The Art of Medicine: Can You Recognize Aunt Minnie?

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Abstract

Aunt Minnie, the pseudonym most often used by radiologists, describes pattern recognition that is pathognomonic of a disease. Debate exists in medical training as to whether a lengthy workup for symptoms affects diagnostic accuracy, as the Aunt Minnie method usually yields the correct diagnosis rapidly. After training, many unknowingly adopt this method of pattern recognition for symptoms or imaging based off initial impressions. However, this can lead even the most experienced clinician down the wrong path.

Classic Aunt Minnie scenarios may resemble very different pathologies and confuse the clinician. At times, recognizing what appears ordinary as extraordinary is achieved by embracing a more Socratic method of discussion among colleagues. Here, we present three cases that appear to be Aunt Minnie from afar but are not. Our objective is to encourage direct dialogue with radiologists to aid in diagnostic accuracy in an age when technologic advances and outside pressures have limited the personal interactions of the past. The clinical and radiographic criteria for each diagnosis are also reviewed.

Introduction

As much as 80-90% of diagnoses can be made from history alone, and, yet, imaging has become mainstay to support diagnoses.[1] However, our clinical course for a patient may alter dramatically based on the radiographic interpretation and in particular for those who lack confidence in certain findings. Understanding that a potential disconnect exists between history, clinical examinations, and the radiographic picture, especially when interpreted as separate entities, can have dramatic effects on patient care and their future outcomes.

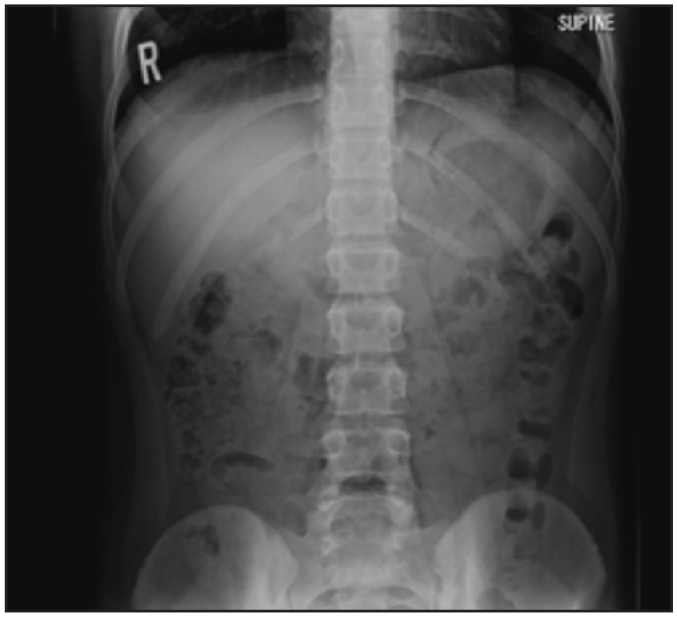
With varying degrees of enthusiasm, traditional medical education has embraced the Socratic Method for trainees.[2] This very thorough and time-consuming discussion of all the known diagnostic possibilities tends to slowly dissolve through the years due to outside pressures, advancements in technology and imaging, and the development of focused super subspecialties.[3] For an experienced clinician, most correct diagnoses do come through pattern recognition and not problem solving.[1] As medical training ensues, most have been told the medical adage, "When you hear hoof beats don't look for zebras" implying that one should look for the obvious answer, not the exotic one. Among all disciplines, clinical reasoning and diagnostic accuracy are improved with acquisition of knowledge and experience, and, through time, we begin to rapidly identify the hoofbeats or, more appropriately said, we have embraced Aunt Minnie.

Aunt Minnie is the fictitious name given by Sackett et al. and others to describe pattern recognition in medicine. If a lady walks and looks like your Aunt Minnie, then she probably is.[4] Often we see her somewhere, radiologically or in history and physical examination, and proceed to make critical medical and surgical interventions based off this that are most of the time correct. Presumptive diagnosis based on radiographic or symptomatic pattern recognition can be fraught with complications, as Aunt Minnie often changes her appearance when more dynamic clinical information is provided among

disciplines. Recognizing when Aunt Minnie is not who she appears to be can often be disclosed by dialogue with radiologists who can help attribute clinical features to radiographic findings that could be interpreted more than one way.

The three cases described will show how a classic Aunt Minnie diagnosis can change with additional information and how dialogue could have changed the patient's course. The first case describes what appears to be constipation by history and physical examination. Aunt Minnie is recognized as constipation, initially treated as such, and later proven wrong by imaging. The second case describes vague chest complaints and possible partial bowel obstruction in an otherwise healthy individual. Aunt Minnie is recognized on chest radiograph as pulmonary edema by the radiologist and is later proven to be wrong with additional information. The third case describes what appears to be acute appendicitis on history and physical examination. Aunt Minnie is recognized as acute appendicitis; however, imaging and pathology prove it to be wrong. The clinical and radiographic findings for each diagnosis are reviewed for each different entity that can mimic another benign condition based off of historical or radiographic information that is interpreted separately.

Image 1: KUB demonstrating psoas shadow on right.



