Adult Nursing II

Chronic Renal Failure

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Chronic Renal Failure: Characteristics

- **Progressive** deterioration of renal function
- Irreversible
- The kidneys are unable to maintain fluid and electrolyte balance →
- Uraemia (azotaemia): increased urea and nitrogenous waste products in the blood, which adversely affects every system of the body

Chronic Renal Failure: Aetiology/ Underlying Causes

- Diabetes Mellitus (Diabetic nephropathy): most common cause
- Hypertension
- Chronic glomerulonephritis or chronic pyelonephritis
- Renal calculi
- Obstructions/ deformities of renal tract
- Long-term exposure to toxic agents (lead, mercury)

Chronic Renal Failure: Clinical Stages

- Reduced renal reserve (up to 75% loss of nephron function): others compensate therefore no symptoms
- Renal insufficiency (75-90% nephron loss): inability to concentrate urine, ↑serum creatinine and urea, anaemia
- End Stage Renal Disease (severely impaired requiring dialysis): uraemia and fluid/ electrolyte imbalance

Chronic Renal Failure: Pathophysiology

- Nephrons unable to produce urine or concentrate urine (→ retention of fluid and toxic metabolic waste)
- Altered basement membrane allows leakage of protein
- Normal renal buffering system fails → metabolic acidosis
- Retention of phosphates → calcium loss (normally balance each other)
- ↓ production of erythropoietin (anaemia)

Chronic Renal Failure: Clinical Manifestations

- Hypertension (fluid retention)
- Weight gain, oedema (↓urine output)
- Signs of congestive heart failure or pulmonary oedema, ↑ JVP
- Dysrhythmias, pericarditis, pruritis
- Nausea, vomiting, diarrhoea, hiccoughs
- Drowsiness, muscle twitches, restlessness
- Fatigue, pallor, breathlessness

Chronic Renal Failure: Signs of Hyperkalaemia

- Abdominal cramps
- Diarrhoea
- Muscle weakness
- Cardiac dysrhythmias

Chronic Renal Failure: Renal Osteodystrophy

- Kidneys unable to excrete phosphorus→
- ↑ serum phosphate and ↓ serum calcium
- Kidneys: ↓ vit D to aid calcium absorption
- Parathyroids triggered to raise blood calcium through resorption from bone
- ↑ phosphates form calcification in tissues: heart, blood vessels, joints, lungs, muscles
- Osteomalacia: ↓ calcium for bone tissue
- Osteitis fibrosis: bone calcium replaced by fibrosis

Chronic Renal Failure: Diagnosis

- History and clinical picture
- ↓ urine output and specific gravity
- ↑ blood urea, creatinine
- (Creatinine clearance test is valuable for diagnosis and monitoring disease progression)
- Hyperkalaemia
- Metabolic acidosis
- ↓ serum calcium, ↑ phosphorus
- Anaemia

Chronic Renal Failure: Clinical Signs of Deterioration

- Rise in blood pressure

- Excretion of protein

Chronic Renal Failure: Medical Management

- Haemodialysis (2-3 times weekly)
- Peritoneal dialysis (continuous ambulatory or 2-3 times weekly)
- Kidney transplant
- Diet and medications

Chronic Renal Failure: Diet and Medications

- Fluid restriction: usually previous 24 hour urine output + 500ml (insensible loss)
- Sodium restriction
- Protein reduction
- Avoid potassium-containing foods
- Medications more potent therefore ↓ dose
- Erythropoietin, iron, folic acid, vitamin D, calcium supplements, calcium carbonate

Chronic Renal Failure

- Dialysis

Chronic Renal Failure: Principles of Dialysis

- Diffusion: **toxins** pass from high concentration to ideal blood levels in the dialysate by diffusion(until equal)
- Osmosis: **excess water** passes to dialysate by osmosis (glucose added to draw water)
- Semi-permeable membrane: impedes larger molecules
- Ultra-filtration (negative pressure applied)

Chronic Renal Failure: Haemodialysis

- Arterio-venous fistula (AV fistula)
- Arterio-venous graft (synthetic, or formed from saphenous vein) where fistula not possible
- Central line (temporary measure): subclavian, internal jugular, femoral

Chronic Renal Failure: Nursing Considerations for Dialysis

- In case of a fistula or graft, do not use this arm for BP, IVI, taking blood, carrying weights
- Feel for “bruit” to check patency
- Weigh prior to dialysis (calculates excess fluid based on dry weight)
- BP initially and throughout
- Emergency measure for hypotension
- Medications and food post-dialysis

Chronic Renal Failure

- Kidney Transplant

Chronic Renal Failure: Kidney Transplant

- Once working, a new kidney reverses some of the pathophysiological changes of renal failure allowing a more normal lifestyle and diet

- The client following transplant will be immunosuppressed for the rest of his life

Chronic Renal Failure: Kidney Transplant: Donor

- The kidney donor may be a living relative (homogeneic) or a cadaver (allogeneic)
- A living relative is preferable as optimal timing arranged, and minimal “cold” time prior to surgery
- Thorough health check of donor
- Screen for HIV, HBsAg, HCV, CMV
- Histocompatibility (HLA) on initial serum test and by crossmatch: NO antibodies as would cause immediate rejection

Chronic Renal Failure: Kidney Transplant: Recipient

- Optimal recipient health at time of surgery
- Old kidney left to reduce rejection risk
- Cadaver kidney more at risk of acute tubular necrosis/ malfunction (from delay)
- Usually huge diuresis from live donor kidney :
- Monitor and counteract risk of dehydration and hypovolaemia, electrolyte imbalance, metabolic acidosis

Chronic Renal Failure: Kidney Transplant: Rejection

- Rejection of the kidney is common in the first 3 months:
- Hyper-acute rejection (antibodies): occurs immediately post-op and requires removal of the kidney
- Acute rejection (killer T cells) occurs days to months post-op: is manageable by increasing immunosuppressives
- Chronic rejection (months to years) is irreversible and requires another donor

Kidney Transplant: Signs of Rejection

- Reduced urine output
- Pyrexia (fever)
- Raised BP
- Weight gain and oedema
- Tenderness and pain over the transplant site (usually iliac fossa)
- Raised serum creatinine and urea

Kidney Transplant: Management and Nursing Considerations

- Ensure vascular access (“bruit”) in case haemodialysis required once more
- Observe for signs of rejection
- Record diuresis and replace fluid regimen
- Monitor fluid/ electrolyte balance, ABGs
- Monitor vital signs (haemo-dynamics)
- Immunosuppressive therapy, immediate/ long-term: initial isolation/ patient education

Kidney Transplant: Immunosuppressive Therapy

- Cyclosporine
- Prograf
- Prednisolone
- Cellcept

- These drugs will be gradually tapered but a combination will be taken for life

Kidney Transplant: Side Effects of Immunosuppression

- Increased risk of infection
- Risk of opportunistic infections eg candida
- Increased risk of malignancy
- Risk of atherosclerosis and cardiovascular disease
- Problems associated with steroid therapy: hypertension, weight gain, Diabetes Mellitus, muscle wasting, Cushing's syndrome, osteoporosis, cholelithiasis, renal calculi, cataract, glaucoma

Kidney Transplant: Long-term Health Education

- Be aware of signs of rejection
- Regular BP, weight checks
- Report infection
- Advise health care providers that taking immunosuppressives (card)
- NEVER stop steroids suddenly
- Injury, surgery, stress or infection may require increased steroid dose
- Dietary modifications