**Patient:** Elaine Berkowitz (DOB: 1960-11-05)  
**Medical Record Number:** 893746  
**Date of Admission:** 2025-03-18  
**Date of Discharge:** 2025-03-23  
**Admitting Physician:** Dr. R. Thompson (Internal Medicine)  
**Consulting Physician:** Dr. K. Patel (Gastroenterology), Dr. L. Martinez (Hematology)

**Discharge Diagnosis: Pernicious Anemia with Severe Vitamin B12 Deficiency**

**1. Detailed Diagnosis:**

Primary Diagnosis: Pernicious Anemia with Severe Vitamin B12 Deficiency  
Date of Initial Diagnosis: 2025-03-19

Laboratory Findings:

* Hemoglobin: 7.2 g/dL (Reference: 12.0-15.5)
* MCV: 112 fL (Reference: 80-100)
* Vitamin B12: <50 pg/mL (Reference: 200-900)
* Methylmalonic acid: 3.85 μmol/L (Reference: 0.08-0.56)
* Homocysteine: 89 μmol/L (Reference: 5-15)
* Reticulocyte index: 0.4 (Reference: >2.0 in appropriate response to anemia)

Immunologic Studies:

* Anti-intrinsic factor antibodies: Positive
* Anti-parietal cell antibodies: Positive

Peripheral Blood Smear: Marked macrocytosis with oval macrocytes, anisocytosis, poikilocytosis, and hypersegmented neutrophils.

Bone Marrow Findings (2025-03-19):

* Hypercellular bone marrow (70-80%) with marked erythroid hyperplasia
* Megaloblastic changes in erythroid precursors
* Dysmyelopoiesis with giant metamyelocytes and hypersegmented neutrophils
* No evidence of dysplasia or malignancy
* Iron stores adequate
* Consistent with megaloblastic anemia due to vitamin B12 deficiency

EGD with Gastric Biopsy (2025-03-20):

* Atrophic gastritis in the body and fundus of the stomach
* Negative for Helicobacter pylori
* Histopathology: Chronic atrophic gastritis with intestinal metaplasia, consistent with autoimmune gastritis

Clinical Manifestations:

* Hematologic: Severe macrocytic anemia, mild thrombocytopenia
* Neurologic: Peripheral neuropathy with paresthesias, decreased proprioception, diminished reflexes in lower extremities, positive Romberg sign, and mild ataxia
* Gastrointestinal: Glossitis, anorexia, unintentional weight loss
* Constitutional: Fatigue, weakness, shortness of breath with exertion

**2. Current Treatment:**

Vitamin B12 Replacement Therapy:

* Cyanocobalamin 1000 mcg IM daily for 7 days
* Then weekly for 4 weeks
* Then monthly indefinitely

Response to Therapy:

* Hemoglobin increased from 7.2 g/dL to 8.9 g/dL during hospitalization
* Appropriate reticulocytosis observed
* Early improvement in fatigue and lightheadedness
* Initial improvement in paresthesias, with expectation of continued neurological recovery over several months

**3. History of Previous Treatment:**

* No prior documented diagnosis of pernicious anemia
* Received 2 units of packed red blood cells 2 weeks prior to current admission for symptomatic anemia (at outside ED)
* No prior vitamin B12 supplementation
* Had been taking a multivitamin daily (insufficient to overcome malabsorption)

**4. Comorbidities:**

* Breast cancer (diagnosed 2018, status post right lumpectomy and radiation therapy, currently in remission on adjuvant anti-hormone therapy with anastrozole)
* Hypothyroidism (diagnosed 2018, controlled on levothyroxine)
* Vitiligo (diagnosed 2010)
* Osteoporosis
* Hypertension (controlled)
* Hyperlipidemia
* Gastroesophageal reflux disease (GERD)

**5. Physical Exam at Admission:**

General: 64-year-old female appearing fatigued, pale, but in no acute distress.

Vitals: Temperature 36.8°C, Heart Rate 92 bpm, Respiratory Rate 18/min, Blood Pressure 138/82 mmHg, Oxygen Saturation 97% on room air, Weight 62 kg, Height 165 cm, BMI 22.8 kg/m².

HEENT: Conjunctivae pale. Sclera anicteric. Oral mucosa with glossitis and atrophic glossy tongue.

Neck: Supple, no lymphadenopathy, no thyromegaly.

Cardiovascular: Regular rate and rhythm, S1 and S2 normal, 2/6 systolic flow murmur at left sternal border.

Respiratory: Clear to auscultation bilaterally.

Abdomen: Soft, non-tender, non-distended. Normal bowel sounds. No hepatosplenomegaly.

Extremities: No cyanosis, clubbing, or edema. Patches of vitiligo on hands and forearms. Skin: Pale, with areas of depigmentation on hands, forearms, and periorbital areas consistent with vitiligo.

Neurological: Alert and oriented x3. Decreased sensation to light touch and vibration in distal extremities. Proprioception diminished in toes. Motor strength 4+/5 in all extremities. Reflexes 2+ in upper extremities, 1+ in patellar tendons, absent in Achilles tendons. Positive Romberg sign. Gait mildly ataxic.

