What Causes Diagnostic Errors? Referred Patients and Our Own Cognitive Biases: A Case Report

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Patient: Male, 21-year-old
Final Diagnosis: Crohn’s disease
Symptoms: Diarrhea • fever
Medication: —
Clinical Procedure: —
Specialty: Rheumatology

Objective: Rare coexistence of disease or pathology
Background: We emphasize the utility of focusing on patient medical history and concerns rather than anchoring on data sent from referral institutions, which is often qualitative and devoid of useful patient-driven information.

Case Report: A 21-year-old man was referred to our hospital with persistent back pain, hypoalbuminemia, and C-reactive protein (CRP) elevation after prolonged hospitalization for a UTI at another hospital. A review of systems (ROS) revealed chronic diarrhea and colonoscopy revealed Crohn’s disease. Colonoscopy was followed by worsening back pain. Intestinal perforation was ruled out by X-ray, and analgesics were prescribed for long-standing spondylitis. The patient returned several days later with a recurrent UTI; a vesicointestinal fistula was identified, a known complication of Crohn’s disease. This case involved diagnostic errors due to the doctors’ faulty cognitive process. Also, in retrospect, we needed to be aware that the CT at the time of referral showed free air in the bladder and not uncomplicated pyelonephritis. The diagnostic errors were related to both satisfaction bias (finding one disease that prevents the accurate and timely diagnosis of another) and lack of awareness of epidemiology. To prevent errors like these, it is important to first conduct a careful interview and physical examination, as if the patient were a first-time patient, in order to eliminate the influence of bias. Next, epidemiological possibilities should be considered and differentiation made between physical and epidemiological issues.

Conclusions: It is important to treat referral patients as if they were first-time patients and to give due consideration to diagnostic biases and epidemiology.

Keywords: Crohn Disease • Diagnostic Errors • Urinary Tract Infections

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Background

The incidence of urinary tract infection (UTI) as a primary pathology in men below the age of 50 years without a high-risk sexual history is approximately 5-8 per 10 000 population per year [1]. The numerous structural and functional problems that can potentially lead to UTIs in men can be clinically challenging. The yearly incidence of Crohn’s disease (CD) has been reported to be about 3-20 cases per 100 000 patients [2]. It is a disease mostly diagnosed in young adults, where symptoms primarily emerge in their 30s, but can emerge as late as their 60s [3]. Through this case report, we communicate the importance of considering diagnoses in the context of 5 aspects: 1) disease frequency (hereafter referred to as epidemiology) [4] including percent probability; 2) understanding that disease is as likely to be identified by organ-specific pathology as by its complications on neighboring organ systems (pathoanatomy) [5]; 3) we emphasize the utility of focusing on patient concerns via the standard review of systems (ROS) [6]; 4) rather than anchoring on data sent from referral institutions, which may be qualitative and devoid of useful patient-driven information; and finally 5) we highlight this case because it presents a clear and interesting example of cognitive biases including satisfaction and anchoring biases, that is, finding one disease, the discovery of which prevents the accurate and timely diagnosis of another.

Case Report

A 21-year-old man was referred to our hospital by an outside provider for 7 weeks of left back pain without fever. He had been hospitalized at another facility for the previous 3 weeks for severe back pain, during which time he developed fever and pyuria for which he was prescribed 2 weeks of doripenem for susceptible E. coli in the urine. Although the patient’s back pain continued, he deferred care. On laboratory testing, his serum albumin level was noted to be 1.8 g/dL (normal range 4.1 to 5.1 g/dL) and his C-reactive protein (CRP) level remained elevated at 7.8 mg/dL (normal range ≤0.3 mg/dL), despite clinical improvement. The patient was discharged with a referral to our outpatient department to investigate the low serum albumin and high CRP levels.

