السلام عليكم ورحمة الله وبركاته Dr,ahmed almissan

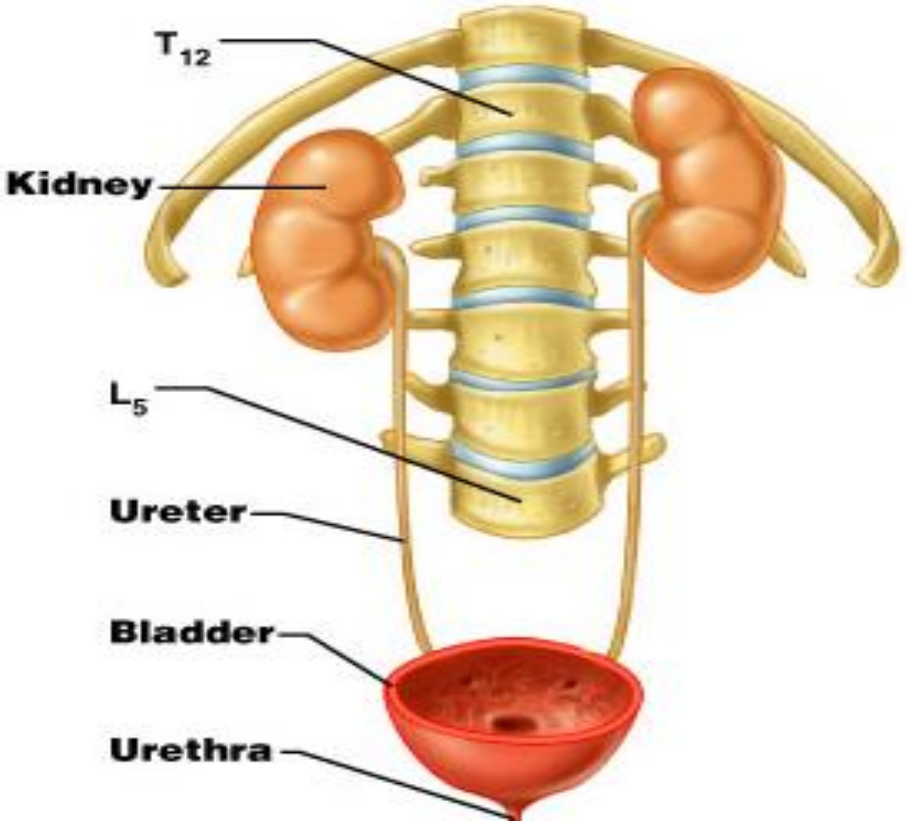
URINARY SYSTEM

Paired kidneys

A ureter for each kidney

Urinary bladder

Urethra



Functions of the kidneys

In health, the volume and composition of body fluids are tightly regulated and the kidneys are largely responsible. This is achieved by making large volumes of an ultrafiltrate of plasma (120 ml/min, 170 litres/day) at the glomerulus, and selectively reabsorbing components of this ultrafiltrate at points along the nephron The rates of filtration and reabsorption are under the control of many hormonal and haemodynamic signals.

Some metabolites either are not reabsorbed from the filtrate, or are actively secreted into it. The kidney is primarily responsible for excretion of many metaboli breakdown products (including ammonia, urea and creatinine from protein, and uric acid from nucleic acids), drugs and toxins
ALSO electrolyts and blood PH CONTROL

