***Kidney disease***

***Kidney function :***

1.maintaince of water and electrolytes balance

2.maintaince of acid-base balance

3.synthesis of erythropiotine (synthesis of RBC)

4.vitamin D metabolism

5.regulation of blood pressure

***Kidney function measured by several tests :***

(1) GFR glomerular infiltration rate ; It’s the amount of fluids filtrated by kidney per minute.

-Normal value :80-100ml/minute

-<20%: renal failure

-20-25%:end stage renal disease it’s the stage before you need kidney transplant.

-25-40%: renal insufficiency

-60-75%: decreased renal reserve some renal damage is present but the rest of the kidney does the usual function.

 (2)BUN: blood urea nitrogen

normal value :10-20mg/dl.

 (3)Creatinin.

 (4 )Electrolytes (Na, K , p ,Ca )

(5) Urine analysis: we check PH, colour RBC, WBC.

***We have 4 main kidney diseases we should know about***:

* Chronic renal failure
* Dialysis
* Renal transplant
* Nephrotic syndrome

* ***Chronic renal failure:***
* A slowly progressive disease characterised by irreversible reduction of GFR over a period of months to years.
* Signs and symptoms depend on the degree of renal malfunction
* In early stages it’s asymptomatic then nocturia, anorexia then end stage renal failure (uremic syndrome).

***Clinical features :***

* ***Cardiovascular***: hypertension and congestive heart failure.
* ***Gastrointestinal:***,nausea, vomiting, peptic ulcer( due to hypercalcemia )
* ***Neurological***: lassitude, headache, tremor
* ***Dermatological***: itching, hyperpigmentation of skin and mucosal membrane
* ***Haematological***: bleeding tendency, anaemia, susceptibility to infection
* ***Musculoskeletal***: renal osteodystrophy effect bone, growth retardation .
* ***Metabolic***: thirst, polyuria, secondary hyperparathyroidism( increase in PTH ,Ca) ( decrease in PO4) .

***\*\*So basically the chronic renal failure patient have all diseases.***

***Classification of chronic renal failure according the GFR :***

* Stage 1: kidney damage with normal GFR (90%)
* Stage 2: mildly decreased GFR (60-90%)
* Stage 3: moderately decreased GFR (30-60%)
* Stage 4: severely decreased GFR (15-30%)
* Stage 5: kidney failure (GFR<15%)== > needs dialysis or renal transplant.

***Causes of chronic renal failure:***

\*\*The most important 2 causes are; Diabetes mellitus , hypertension ( especiall if uncontrolled)

\*\*Other causes:

* Glomerulonephritis
* Poly cystic kidney disease
* Reno-vascular disease
* Idiopathic

***Management of chronic renal failure*:**

* Usually they modify the patient’s diet.
* decrease fluid intake.
* restricting protein to minimise the increase in BUN
* Restricting dietary Na, K, Cl, Mg, p, Al
* Diuretics to maintain appropriate fluid balance
* Control of blood pressure .
* ***Dialysis:*** severe disease when medical (conservative) management fails

\*\* Removes fluid and wastes and equilibrate electrolytes and acid-bases

|  |  |
| --- | --- |
| *Peritoneal dialysis* | *Haemodialysis* |
| *performed by the patient at home* | *done at the hospital* |
| *A dialysis catheter is surgically placed into the peritoneum(part of body surround intestine )*  | *a vascular access is achieved by forming an arteriovenous fistula.* |
| *Peritoneum is the semipermeable membrane and is used for access.* | *uses an artificial kidney that circulates blood along a semipermeable membrane.* |
| *performed by the patient four to five exchanges a day.* | *performed three times a week; each session is for about 4 hours.* |
| *Used for ptn can't move , very obese,**Don't have access for hospital*  | *\*Heparin is used to prevent activation of the clotting cascade by dialysis membranes( anticoagulant )* |

\*\*Relies on the patient’s blood being exposed to a solution hypotonic in metabolites (dialysate) across a semi-permeable membrane.

***3-Renal transplant***: only in end stage renal failurewhen dialysis failed

\*Is limited by the availability of donor organs

\*Complications include:

-Increased incidence of cardiovascular disease

-Increased incidence of malignancies (skin, lymphoma...)

-Side effects of drugs: steroids, Immunosuppression.

***Dental aspect :***

***Oral manifestations:***

* Halitosis due to increased blood level of urea and ammonia; distinctive smell
* Xerostomia ; due to fluid restriction, medications(Antihypertensive drugs).
* Metallic taste due to increased blood level of urea and changes in salivary PH
* Mucosal pallor due to anaemia
* Uremic stomatitis: usually seen in last stage renal disease and maybe need renal transpernt and present as oral mucosal erythema and ulceration
* Petechia and echymosis due to uremia induced platelet dysfunction
* Delayed eruption of teeth and enamel hypoplasia in children have renal disease
* Salivary gland swelling in dialysis.

