

CASE STUDY

31

CHRONIC RENAL FAILURE



For the Disease Summary for this case study,
see the CD-ROM.

PATIENT CASE

History of Present Illness

Mr. M.A. is a 27-year-old white male, who is visiting his primary healthcare provider to discuss recent blood tests. He has been feeling fatigued and weak lately.

Past Medical History

Three years ago, the patient presented to the emergency room with a six-hour history of coughing up blood. He also complained of difficulty breathing, chills, and chest pain. He had recently suffered a two-week episode of influenza A. Laboratory tests revealed an elevated white blood cell count and iron deficiency anemia. A physical exam revealed moderate hepatosplenomegaly and inspiratory crackles at the base of each lung. He was hospitalized for a thorough clinical workup.

An ELISA test was positive for anti-glomerular basement membrane (GBM) antibodies in the blood, but serum complement levels were within normal limits. Immunofluorescence of the renal biopsy was positive for IgG and complement lining the glomerular membranes. A diagnosis of Goodpasture syndrome was made. The patient was educated about Goodpasture syndrome (that it is a disease in which the immune system attacks the kidneys and lungs) and that a potential serious complication is chronic renal failure.

The patient was immediately placed on methylprednisolone (1 mg/kg/d po divided Q 6–12 hrs) and plasmapheresis was conducted (four plasma exchanges of 1 L each daily for two weeks). After two weeks, the patient's symptoms resolved and serum anti-GBM antibodies were no longer detectable. The patient was maintained for six months on azathioprine (2 mg/kg/d po QD) and 160 mg trimethoprim plus 800 mg sulfamethoxazole 3×/week.

Patient Case Question 1. Which type of immune hypersensitivity reaction causes the destructive renal changes in Goodpasture syndrome—type I, II, III, or IV?

Patient Case Question 2. Why were methylprednisolone and azathioprine given to the patient?

Patient Case Question 3. Why was trimethoprim and sulfamethoxazole prescribed with azathioprine for this patient?

Patient Case Question 4. What is the purpose of plasmapheresis?

During a follow-up visit with a nephrologist in six months, a urinalysis revealed a low-grade proteinuria and hematuria.

Patient Case Question 5. What is the pathophysiology behind the clinical signs of proteinuria and hematuria in this patient?

Clinical Course

With each patient visit at every six-month interval, proteinuria and hematuria became more severe. Also, increasing BUN and serum creatinine levels indicated that kidney disease was progressing. The patient had one relapse at one year following onset and had been hospitalized and treated again with methylprednisolone, azathioprine, and plasmapheresis.

At the patient's most recent visit with the nephrologist, vital signs were: BP 150/95, P 90, RR 22 and unlabored, T 98.6°F, Ht 5'9", Wt 170 lb. Serum creatinine test results were compared with previous tests to determine the extent of progression of renal failure. See Patient Case Table 31.1.

Patient Case Table 31.1 Serum Creatinine Test Results	
Serum Creatinine Measurement	Serum Creatinine Concentration (mg/dL)
At onset of disease 3 years ago	1.00
6 months after onset	1.18
1 year after onset	1.39
18 months after onset	1.72
24 months after onset	2.38
30 months after onset	3.57
3 days ago	7.14

Patient Case Question 6. Determine the approximate time to end-stage renal disease from this visit.

Patient Case Question 7. Determine the patient's creatinine clearance from tests done three days ago, indicate the stage of chronic renal failure to which the patient has progressed, and identify an action plan.

Review of Systems

The patient denies any bleeding and bruising, shortness of breath, chest pain with inspiration, anorexia, nausea, vomiting, loss of coordination, unsteady gait, and bone pain. He states, however, that his "skin has been itching some lately. I have been using a lot of lotion on my arms and legs, because sometimes it is really bothersome."

Physical Examination and Laboratory Tests

The patient is very pale and appears to be in mild acute distress. There is some periorbital edema and mild swelling of his hands. He reports a dull headache for the past four days. "I have been forgetting things a lot lately and I can't seem to concentrate at work anymore."

