The phantom menace: Cognitive bias in an unusual case of vertebral osteomyelitis

Sven Olson MD, Claire Zeigler MD, MPH
Oregon Health & Science University, Department of medicine

Patient Case: background
A 76 year-old male with a history of renal cell carcinoma status post left nephrectomy presented to his urologist in January 2015 with carcinoma status post left nephrectomy. In May 2015, then had his indwelling urinary catheter removed. In May 2015, then had his indwelling urinary catheter removed. The patient underwent trans-urethral resection of the prostate and cystolithopaxy. The patient presented to the ED complaining of neck pain and subjective fevers. Patient presented to his primary care office one week after ED visit with persistent neck pain, left (L) forearm and thumb numbness and paresthesias. Patient continued neck pain only mildly responsive to PT and muscle relaxant. Patient presented to primary care a second time with continued neck pain only mildly responsive to PT and muscle relaxant.

Vertebral osteomyelitis
- Vertebral osteomyelitis is the most common form of hematogenous osteomyelitis in individuals >50 years of age (3-5% of all osteomyelitis cases)
- The disease process is insidious and frequently misinterpreted as musculoskeletal back or neck pain
- Average time to diagnosis can be as long as 2-4 months
- Up to 34% of patients are initially mis-diagnosed

Neck pain: round 1
Patient presented to the ED complaining of neck pain and subjective fevers.

Neck pain: round 2
Patient presented to his primary care office one week after ED visit with persistent neck pain, left (L) forearm and thumb numbness and paresthesias.

Neck pain: round 3
Patient presented to primary care a second time with continued neck pain only mildly responsive to PT and muscle relaxant.

Admission to hospital
Anterior neck dissection with biopsies of the C6 and C7 vertebrae and C6-7 intervertebral disc.

Blood cultures: no growth
Bone culture: no growth
Urine culture: S. marasencs

Pathology (neck dissection): non-specific biopsies.

Diagnosis: S. marasencs vertebral osteomyelitis
- Rx for 6 weeks trimethoprim/ sulfamethoxazole

Discussion
Systems of reasoning
- **System 1: "Intuitive"
  - Fast
  - Heuristic
  - Rule-based
  - Low effort
  - Errors common

- **System 2: "Analytical"
  - Slow
  - Systematic
  - Model-based
  - High effort
  - Errors uncommon

Cognitive biases in this case
- Anchoring and adjustment bias: Quoted: "Resistance to deviation from initial diagnosis of musculoskeletal (MSK) strain as cause of neck pain: Initial imaging (neck ultrasound, cervical spine plain films) suggestive of musculoskeletal etiology but with unreassuring CSF studies. Absence of SIRS". Diagnosis momentum: "Initial diagnosis of MSK pain carried forward"

Cognitive pills for cognitive ills: Approaches to reduce cognitive bias
- Mentalization: overcome the bias against overcoming bias
  - Step back from problem, reflect on thinking process
  - Decrease reliance on memory
    - Heuristics: mental shortcuts that aid in reasoning and decision-making
  - Minimize time constraints
    - Rapid feedback

Heuristics & cognitive bias
- Heuristics: mental shortcuts that aid in reasoning and decision-making
- Key component of the "intuitive" method of reasoning.
  - Heuristics assist with pattern-recognition and facilitate quick diagnoses
  - Reality: Heuristics often become sources of cognitive bias, leading to diagnostic errors

References
- Crosskerry, P. The importance of cognitive errors in diagnosis and strategies to minimize them. Acad Med, August 2003; 78(8).
- Sven Olson MD, Claire Zeigler MD, MPH

"Cognitive pills for cognitive ills": Approaches to reduce cognitive bias
- "Cognitive pills for cognitive ills": Approaches to reduce cognitive bias
  - Metacognition: overcome the bias against overcoming bias
  - Step back from problem, reflect on thinking process
  - Decrease reliance on memory
    - Heuristics: mental shortcuts that aid in reasoning and decision-making
  - Minimize time constraints
    - Rapid feedback

- Key component of the "intuitive" method of reasoning.
  - Heuristics assist with pattern-recognition and facilitate quick diagnoses
  - Reality: Heuristics often become sources of cognitive bias, leading to diagnostic errors