During the interview, the patient reported an unintentional 5-kg weight loss, as well as approximately 2 years of diarrhea (soft stool) up to 5 times per day. He denied any joint, abdominal, or muscle pain, vomiting, rigors, dysuria, urinary frequency, appetite loss, bloody stools, or high-risk sexual history. On physical examination, his general appearance was good, and his consciousness was clear. Body temperature was 37.0°C, pulse was 98/min, blood pressure was 104/59 mmHg, respiration rate was 14/min, and SpO2 was 98% on room air. The lung and heart examinations were normal. The abdomen was soft and flat with slight tympanic bowel sounds. Mild, right-upper-quadrant tenderness was noted without muscular defense or rebound tenderness. We identified left costovertebral angle tenderness. There was no edema nor were there abnormal skin findings. During presentation at our hospital, the patient was found to have a urinary protein of 1.92 g/g Cre (normal range <0.15 g/g Cre), with a urine WBC count of 50 cells/high-power field, a urine RBC of 10 cells/high-power field, and bacteria in the urine. CRP was elevated at 6.3 mg/dL (normal range ≤0.3 mg/dL); however, serum WBC was normal at 5100/L (normal range 3100 to 8400/L). The 1-h erythrocyte sedimentation rate (ESR) was 42 mm. Total protein was 5.1 g/dL (normal range 6.5 to 8.0 g/dL), serum albumin was 1.8 g/dL (normal range 4.1 to 5.1 g/dL), blood urea nitrogen was 11.0 mg/dL (normal range 8.0 to 21.0 mg/dL), serum creatinine was 0.4 mg/dL (normal range 0.6 to 1.1 g/dL), and eGFR was 141.6 mL/min/1.73 m². Liver function was within normal limits. Our initial diagnosis was urinary tract infection (UTI) with complicated pyelonephritis.

Based on the chronic diarrhea and high inflammatory response, inflammatory bowel disease was considered, and colonoscopy was performed. Multiple longitudinal ulcers and skip lesions were identified. Biopsy results were consistent with a diagnosis of Crohn’s disease (CD).

The day after the colonoscopy at the outpatient clinic of our hospital, and after ruling out post-procedural perforation with abdominal x-ray and echography, the patient was prescribed NSAIDs for scoliosis, which had been painful for him in the past. Three days after the colonoscopy, he returned to our Emergency Department, this time with recurrent fever and exacerbation of back pain. On this visit, his urine revealed fecal contamination from the intestinal tract, which might have been due to a vesicointestinal fistula. Reexamination of CT images from the previous hospital identified air in the bladder, which was also compatible with a vesicointestinal fistula due to CD (Figure 1). A contrast enema at our institution identified a vesicointestinal fistula (Figure 2).

The patient was admitted to our hospital’s inpatient service from the Emergency Department for evaluation of the fistula; he was started on tazobactam/piperacillin 4.5 g every 6 h and oral mesalazine (3 g/day). Fourteen days after admission, gastrointestinal surgeons performed laparoscopic resection of the terminal ileum because stenosis of the ileum due to Crohn’s disease had occurred, with spontaneous closure of the fistula facilitated by medical management only. The patient completed a 2-week course of antibiotic therapy. He was discharged 2 weeks later after an uncomplicated postoperative course and was judged to have made good progress toward healing. The patient continued to be followed up every 3 months by the Gastroenterology Department and is being...
Maintained on oral mesalazine at 3 g/day. There has been no recurrence of UTI to date.

Discussion

That this young man was being treated for about 3 weeks for a poorly responding UTI suggests the diagnostic error due to the referring physician’s lack knowledge about complicated UTI and its epidemiology in young men [1]. We, the authors, continued this lack of knowledge and epidemiology about persistent UTI in men with our initial failure to investigate structural, that is anatomic, causes of the patient’s UTI. We delayed obtaining and interpreting the referring hospital’s CT study showing free air in the urinary bladder, and we anchored the initial diagnosis incorrectly. Furthermore, the early finding of the chronic diarrhea history, which led to the Crohn’s disease diagnosis via colonoscopy, generated our satisfaction bias. Satisfaction bias is when one concludes a diagnosis after identifying a single disease as the root cause [7]. Prior case reports have recommended a thorough physical examination to avoid satisfaction bias [8]. We failed to consider the complications of CD, such as fistula formation, as was the cause of our patient’s recurrent UTI. Lastly, overconfidence bias, or diagnostic fatigue, was our failure to correctly diagnose the patient’s low back pain, ascribing it to the patient’s chronic scoliosis, rather than considering more detailed evaluation of this pain, prescribing a non-steroidal anti-inflammatory drug (NSAID), resulting in delayed emergency care for the newly-recognized vesicointestinal fistula. UTIs in men are often complex infections; the diagnosis should have been questioned and addressed.

