MEDICAL UNIVERSITY - PLEVEN
FACULTY OF MEDICINE

DISTANCE LEARNING CENTRE

DEPARTMENT OF "NEPHROLOGY,

HEMATOLOGY AND GASTROENTEROLOGY"

PRACTICAL EXERCISES – THESES

FOR E- LEARNING IN NEPHROLOGY

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CHRONIC RENAL FAILURE

Introduction: Chronic renal failure/CRF/ is not a primary renal disease. It represents a complex of clinical and laboratory syndromes that appear to be a result of gradually dropping out of all the renal functions because of irreversible structure impairments of the kidney parenchyma.

The **most important causes** in are chronic glomerulonephritis and chronic pyelonephritis, polycystic kidney disease, diabetic nephropathy, chronic interstitial nephritis. Risky for CRF also are other satellite nephropathies, hypertensive nephroangiosclerosis, Balkan endemic nephropathy, chronic obstructive uropathies.

PART I – Examining a patient

1. Asking *basic questions* – surname, first names, time of admission to the hospital, marital status, age.

NB – People of all ages may develop CRF.

The birthplace is of significance in noting eventually an endemic for BEN region.

Residence and occupation may be informative of possible toxic for the kidneys agents in the environment.

2. *Case history* – the complaints are due to the primary renal disease and to the disturbed homeostasis as well as to a variety of system changes.

- Lack of a distinct start of patient's illness.
- General sufferings: weariness, anorexia, headache, and weak resistance to infection.
- Troubles with the digestive system: alteration in taste, nausea, pain in the epigastrium, vomiting, diarrhea, gastro-intestinal hemorrhaging.
- Polyuria and nocturia: very indicative of CRF.
- Colorless urine, because the specific weight of the urine is low as a sign of either hypo- or isostenuria.
- History of a long-term hypertension.
- Cardiac irregularities: heart palpitations, fatigue at physical exercise and while walking, labored breathing, swollen feet, retrosternal or across the chest pain in cases of uremic pericarditis.
- Troubles that are related to the central nervous system: headaches, dizziness, convulsions, seizures.
- Disorders of the peripheral nerves: tingling, numbness, muscle pain, muscle weakness, cramps, involuntary trembling of the lower extremities, the so-called "syndrome of the hot feet".

- Pruritus all over the skin, especially in an advanced uremia.

3. *Past history*:

-Previous chronic renal disease.

-Disorders of urine drainage in middle- and old-aged males.

-Knowledge of congenital defects.

-Long-termed taking of analgesic drugs that contain peacetime and salicylic acid.

-Anamnesis of undergone radio- or polychemotherapy.

4. *Family history*: relations with polycystic renal disease, nephrolithiasis, BEN, abnormalities.

5. *Risky factors*: obesity, gout, diabetes mellitus, toxins in the environment.

6. *Physical examination of the patient*: according the propaedeutic rules.

Specific of CRF findings:

Typical complexion, the so called Bright's face. The skin is colored in tinny grayish-yellow and looks dry and desquamated. The tissue turgor is reduced, the visible mucosae- pale. Syndrome of the "rabbit eyes".

The tongue may be dry and browny furred. Urinous foetor ex ore.

-Respiratory system – deep and noisy breathing of Kussmaul type when metabolic acidosis is present. Lost resonance and moist crepitations in an affected by uremic pneumonia area. Crepitant wheeze in waterlogged lungs in case of eventual hyperhydration. Pleural friction rub as a sign of uremic pleuritis.

-Cardiovascular system – typical of a hypertonic heart findings in patients that have arterial hypertension. Left-sided, right-sided as well as total heart failure may be manifested because of heart-dystrophy or hyperhydration, mainly in the advanced stages of CRF. Pericardial friction rub is the most important physical sign of uremic pericarditis; sometimes it can be elicited only when firm pressure with the stethoscope is applied to the chest wall; it is heard most frequently during expiration, with the patient leaning forward. Arrhythmias of all types are possible on account of different cardiac disorders as well as of some electrolyte imbalances.

-Digestive system – cracked lips, either present or none stomatitis, features of an eliminative gastroenterocolitis such as hematemesis and/or melaena when CRF is quite in advance.

- At palpating the abdomen possible findings might be those of a hepatomegaly in cases with heart insufficiency and of enlarged kidneys in having polycystic renal disease patients.

- Peripheral edemas and increase in weight caused by a volume excess.

-Central nervous system: appearance of uremic encephalopathy, demonstrated by delirium, seizures, clouding of consciousness and even coma. The brain disorders are characteristic of mainly the end stages of CRF and are due to uremic intoxication, acid-base imbalances, edema.

