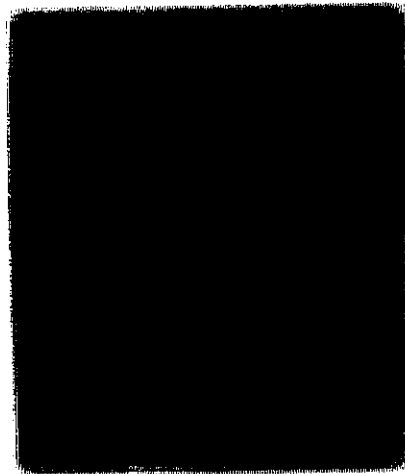




King Saud University
College of Medicine
Medical Education Department

RENAL BLOCK

CASE NO. (3)



“My body is swollen”

Scenario:

Mohammed is a 14 year old boy, not known to have any medical illness before presented with one week history of lower limbs swelling and puffiness around the eyes especially in the morning. He has no history of shortness of breath. However, he noticed that his urine is frothy for a few days.



On examination:

Mohammed is not in apparent distress. His vitals are as follows:

Vitals	Muhammed	Normal Range
Blood pressure	110/67 mmHg	130/80 mmHg
Pulse	78/min	60-100/min
Weight	56 kg	

Head and neck examination reveals puffiness around the eyes
Lower limb examination showed bilateral edema.

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 ascites.



Investigations:

▪ Haematology:

	Result	Normal range
Serum albumin level	24 mg/dL	35-45 mg/dL
Serum urea	4 mmol/L	2.5-8 mmol/L

▪ Complete urine analysis, shows the following:

Examination Made	Result	Normal values	Clinical significance
Color	Yellow	Amber yellow	Normal
Character	clear	clear	Normal
PH	6.0 acidic	4.8-8.0	Normal
Specific gravity	1.020	1.015-1.025	Normal
Protein	7 g/d.	(-)	Proteinuria
Sugar	(-)	(-)	Normal
Red blood cells	(-)	(-)	Normal
Pus cells	(-)	(-)	Normal
Epithelial cells	++	(-)	Contaminated sample
Amorphous phosphate	(-)	(-)	Normal
Bacteria	(-)	(-)	Normal

- **Percutaneous renal biopsy** was done and the following examinations on it showed:
 - **Light microscopy:** within normal
 - **Immunofluorescence microscopy:** Showed no particular staining except for trace coarse granular staining for immunoglobulin G and immunoglobulin M in capillary walls.
 - **Electron microscopy:** Showed an extensive effacement of epithelial foot process in glomeruli.



Treatment:

Mohammed was started on prednisolone 60mg per oral once a day. He was started on furosemide diuretic, and he was advised to reduced sodium intake to 1000-2000mg/day.



Tutor guide:

Introduction:

The students now confident that these clinical findings were consistent with a nephrotic syndrome. Consequently and according to the earlier findings, the case diagnosed as minimal change nephrotic syndrome.

Learning Issues:

- Define nephrotic syndrome.
- Explain the physiological mechanism of edema formation.
- Explain the pathophysiology of nephrotic syndrome.
- Discuss glomerular pathophysiology that can lead to nephrotic syndrome
- Classify diuretics and discuss mechanism of action and the potential side effect.

SESSION 1

Distribute page 1

Mohammed a 14 year old boy, not known to have any medical illness before presented with one week history of lower limbs swelling and puffiness around the eyes especially in the morning. He has no history of shortness of breath. However, he noticed that his urine is frothy for a few days.

The students should start to ask questions about what has happened with the patient. They will almost certainly think of meaning of the present symptoms like puffiness and its significance along with the past history of the patient and its relation to the present history early in the discussion, which should trigger some questions about what they would want to know in terms of a focused history. At an appropriate point in the discussion, the students will soon want to know what the physical examination showed. At that point



Distribute Page 2

On examination:

He is not in apparent distress. His vitals are as follows:

Vitals	Muhammed	Normal Range
Blood pressure	110/67 mmHg	130/80 mmHg
Pulse	78/min	60-100/min
Weight	56 kg	

Head and neck examination reveals puffiness around the eyes

Lower limb examination showed bilateral edema.

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 ascites.

At this stage, the students will ask about the meanings of the positive findings in the examination and its values. Anything that is not clear should become a learning issue.

The students should consider what laboratory data they need, and will probably request it.



Distribute Page 3:

Investigations:

	Result	Normal range
Serum albumin level	24 mg/dL	35-45 mg/dL
Serum urea	4 mmol/L	2.5-8 mmol/L

▪ **Complete urine analysis:**

Parameter	Result	Normal values	Clinical significance
Color	clear	clear	Normal
Specific gravity	1.020	1.015-1.025	Normal
Sugar	(-)	(-)	Normal
Pus cells	(-)	(-)	Normal
Amorphous phosphate	(-)	(-)	Normal

▪ Percutaneous renal biopsy was done and the following examinations on it showed:

*Light microscopy: normal

*Immunofluorescence microscopy: Showed no particular staining except for trace coarse granular staining for immunoglobulin G and immunoglobulin M in capillary walls.

