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Vein of Labbe thrombosis, a near-miss

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Abstract:

Emergency department visits for a headache are relatively common, and in most cases, the etiologies of the headache are typically benign. We present a case of a patient who presented to the emergency room for new onset of unremitting unilateral headache. She subsequently had two hospital visits and three separate imaging modalities to identify vein of Labbe thrombosis. The vein of Labbe is a relatively smaller vein which runs superficially and laterally. In our patient, a cerebral venous thrombosis (CTV) was unable to identify vein of Labbe thrombosis, requiring eventually a magnetic resonance imaging (MRI) with and without contrast to identify the culprit etiology. CTV is frequently used in the acute setting due to its speed of acquisition and shorter wait times in the hospital. For patients that fit criteria for venous sinus thrombosis, we caution the use of CTV in identifying the causative etiology, and would consider the MRI as a better imaging modality for these patients.

Keywords:

Cerebral venous thrombosis, headache, magnetic resonance imaging, seizure, vein of labbe, venous sinus thrombosis

Introduction

Medical decision-making is a topic that many physicians and educators are invested in, with efforts to decrease uncertainty and minimize misdiagnoses or near misses. To decrease the use of heuristic shortcuts, we rely on Bayesian analysis. Bayesian analysis allows one conditional probability to be calculated from another. The theorem is used when the probability of case "A" depends conditionally on the probability of case "B".^[1] In medicine, this may be applied, as the probability of a diagnosis is dependent on the sensitivities and specificities of a test or exam finding in the proper clinical context.^[2]

Many would assert that neurology is applied neuroanatomy, but when there are no examination findings to include in our analysis neurologists have to rely on symptoms and imaging alone to make clinical judgments. We present a case of

vein of Labbe thrombosis that required two different presentations to the emergency department (ED) and two eventual imaging modalities to identify. The case presented is used as an example of the importance of understanding Bayesian statistics and remembering the pretest probability of diagnosis before ordering further tests for more accurate interpretation.

Venous sinus thrombosis (VST) is a relatively uncommon diagnosis with an annual incidence of 0.2–1.32/100,000 person-years. Incidence is significantly higher in women than men (1.86 vs. 0.75) and higher among patients aged 31–50 years. One study showed that 52% diagnosed with VST were female patients who had used oral contraceptives (OCPs), and 18% were pregnant or had recently given birth.^[3] Factors such as hypercoagulable states (acquired and inherited), trauma, surgeries, pregnancy, and OCP use are all associated with increased risk of VST.^[4] The identification of VST has always been difficult as the symptoms are nonspecific and despite understanding risk factors and the appropriate workup it may go

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unidentified. For this reason, Bayesian statistics has a particularly applicable usage when it comes to VST diagnosis, as the pretest probability should be influenced by the factors described above.

Case Report

An 18-year-old female who is currently a freshman in college presented to the ED with 9 days of unremitting left-sided headache that originated in the occiput and spread throughout the entire left side of her head. The headache was characterized as sharp, waxing and waning, and insidious in onset over the week before presentation. Her vitals were all within normal limits. The examination was intact including normal mental status, cranial nerve evaluation, motor, sensory, and coordination. She was noted to be obese with a body mass index of 37.6. Given the duration and severity of her symptoms, computed tomography of the head (CTH) was performed which did not show any acute pathology. She was presumed to have migraines despite the history that she rarely had headaches, and was treated with Toradol, Reglan, and discharged home.

Approximately 2 weeks after her initial discharge, she represented to the ED after she was noted to have a witnessed tonic-clonic seizure by her roommate. En route to the hospital, paramedics witnessed a second tonic-clonic seizure lasting <2 min. In the ED she was initially hypertensive 152/103 and tachycardic to 151. On examination, she had b/l lateral tongue lacerations, but her neurological examination was intact and did not have any discernable vision deficit, speech issues, neglect, or significant weakness. The ophthalmoscopic examination showed sharp margins around the optic disc.