Head, Eyes, Ears, Nose, and Throat

- Pupils equal at 3 mm, round, and reactive to light and accommodation
- Extra-ocular muscles intact

- Anti-icte
- Fundi n
- Conjunc
- Tympan
- No exuc

Skin

- Very pa
- No ecch

Neck

- Supple
- Thyroid
- No lym

Lungs

Mild biba

Patient

Heart

- Regular
- S₁ and
- No mu

Abdon

- Soft, r
- No gu
- No ma
- Norm

Rectal

- Prosta
- Anal s
- Stool

Extrer

- Negat
- Mild
- Norm
- 2+ de

Neuro

- Alert
- No se

analysis revealed a low.

clinical signs of pro-

naturia became more
at kidney disease was
and had been hospital-
ismapheresis.
were: BP 150/95, P 90,
test results were com-
al failure. See Patient

concentration (mg/dL)

00

18

39

72

38

57

14

age renal disease—

ce from tests done
e patient has pro-

st pain with inspira-
and bone pain. He
using a lot of lotion

Tests

is some periorbital
he past four days. "I
at work anymore."

on

- Anti-icteric sclera
- Fundi normal
- Conjunctiva normal
- Tympanic membranes intact and clear
- No exudates or erythema in oropharynx

Skin

- Very pale, dry with flakiness
- No ecchymoses or purpura

Neck

- Supple without masses or bruits
- Thyroid normal
- No lymphadenopathy

Lungs

Mild bibasilar crackles with auscultation

Patient Case Question 8. What is a likely cause of the abnormal lung sounds here?

Heart

- Regular rate and rhythm
- S₁ and S₂ sounds clear with no additional heart sounds
- No murmurs or rubs

Abdomen

- Soft, non-tender, and non-distended
- No guarding or rebound with palpation
- No masses, bruits, hepatomegaly, or splenomegaly
- Normal bowel sounds

Rectal/Genitourinary

- Prostate normal in size with no nodules
- Anal sphincter tone normal
- Stool is guaiac-negative

Extremities

- Negative for cyanosis or clubbing
- Mild (1+) edema of the hands and feet
- Normal range of motion throughout
- 2+ dorsalis pedis and posterior tibial pulses bilaterally

Neurological

- Alert and oriented × 3
- No sensory or motor abnormalities

- CNs II-XII intact
- DTRs = 2+ throughout
- Muscle tone 5/5 throughout
- Positive Chvostek sign bilaterally

Patient Case Question 9. Describe a positive Chvostek sign and suggest with which abnormal laboratory test below this clinical sign is consistent.

Laboratory Test Results

See Patient Case Table 31.2

Patient Case Table 31.2 Laboratory Test Results					
Na	149 meq/L	Plt	270,000/mm ³	Mg	3.8 mg/dL
K	5.4 meq/L	RBC	3.4 million/mm ³	PO ₄	5.9 mg/dL
Cl	116 meq/L	WBC	9,400/mm ³	PT	14.2 sec
Ca	6.7 mg/dL	AST	18 IU/L	PTT	34 sec
HCO ₃	32 meq/L	ALT	38 IU/L	Protein _{urine}	+++
BUN	143 mg/dL	Alk Phos	178 IU/L	Blood _{urine}	+++
Cr	7.1 mg/dL	Glu, random	152 mg/dL	pH blood	7.45
Hb	9.5 g/dL	T bilirubin	2.0 mg/dL	Renal ultrasound:	significant bilateral atrophy, 8.3 cm each
Hct	30.7%	Alb	2.9 g/dL	Chest x-ray:	bibasilar shadows
MCV	80 fL	T protein	5.0 g/dL	ECG	Normal

Patient Case Question 10. There are *twenty* abnormal laboratory tests above. Identify them and suggest a brief pathophysiologic mechanism for each.

CASE

3



For t
see ti

PATIENT

■ Patient

"I've had three
mow the year
very weak an
cramps, and

■ History

Mr. M.B. is
assisted hen
that resulte
with a bloo
renal failure
was started
each week,
pyelonephri
summer in
to have his
currently on

■ Past

- Measles
- "Nervous"
ble bowe
- Diabetes
- Recurring

■ Physical

- Tonsils
- Left ing