Cases

A 12-year-old male presented to the emergency room (ER) complaining of diffuse abdominal pain for three days. Prior to this presentation, he felt constipated and was unable to move his bowels after enema administration at home. He complained of anorexia but was tolerating a diet. He denied fevers, chills, nausea, or vomiting. His past medical and surgical history was unremarkable. On physical examination he was afebrile with normal vital signs. His abdomen was soft, mildly distended, but diffusely tender without guarding, rebound, or rigidity. All laboratory results were normal. Image 1 shows the kidneys, ureters, bladder (KUB) radiograph ordered. This image confirmed the working diagnosis of constipation by the ER physician, and the patient was discharged home with instructions for a bowel regimen. The patient returned to the ER two days later with progressively worsening symptoms and localization of pain to the right lower quadrant. Computed Tomography (CT) scan of the abdomen and pelvis was ordered, and demonstrated acute appendicitis. Histological evaluation of the specimen after appendectomy was also consistent with acute appendicitis. The initial report on Image 1 noted a psoas shadow was absent on the right, raising the possibility of acute appendicitis on the radiograph. Clinically, at the time this was not recognized as pertinent.

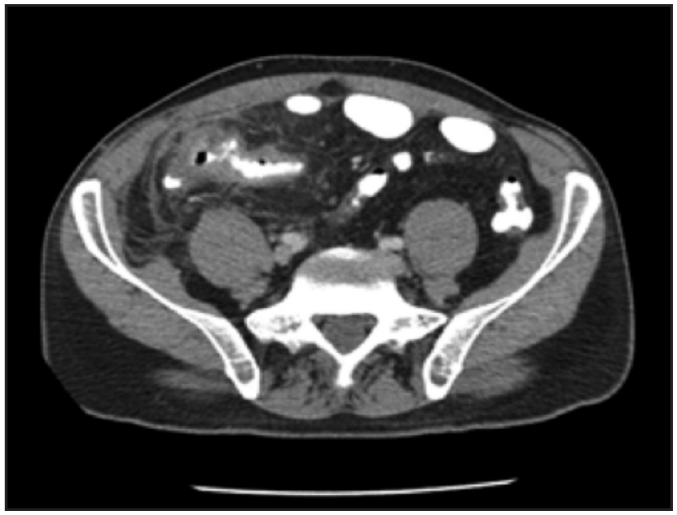
Image 2: Diffuse bilateral interstitial alveolar opacities.

A 68-year-old male presented to the ER complaining of two days of worsening nausea, vomiting, chest pain, and shortness of breath at rest. He also complained of mild abdominal bloating and recent loose stools. His history was remarkable for six months of worsening joint aches, nausea, and unintentional weight loss. His past surgical history was significant for gastric banding and prostate biopsy for an elevated Prostate-Specific Antigen (PSA) level obtained as an outpatient. Multiple biopsies demonstrated chronic inflammation. His past medical history was significant for benign prostatic hyperplasia. On physical examination he was afebrile, slightly tachycardic, and oxygen saturation was 95% on room air. His heart and lung sounds were unremarkable. He was tender in the epigastric region, right lower quadrant, and demonstrated peritoneal signs. A chest radiograph, seen in Image 2, was ordered and performed prior to CT scan. This was read as diffuse interstitial alveolar opacities suggestive of pulmonary edema. CT scan of the abdomen and pelvis demonstrated mechanical small bowel obstruction at the level of the distal ileum, diffuse sclerotic lesions within the axial skeleton compatible with diffuse metastatic disease. Later that evening he underwent laparotomy and right hemicolectomy for an obstructing

mass in this area. Pathology from surgery came back poorly differentiated adenocarcinoma with signet ring features with extensive angiolymphatic invasion. Retrospectively, Image 2 was consistent with pulmonary lymphangitic metastases from prostate cancer and not pulmonary edema.

A 53-year-old male presented to the ER with a four-day history of worsening abdominal pain, now localized to the right lower quadrant. He complained of fevers and chills, anorexia, diarrhea, and emesis. His past medical and surgical history was unremarkable. On physical examination he was afebrile with a heart rate of 110. He had diffuse abdominal tenderness, greatest in the right lower quadrant, with mild peritoneal signs. He had a normal white count with a slight left shift and a C-reactive protein level elevated at 5.3. Urinalysis was positive for trace blood. Image 3 shows the CT scan of the abdomen and pelvis ordered. This was read as significant phlegmon formation in the right lower quadrant suspicious for Crohn's disease versus acute appendicitis. He was admitted for observation that evening. The following morning his laboratory results remained unchanged, and his pain was more localized to the right lower quadrant. He underwent surgery later that morning. In the operating room a significant amount of phlegmon was evacuated from the right lower quadrant. The appendix was identified, removed, and did appear inflamed as did some mesentery in the cecal region. The cecum and the remainder of large and small bowel appeared normal. Pathology from the appendix came back consistent with active Crohn's disease.

Image 3: Axial view demonstrating phlegmon formation on the right and thickening of the cecum and terminal ileum.



