialysis.
- Internal Arteriovenous Fistula and Grafts: An AVF is created most commonly in the forearm with anastomosis between an artery (radial or ulnar) and a vein(cephalic).

AV fistula



Conti..

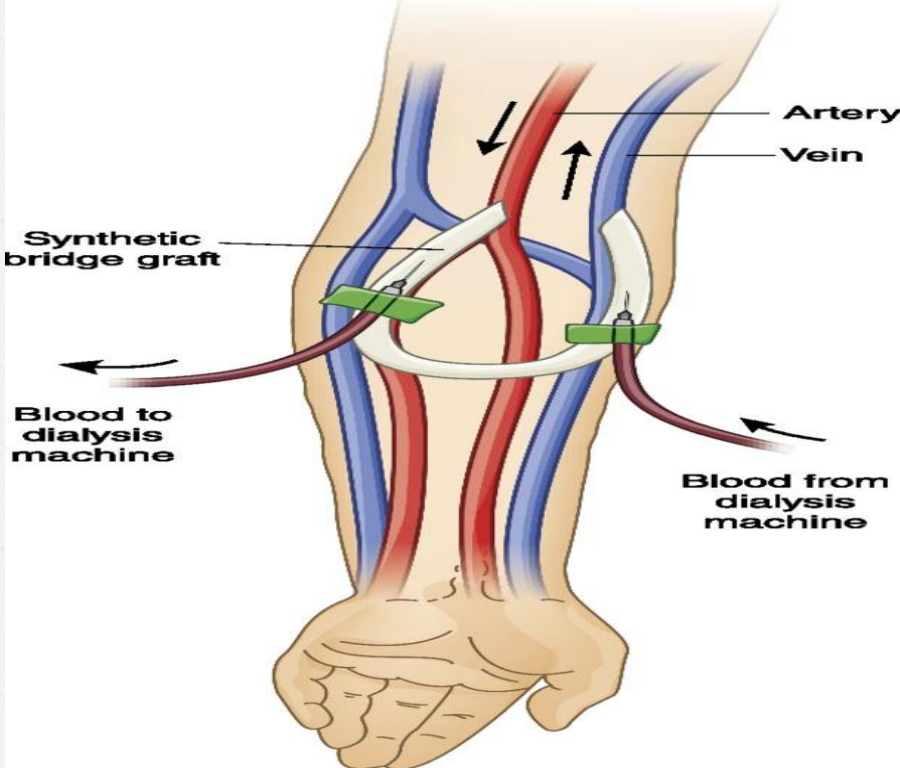


Conti..

The fistula provide an arterial blood flow through the vein.

- Arteriovenous grafts: they are made up of synthetic materials like PTFE, Teflon and form a bridge between the arterial and venous blood supplies. Grafts are placed under the skin and surgically anastomosed between an artery (brachial) and a vein(antecubital).

Conti..



