



Case 1:

- 23 yrs old male, previously healthy, c/o Rt loin pain of 2 days duration and noticed blood in the urine.
- What is your next step?



- You sent for him a urinalysis and it showed: nil protein, nil sugar, RBCs 10-20, WBCs 4-5.
- ↳ NO NO RBC → hematuria
- What is next? (? Case of kidney stones)

*hematuria + pain in Right loin → Kidney stone

Case 2:

- 66 yrs old male, previously healthy, c/o Rt loin pain of 2 days duration and noticed blood in the urine.
- What is your next step?



- You sent for him a urinalysis and it showed: nil protein, nil sugar, RBCs 10-20, WBC (4-5)
- What is next? (? Case of Renal cell carcinoma)

- Renal cell carcinoma bc of age لأن عمر المريض اختلف

Case 3:

- 30 yrs old male previously healthy, he noticed blood in the urine.
- Your next step was to send a urinalysis for him.



- Urinalysis showed : +2 protein, nil sugar, RBCs 10-20, WBCs 4-5.
- What is next? (? Case of Glomerulonephritis)

hematuria + proteinuria ⇒ Glomerulonephritis
*inflammation in glomerulai so when it damaged or inflammed it leaks protein + blood cells.
توصيف من عنكب

Case 4:

- 30 yrs old male previously healthy, c/o sudden severe LT loin pain, then noticed blood in the urine.
- Urinalysis: +3 protein, nil sugar, 20-20 RBCs, 4-5 WBCs
- What is next? (? Lt renal vein thrombosis)



- Urinalysis: +3 protein, nil sugar, 20-20 RBCs, 4-5 WBCs
- What is next? (? Lt renal vein thrombosis)
- Sudden left loin pain
↳ Lt renal vein thrombosis
this thrombosis cause hematuria + pain in loin region.

Case 5:

- 30 yrs old male previously healthy, had diarrhea and treated with metronidazole noticed blood in the urine.
- Urinalysis showed: protein nil, sugar nil, RBCs 1-2, WBCs 1-2
- What is next? (Drug related red urine)

→ Red urine secondary to administration of metronidazole.
→ it's not hematuria.

Case 6:

- 70 yrs. Old male presented to the clinic with painless attacks of bloody urine and urgency with feeling of hotness.

Urinalysis showed: no sugar, +1 protein, 10-15 RBCs and 20-25 WBCs (? UTI)

↳ these symptoms of urinary tract infection

Case 7:

- 70 yrs. Old male presented to the clinic with painless attacks of bloody urine and history of passing clots.

His urinalysis showed numerous RBCs, 8-10 WBCs and numerous epithelial and transitional cells. (? Transitional cell carcinoma of bladder)

↳ transitional cell carcinoma

*the hint here is numerous epithelial & transitional cell

Case 8:

- 70 yrs. Old male presented to the clinic with painless attacks of bloody urine and history of passing clots.

His urinalysis showed numerous RBCs, 8-10 WBCs and numerous epithelial and transitional cells.

You noticed that his body was covered with some dark red-black areas that he can't remember any trauma at these sites.



(? Low platelets, meds like warfarin)

↓
thrombocytopenia

think about drug cause bleeding + bruises → warfarin

Case 9:

- 13 yrs old female came to the clinic with back pain which radiates to the groin and attacks of hematuria.

Her urinalysis showed only 8-10 RBCs.

(? Menses related)

- maybe her first menses

her urinalysis showed nil sugar, +3 protein and 10-15 RBCs with casts.

(?SLE and lupus nephritis)

Systemic lupus
↳ autoimmune affect various part of body

↓
auto immune affects kidney

her urinalysis showed nil sugar, +1 protein and 10-15 RBCs with casts.

(?vasculitis)

- bc of age the diagnosis differ
- inflammation of vessels can affect multiple organ leading to range of systemic symptoms

Case 11 :

- 70 yr old lady, came to the clinic with history of generalized pain, arthralgia and skin rash. She noticed also bloody urine sometimes and new onset bloody cough.

توصيف من عيني

age *

70

Case 12 :

- 70 yr old lady, came to the clinic with history of generalized fatigue, polyuria and numbness in the tips of her fingers .

She noticed bloody urine sometimes and new onset ankle swelling.

her urinalysis showed +3 sugar, +2 protein and 5-8 RBCs with no casts.

(?Diabetic nephropathy)

- numbness + polyuria → Diabetes
 - bloody urine + swelling in ankle → kidney involvement
- so **diabetic neuropathy**.