*Electron microscopy: Showed an extensive effacement of epithelial foot processes in glomeruli.



At this stage and after the distribution of the page 3 The interpretation of these data should trigger learning issues in the students. They should at this stage finalize the learning issues regarding this case. The students now, must know that this is the case of nephrotic syndrome and asking about the appropriate management to this case.

Distribute Page 4

Treatment:

- Reduce sodium intake to 1000-2000mg /day
- Diuretics(IV furosemide)
- Prednisone 60 mg P.O. OD



Session 2:

At this stage and after the students went for searching and studying all the topics related to the case, they are trying to report all data about the case to solve the problem of the patient and decide if the management that took place for the patient is enough or not.

At the end of the session the evaluations of the students, tutor along with the case presentation must be consider.

Topic for group facilitator:

Nephrotic syndrome is a nonspecific disorder in which the kidneys are damaged, causing them to leak large amounts of protein (proteinuria at least 3.5 grams per day per 1.73m² body surface area) from the blood into the urine.

Kidneys affected by nephrotic syndrome have small pores in the podocytes, large enough to permit proteinuria (and subsequently hypoalbuminemia, because some of the protein albumin has gone from the blood to the urine) but not large enough to allow cells through (hence no hematuria). By contrast, in nephritic syndrome, RBCs pass through the pores, causing hematuria.

Clinical Presentation

It is characterized by proteinuria (>3.5g/day), hypoalbuminemia, hyperlipidemia and edema. A few other characteristics are:

- The most common sign is excess fluid in the body. This may take several forms:
 - Puffiness around the eyes, characteristically in the morning.
 - Edema over the legs which is *pitting* (i.e., leaves a little pit when the fluid is pressed out, which resolves over a few seconds).
 - Fluid in the pleural cavity causing pleural effusion. More commonly associated with excess fluid is pulmonary edema.
 - Fluid in the peritoneal cavity causing ascites.
- Hypertension (rarely)
- Some patients may notice foamy urine, due to a lowering of the surface tension by the severe proteinuria. Actual urinary complaints such as hematuria or oliguria are uncommon, and are seen commonly in nephritic syndrome.



- May have features of the underlying cause, such as the rash associated with Systemic Lupus Erythematosus, or the neuropathy associated with diabetes.
- Examination should also exclude other causes of gross edema—especially the cardiovascular and hepatic system.

Investigations

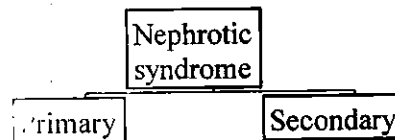
- Urine sample shows proteinuria (>3.5 per 1.73 m² per 24 hour). It is also examined for urinary casts; which is more a feature of active nephritis.
- Hypoalbuminemia: albumin level ≤ 2.5 g/dL (normal=3.5-5g/dL).
- High levels of cholesterol (hypercholesterolemia), specifically elevated LDL, usually with concomitantly elevated VLDL
- Electrolytes, urea and creatinine :to evaluate renal function

Further investigations are indicated if the cause is not clear

- Kidney Biopsy
- Auto-immune markers (ANA, ASOT, C3, cryoglobulins, serum electrophoresis)

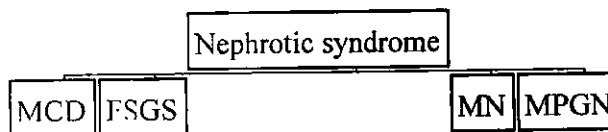
Classification and causes

A broad classification of nephrotic syndrome based on etiology:



Histological classification

Nephrotic syndrome is often classified histologically in to:



Primary causes

Primary causes of nephrotic syndrome are usually described by the histology, i.e., minimal change disease (MCD), focal segmental glomerulosclerosis (FSGS) and membranous nephropathy (MN).

They are considered to be "diagnoses of exclusion", i.e., they are diagnosed only after secondary causes have been excluded.



Secondary causes

Secondary causes of nephrotic syndrome have the same histologic patterns as the primary causes, though may exhibit some differences suggesting a secondary cause, such as inclusion bodies.

They are usually described by the underlying cause.

Secondary causes by histological pattern

- **Membranous nephropathy (MN):**
 - Hepatitis B
 - Sjögren's syndrome
 - Systemic lupus erythematosus (SLE)
 - Diabetes mellitus
 - Sarcoidosis
 - Syphilis
 - Drugs
 - Malignancy (cancer)

- **Focal segmental glomerulosclerosis (FSGS):**
 - Hypertensive Nephrosclerosis
 - Human immunodeficiency virus (HIV)
 - Diabetes mellitus
 - Obesity
 - Kidney loss

- **Minimal change disease (MCD):**
 - Drugs
 - Malignancy, especially Hodgkin's lymphoma

Diagnosis

Diagnosis is based on blood and urine tests and sometimes on the the kidneys biopsy or both.