Chronic Kidney Disease

March 2023

References

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

Chronic Kidney Disease: Detection and Evaluation

AFP 2017

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Up-To-Date

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Chronic Kidney Disease and SGLT2 Inhibitors: A Review of the Evolving Treatment Landscape

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Chronic Kidney Disease

#1

- WHAT IS OUR JOB?
  - Screen for CKD in patients at risk for CKD to try and slow progression
    - ACE/ARB
    - SGLT-2
    - Appropriate med dosing
    - Minimize further damage – no nephrotoxic meds, smoking cessation, mgt of DM/HTN

Chronic kidney disease

#2

- WHAT IS OUR JOB?
  - Make sure there is not a potentially reversible/treatable cause or component of the CKD.
    - Nephrotoxic meds
    - Urinary obstruction
    - Autoimmune kidney disease
    - Multiple myeloma

Chronic Kidney Disease

#3

- WHAT IS OUR JOB?
  - Monitor for progression of CKD
    - Impending need for dialysis/transplant – referral to nephrology
  - Monitor for complications of CKD
    - Anemia
    - Phosphate, calcium, parathyroid
    - Potassium
  - Support patient through decision for dialysis/transplant

Case #1 (FMC Case)

- 59 year old white male presents to the FMC for follow-up hypertension. He has no complaints and has been taking all his meds as prescribed.
- His last labs (CMP, CBC, lipids and A1C) were all normal, but were done one year ago.

Case #1

- HTN - amlodipine 10 mg, HCTZ 12.5 mg, lisinopril 40 mg
- Hyperlipidemia - pravastatin
- Peripheral arterial disease - s/p stent, ASA, cilostazol
- Ascending aortic aneurysm - 4.6 cm
- GERD - omeprazole
- Chronic back pain - Flexeril
- Current smoker – 1 1/2 ppd

Does he need screening for CKD?

Chronic Kidney Disease

#1

- WHAT IS OUR JOB?
  - Screen for CKD in patients at risk for CKD to try and slow progression
    - ACE/ARB
    - SGLT-2
    - Appropriate med dosing
    - Minimize further damage – no nephrotoxic meds, smoking cessation, mgt of DM/HTN

CKD Screening (Case-Finding)

- Almost all guidelines agree that screening of the entire population in NOT warranted.
- All guidelines agree that people at high risk for developing CKD should be screened.
  - Cost-effectiveness analysis supports this
- In a study of 25,000 people with no increased risk for CKD, only 6 developed ESRD.

High Risk for CKD

- Diabetes, HTN, CVD
- HIV, Hepatitis C
- Malignancy (current or hx of)
- Autoimmune disease
- Chronic nephrolithiasis
- Recurrent UTI
- Native American, African-American
- Sickle cell trait
- Chronic nephrotoxic meds (NSAIDS, lithium)
- Family hx of renal disease

Many or these patients already get regular BMP's, but they ALSO need urine alb/creat!

Method of Screening

- Get urine albumin-creatinine ratio AND serum creatinine to estimate GFR
  - CKD is detected earlier with urine albumin-creatinine ratio

SCREENING KEY POINT

- SCREEN HIGH RISK PATIENTS YEARLY WITH BOTH SERUM CREATININE (eGFR) AND ALBUMIN-CREATININE RATIO
  - eGFR < 60 OR albumin-creatinine ratio > 30

= CKD

Frequency of Screening

- Screen diabetics yearly
- Screen other patients at risk every 1-3 years (including hypertensive pts)

Expert Opinion

Case #1

- Our patient has HTN and vascular disease
  - HE SHOULD BE SCREENED FOR CKD – every 1-3 yrs

- No albumin-creatinine ratio was done, but UA was normal.
- BMP reveals a creatinine of 1.38 with an eGFR = 53.
- CBC and CMP otherwise normal
- A1C = 5.4
- Cholesterol = 218, LDL = 104, HDL = 83

Does he have CKD?

CKD Definition

1.1: DEFINITION OF CKD

1.1.1: CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health. (*Not Graded*)

Criteria for CKD (either of the following present for >3 months)

Markers of kidney damage (one or more)	Albuminuria (AER ≥30 mg/24 hours; ACR ≥30 mg/g [≥3 mg/mmol]) Urine sediment abnormalities Electrolyte and other abnormalities due to tubular disorders Abnormalities detected by histology Structural abnormalities detected by imaging History of kidney transplantation
Decreased GFR	GFR <60 ml/min/1.73 m^2 (GFR categories G3a–G5)

Abbreviations: CKD, chronic kidney disease; GFR, glomerular filtration rate.

CKD Classification and Prognosis

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

Case #1

- Our patient has Stage 3a CKD according to his eGFR. (Looking back, he had a similar creatinine a year ago.)
- His BP = 140/90
- He is on amlodipine, lisinopril and HCTZ.

- WHAT CAN WE DO TO SLOW PROGRESSION?