Dipstick:(visual or automated)

- Blood negative
- Ketones negative
- Glucose negative
- Protein negative or trace
- pH 5.0 to 8.0 **acidic**

Microscopy

- Cells: Rare red cells (<< 1/hpf); squamous cells
- Casts: Hyaline **Normal**
- Crystals: Calcium oxalate **Normal**

Normally

- No blood
- No Ketone
- No Glucose
- NO protein or trace amount

microscopy

- See Red cell less than 1 hpf
- Sometime it's allowed to see 2-3 hpf but not more than.
- you can see up to 5 wbc
- " " Ca oxalate
- Hyaline Casts can be seen normally

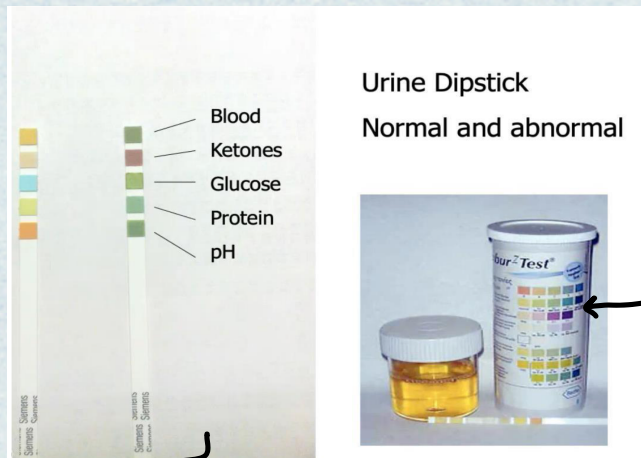
Abnormal urine

Dipstick

- Blood trace to large
- Protein 0.3 g/L to 20 g/L
- Glucose, ketones

Microscopy

- Cells: red, white, yeast
- Casts – granular, rbc, wbc, hemegranular, lipid
- Crystals: urate, cysteine, triple phosphate, drugs
- Other: oval fat bodies, lipid droplets, debris (ATN)



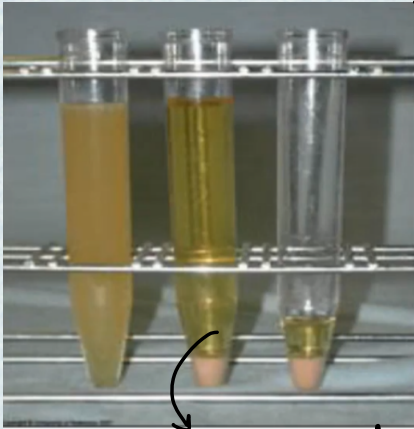
نقارن
به جدول
(key)

- Dip the dipstick into urine & wait for 30 s.
- Remove it from the urine & wait for 30 s.
- Compare the color of dipstick with key provided by manufacturer
- each square to specific substance (blood, protein, sugar) & color change indicate the presence or absence of substance.



preparation for microscopy

- ① you need to obtain Fresh urine about 10-12 mL in centrifuge for 1-3 minutes
- ② after centrifugation the urine samples separates into layers, the sediment at the bottom and clear liquid (supernatant) above it.
- ③ to perform microscopic you need to discard supernatant leaving behind sediment contain crystals, casts, other elements for examination
- ④ take drop and look under lower power field then high power field.



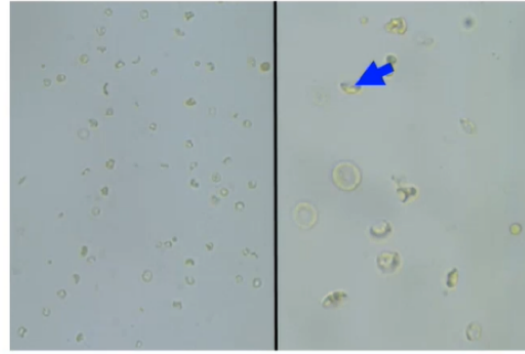
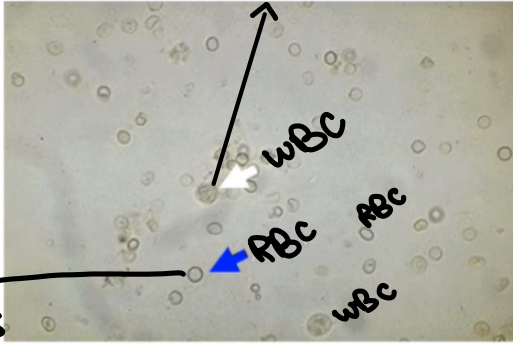
• Supernatant

* IF there is bloody urine or not clear you don't have to spin it \Rightarrow take small drop from urine and make a smear on slide \Rightarrow look under microscope.