***Oral manifestations related to renal osteodystrophy and include:***

* Osteoporosis and osteolytic areas;appear on x-ray bone loss or cystic lesion.
* Loss of lamina dura
* Decreased bone trabeculation
* Ground glass appearance Paget's disease
* Secondary hyperparathyroidism may lead to giant cell lesions (brown tumour).

***Oral manifestations related to Immunosuppressent drugs after renal transplant and include:***

* oral infections (candidal infection , frequently recurrent herpes labials)
* hairy leukoplakia.
* Cyclosporine induced gingival hyperplasia , Adalat,phynotin
* Increased incidence of skin ,lymphoma , and lip cancer.

***Dental treatment may be complicated by:***

* Bleeding tendency due to uraemia induced platelet dysfunction or the use of heparin.
* Anaemia due to reduced erythropoietin production
* Associated co morbidities such as diabetes, hypertension, and congestive heart failure
* Dysrhythmias due to hyperkalaemia
* Impaired drug excretion
* Increased susceptibility to infection
* Blood born infections (HBV, HCV, HIV)
* Corticosteroid and Immunosuppression therapy post transplant.

***Management :***

* Consultation with renal physician is advised before treatment
* Most patients are best treated under LA; GA can be complicated by anaemia and electrolytes disturbances
* Patients are best treated the day after dialysis when there has been maximal benefit from dialysis and the effect of heparin has worn off
* Bleeding tendency should be excluded before surgical procedures (bleeding time, PT, PTT, INR) and local haemostatic measures should be applied .
* Antibiotic prophylaxis is recommended before surgical procedures because of the increased susceptibility to infection and to prevent infection of the arterio-venous fistulae in dialysis patients
* Early and aggressive treatment of odontogenic infections is advised to prevent spread of infection
* Corticosteroid cover may be required before surgical procedures in patients treated with systemic steroids
* Avoid the use of A-V fistula 's hand for blood pressure measurement use another hand , I.V sedation or venipuncture.
* NSAIDs, aspirin, tetracyclins, gentamycin are nephrotoxic and should be avoided
* Local anaesthesia is safe
* Paracetamole is safe
* Paracetamole and opioids “ codeine” hydrolyzed in the liver so they are safe.
* amoxicillin, ampicillin, metronidazole, clindamycin, lincomycin( nephrotoxic) dose should be reduced according to renal function (GFR) so adult dose for amoxicillin 500mg but for renal ptn use 250mg and preferable to use erytromycin derivatieves with normal dose .

***\*\*patient attended to the clinic has Mild chronic renal failure according the GFR we should:***

* Consult physician to determine the stage of the disease
* Be aware of associated co-morbidities such as diabetes and hypertension
* Avoid nephrotoxic drugs (NSAIDs, tetracycline, aminoglycosides), and adjust drug dosage according to GFR
* Consider bleeding tendency espcially if invasive dental procedure is planned (arrange BT, hemostatic measures).

\*\*Patients on peritoneal dialysis have the same guide lines

***Patients on haemodialysis*:**

\*\*Same previous guidelines +

* Dental treatment is best performed the day after dialysis ; because the effect of heparin is reduced and the patient had the maximum benefit of dialysis; so less risk of infection.
* avoid trauma to the A-V fistula, don't use for blood pressure measurement or venepuncture
* Adjust drug dosage according to GFR
* Prophylactic antibiotics are recommended before surgical procedures to prevent infection of A-V fistula.
* Cross infection hazard (HBV, HCV, HIV)

***Patients with kidney transplant:***

\*\*The same previous guidelines +

* Consider steroid cover ; to prevent infection.
* Consider prophylactic antibiotics; patients are immunosuppressed. Erythromycin is contraindicated in patients taking cyclosporine because both are metabolized in kidney
* Adjust drug dosage according to GFR
* Examine oral mucosa and skin carefully especially lip; patients have increased risk of malignancy

**4)*Nephrotic syndrome:***

\*Patient has protienurea, Hypoalbumenemia

Hyperlipidemia,

Hypercoaguabiity (increased blood concentration of clotting factors) more susceptible thromboembolic event such as MI or CBA, so the patient is given warfarin.

* ***Causes***
* Idiopathic most often.
* Diabetes
* Amyloidosis
* SLE, other autoimmune diseases

***Dental treatment :***

\*\*It’s treated as chronic renal failure treatment.

\*\*Dental treatment is influenced by the degree of kidney malfunction

\*\* Patients are usually treated with systemic steroids and anticoagulants.

\*\* Patients are more susceptible to infection due to steroid therapy, hypoproteinemia, and hypoimmunoglubulinemia prophylactic antibiotics.

\*\* Patients are usually treated with anti-coagulants (warfarin, heparin) to prevent thrombosis

\*\* Treatment is very complicated : even warfarin and heparin is not taken the same as a patient suffering from cardiac condition, we have to manipulate the dose which is very difficult.

\*\*Facial and labial oedema is common finding in these patients (why?) :hypoproteinemia ;so fluid will shift to the interstitial compartment causing facial edema.

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