Slowing CKD Progression

- Control hyperglycemia (goal A1C < 7)
- Avoid nephrotoxic meds – NSAIDS, iodine contrast
- Control blood pressure
- Decrease proteinuria

- Certain BP meds lower BP AND decrease proteinuria
  - ACE inhibitors and ARBS
  - Diltiazem and verapamil (NOT amlodipine or nifedipine)

Slowing CKD Progression

- BP Goal
  - KDIGO – depends on albumin-creatinine ratio
    - If alb/creat < 30, goal BP = 140/90
    - If alb/creat > 30, goal BP = 130/80
  - Benefit from intensive BP control has only been clearly shown in patients with proteinuria.
  - Up-To-Date recommends a goal BP of 125/80 for everyone for the cardiovascular benefits.

Slowing CKD Progression

- Barriers to prescribing ACE inhibitor or ARB
  - MYTH – “People with kidney disease should not get these – they are nephrotoxic.”
    - GFR may decrease over the first 6-8 wks of starting ACE/ARB but it is usually < 30% decline in GFR and does not seem to be clinically significant.
    - GFR may decrease > 30% in some people (0.7%) who have or are at risk for renal artery stenosis.
      - Follow BMP in these patients over the first 8 weeks
    - There is NO limiting GFR!

Slowing CKD Progression

- Barriers to ACE/ARB use
  - Hypotension – 1.7% in ACE, 2.7% in ARB
  - Hyperkalemia (> 5.5) – 3.3%
    - Increased risk with GFR < 15
  - Cough – ACE>>ARB
  - Angioedema – ACE>>ARB
  - Cannot use in pregnancy

Slowing CKD Progression

- What about African-American patients?
  - Studies clearly show a benefit of ACE/ARB in patients with CKD AND proteinuria
  - Less clear if there is benefit or ACE/ARB in CKD patients without proteinuria

What about diuretics?

- Most patients with CKD have some degree of fluid overload.
- Diuretics can help with this and are OK to use in CKD patients.
- Higher doses may be needed.
- Thiazides will not work as well once GFR is < 30 and a loop diuretic (torsemide or furosemide) should be used instead or added.
- A rise in creatinine on a diuretic likely indicates hypovolemia from overdiuresis.

Slowing CKD Progression

- Diabetic patients and SGLT2's
  - SGLT2 inhibitors decrease proteinuria and should be used in ANY type 2 diabetics with increased albumin-creatinine ratio, REGARDLESS OF THEIR A1C
  - CREDENCE trial – decreased CKD progression by 30% in patients with DKD given canagliflozin (Invokana)
  - Invokana is now FDA-approved for diabetic nephropathy with GFR > 30 and albuminuria.

Slowing CKD Progression

Practice Changer!

- What about SGLT2 inhibitors in NON-diabetics with CKD?
  - DAPA-CKD trial
    - Patients with CKD from ANY cause were given dapagliflozin (Farxiga).
    - Decrease in CKD progression by 39% AND decrease in all-cause mortality by 31%!!
  - Farxiga is now FDA-approved for ANY CKD patient with a GFR > 25 and who is at risk for progression.

Prescribing SGLT2-inhibitors

- There is an expected initial drop in GFR of about 4 points in the first 2-3 weeks of treatment.
  - The GFR then stabilizes and there is overall less decline in GFR than placebo.
- THIS IS NOT A REASON TO STOP THE MED! (unless GFR drops by 30%)
- A larger drop in GFR is more likely in a volume-depleted patient.
  - Correct volume-depletion (eg – decrease diuretic) prior to starting med.

Prescribing SGLT2-inhibitors

- Risk
  - Increased risk of euglycemic DKA in some patients
    - Patients on a ketogenic diet
    - Patients with insulin deficiency (type 1 diabetics and type 2 diabetics who have had DKA)
    - Patients with alcohol use disorder
  - Increased risk of genital yeast infections.
  - No serious UTI's were seen in the studies.

Prescribing SGLT2-inhibitors

- Things we thought were risks:
  - NO increased risk of lower extremity amputation or fracture in these studies.
  - NO increased risk of AKI.
  - NO major hypoglycemic episodes in non-diabetic patients.

Other Meds to Slow Progression

- Finerenone (Kerendia) – mineralcorticoid agonist
  - FIDELIO-DKD trial – decreased CKD progression in patients with diabetic nephropathy
  - Now FDA-approved for this indication
  - Down-side is hyperkalemia
- GLP1-Receptor Agonists
  - Ongoing trial (FLOW study) for semaglutide in patients with diabetic nephropathy

Case #1

- Our patient has not had a urine alb-creatinine ratio done – this would help determine BP goal and choice of meds.
- His BP = 140/90. If his ACR is > 30 he would likely benefit from more intensive BP control.