- If urine grossly bloody, or heavily sedimented:
- Examine Unspun and spun
- Spun sediment may be so thick that it is impossible to identify casts

Cells

multisegmented nuclei (neutrophil)



→ may be glomerulonephritis.

oval + NO nucleus (RBC)

RBC – small, distinct cell membrane, clear cytoplasm

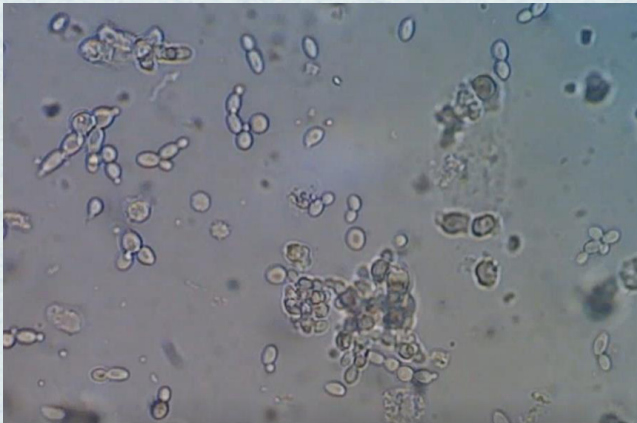
WBC – larger, less distinct cell membrane, granular cytoplasm

Dysmorphic red cells – typical of glomerular disease

pathological at level of glomerulus

- any injury in urinary tract ⇒ give you hematuria with normal shape RBC

- abnormal RBC → dysmorphic [sickle cell]

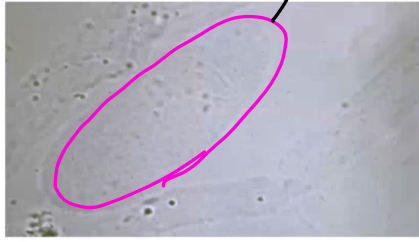


- Budding yeast [similar in size to RBC but often in chain]
- yeast in case of infection, specially in immunosuppressed patient like diabetes or patient taking steroids.
- dipstick blood may be negative



- Squamous cell
- large + cuboidal in shape + cytoplasm fill most of cell + nucleus is center & dense
- think about some sort of pregnancy or increased cell production [transitional cell + tumor around meatus] carcinoma

Acellular Casts: Hyaline cast



Hyaline cast: no significance; common in highly concentrated urine: probably Tamm-Horsfall protein

① it's not pathological you can find it in case of dehydration + Fast or fever

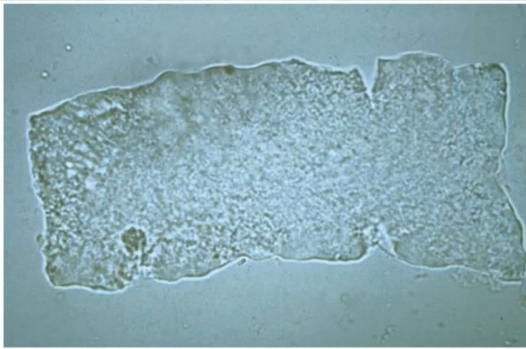
② protein + tamm-Horsfall protein aggregate & form hyaline cast.

Acellular Cast: Granular



Granular cast: abnormal but non-specific

* Granular it's pathological.
* hyaline casts => it's not pathological



Broad "waxy" cast - said to be typical of advanced CKD

* it will be found in chronic kidney disease (CKD) & prolong situation

• low urine output => material like tamm horsfall protein and debris build up in kidney tubules bc of decrease urine & build up of these material can stick together form waxy casts.

Acellular casts: Heme granular cast



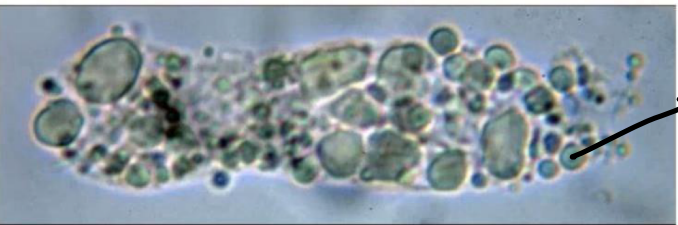
Heme-pigmented granular cast.

- 1. ATN (most common)
- 2. Proliferative or necrotizing GN (same significance as RBC cast in this setting)

With ATN look for tubular cells and debris

• typical to be found in acute tubular necrosis (ATN)

- acellular
- it's pigmented
- another name is brown-muddy casts
- very rare to find them in proliferative or necrotizing GN.