**6. Epicrisis:**

Ms. Berkowitz presented with severe macrocytic anemia, neurological symptoms, and constitutional complaints. Laboratory workup confirmed profound vitamin B12 deficiency with elevated methylmalonic acid and homocysteine levels. Bone marrow examination revealed megaloblastic changes, and endoscopy with biopsy showed atrophic gastritis. Immunologic studies were positive for anti-intrinsic factor and anti-parietal cell antibodies, confirming the diagnosis of pernicious anemia.

Parenteral cyanocobalamin therapy was initiated promptly with 1000 mcg IM daily. The patient responded well with improvement in fatigue and lightheadedness, and her hemoglobin increased from 7.2 g/dL to 8.9 g/dL during hospitalization. Neurological symptoms showed early improvement, though complete resolution was expected to take several months.

Given the patient's breast cancer history, stable remission status with no evidence of recurrence or relationship to current hematologic findings was confirmed. The patient's anastrozole therapy was continued without interruption during hospitalization.

The patient received education on vitamin B12 self-injection technique and the importance of lifelong replacement therapy. A multidisciplinary approach involving Hematology and Gastroenterology consultations established a treatment plan and appropriate follow-up schedule.

**7. Medication at Discharge:**

* Cyanocobalamin 1000 mcg IM daily (for 2 more days, then weekly for 4 weeks, then monthly thereafter)
* Folate 1 mg PO daily (for 28 days during high-dose vitamin B12 treatment)
* Anastrozole 1 mg PO daily (for hormone receptor-positive breast cancer)
* Levothyroxine 112 mcg PO daily
* Amlodipine 5 mg PO daily
* Rosuvastatin 10 mg PO daily
* Omeprazole 20 mg PO daily
* Calcium carbonate 600 mg/Vitamin D 400 IU PO BID
* Alendronate 70 mg PO weekly (take first thing in the morning with a full glass of water, remain upright for 30 minutes)

**8. Further Procedure / Follow-up:**

Hematology Follow-up:

* Appointment with Dr. L. Martinez in 3 days (2025-03-26) and 2 weeks (2025-04-06)
* Laboratory monitoring: Electrolytes, CBC, reticulocyte count, vitamin B12 level at 2 weeks, then at 3 months, then every 6-12 months
* Assessment of response to B12 therapy and neurological recovery

Gastroenterology Follow-up:

* Appointment with Dr. K. Patel in 4 weeks (2025-04-20)
* Discussion regarding surveillance for gastric cancer (increased risk with atrophic gastritis)
* Consideration for follow-up endoscopy in 1 year

Primary Care Follow-up:

* Appointment with Dr. R. Thompson in 4 weeks (2025-04-22)
* Monitoring for other autoimmune conditions given existing autoimmune predisposition
* Management of comorbid conditions
* Annual mammogram due in June 2025 for breast cancer surveillance
* Bone density scan due in September 2025 (monitoring for anastrozole-associated bone loss)

Patient Education:

* Self-administration technique for vitamin B12 injections demonstrated and return demonstration verified
* Information provided on signs/symptoms requiring medical attention:
  + Worsening neurological symptoms (numbness, tingling, weakness, difficulty walking)
  + Signs of anemia (fatigue, weakness, shortness of breath, dizziness)
  + Symptoms of gastritis (abdominal pain, nausea, vomiting)
  + Signs of hypokalemia (muscle weakness, cramps, palpitations)
* Dietary counseling provided, emphasizing that B12 supplementation will still be required despite dietary intake

**9. Lab Values (Excerpt):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Admission (2025-03-18)** | **Discharge (2025-03-23)** | **Units** | **Reference Range** |
| WBC | 4.1 | 4.3 | x10^9/L | 4.0-11.0 |
| RBC | 1.98 | 2.42 | x10^12/L | 3.80-5.10 |
| Hemoglobin | 7.2 | 8.9 | g/dL | 12.0-15.5 |
| Hematocrit | 20.5 | 26.2 | % | 36.0-46.0 |
| MCV | 112 | 108 | fL | 80-100 |
| MCH | 38.2 | 36.8 | pg | 27.0-33.0 |
| MCHC | 34.8 | 34.0 | g/dL | 32.0-36.0 |
| RDW | 18.5 | 19.2 | % | 11.5-14.5 |
| Platelets | 112 | 128 | x10^9/L | 150-400 |
| Reticulocyte count | 0.8 | 4.6 | % | 0.5-2.5 |
| Reticulocyte index | 0.4 | 3.5 | - | >2.0 |
| Vitamin B12 | <50 | 1,850 | pg/mL | 200-900 |
| Methylmalonic acid | 3.85 | 2.12 | μmol/L | 0.08-0.56 |
| Homocysteine | 89 | 42 | μmol/L | 5-15 |
| Folate (serum) | 14.2 | 15.1 | ng/ml | 5-20 |
| LDH | 985 | 280 | U/L | 125-220 |
| Total bilirubin | 1.4 | 1.1 | mg/dL | 0.1-1.2 |
| Creatinine | 0.8 | 0.7 | mg/dL | 0.6-1.1 |
| Potassium | 4.2 | 4.3 | Mmol/L | 3.5-5.0 |

Dr. R. Thompson (Internal Medicine)  
Date/Time: 2025-03-23 15:30

Dr. L. Martinez (Hematology)  
Date/Time: 2025-03-23 14:45

Dr. K. Patel (Gastroenterology)  
Date/Time: 2025-03-23 13:30