Chronic Kidney Disease

- WHAT IS OUR JOB? #1
  - Screen for CKD in patients at risk for CKD to try and slow progression
    - ACE/ARB
    - SGLT-2
    - Appropriate med dosing
    - Minimize further damage – no nephrotoxic meds, smoking cessation, mgt of DM/HTN

Med Management

Table 32 | Cautionary notes for prescribing in people with CKD

Agents	Cautionary notes
1. Antihypertensives/cardiac medications	
RAAS antagonists (ACE-Is, ARBs, aldosterone antagonists, direct renin inhibitors)	• Avoid in people with suspected functional renal artery stenosis • Start at lower dose in people with GFR <45 ml/min/1.73 m^2 • Assess GFR and measure serum potassium within 1 week of starting or following any dose escalation • Temporarily suspend during intercurrent illness, planned IV radiocontrast administration, bowel preparation prior to colonoscopy, or prior to major surgery • Do not routinely discontinue in people with GFR <30 ml/min/1.73 m^2 as they remain nephroprotective
Beta-blockers	• Reduce dose by 50% in people with GFR <30 ml/min/1.73 m^2
Digoxin	• Reduce dose based on plasma concentrations

BP Meds

ANALGESICS

2. Analgesics	
NSAIDS	• Avoid in people with GFR <30 ml/min/1.73 m^2 • Prolonged therapy is not recommended in people with GFR <60 ml/min/1.73 m^2 • Should not be used in people taking lithium • Avoid in people taking RAAS blocking agents
Opioids	• Reduce dose when GFR <60 ml/min/1.73 m^2 • Use with caution in people with GFR <15 ml/min/1.73 m^2

NO NSAIDS if GFR < 30

Reduce dose of opioids

ANTIBIOTICS

3. Antimicrobials	
Penicillin	• Risk of crystalluria when GFR <15 ml/min/1.73 m^2 with high doses • Neurotoxicity with benzylpenicillin when GFR <15 ml/min/1.73 m^2 with high doses (maximum 6 g/day)
Aminoglycosides	• Reduce dose and/or increase dosage interval when GFR <60 ml/min/1.73 m^2 • Monitor serum levels (trough and peak) • Avoid concomitant ototoxic agents such as furosemide
Macrolides	• Reduce dose by 50% when GFR <30 ml/min/1.73 m^2
Fluoroquinolones	• Reduce dose by 50% when GFR <15 ml/min/1.73 m^2
Tetracyclines	• Reduce dose when GFR <45 ml/min/1.73 m^2; can exacerbate uremia
Antifungals	• Avoid amphotericin unless no alternative when GFR <60 ml/min/1.73 m^2 • Reduce maintenance dose of fluconazole by 50% when GFR <45 ml/min/1.73 m^2 • Reduce dose of flucytosine when GFR <60 ml/min/1.73 m^2

May need to reduce dose

DIABETES MEDS

4. Hypoglycemics	
Sulfonylureas	• Avoid agents that are mainly renally excreted (e.g., glyburide/ glibenclamide) • Other agents that are mainly metabolized in the liver may need reduced dose when GFR <30 ml/min/1.73 m^2 (e.g., gliclazide, gliquidone)
Insulin	• Partly renally excreted and may need reduced dose when GFR <30 ml/min/1.73 m^2
Metformin	• Suggest avoid when GFR <30 ml/min/1.73 m^2, but consider risk-benefit if GFR is stable • Review use when GFR <45 ml/min/1.73 m^2 • Probably safe when GFR $\geqslant 45$ ml/min/1.73 m^2 • Suspend in people who become acutely unwell

Avoid glyburide

Metformin OK until GFR = 30-45

May need to decrease insulin

CHOLESTEROL MEDS

5. Lipid-lowering	
Statins	• No increase in toxicity for simvastatin dosed at 20 mg per day or simvastatin 20 mg /ezetimide 10 mg combinations per day in people with GFR <30 ml/min/1.73 m^2 or on dialysis[449] • Other trials of statins in people with GFR <15 ml/min/1.73 m^2 or on dialysis also showed no excess toxicity
Fenofibrate	• Increases SCr by approximately 0.13 mg/dl (12 µmol/l)

Statins are okay

ANTI-COAGULANTS

7. Anticoagulants	
Low-molecular-weight heparins	● Halve the dose when GFR <30 ml/min/1.73 m^2 ● Consider switch to conventional heparin or alternatively monitor plasma anti-factor Xa in those at high risk for bleeding
Warfarin	● Increased risk of bleeding when GFR <30 ml/min/1.73 m^2 ● Use lower doses and monitor closely when GFR <30 ml/min/1.73 m^2

LMWH CAN be used with CKD

DOAC's can be used if GFR > 30

(apixaban if GFR > 15)

LITHIUM

8. Miscellaneous	
Lithium	• Nephrotoxic and may cause renal tubular dysfunction with prolonged use even at therapeutic levels • Monitor GFR, electrolytes, and lithium levels 6 monthly or more frequently if the dose changes or the patient is acutely unwell • Avoid using concomitant NSAIDs • Maintain hydration during intercurrent illness • Risk-benefit of drug in specific situation must be weighed

Case #1

- Does our patient need any further eval for his CKD, or can we say it is from the hypertension?

Chronic kidney disease

#2

- WHAT IS OUR JOB?
  - Make sure there is not a potentially reversible/treatable cause or component of the CKD.
    - Nephrotoxic meds
    - Urinary obstruction
    - Autoimmune kidney disease
    - Multiple myeloma

WORK-UP

Search For Treatable Causes

- The majority of CKD is caused by diabetes and/or HTN.
- However, people can have more than one cause of their CKD!

- WE DO NOT WANT TO MISS SOMETHING WE COULD TREAT!!