-Peripheral nervous system: findings of polyneuropathy. A lack of reflexes indicates a potassium deficiency in cases of an extreme polyuria, diarrhea etc.

PART II – Making the diagnosis

BASIC PURPOSES: (1) To establish the presence of CRF. (2) To qualify the grade of CRF. (3) To diagnose the renal primary disease as far as possible. Discussion on the clinical findings and explaining the genesis of the syndromes takes place.

IMPORTANT POINTS IN DIAGNOSING:

1. The appearance of the patient and the variety of disorders.

2. 24-hour diuresis. Noting the equality of day- and nighttime output of urine. Attention must be paid to the significance of day-to-day patient's weight measuring – evaluation of possible fluid overload.

3. Concentration of urine, estimated by measuring the specific gravity-either hypo- or isostenuria.

4. Laboratory analysis – laboratory tests supplement the clinical findings and back up the diagnosis.

-Urinalysis: proteinuria and urinary sediment according the primary renal disease.

-Blood tests for the values of nitrogen-waste products: urea above 8 mmol/l, creatinine of a value upper than 140 mkmol/l, possible raise in the level of uric acid. Serum urea and serum creatinine are increased to a different degree, within the limits of the relevant stage of CRF.

-Full blood count: shows reduction in hemoglobin, with lowered count of red blood cells and haematocrit.

-Acid-base balance: metabolic acidosis of a different degree, either compensated or decompensated.

-Serum electrolytes: changed according the stage of CRF and in relation to fluid overload or dehydration as well. Attention must be paid to the potassium imbalances: hyperkalemia and hypokalemia. Potassium values above 6 mmol/l are dangerous, more than 8-9 mmol/l – fatal. In cases of deficiency the plasma potassium is often under 3 mmol/l.

-Calcium – phosphorus metabolism. Typical of CRF are hypoCa-emia and hyper-P-emia. Discussing the significance, concerning renal osteodystrophy.

5. Functional investigations:

- Evaluating the kidney ability of concentrating and diluting urine by the test of Zimnitzki. Either hypo- or isostenuria are to be found out.

- Clearance of endogenous creatinine: of values within 80-40 ml per minute at compensated renal insufficiency and below 40 ml/min at the decompensated stages.

- Radioisotopic nephrography: shows severely damaged secretory and excretory phases bilaterally. Typical of an advanced renal failure is a view of "isostenuric", sometimes even "nephrectomic" kinds of curves on the nephrogram.

6. Methods of imaging the kidneys:

-Ultrasonography: of a great importance, especially in cases that require differential diagnosis with other conditions of altered diuresis and uremia..

- Excretory venous pyelography is contraindicated at CRF.

- Retrograde pyelography and CAT are of use on special occasion, e. g. suspective malignancies or obstructions of the urinary tract.

7. Chest-X-Ray: informs about hypertensive shaped heart, pericardial effusion, waterlogged lungs, pneumonia, pleural effusions.

8. Electrocardiography: arrhythmias, partial or total AV blocks, auricular fibrillation, ischemic changes et al. are possible.

PART III – Classifying the stages of CRF

I stage: polyuria, hypostenuria, urea within 8 -15 mmol/l, creatinine of values 150 -360 mcmol/l, clearance of creatinine 40-20 ml/min.

II stage: still polyuria, but already present isostenuria, urea within the limits of 15-30 mmol/l, creatinine of 350-700 mcmol/l, clearance 20-10 ml/min, either compensated or subcompensated metabolic acidosis.

III stage: pseudonormouria, hypostenuria, urea within 30-50 mmol/l, creatinine of 700-1300 mcmol/l, clearance of 10-5 ml/min, decompensate stage of metabolic acidosis, hyperkalemia.

IV stage: oliguria, isostenuria, excessive urea values above 50 mmol/l, creatinine more than 1300 mcmol/l, clearance of creatinine lower than 5 ml/min, exceedingly severe acidosis, excessive serum potassium.

PART IV – Diagnostic criteria

NB: Since renal function has to be seriously impaired before there are any symptoms, early diagnosis is difficult.

1. Higher than the normal values of blood urea and creatinine.

2. Altered concentration renal capacity and lowered creatinine clearance.

3. Disorders in normal diuresis, i. e. poly- or oliguria, nocturia.

4. Findings from ultrasonography of serious kidney damages. Data from isotopic nephrography.

5. Typical complexion and color of the skin.

6. History of previous chronic renal disease.

7. Acid-base and water-electrolyte imbalances.

PART V – Differential diagnosis

1. Acute renal functions and appearance of anuria, increasing of failure

2. Low-volume oliguria /extrarenal uremia/ :

3. Obstructive uropathy.