A previous study noted that 7% of patients were found to have fistula formation prior to a CD diagnosis [9]. One in 3 patients with CD experiences complicated fistula formation, and 5-10% are admitted for internal fistula [10], of which vesicointestinal fistulas are the most common [11].

Conclusions

For cases like this one, it is important to first conduct a careful interview and physical examination, as if the patient were a first-time patient, in order to eliminate the influence of bias. Next, epidemiological possibilities should be considered and correct differentiation between physical and epidemiological issues made. It is, of course, important to make calm decisions with every patient and every case. A check list or problem list might be considered for complicated patient diagnosis and management [12,13].

Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

Figure 1. Non-contrast CT scan. The non-contrast CT scan showed air in the urinary bladder (arrow).

Figure 2. X-ray intestinal studies with barium enteroclysis. Oral contrast media was seen in the small and large intestines and urinary bladder simultaneously (arrow).
References:

1. Seminerio JL, Aggarwal G, Sweeter S. 26-year-old man with recurrent urinary tract infections. Mayo Clin Proc. 2011;86(6):557-60
2. Molodecky NA, Soon IS, Rabi DM, et al. Increasing incidence and prevalence of the inflammatory bowel diseases with time, based on systematic review. Gastroenterology. 2012;142:46-54
3. Feuerstein JD, Cheifetz AS. Crohn disease: Epidemiology, diagnosis, and management. Mayo Clin Proc. 2017;92(7):1088-103
4. Morgan DJ, Pineles L, Owczarzak J, et al. Accuracy of practitioner estimates of probability of diagnosis before and after testing. JAMA Intern Med. 2021;181(6):747-55
5. Khanna PC, Karkik ND, Jankharia BG, et al. Magnetic resonance urography (MRU) versus intravenous urography (IVU) in obstructive uropathy: A prospective study of 30 cases. J Assoc Physicians India. 2005;53:527-34
6. Hendrickson MA, Melton GB, Pitt MB. The review of systems, the electronic health record, and billing. JAMA. 2019;322(2):115-16
7. Zubero EE, Valdivia-Grandez MA, Alatorre-Jiménez MA, et al. Diagnosis bias and its relevance during the diagnosis process. Arch Clin Med Case Rep. 2017;1(1):24-30
8. Tomoda Y, Kamata K, Tokuda Y. Readily accepting the most obvious diagnosis may increase the risk of search satisfaction bias. Diagnostic Error in Medicine. 9th International Conference November 6-8, 2016. Diagnosis. 2017; 4(1):eA1-eA41
9. Gruner JS, Sehon JK, Johnson LW. Diagnosis and management of enterovesical fistulas in patients with Crohn’s disease. Am Surg. 2002;68(8):714-19
10. Vagianos C, Malgarinos G, Spyropoulos C, et al. Entero-vesical fistulas in Crohn's disease: A case series report and review of the literature. Int J Surg Case Rep. 2017;24(41):477-80
11. Wade G, Zaslau S, Janse R. A review of urinary fistulae in Crohn’s disease. Can J Urol. 2014;21:7179-84
12. Ely JW, Graber ML, Croskerry P. Checklists to reduce diagnostic errors. Acad Med. 2011;86(3):307-13
13. Graber M, Sorensen A, Biswas J, et al. Developing checklists to prevent diagnostic error in Emergency Room settings. Diagnosis (Berl). 2014;1(3):223-31