Treatable Causes

- Nephrotoxins – lithium, NSAIDS, lead
- Urinary Obstruction
- Auto-Immune Disease/Glomerulonephritis/Vasculitis
- Multiple Myeloma, Light Chain Deposition Disease
- HIV
- Hepatitis B or C
- ?? Renal Artery Stenosis

LABS

- EVERYONE GETS:
  - CMP – electrolytes, glucose, calcium, protein, albumin
  - CBC diff – anemia
  - Urine microscopy – dysmorphic RBC's, casts
  - Urine albumin-creatinine ratio
  - HIV
  - Hepatitis B S Ag, Hepatitis C Ab
  - ANA if concern for lupus

LABS

- People over 40 with anemia, elevated Ca, bony lesions or unexplained, worsening CKD get:
  - Serum protein electrophoresis
  - Urine protein electrophoresis
  - Serum free light chain assay

LABS

- Anyone with rapidly progressive CKD or evidence of glomerular disease on UA (dysmorphic RBC's, casts) gets:
  - Anti-neutrophil cytoplasmic Ab test
  - Anti-glomerular basement membrane Ab test
  - Serum complement tests – C3 and C4
  - Serum cryoglobulin
  - ANA

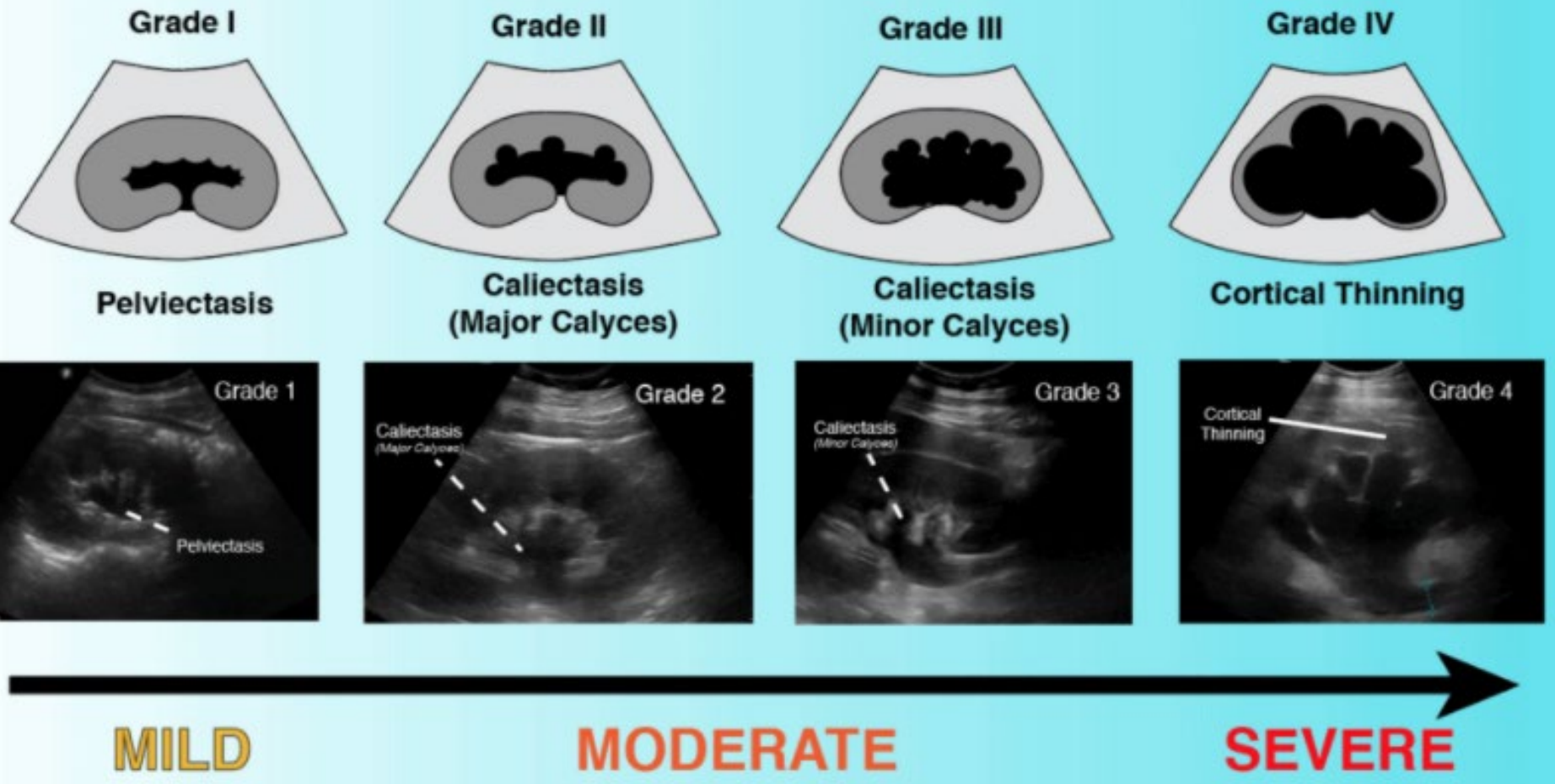
AND referral to nephrology!