The kidney is the main source of erythropoietin, which is produced by interstitial peritubular cells in response to hypoxia. Replacement of erythropoietin reverses the anaemia of chronic renal failure (p. 488).
The kidney is essential for vitamin D metabolism; it hydroxylates 25-hydroxycholecalciferol to the active form, 1,25-dihydroxycholecalciferol. Failure of this process contributes to the hypocalcaemia and bone disease of chronic renal failure (p. 490).
Renin is secreted from the juxtaglomerular apparatus in response to reduced afferent arteriolar pressure, stimulation of sympathetic nerves, and changes in sodium content of fluid in the distal convoluted tubule at the macula densa. Renin generates angiotensin II (Fig. 18.26, p. 549), which causes aldosterone release from the adrenal cortex, constricts the efferent arteriole of the glomerulus and thereby increases glomerular filtration pressure (Fig. 17.1D). Angiotensin II also induces systemic vasoconstriction. By these mechanisms, the kidneys 'defend' circulating blood volume, blood pressure and glomerular filtration during circulatory shock. However, the same mechanisms lead to systemic hypertension in renal ischaemia

Urine

Amount:0.5L-3L/Day

The color of urine can vary from colorless to deep yellow

specific gravity of urine ranges from 1.001 to 1.035A high specific gravity (greater than 1.020) indicates concentrated urine, whereas a low specific gravity (less than 1.005) indicates dilute urine.

normal urine has a pH between 5.0 and 6.0

Protein is normally found in the urine(150mg/d) 60% of the proteins originate from the plasma, and the remaining 40% originate from the kidney and the urogenital tract. There are over 32 different plasma proteins; albumin is the predominant protein)

Glucose

The renal threshold for glucose is a serum concentration of 180 mg/dL

COMMON URINARY DISEASES

COMMON URINARY SYMPTOMS

POLYURIA

increase amount of urination more than 3L/day There will always be an associated increase in the frequency of micturition (*frequency*), and often *nocturia* as well.

may result from increased urinary solute excretion (osmotic diuresis) or may represent pure water diuresis

CAUSES OF POLYURIA

1-Excess fluid intake: primary or psychogenic polydipsia

2-Osmotic, e.g. hyperglycaemia, hypercalcaemia

3- diuretic use

4-diabetes insipidus

Cranial (reduced antidiuretic hormone (ADH) secretion)

Idiopathic (50%), mass lesion, trauma, infection

Nephrogenic diabetes insipidus (tubular dysfunction)

Genetic tubular defects

Drugs/toxins, e.g. lithium, diuretics

Interstitial renal disease

Hypokalaemia, hypercalcaemia

5- stages of healinf of acute renal failure

6- chronic renal disease ,pyelonephritis

FREQUENCY

Increased frequency of micturition or describes micturition more often than a patient's expectations

causes

1-results from polyuria,

2- with prostatic hypertrophy and bladder outlet obstruction

3- bladder/urethral irritation: Lower urinary tract infection (cystitis ,urethritis ,prostitis) causes bladder irritation and an increase in urinary frequency.

4-a reduction in functional bladder capacity . The detrusor muscle of the bladder contracts at an inappropriately low bladder volume

,5 Some patients with neurological diseases, in particular multiple sclerosis, also have frequency of micturition -.

NOCTURIA

- Waking up at night to void urine may be a consequence of polyuria and causes of it, urinary frequency but may also result from fluid intake or diuretic use in the late evening. Nocturia also occurs in chronic kidney disease, and in prostatic diseases

Urgency. is the sudden urge to urinate, due to involuntary contractions of the bladder muscle. Urinary **urgency** is one of the hallmark symptoms of urinary tract infection (UTI) and can be related to other conditions as well. Certain medications, like diuretics

- ***Incontinence*** is the involuntary passage of urine. In extreme cases urgency may lead to *urge incontinence*, in which the desire to void cannot be voluntarily inhibited.
- ***Stress incontinence***, on the other hand, is leakage of urine associated with straining or coughing, often due to weakened pelvic floor muscles.

