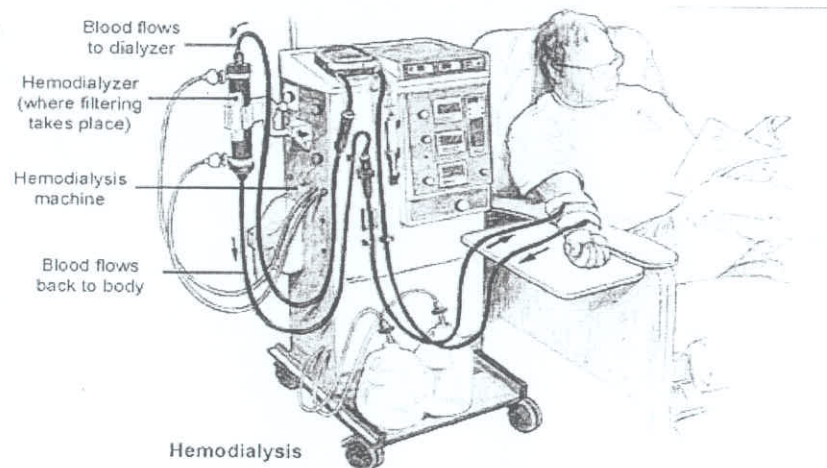




King Saud University  
College of Medicine  
Medical Education Department

## RENAL BLOCK

CASE NO. (4)



**“ I feel tired ”**

### Scenario:

Mufleh, a 57 years old male, known to have long standing type II diabetes, hypertension for 16 years, and hyperlipedemia.

He is known to have retinopathy and diabetic nephropathy and a base line creatinine of  $460\mu\text{mol/L}$  about, 8 months ago.

He has presented with 2 months history of fatigue, loss of appetite, itching.

His taking the following medication: insulin, Lisinopril 20 mg PO OD, ASA 80 mg PO OD, Atorvastatin 20 mg PO OD.





**On examination:**

Mufleh is not in distress. His vitals are as follows:

Vitals	Mamdouh	Normal Range
Blood pressure	150/97 mmHg	130/80 mmHg
Pulse	89/minutes	60-100/min

Lower limbs oedema bilaterally

Cardiovascular examination: normal first and second heart sound no added sound or murmurs.

Lungs are clear to auscultation and percussion.

Abdominal examination: no tenderness, abdomen is distended, positive shifting dullness for ascetics.



### Investigation:

- His fasting plasma glucose concentration was 10.5 mmol/l, with hypoalbuminemia and his alkaline phosphates was slightly raised.
- **Urine analysis:**
  - Protein +3, Hemoglobin negative, WBC 3 /HPF, RBC nil
- **Urea and electrolytes:**
  - Creatinine 670  $\mu$ mol/l , Urea 36 mmol/l K 6.2 mmol/l Na 138 mmol/l
  - $H_2CO_3=$  12 mmol/l PO<sub>4</sub>= 2.1 mmol/l Ca= 2.1 mmol/l
- **Complete blood count:**
  - WBC 5.6 Hb 87 Platelet 198
- **24 hours urine analysis:**

A 24-h evaluation of urine protein excretion confirmed increased protein in the urine. The glomerular filtration rate, as estimated with the creatinine clearance in 24 hours, was very low.
- **Ultrasound:**

An ultrasound analysis revealed bilateral echogenic kidneys of normal size.

The patient was diagnosed as having End Stage renal Disease (chronic kidney disease stage 5), due to long standing uncontrolled diabetes and hypertension.





## SECOND SESSION

### Management:

- To advise and explain the option of treatment of ESRD which includes:
  - 1- Renal replacement therapy:
    - a. Hemodialysis 3 times a week each session 4 hours through vascular access
    - b. Peritoneal dialysis (which is done at home after training)
  - 2- Kidney transplantation (the optimal treatment)
- Treat complication of chronic kidney disease:
  - Anemia:
    - iron supplements
    - Red blood cell production stimulation (erythropoietin)
  - Calcium / phosphate and bone disease:
    - dietitian for diet modification
    - phosphate binders
  - Hyperkalemia:
    - dietitian for diet modification
  - Metabolic acidosis:
    - dietitian for diet modification
    - sodium bicarbonate
  - Fluid imbalance
    - Diuretics
- Control diabetes and hypertension





## Tutor Guide

### **Introduction:**

It is a case of End stage renal disease (chronic kidney disease stage 5), due to long standing, uncontrolled HTN and diabetes.