IMAGING

- EVERYONE GETS A RENAL ULTRASOUND!!
  - Hydronephrosis
  - Stones, masses, cysts
  - Distended bladder
  - Small kidneys – usually scarred and atrophied from chronic disease or vascular disease
  - Large kidneys – polycystic kidneys, infiltrative disease

Hydronephrosis Grading

POCUS 101



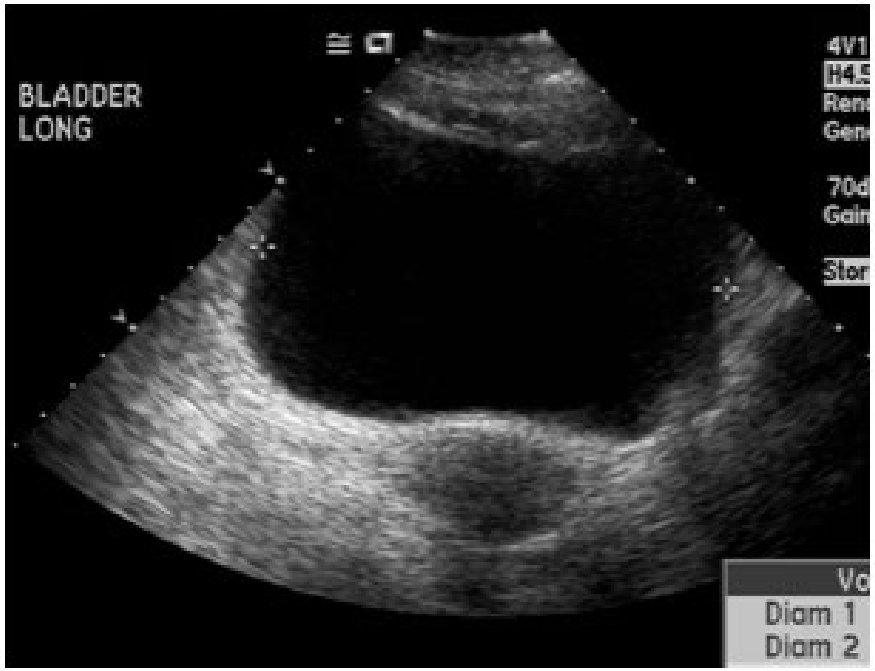
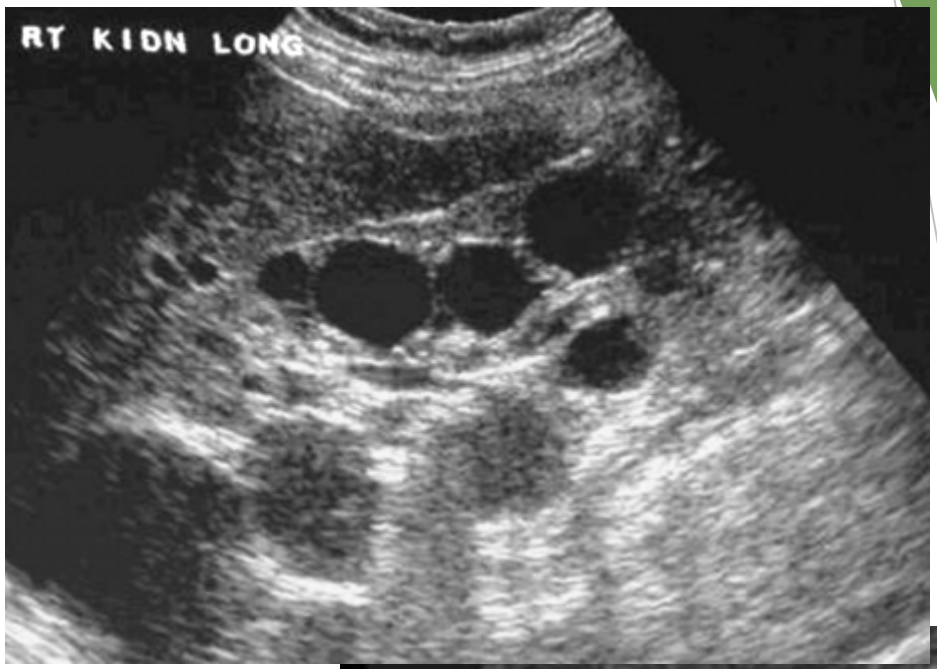
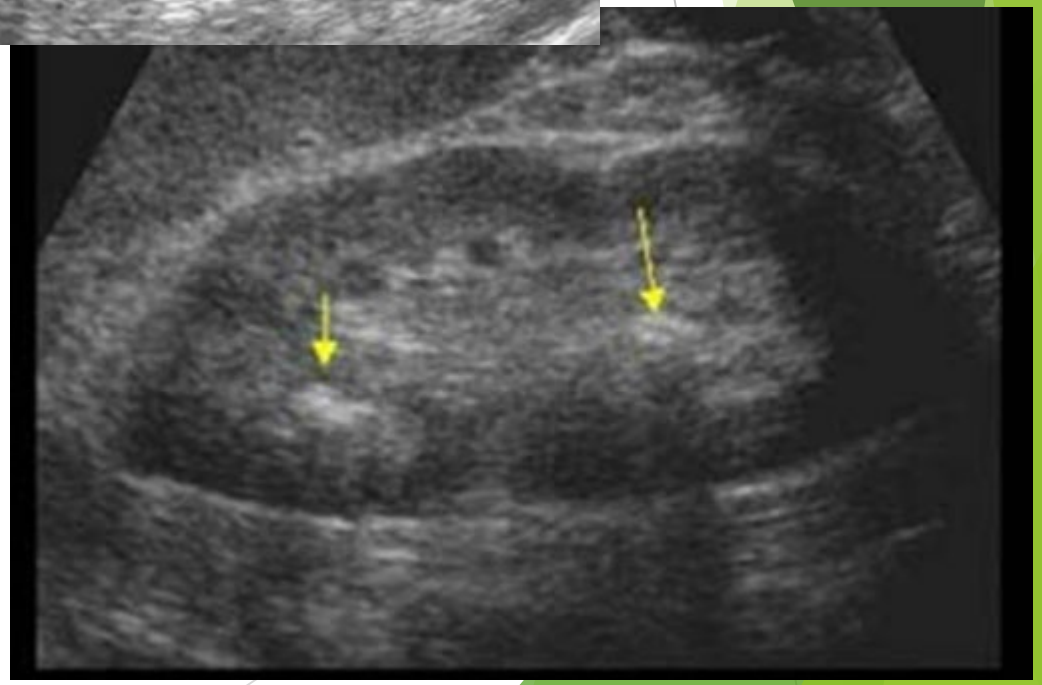