On further history, the patient denied any alcohol or illicit drug use. Approximately 4 days before presentation, she had a levonorgestrel intrauterine device placed and before this, she had been on a combined estrogen-progesterone OCPs. CTH, CT arteriogram and CT venogram were ordered to rule out VSD. CTH showed no evidence of acute pathology, CT angiogram showed no significant arterial changes, and cerebral venous thrombosis (CTV) demonstrated that all sinuses and veins were patent.

Based on a review of her clinical findings with an initial unremitting headache and two seizures, the neurology team decided to admit her for further evaluation. She was loaded with vimpat in the emergency room and started on maintenance vimpat. Her EEG showed normal wake and sleep architecture. A subsequent magnetic resonance imaging (MRI) with IV contrast (Epilepsy protocol) showed thrombosis in the left vein of Labbe extending into the ipsilateral sigmoid sinus and internal jugular

vein with venous infarct involving the left angular gyrus [Figures 1-3]. The patient was immediately started on heparin drip. Once heparin drip became therapeutic,

Figure 1: Axial magnetic resonance imaging magnetization prepared-rapid gradient-echo postcontrast

Figure 2: Coronal magnetic resonance imaging magnetization prepared-rapid gradient-echo postcontrast

Figure 3: Coronal T2 flair

she had a repeat CTH without contrast, which showed a pronounced focus of hypoattenuation in the left middle temporal gyrus consistent with evolving venous infarct. She was discharged with a Lovenox bridge to warfarin with close follow-up in both stroke and epilepsy clinics.

Discussion

In summary, the patient, in this case, is a young female on OCPs who presented with new onset of unremitting headaches in her first admission, and later with seizures. Notably, her symptoms fit the characteristics of VST and meet one of the major risk factors associated with VST. Despite being the appropriate sex, having a new unexplained headache, and having a major risk factor of being on OCPs, physicians were unable to diagnose her appropriately on her first ED visit and thought that she was having migraines. During her second admission, despite a negative CTV, the neurology team requested an MRI with and without contrast to evaluate for subtle findings that could have been missed.

There have been previous case reports of isolated vein of Labbe thrombosis;^[5-7] however, we felt that case was important due to its subtle imaging findings and presentation. This report is also a significant reminder of the different presentations of VST and the importance of remembering to include predisposing factors such as family history, medication use, and clinical features into the analysis of a case. We demonstrated the nonspecific symptoms of VST and a failure of CTV.

In the past, CTV was theorized to be less sensitive to magnetic resonance venography (MRV), but given new technologies, it has been proposed that there is no difference in MRV and CTV.^[8] MRV is the gold standard, but often in an acute setting, CTV is used and when compared has been shown to have a 75%–100% sensitivity and specificity depending on the vein or sinus involved.^[9] MRV is more sensitive for deeper venous structures than CTV.^[4] Notably, CTV is frequently used in the acute setting due to its speed of acquisition and shorter wait times in the hospital. An MRI study frequently requires admission to the hospital and will likely be acquired in a span of 12–24 h, whereas CTV can be obtained in 5 min in the ED and is, therefore, sometimes the preferred option.

It is important to remember the basic principles of pretest and posttest probabilities based on sensitivities and specificities of testing modalities and clinical features of a patient. Regarding medical decision-making it is important to remember that certain risk factors increase the pretest probability of diagnosis. This should be accounted for when evaluating a patient to avoid near misses as described in this case.

The question then becomes given these numbers, what is a clinician to do with a negative result. If we were to apply Bayesian principles with a 75%–100% sensitivity and specificity of a test, our posttest probability would be low enough to warrant considering other nonreversible causes of seizures such as epilepsy. In these cases, should the gold standard always be applied? Should there be a consensus among our field that we do not order CTV if the pretest probability is high enough. We propose that this is similar to the use of D-dimer to rule out PE in patients with a low pretest probability. Should there be a consensus to utilize CTV only if our pretest probability is low to safely discharge patients from the ED? These are theoretical questions and ones that will require more studies to be conducted.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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