### **Objectives**

- 1- Identify the commonest cause of chronic kidney disease in Saudi Arabia.
- 2- Discuss the pathophysiology of developing chronic kidney disease.
- 3- Describe the complications of chronic kidney disease.
- 4- Discuss the mechanism of acid base and electrolytes imbalance in chronic kidney disease.
- 5- Compare and contrast acute kidney injury from chronic kidney disease
- 6- Illustrate the histopathology of diabetic nephropathy
- 7- Identify basic principles of management of chronic kidney disease.

**Distribute page1**

### **Page 1**

Mufleh, a 57 years old male, known to have long standing type II diabetes, hypertension for 16 years, and hyperlipidemia.

He is known to have retinopathy and diabetic nephropathy and a base line creatinine of  $460\mu\text{mol/L}$  about, 8 months ago.

He has presented with 2 months history of fatigue, loss of appetite, itching.

His taking the following medication: insulin, Lisinopril 20 mg PO OD, ASA 80 mg PO OD, Atorvastatin 20 mg PO OD.

The students should start to ask questions about what has happened to the patient. They will discuss the different causes of such presentation. What evoked these symptoms? These should trigger some questions about what they would want to know in terms of a focused history. At an appropriate point in the discussion, when they need more information from the history and physical examination.





**Distribute page2**

**On examination:**

Mufleh is not in distress. His vitals are as follows:

<b>Vitals</b>	<b>Mamdouh</b>	<b>Normal Range</b>
Blood pressure	150/97 mmHg	130/80 mmHg
Pulse	89/minutes	60-100/min

Lower limbs oedema bilaterally

Cardiovascular examination: normal first and second heart sound no added sound or murmurs.

Lungs are clear to auscultation and percussion.

Abdominal examination: no tenderness abdomen is distended, positive shifting dullness for ascetics.





### Distribute page 3

#### Investigation:

- His fasting plasma glucose concentration was 10.5 mmol/l, with hypoalbuminemia and his alkaline phosphates was slightly raised.
- **Urine analysis:**
  - Protein +3, Hemoglobin negative, WBC 3 /HPF, RBC nil
- **Urea and electrolytes:**
  - Creatinine 670  $\mu$ mol/l , Urea 36 mmol/l K 6.2 mmol/l Na 138 mmol/l
  - $H_2CO_3$ = 12 mmol/l PO<sub>4</sub>= 2.1 mmol/l Ca= 2.1 mmol/l
- **Complete blood count:**
  - WBC 5.6 Hb 87 Platelet 198
- **24 hours urine analysis:**

A 24-h evaluation of urine protein excretion confirmed increased protein in the urine.

At this point, the students should try to interpret the results and relevance of the investigations done, in relation to the history and clinical examination and try to discuss differential diagnosis of according to the new scope. The interpretation of these data should trigger learning issues in the students about physiology of kidney function, kidney functions tests,

### Distribute page 4

The patient was diagnosed as having End stage renal disease (chronic kidney disease stage 5), due to long standing, uncontrolled hypertension and diabetes.

At this point, the students should ask about what is renal failure causes, , risk factors, diagnosis, and management. The tutor must assure that the student's learning issues are in the line of the session objectives.





## Second session

Distribute page4

### Management:

- To advice and explain to the option of treatment of ESRD which includes:
  - 1- Renal replacement therapy:
    - a. Hemodialysis 3 times a week each session 4 hours through vascular access
    - b. Peritoneal dialysis (which is done at home after training)
  - 2- Kidney transplantation (the optimal treatment)
- Treat complication of chronic kidney disease:
  - Anemia:
    - iron supplements
    - Red blood cell production stimulation (erythropoietin)
  - Calcium / phosphate and bone disease:
    - dietitian for diet modification
    - phosphate binders
  - Hyperkalemia:
    - dietitian for diet modification
  - Metabolic acidosis:
    - dietitian for diet modification
    - sodium bicarbonate
  - Fluid imbalance
    - Diuretics
- Control diabetes and hypertension







In the second session, after the student feedback about lines of management, the tutor should distribute this page to criticize the case management and to conclude finally if they need any further information.