Figure 1. Ultrasound of a distended bladder containing more than 450 mL of urine.





IMAGING

- What about evaluating the renal arteries?
- Up-To-Date suggests a renal arterial doppler if the patient is at high risk for renal artery stenosis:
  - Over age 50
  - Hx cardiovascular or peripheral arterial disease
  - Smoker
- BUT it is NOT clear that tx of renal artery stenosis can reverse CKD!

CASE #1

- Our patient is over 50, smokes and has hx PAD.
- Should we do a renal artery doppler??

- Studies DO show a benefit of tx of renal artery stenosis for BP control when the BP is difficult to control with meds.

CASE #1

- Our patient should get the following:
  - Check meds – ask about OTC and herbals
  - HIV, Hep B, Hep C
  - Urine albumin-creatinine ratio
  - Consider SPEP, UPEP, serum light chains
  - Renal ultrasound

CASE #1

- Fast Forward
  - Our patient's work-up is normal
  - How do we monitor him going forward?
  - When would we refer to nephrology?

Chronic Kidney Disease

#3

- WHAT IS OUR JOB?
  - Monitor for progression of CKD
    - Impending need for dialysis/transplant – referral to nephrology
  - Monitor for complications of CKD
    - Anemia
    - Phosphate, calcium, parathyroid
    - Potassium
  - Support patient through decision for dialysis/transplant

Monitoring

GFR and Albuminuria

Guide to Frequency of Monitoring (number of times per year) by GFR and Albuminuria Category

GFR categories (ml/min/1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30mg/mmol
	G1	Normal or high	≥90	1 if CKD	1	2
	G2	Mildly decreased	60–89	1 if CKD	1	2
	G3a	Mildly to moderately decreased	45–59	1	2	3
	G3b	Moderately to severely decreased	30–44	2	3	3
	G4	Severely decreased	15–29	3	3	4+
	G5	Kidney failure	<15	4+	4+	4+

When to Refer

GFR categories (ml/min/1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90		Monitor	Refer*
	G2	Mildly decreased	60–89		Monitor	Refer*
	G3a	Mildly to moderately decreased	45–59	Monitor	Monitor	Refer
	G3b	Moderately to severely decreased	30–44	Monitor	Monitor	Refer
	G4	Severely decreased	15–29	Refer*	Refer*	Refer
	G5	Kidney failure	<15	Refer	Refer	Refer

Referral decision making by GFR and albuminuria. *Referring clinicians may wish to discuss with their nephrology service depending on local arrangements regarding monitoring or referring.

Reasons To Refer to Nephrology

- eGFR < 30 (stages 4 and 5)
- Unclear cause of CKD
- Hematuria not explained by urologic causes
- Albumin-creatinine ratio > 300 mg/g
- Familial kidney disease – Alport, polycystic kidney disease
- Potassium > 5.5
- Complications of CKD – anemia, bone and mineral problems
- Resistant HTN
- Rapid progression of renal failure

Table 36 | Outcomes of early versus late referral

Variable	Early referral mean (SD)	Late referral mean (SD)	P value
Overall mortality, %	11 (3)	23 (4)	<0.0001
1-year mortality, %	13 (4)	29 (5)	0.028
Hospital length of stay, days	13.5 (2.2)	25.3 (3.8)	0.0007
Serum albumin at RRT start, g/dl [g/l]	3.62 (0.05) [36.2 (0.5)]	3.40 (0.03) [34.0 (0.3)]	0.001
Hematocrit at RRT start, %	30.54 (0.18)	29.71 (0.10)	0.013

Abbreviation: RRT, renal replacement therapy.