→ shine

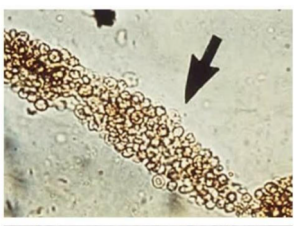
acellular casts

Lipid cast: seen in nephrotic syndrome; dipstick protein ≥ 3 g/L

Note variable size of droplets of lipid

→ heavy proteinuria
 → losing protein → losing lipid
 & "Lipid Cast"

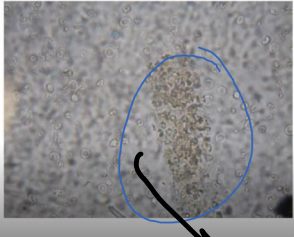
Cellular Cast: RBC



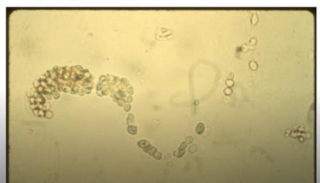
Distinct red cells seen within cast. Dip must be positive for blood.

Not numerous.

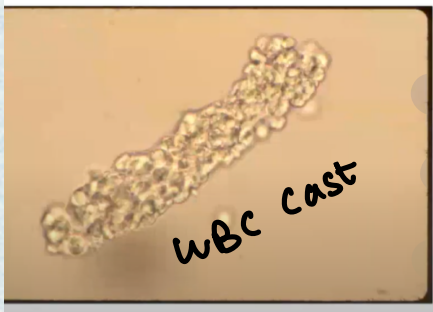
Seen in proliferative or necrotizing GN: PSGN, proliferative lupus, IgAN, ANCA vasculitis etc.



RBC cast



Cellular Cast: WBC casts



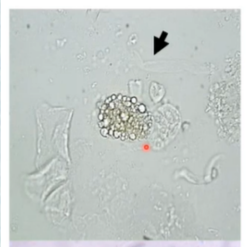
Seen in:
 Pyelonephritis
 Allergic interstitial nephritis
 Granulomatous interstitial nephritis
 Rarely proliferative GN

Other: bacteria

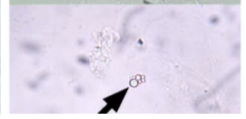


Always abnormal. If associated with white cells, suggests UTI. Look for movement of bacteria!

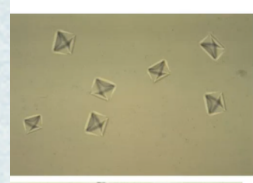
Other: Oval Fat Body, Lipid droplets



Oval, round or cast-shaped dark object with small "bubbles" within
 Likely droplets of lipoprotein
 Typical of nephrotic range proteinuria



Crystals: Calcium oxalate



• 2-3 normal
 • filled with ten

Seen in normal urine, rarely pathological

Look for them in suspected ethylene glycol poisoning.

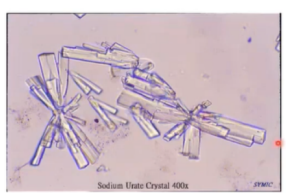
→ envelop shape

suggest

Crystals: uric acid

* this will be seen in hyperuricemia

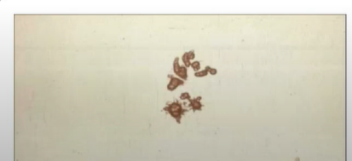
→ cuboidal shape
 → needle shape



Sodium urate

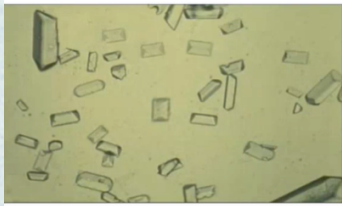


Uric acid



Ammonium biurate

Abnormal Crystals



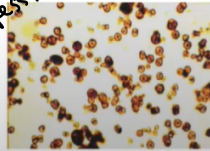
Triple phosphate: seen with chronic UTI (coffin lid)

↳ this another name

↑ autosomal recessive



Cysteine: rare - AR genetic disorder of childre, teens; cause of stones



2,8-dihydroxyadeninuria extremely rare rare

seen in diabetes patient ↓ Immuno Supressed patient who are usually infected with urea split bacteria

اللاكتوز،
فالهقمة
فيهم

Other



Mucous

can be found in urine + masy

see sperm in urine.

of male

Urinalysis in Decision Making

Most useful in:

- Hematuria: red cell casts and/or clearly dysmorphic rbc's defines glomerular cause
 - AKI: finding of blood, protein, debris and HG casts defines ATN
- acute kidney Injury.

glomerular disease

↑
RBC