(***hesitancy***)

difficulty in initiating micturition

and in completing micturition (***terminal dribbling***) This is very common in men, even in the relatively young. It is due to a small amount of urine becoming trapped in the U-bend of the bulbar urethra, which leaks out when the patient moves. It is more pronounced if associated with a urethral diverticulum or urethral stricture. It may occur in females with a urethral diverticulum and may mimic stress incontinence

LOIN PAIN

- Dull ache in the loin is rarely due to renal disease but may be due to renal stone, renal tumour, acute pyelonephritis or obstruction of the renal pelvis. This is most commonly caused by a congenital abnormality of the pelvi-ureteric junction

DYSURIA

- : pain immediately before, during or after micturition. The urine is often described as 'burning' or 'scalding',usually associated with . Infection ,irritation truma ,crystals and neoplasia in the bladder or urethra are the most important causes

Oliguria is decreased production of urine. It can be defined as a urine output that is less than 500 mL/day in adults. It is important and requires investigation because it can be one of the earliest signs of renal failure; however in most cases it can be reversed.

Anuria refers to the absence of urine production.

Causes

Common causes of decreased urine output include:

Dehydration due to vomiting, diarrhoea or fever, and a simultaneous lack of adequate fluid intake,hemorrhge ,sweeting ,burn.

Total urinary tract obstruction, such as may result from an enlarged prostate.,stones,tumer,truma

Severe infection leading to shock.

Kidney inflammation or damage.

Medications which may be harmful to the kidneys, including chemotherapy or immunosuppressant drugs and certain antibiotics

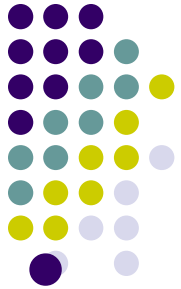
Renal failure

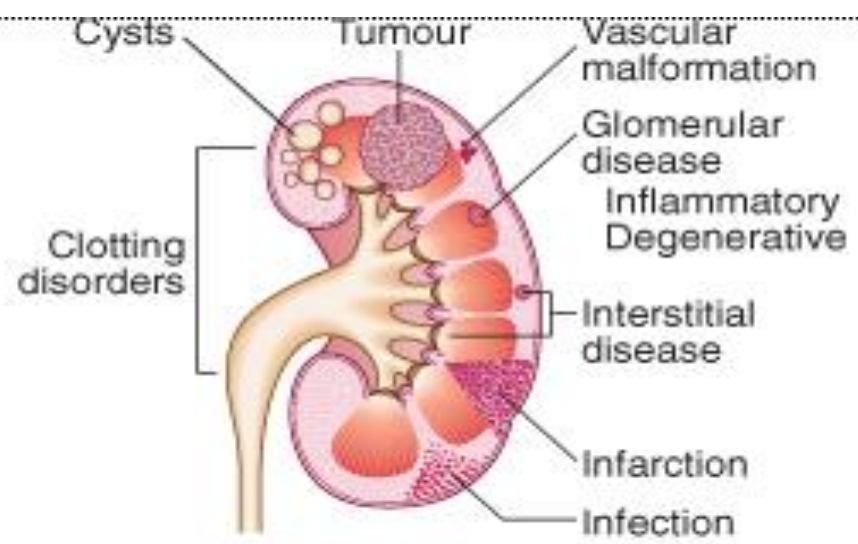
HAEMATURIA :