Fistula Vs Graft

AV Fistula

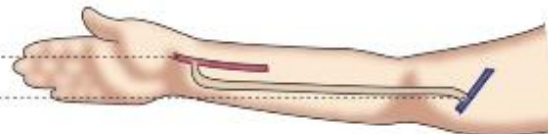
Catheter



Straight graft

Radial artery

Cubital vein



Loop graft

Branchial artery

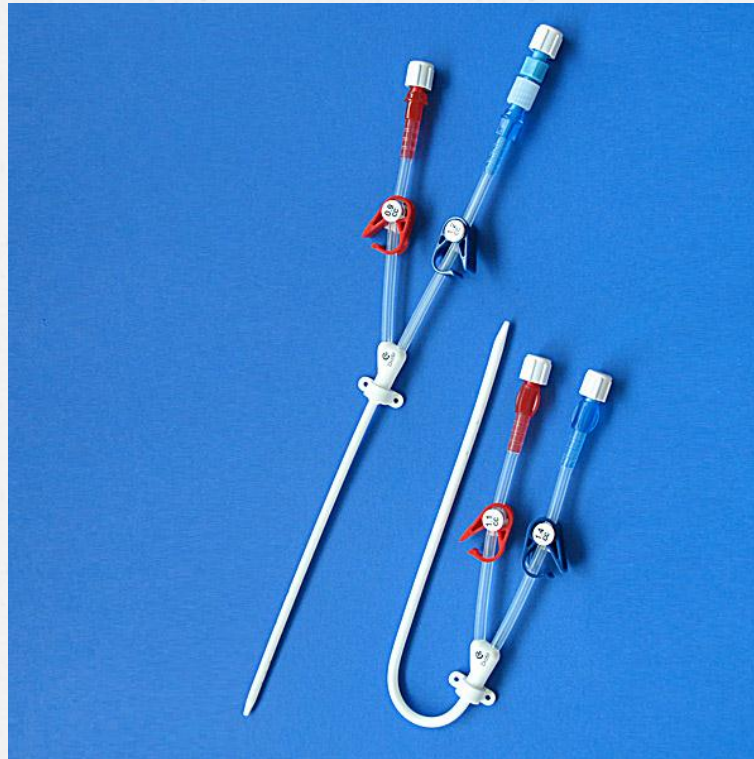
Cubital vein



Temporary vascular access

- o percutaneous cannulation of the internal jugular or femoral vein
- o A flexible Teflon, silicon rubber or polyurethane catheter is inserted at the bedside in to one of these large veins and provides access to circulation without surgery

catheter



Temporary vascular access



Conti..

- The catheter have usually double external lumen with an internal septum separating the two internal segments. One lumen is used for blood removal and the other for blood return.

Conti..

- Heparin is infused into the lumens of the catheter at the end of the each treatment to ensure patency and withdrawn.

COMPLICATIONS

o Peritoneal dialysis

- Abdominal pain
- Peritonitis
- Outflow problems
- Hernias
- Lower back problems
- Bleeding
- Protein loss

➤ Carbohydrate and lipid abnormalities

○ **Hemodialysis**

➤ Hypotension

➤ Muscle cramps

➤ Loss of blood

➤ Hepatitis

➤ Sepsis

➤ Disequilibrium syndrome

CARE OF PATIENTS WITH DIALYSIS



Before the procedure

- Check the doctor's order for the type of dialysis, type amount of solution.
- Explain the purpose and procedure to the patient. Ask the patient to take light meal in the morning.
- Collect and take the supplies to the bed side.

Conti..

- Obtain the consent
- See that the patient is wearing loose clothes
- Take weight and check vital signs
- Ask the patient to void or catheterize if patient is drowsy.
- Shave the site if required
- Place the patient comfortably in supine position

Conti..

- Wash your hands
- Collect and send blood sample for blood biochemistry
- Assist to perform dialysis.

During dialysis – Peritoneal

- Observe the patient for following to detect early signs of complications.
- Pulse , respiration, BP every 15 minutes during the first exchange and every hour thereafter
- Temperature every hour
- Dressing for leakage and bleeding

Conti..

- Loss or gain of fluid at the end of the each exchange.
- Weight daily especially on a gram scale
- ◊ Site for signs of infection
- Amount of urinary output.
- Slowing the flow rate if patient has pain and discomfort.
- As the procedure is lengthy and patient get tired provide comfort to the patient.

After the dialysis

- Change the dressing
- Change the inflow tubing and drain bag
- Remove the stitches and peritoneal catheter
- Resuture the site
- Clean the area and dress the wound
- Collect the blood sample and label.

Hemodialysis – During the procedure

- Observe the flow of blood through the tubings
- Observe the patient during exchange for vital signs every 15 minutes during the exchange and report to the doctor of any change like chest pain, reaction of blood transfused, headache.
- Repeat heparin as ordered

After the procedure

- When the dialysis is over, collect and label the blood sample.
- Remove the arterial catheter and fistula needle and apply pressure dressing on the site.
- Check vital signs and weight of the patient
- Offer feed to the patient
- Fill artificial kidney with formalin 40 % for about 2 hrs if required to be used again , otherwise discard it.

Conti..

- Wash the blood compartment of the artificial kidney with normal saline and dialyzing compartment with tap water.
- Shift the patient to post dialysis unit after half hour following the completion of the dialysis
- Remove and clean the supplies and send for sterilization
- Reset the equipments for next use.

Recordings

- Date and time of insertion of catheters
- Date and time of starting and ending of the dialysis
- Vital signs, weight and urine output before and after the procedure
- Comfort measures provided
- Complication detected
- Dressing changes

Conti..

- Amount and colour of the solution
- Tubing and drainage bag changes
- Time of removal of catheter removed, by whom, any problem if encountered.
- Time and date of feed offered
- Blood reports
- Any instructions given to the patient.