Adapted from Am J Med, Chan MR, Dall AT, Fletcher KE, *et al.*[673] Outcomes in patients with chronic kidney disease referred late to nephrologists: a meta-analysis. 120: 1063-1070, 2007, with permission from Elsevier; accessed http://download.journals.elsevierhealth.com/pdfs/journals/0002-9343/PIIS000293430700664X.pdf

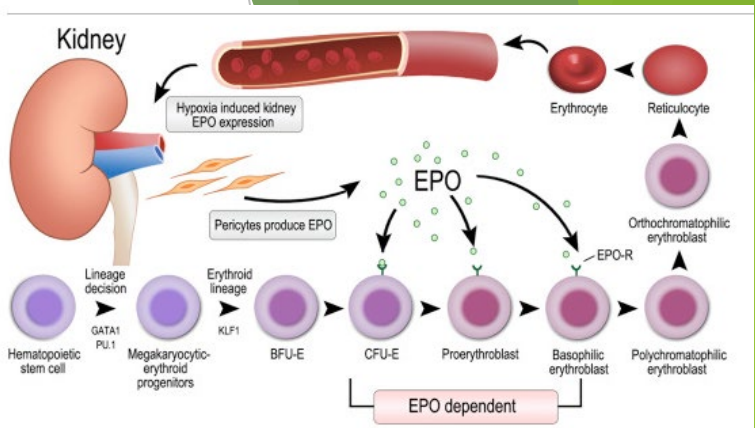
Anemia of CKD

- Most common with CKD stages 4 and 5 but can occur in stage 3
  - Most will already be seeing a nephrologist
- How often should we check for anemia?
  - CKD stage 3 – check Hgb yearly
  - CKD stage 4-5, not on dialysis – check every 6 months
  - CKD stage 5, on dialysis – check every 1-3 months

Anemia of CKD

- CANNOT ASSUME ANEMIA IS DUE TO CKD!
- Everyone gets further eval for other causes
  - CBC diff
  - Absolute retic count
  - Ferritin, transferrin saturation
  - Vitamin B12 and folate
  - If ferritin is low, screen for malignancy

