(PBL) Chronic Kidney Disease and End-Stage Renal Disease Diagnosis and Management

Michael M. Braun, DO, FAAFP, RFPHM

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Michael M. Braun, DO, FAAFP, RFPHM

Chief, Inpatient Medicine, Department of Family Medicine, Madigan Army Medical Center (MAMC), Tacoma, Washington; Director of the Medical Wards, MAMC, Tacoma, Washington

Dr. Braun earned his medical degree at the Philadelphia College of Osteopathic Medicine, Pennsylvania, and completed his residency in family medicine at Womack Army Medical Center, Fort Bragg, North Carolina. At Madigan Army Medical Center, he has served as family medicine and internal medicine residency faculty for nine years. He has been a practicing hospitalist for seven years. He earned the Recognition of Focused Practice in Hospital Medicine (RFPHM) from the American Board of Family Medicine (ABFM) and the American Board of Internal Medicine (ABIM).

Learning Objectives

1. Practice applying new knowledge and skills gained from Chronic Kidney Disease and End-Stage Renal Disease Diagnosis and Management sessions, through collaborative learning with peers and expert faculty.

2. Identify strategies that foster optimal management of chronic kidney disease and end-stage renal disease within the context of professional practice.

3. Formulate an action plan to implement practice changes, aimed at improving patient care.
Associated Sessions

• Chronic Kidney Disease and End-Stage Renal Disease Diagnosis and Management

Chief Complaint

“I feel tired and fatigued all the time”
History of Present Illness

- Tina – 57 yo Female
- Presenting to your clinic for routine well adult exam
- Complains of fatigue that has gotten worse over the past year

Past Medical History

- Hypertension
- Insulin dependent diabetes mellitus
- Hyperlipidemia
- CKD stage 3aA1 (Cr baseline 1.3 with eGFR of 46 mL/min/1.73m2)
Tina’s CKD Stage:

Medications

- Aspirin 81mg
- Lantus 20u QHS
- Metformin 1000mg BID
- Simvastatin 10mg daily
- Metoprolol succinate ER 50mg daily
- Lisinopril 20mg daily
Immunizations

• PCV-13
• PPSV-23
• TD
• Zoster

Family History

• Father: Diabetes, HTN, MI at age 67

• Mother: CKD, HTN, Diabetes, hyperlipidemia
Social History

• Occasional EtOH usage – socially (1 glass of wine/week)

• No tobacco usage

• No Recreational drugs

• Marries 20 years, one sexual partner during that time

Review of Systems

• Denies:
  • Fever
  • Chills/sweats
  • Weight loss
  • Chest pain or pressure
  • Shortness of breath
  • Headache
  • Visual changes

• Reports
  • Fatigue
  • Sluggishness
Physical Examination

• VS: 98.9, 78, 152/88, 18, 99%, BMI 34
• Gen: alert, oriented, no acute distress
• HEENT: EOMI, PERRLA, normal hearing, no PND
• CV: RRR, no M/R/G
• Lungs: CTAB, No W/R/R
• Abd: nl BS, NT, ND, no TTP, no masses
• Neuro: Grossly intact neuro exam

Laboratory/Radiology

• HbA1C: 7.2%
• BMP: 135/4.5/105/27/38/1.3
• eGFR: 46 mL/min1.73m2
• Urine protein/cr ratio: 1.5
Question 1

What is your blood pressure target?

Question 2

How would you like to treat Tina’s hypertension?
Medications

• Aspirin 81mg
• Lantus 20u QHS
• Simvastatin 10mg daily
• Metoprolol succinate ER 50mg daily
• Lisinopril 40mg daily

Hypertension Management (Non-dialysis)

• Blood pressure
  • Goal is <130/80
  • ACEI/ARBS recommended at first line in ≥ Stage 3 or stage 1-2 with albumin/creatinine ≥300 mg/g
  • Sodium restriction of <2G/day

• Proteinuria
  • Goal spot protein/cr ratio if <1.0
  • Check at each visit to trend
Question 3

How would your management change if she was on dialysis?

Hypertension Management (Dialysis)

• Do not use pre- and post dialysis BP measurements to make decisions
• Ambulatory Blood pressure monitoring is preferred
• BP target is <140/80
• Achieve target dry weight before start BP medications
• Beta blockers are preferred first line
• Dihydropyridine calcium blockers are second line (i.e. amlodipine)
• ACEI/ARBs may decrease risk of CV events – they do no confer the same mortality benefit as in non-dialysis patients
Question 4

Are there any other labs you would like to order today?