## Reading material:



Chronic kidney disease (CKD) also known previously as Chronic Renal Failure (CRF) is a worldwide public health problem. There is a raising incidence and prevalence of kidney disease, with poor outcomes and high cost.



### *Definition of Chronic Kidney Disease (CKD):*

The National Kidney Foundation (NKF) defines CKD according to:

- the presence or absence of kidney damage and
- level of kidney function.

CKD is defined as structural or functional abnormalities of the kidneys for  $\geq 3$  months, as manifested by either

- $GFR < 60 \text{ mL/min/1.73 m}^2$ , with or without kidney damage
- Kidney damage, with or without decreased glomerular filtration rate (GFR), defined by
  - Pathologic abnormalities or
  - Markers of kidney damage:
    - blood or urine abnormalities or
    - Proteinuria
    - imaging tests (Multiple cysts consistent with PKD or Extensive scarring)

GFR is widely accepted as the best overall index of kidney function in health and disease.

Normal GFR varies according to age, sex, and body size; in young adults it is approximately 120 to 130 mL/min/1.73 m<sup>2</sup> and declines with age. A decrease in GFR precedes the onset of kidney failure; therefore, a persistently reduced GFR is a specific indication of CKD.



### *CKD Signs and Symptoms*

Chronic renal failure (CRF) usually produces symptoms when renal function falls below  $< 30 \text{ mL/min}$ , and When the GFR start to go below 30 mL/min, signs of uremia (high blood level of protein by-products, such as urea) may become noticeable as well as other complications (anemia, abnormal CA, and Po<sub>4</sub> metabolism). When the GFR falls below 15 mL/min most people become increasingly symptomatic.





Uremic symptoms can affect every organ system:

- **Neurological system**—cognitive impairment, personality change, asterixis, seizures (rare)
- **Gastrointestinal system**—nausea, vomiting
- **Hematological** —anemia due to erythropoietin deficiency, easy bruising and bleeding due to abnormal platelets function.
- **Pulmonary system**—Shortness of breath and pulmonary edema
- **Cardiovascular system** —chest pain due to pericarditis and pericardial effusion
- **Skin** —generalized itching and dry skin



### Complications:

- Anemia
- Hyperparathyroidism
- Hypocalcemia
- Hyperphosphatemia
- Hyperkalemia
- Metabolic acidosis



### CKD Stages:

K/DOQI clinical practice guidelines for chronic kidney disease have suggested the following staging system for CKD based on Estimated Glomerular filtration Rate (eGFR)

Stage	Description	GFR(mL/min/1.73m <sup>2</sup> )
1	Kidney damage with normal or ↑ GFR	> 90
2	Mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	Kidney Failure	< 15 or dialysis





Whether renal failure is acute or chronic usually can be distinguished by comparing prior test results (e.g., from the past several months or years). It is difficult to make the distinction without previous test results.

### *Differentiation between acute and chronic kidney disease*

	<i>Acute</i>	<i>Chronic</i>
<b>History</b>	Short (days-week)	Long (month-years)
<b>Haemoglobin concentration</b>	Normal	Low
<b>Renal size</b>	Normal	Reduced
<b>Serum Creatinine concentration</b>	Acute reversible increase	Chronic irreversible



## **Treatment**

Primary goal of treatment of CKD:

- To prevent cardiovascular events and death
  - Heart Attacks
  - Congestive Heart Failure
  - Sudden Cardiac Death
  - Stroke
- To prevent the progression of CKD to Kidney Failure or ESRD
- To prevent complications of CKD:
- Treat complication of chronic kidney disease:
  - Anemia:
    - iron supplements
    - Red blood cell production stimulation (erythropoietin)
  - Calcium / phosphate and bone disease:
    - dietitian for diet modification
    - phosphate binders such as
  - Hyperkalemia:
    - dietitian for diet modification
  - Metabolic acidosis:
    - dietitian for diet modification
    - sodium bicarbonate
  - Fluid imbalance
    - Diuretics
- Control diabetes and hypertension
- To prepare for dialysis/transplantation in a timely manner





- To advice and explain to the option of treatment of ESRD which includes:
  - Renal replacement therapy:
    - i. Hemodialysis 3 times a week each session 4 hours through vascular access
    - ii. Peritoneal dialysis (which is done at home after training)
  - Kidney transplantation (the optimal treatment)