Discussion

The first case presented appeared to be constipation based on history and physical examination. The plain abdominal film (PAX) obtained appeared to support this benign suspicion. This looked virtually normal to the untrained eye; however, the radiologist identified something much different. This patient did not fit the classic description of acute appendicitis which he ultimately had. The imaging abnormality identified should have prompted further investigation from the ER physician. Likely, a different outcome would have occurred if dialogue between specialties was present.

Appendicitis is the most common surgical emergency in children in the United States, with more than 75,000 appendectomies performed each year.[5] It remains difficult to diagnose, and much debate exists regarding the optimal diagnostic approach in children with abdominal pain.[5,6] Many studies highlight the variability in eliciting history and physical examination findings in children. This may reflect the fluid nature of the physical examination, the maturity of the child, and the need to perform multiple examinations to gain a better perspective of clinical status.[5] In one study examining this, the inter-rater reliability of patient history and physical examination findings was generally considered fair to moderate and should be accounted for when developing prediction rules and clinical pathways that guide clinical management. The duration of pain, history of emesis, presence of abdominal tenderness, and pain with walking, jumping or coughing were the variables with the highest degree of inter-rater reliability in children with possible appendicitis.[5]

CT scan remains the most sensitive imaging modality for appendicitis, although protocols vary among institutions to its use in children where ultrasound or magnetic resonance imaging may be the first study of choice.[6,7] Reported accuracy rates of spiral CT for diagnosis of appendicitis are as high as 98%, with a diameter >6mm being the most specific finding.[8,9] Uncommonly, PAX is used to aid in the diagnosis of appendicitis but does not remain among the recommended imaging modalities. The utility of ordering such a study is debated in the literature with different numbers supporting or negating its use.[10] PAX can frequently be misleading but may raise suspicion when an abnormality is identified. One study showed that the negative predictive value of PAX in diagnosing acute appendicitis was 32.5%, and the positive predictive value was 89%,[11] whereas another study showed abnormal finding in 51% of patients with appendicitis, 47% of those without, and normal in 50% of those with appendicitis.[12] PAX findings of appendicitis can demonstrate an appendicolith, right lower quadrant soft tissue mass or extraluminal air, psoas margin obstruction, and levoconvex lumbar spine scoliosis.[11,12]

As demonstrated in Image 2, a classic Aunt Minnie picture of pulmonary edema is seen. However, it is pulmonary lymphangitic carcinomatosis (LC), a much different pathology that looks similar radiographically. This was appreciated retrospectively when a more complete history and pathology was obtained. Pulmonary LC is a rare manifestation of metastatic cancer, and radiographic imaging can mimic other pulmonary entities.[13] Clinical awareness of this is important to help guide appropriate therapy in these patients, as it signifies very poor prognosis and advanced metastatic disease. The diffuse infiltration and obstruction of lymphatic channels by tumor causes a beaded chain appearance on chest radiograph due to uneven thickening in the interlobular septa. This reticulonodular pattern can easily be seen in Image 2 and resembles Kerley B lines, the hallmark sign for congestive

heart failure.[13-15] Manifestations of LC, such as dyspnea, the most common reported symptom, or non-productive cough, can lead to an incorrect diagnosis of pneumonia, pneumonitis, pulmonary embolism, congestive heart failure, asthma, or sarcoidosis.[13] In LC, tumor spread through the lymphatic system is hypothesized to occur in one of two ways, either through hematogenous spread to the interstitial space or in a retrograde manner from the lymph node to the periphery.[13] The incidence of LC accounts for 6-8% of all metastatic disease to the thorax, and 80% arise from adenocarcinomas. The most common are from breast, larynx, prostate, thyroid, gallbladder, stomach, and pancreas.[13-15]

In the third case, Crohn's disease versus appendicitis was read on CT scan. Based off imaging it was unclear as to which process was occurring in this patient. The admitting team diagnosed appendicitis due to the unlikelihood of a new Crohn's presentation at this age and the classic physical examination findings. Crohn's disease can occur at any age but is more prevalent among adolescents and young adults between the ages of 15 and 35. It is a transmural process that may extend to the surrounding perienteric fat and mesentery. The most specific findings on CT scan for Crohn's disease are a mean wall thickening of 11-13mm and involvement of the right colon.[8] In some patients with appendicitis a distended appendix cannot always be visualized and changes such as focal cecal apical thickening, the arrowhead sign, or a cecal bar may be present instead and are noted in up to 30% of cases.[8] These findings are suspicious for acute appendicitis but not diagnostic because other conditions such as Crohn's or cecal diverticulitis may demonstrate similar inflammatory changes.[8] One study demonstrated that the most significant predictors of acute appendicitis in patients more than 50 years old were tenderness, rigidity, pain at diagnosis, and body temperatures.[16]

In conclusion, embracing the Aunt Minnie method can occasionally lead to snap judgments and the wrong diagnosis in even the most experienced hands. Initial impressions may be incorrect; we must not always see the ordinary as such and develop a more open discussion with our radiology colleagues to improve patient care and outcomes. Recognizing our beloved Aunt Minnie and having Socrates question her may prove to be the most efficient and effective way to improve the rapidly evolving field of medicine.

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