السلام عليكم ورحمة الله وبركاته
URINARY SYSTEM

Paired kidneys
A ureter for each kidney
Urinary bladder
Urethra
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 1.035

A 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
POLYURIA

An increase in the 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
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, prostatitis) 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, 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 loss of the normal ability to postpone micturition beyond the time when the desire to pass urine is initially perceived. **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. **Enuresis** is usually used to describe **nocturnal enuresis**, or bed-wetting
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, trauma, crystals and neoplasia in the bladder or urethra are the most important causes.
OLIGURIA/ANURIA

Oliguria is the passage of <500mL urine per day.

Anuria is the complete absence of urine flow(< 50 ml/day-in practice).

A low measured urine volume is an important finding and is a consequence of reduced production, obstruction to urine flow or both. (low fluid intake, severe gastroenteritis, hemorrhage, burns, renal failure, post renal obstruction by stones, tumor, mass, fibroses....)
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).
INTERPRETATION OF DIPSTICK-POSITIVE HAEMATURIA

Dipstick test positive Urine

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
<table>
<thead>
<tr>
<th>Cause</th>
<th>Colour of urin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Food dyes e.g. Acanthocyanins (beetroot)</td>
<td>Red</td>
</tr>
<tr>
<td>2-Drugs e.g. Phenolphthalein Senna/other anthaquinones Rifampicin</td>
<td>Pink Orange Orange</td>
</tr>
<tr>
<td>Levodopa</td>
<td>Dark</td>
</tr>
<tr>
<td>3-Porphyria</td>
<td>Dark</td>
</tr>
<tr>
<td>4-Bilirubinuria e.g. Obstructive jaundice</td>
<td>Dark</td>
</tr>
<tr>
<td>Dipstick-positive for bilirubin, negative for haemoglobin</td>
<td>Dark</td>
</tr>
</tbody>
</table>
Management

1. History; below age 45 renal stone a common cause of hematuria while atumors is a common 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
Thank you