Anemia of CKD

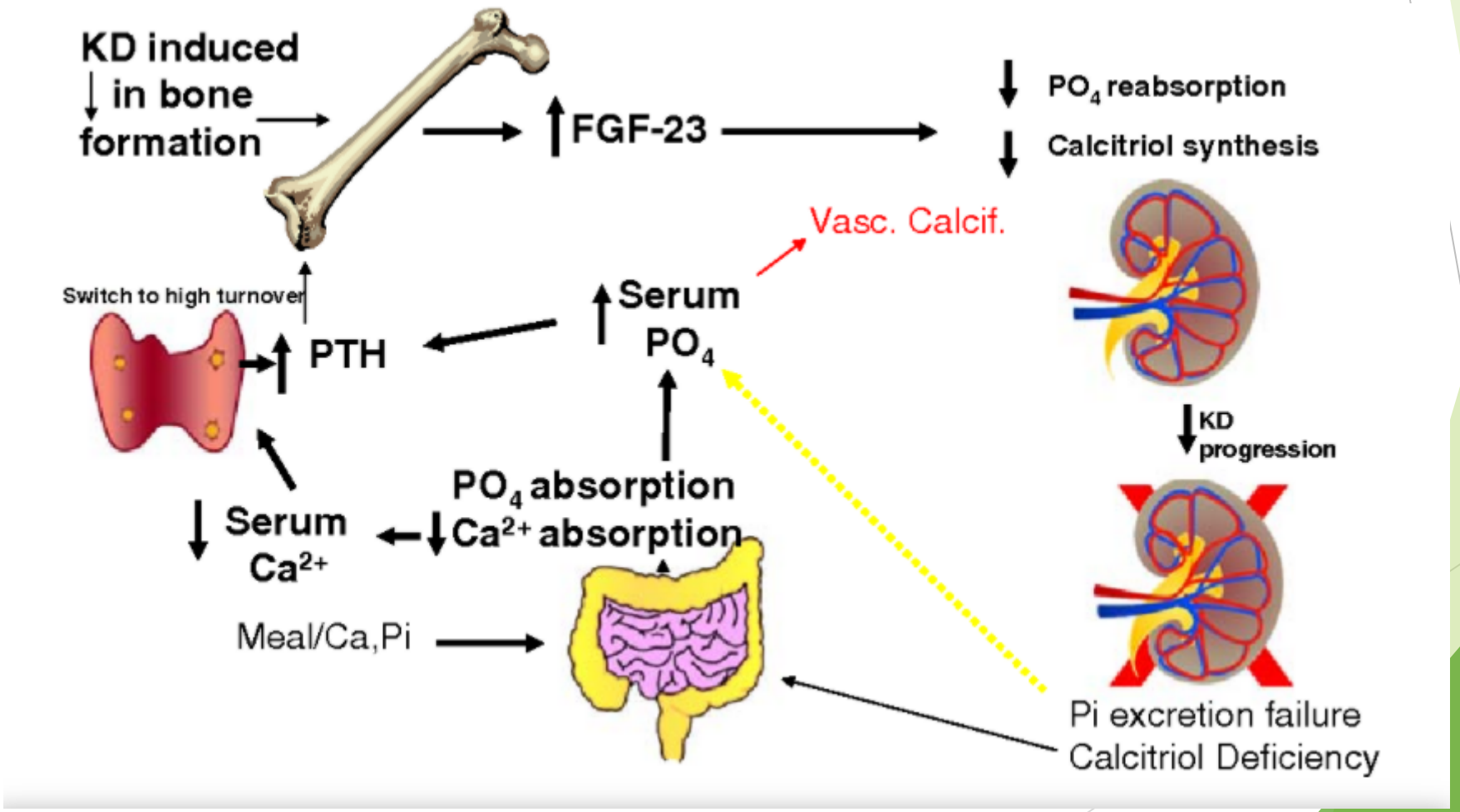


- Anemia will usually look like anemia of chronic disease if due to CKD
  - Normocytic
  - Normochromic
  - Elevated ferritin
  - Absolute retic count is usually low – low erythropoietin levels results in decreased production of red cells
  - NO abnormal WBC's or platelets

Anemia of CKD

- Consider erythropoietin stimulating agents (ESA's) if:
  - Hgb < 10
  - Transferrin saturation > 25%
  - Ferritin > 200
- If TSAT < 20% and ferritin < 500, give iron first as this often works without need for ESA
- ESA contraindications
  - Active cancer or recent hx of cancer
  - Hx stroke

CKD Bone-Mineral Disorder



CKD Bone Mineral Disorder

- How should we screen for this?
- KDIGO 2017
  - Stage 3 (GFR < 60)
    - Check calcium and phosphorus every 6-12 months
    - Check parathyroid level and vitamin D yearly
  - Stage 4 (GFR < 30) and Stage 5 (GFR < 15)
    - Check more frequently

CKD Bone Mineral Disorder

- Elevated phosphorus
  - Usually does not occur until stage 4
  - Treated with low phosphorus diet first
  - If that doesn't work (phos > 5.5), given phosphate binders
- Vitamin D deficiency
  - Treated with regular vitamin D supplements initially
  - If PTH levels are still increasing, switch to calcitriol

Case #2 (FMC patient)

- 58 year old male presents to FMC for follow-up diabetes.
- He feels well and has no complaints.
- PMH
  - DM – metformin, Lantus
  - Hyperlipidemia – Lipitor
  - CAD – ASA
  - Albuminuria – lisinopril 10 mg daily

Case #2

- Exam normal – BP = 122/76, BMI = 29
- Just got labs
  - BMP normal except glucose elevated to 248
  - Creatinine = 0.79 (GFR > 60)
  - TP = 6.1, albumin = 3.2, Ca = 8.6
  - CBC – Hgb = 13.3
  - A1C = 9.7
  - Lipids – cholesterol = 162, LDL = 107
  - Albumin-creatinine ratio = 2776 (increased from 325 to 1195 to 2776 over the past 2 years)

Does he have CKD?

CKD Classification

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

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	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

Case #2

- He has CKD stage 1
- BUT his prognosis is not great due to the high albumin-creatinine ratio

- DO WE CHALK UP THE HIGH ALBUMIN-CREATININE RATIO TO DIABETES OR DOES HE NEED FURTHER EVAL?

Chronic kidney disease

#2

- WHAT IS OUR JOB?
  - Make sure there is not a potentially reversible/treatable cause or component of the CKD.
    - Nephrotoxic meds
    - Urinary obstruction
    - Autoimmune kidney disease
    - Multiple myeloma

WORK-UP

Case #2

- Diabetic nephropathy rarely causes this much albuminuria
- He will need:
  - Check meds, including herbal and OTC
  - HIV, Hep B, Hep C
  - Renal US
  - SPEP, UPEP, serum light chains
  - REFER TO NEPHROLOGY – will likely need a renal biopsy

Case #2

- How should we best manage his diabetes?
- He is presently on metformin and Lantus.

Chronic Kidney Disease

#1

- WHAT IS OUR JOB?
  - Screen for CKD in patients at risk for CKD to try and slow progression
    - ACE/ARB
    - SGLT-2
    - Appropriate med dosing
    - Minimize further damage – no nephrotoxic meds, smoking cessation, mgt of DM/HTN

Case #2

- Goal A1C = 7 (he is 9.7)
- WE SHOULD BE STARTING A SGLT2 INHIBITOR

SUMMARY

Things we are probably not doing but should be!

- Screening for CKD with BOTH creatinine AND albumin-creatinine ratio on our non-diabetic, high risk patients as well as diabetic patients
- Ruling out treatable causes of CKD, EVEN IF THEY HAVE DM OR HTN
- Referring to nephrology for albumin-creatinine ratio > 300 and/or GFR < 30
- Checking for anemia and BMD (phosphorus, PTH, vitamin D) every 6-12 months
  - DO NOT ASSUME ANEMIA IS DUE TO CKD!

Things we are probably not doing but should be!

- Giving ALL patients with CKD, REGARDLESS OF GFR and REGARDLESS OF CAUSE, an ACE or ARB
- Giving diabetic patients with reduced GFR OR elevated albumin-creatinine ratio a SGLT2 inhibitor
- Staying involved in patient care once they start dialysis
  - Good communication with nephrologist
  - Nephrologists almost NEVER suggest stopping dialysis!