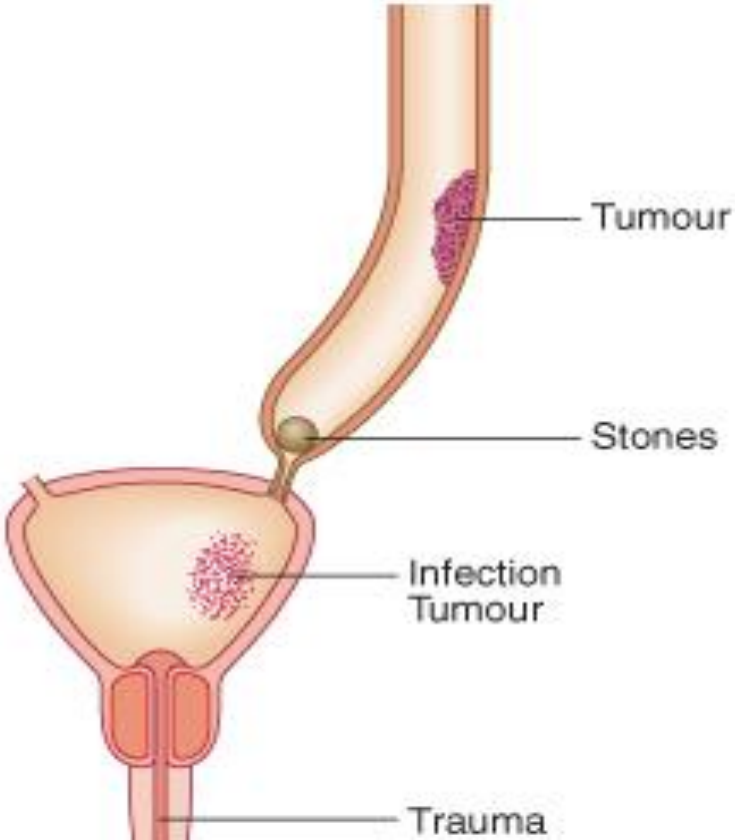
bleeding from anywhere in the renal tract

Haematuria may be visible and reported by the patient (macroscopic haematuria),

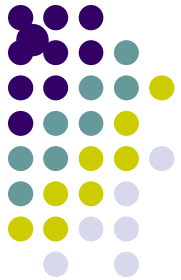
or invisible and detected on dipstick testing of urine (microscopic haematuria




Cysts
Tumour
Vascular malformation
Glomerular disease
Inflammatory
Degenerative
Clotting disorders
Interstitial disease
Infarction
Infection


Tumour
Stones
Infection
Tumour
Trauma

INTERPRETATION OF DIPSTICK-POSITIVE HAEMATURIA



Dipstick test positiveUrine

1-Haematuria+White blood cells--Infection

2- H+ Abnormal epithelial cells--Tumour

3- H +Red cell casts--Glomerular bleeding*

also +Dysmorphic erythrocytes –glomerular

2-Haemoglobinuria-No red cells Intravascular haemolysis

3-Myoglobinuria-No red cells-Rhabdomyolysis

Cause	Colour of urin
1-Food dyes e.g. Acanthocyanins (beetroot	Red
2-Drugs e.g. Phenolphthalein	Pink
Senna/other anthaquinones	Orange
Rifampicin	Orange
Levodopa	Dark
3-**Porphyria**	Dark
4-**Bilirubinuria** e.g. Obstructive jaundice	Dark

Dipstick-positive for bilirubin, negative for haemoglobin

Management

1-history ;below age 45 renal stone acommon cause of hematuria while atumors is acommon after age of 45 y .other symptoms

Examination……

Haematuria as a result of parenchymal renal disease is usually:

continuous

painless

microscopic (occasionally macroscopic).

Haematuria arising from renal tumours is likely to be:

intermittent

associated with renal pain

macroscopic.

PROTEINURIA

- Moderate amounts of low molecular weight protein do pass through the GBM. These proteins are normally reabsorbed by tubular cells so that less than 150 mg/day appears in urine.
- larger amounts indicate renal damage; any renal disease or injury may cause proteinuria. Proteinuria is usually asymptomatic, although large amounts may make urine froth easily

- The amount of protein in urine should be quantified to guide further investigations
- Quantification in a 24-hour urine collection is the) gold standard In many types of renal disease, the severity of proteinuria is a marker for an increased risk of progressive loss of renal function. There is circumstantial evidence that protein in the glomerular filtrate is toxic to the kidneys, and treatments that are effective at lowering the risk of progression of renal failure (e.g. angiotensin-converting enzyme (ACE) inhibitors in diabetic nephropathy) also reduce ‹ .proteinuria

Investigation

1-GUE

2-US

3-CT SCAN

4-IVP

\5-OTHERS

Th you