Tina’s additional labs

- PTH: 44 ng/dL (Normal)
- CBC: 8.0/13/38/205
- 25-Hydroxy-Vitamin D: 55 nmol/L
- Calcium: 8.5 mg/dL
- Phosphorous: 3.5 mg/dL
- Alkaline Phosphatase: 100 IU/L (Normal)
Clinical Evaluations Recommendations

- Stage 3a/b
  - Alk Phos every 12 months
  - Calcium and Phos check 6-12 months
  - Vitamin D 6-12 months
  - PTH every 6-12 months
  - CBC Yearly

- Stage 4
  - Alk Phos every 1-6 months
  - Calcium and Phos every 3-6 months
  - Vitamin D every 6-12 months
  - PTH check 6-12 months
  - CBC every 6 months

- Stage 5
  - Alk Phos every 1-3 months
  - Calcium and Phos every 1-3 months
  - Vitamin D every 6-12 months
  - PTH check 3-6 months
  - CBC every 6 months
    - Every 3 months for dialysis

Case Continued

Tina returns to your office one year later. Her BP is better controlled. She reports significant weight gain of 20lbs with increased SOB. VS: BP 142/85, 16, 96% RA, and 70 bpm. PE reveals 3+ pitting edema to thighs bilaterally. Lungs CTAB. No JVD. You order repeat labs and order an ECHO.
Tina’s labs at 1 year

- HbA1C: 6.8
- BMP: 135/4.0/110/22/30/2.0
- eGFR: 27mL/min/1.73m2
- Previous Cr 1.3
- Spot protein/cr: 0.8 mg/G
- CBC: 9.0/13.5/39/255

- Pro-BNP: 300 pg/dL
- Calcium: 8.5 mg/dL
- Albumin: 3.5 g/dL
- Phosphate: 4.5 mg/dL
- PTH: 50 pg/dL
- ECHO: No wall motion abnormalities with of EF 55%, no diastolic dysfunction
- Vitamin D: 35 ng/L

Question 5

What are your concerns about Tina’s labs?
Question 6

What do you want to do about her worsening edema?

Complications – Volume Overload

• Maintain low sodium diet

• No NSAIDS in anyone with CKD3 or greater
  • Can interfere with function of diuretics

• Bowel mucosal edema may reduce absorption
Volume Overload

• Loop diuretics
  • Maximum effective bolus doses:
    • 160 to 200mg furosemide
    • 8 to 10mg bumetanide
    • 50 to 100mg torsemide
  • Partial response → Add thiazide diuretic
    • 30 minutes prior to loop diuretic
  • No response → Continuous drip, albumin
    • Minimal evidence

• Dialysis or ultrafiltration

Question 7

What would you like to do about his ACEI in light of her worsened Cr?
Tina’s case continued

Tina returns to your office 3 months later. Her edema is improved since she was placed on furosemide 40mg daily. She has no complaints. You redraw more labs.

Tina’s labs 6 months later

- HbA1C: 6.8
- BMP: 135/4.0/96/18/30/2.0
- eGFR: 27mL/min/1.73m2
- Previous Cr 2.0
- Spot protein/cr: 0.7 mg/G
- CBC: 9.0/13.5/39/255
- Calcium: 7.0 mg/dL
- Albumin: 2.0 g/dL
- Phosphate: 6.0 mg/dL
- PTH: 200 pg/dL
- Vitamin D: 25 ng/L
Question 8

How do you want to treat Tina’s low bicarbonate?

Metabolic Acidosis

• Higher mortality rate

• Increased risk for progression of CKD

• Supplemental bicarbonate
  • Maintain normal range (23-29 mEq/L)
  • Generally 0.5-1.0 mEq/kg/day
  • Start when bicarb <22 mEq/L consistently
  • Dialysis
Question 9

What would you like to do about her elevated PTH and phosphorous?

CKD-MBD

• 1. Hyperphosphatemia
  • Persistently above >4.5mg/dL
  • Dietary changes
  • Phosphate binders (Goal <4.5 in non-dialysis, 3.5-5.5 in dialysis)

• 2. Secondary hyperparathyroidism
  • PTH Persistently above 150-200 pg/mL or 2-3x normal
  • Calcitriol 0.25mcg MWF to keep PTH level >30 but <150 pg/mL
  • No calcimimetics
CKD-MBD

• 3. Vitamin D deficiency
  • Only if PTH at target and vitamin D <30ng/mL
  • 600-800IU daily oral supplementation
  • Benefit to utilizing Vit D2 to keep vit D2 levels >30 and Vit D3

• 4. Hypercalcemia
  • Decreased excretion & phosphate binders
  • Extraskeletal calcifications and vascular changes
  • Calcium phosphate product <55

Question 10

Are you concerned about her calcium?
Corrected Calcium

- Corrected Calcium = (0.8 * (Normal Albumin - Pt's Albumin)) + Serum Ca

- Tina’s corrected calcium is 8.1 mg/dL

- This patient has metabolic acidosis.

- Ionized calcium: Normal at 4.5 mg/dL

Question 11

Should Tina be referred to Nephrology?
Early Referral

• Late referral = poor outcomes

• Discuss and plan for replacement therapy
  • GFR<30mL/min
  • Rapidly declining GFR
  • Abrupt sustained decline in GFR
  • Creatinine >4
  • Consistent A3 proteinuria
  • Inability to meet treatment goals

Tina’s case finalized

Over the next few months, Tina’s eGFR continues to decline. Her nephrologist refers her for renal transplant. 12 months later, Tina returns to your office with a successful kidney transplant.
Contact Information

• Michael M. Braun
• Michael.m.braun.civ@mail.mil

Questions
References


References


References