Enterogastric Reflux: An Uncommon Diagnosis Analyzed by Hepatobiliary Imaging

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Abstract

Enterogastric reflux (EGR) is the reflux of bile and digestive enzymes from the small bowel into the stomach. While it is a normal physiologic process in small amounts, excessive reflux and chronic EGR can cause upper GI symptoms often mimicking more common diseases such as gallbladder disease and GERD that often leads to its underdiagnosis. Identifying EGR is significant as it has been associated with the development of gastroesophageal pathology including gastritis, esophagitis, ulcers, and mucosal metaplasia. This article presents a 22-year-old male with enterogastric reflux causing upper abdominal pain and will discuss the role of hepatobiliary scintigraphy in its diagnosis.

Introduction

Enterogastric reflux (EGR) is the reflux of bile and other digestive fluids from the duodenum into the stomach. It can be a normal physiologic process in small amounts, however, excessive reflux and chronic EGR has been associated with the development of gastroesophageal pathology including gastritis, gastric ulcers and gastric or esophageal mucosal metaplasia [1]. Diagnosis of this condition has been made using endoscopy, intragastric fluid analysis obtained by intubation, and hepatobiliary scintigraphy (HIDA) [2,3]. Of these techniques, HIDA can objectively demonstrate dynamic enterogastric reflux and has been shown to be superior in detection of EGR due to its non-invasive and physiologic approach, but is not without its limitations [4]. In this case report, we will discuss a 22-year-old male with no prior surgical history who presented with symptoms that mimicked an acute cholecystitis and resulted in the radiologic and clinical diagnosis of enterogastric reflux.

Case Report

A 22-year-old male patient presented to the Emergency Department for an episode of sharp right upper quadrant pain after eating fatty foods lasting two hours. He reported symptoms of reflux for the past six months including intermittent acid regurgitation at night, a sensation of a lump in his throat and sour taste in his mouth. He described no red flag constitutional symptoms and had no prior surgical history who presented with symptoms that mimicked an acute cholecystitis and resulted in the radiologic and clinical diagnosis of enterogastric reflux.

Keywords: Enterogastric reflux; Duodenogastric reflux; Hepatobiliary scintigraphy; Nuclear medicine; Radiology

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did show evidence of reflux from the duodenum to the stomach (Figure 2).

Figure 1: Esophagogastroduodenoscopy (EGD) images were obtained at multiple levels of the upper gastrointestinal system. In image 6 and 7 you can see mild erythema of the gastric antrum and duodenal bulb mucosa, which is compatible with irritation and inflammatory change. This is the area proximal to the ampulla of Vater, where the bile and digestive enzymes are released, which can suggest retrograde flow, such as EGR.

Figure 2: Dynamic images of a hepatobiliary scan demonstrates normal hepatocyte uptake of the radiotracer. There is normal flow to the bile ducts and gallbladder, essentially excluding acute cholecystitis. Subsequent delayed images demonstrates increasing tracer within the stomach (orange arrows). On cinematic images (not provided in this figure), there was definite reflux from the duodenum to the stomach, confirming an enterogastric reflux.

Analyzed together, the HIDA scan findings and an unrevealing EGD with biopsy suggested enterogastric bile acid reflux to be the most likely etiology of the patient’s abdominal pain. After additional testing with viral, autoimmune, and metabolic serologies, the cause of his abnormal liver function studies was still unclear. However, the patient’s symptoms of GERD may have been due to bile acid reflux rather than typical gastric acid reflux. Given that the reflux symptoms were infrequent and mild, a daily PPI or a bile acid sequestrant was not felt to be necessary, and patient was given reassurance.

Discussion

Enterogastric reflux, or also known as duodenogastric reflux, is a common entity that is frequently underdiagnosed [5]. The retrograde flow of bile and digestive secretions from the duodenum to the stomach can be a normal physiologic process when in small amounts and may not result in symptoms or damaging effects. However, in excessive amounts and chronic exposure it may lead to inflammatory change of the gastric and esophageal mucosa, which may lead to gastritis, esophagitis, ulcers or mucosal metaplasia [3]. This phenomenon is atypical in healthy individuals and is more commonly seen in patients who had prior surgeries of the upper gastrointestinal tract, such as a cholecystectomy or gastric bypass surgery [6].

Based on symptoms alone, EGR would be difficult to differentiate from other gastrointestinal pathologies and may often mimic more common diseases such as gallbladder disease or gastroesophageal reflux disease [7]. Distinguishing between these conditions is critical in order to provide the appropriate management for the patients. The most conventional method of EGR diagnosis is the measurement of intragastric bile acid aspirated through an enteric tube or by endoscopy. However, in more recent years diagnosis has been made using nuclear medicine hepatobiliary scintigraphy, more commonly referred to as HIDA scans [3].

HIDA scans are typically performed to evaluate for bile duct, gallbladder, or liver pathology and is less commonly performed for EGR. Using a biliary nuclear tracer such as technetium-99m hepatic iminodiacetic acid (HIDA), dynamic images can be obtained via single-photon emission computed tomography (SPECT). The expected flow of bile goes from the liver, through the bile ducts and gallbladder, and eventually into the duodenum [8]. In most patients, no radiotracer is typically seen in the stomach, however in cases of EGR there would be increasing activity in the stomach throughout the course of the exam [9].

Several studies including one by Tolin, et al. demonstrated a quantitative method in determination of EGR by HIDA scan. By placing two region of interest circles around the stomach and liver on the imaging software, an EGR index was calculated by dividing the counts in the stomach from those in the hepatobiliary tree (Figure 3). Based on
their study, there was a statistically significant difference between the amounts of reflux in normal patients compared to EGR patients using the quantitative approach [10]. Some studies have suggested that a reflux index of greater than 20% is considered adequate to diagnose EGR in the correct clinical setting [11].

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EGRI_t = \left( \frac{S_t - S_o}{HB_o - HB_t} \right) \times 100
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**Figure 3:** Entero gastric reflux index is defined as the increase in radiotracer activity in the gastric area of interest divided by the decrease in radiotracer activity in the hepatobiliary tree. \( EGRI_t \) represents the entero gastric reflux index from time zero to time \( t \) expressed in percent. \( S_o \) represents activity in the stomach area of interest at time zero. \( S_t \) represents the radiotracer activity in the stomach area of interest at time \( t \). \( HB_o \) represents the radiotracer activity in the hepatobiliary tract area of interest at time zero. \( HB_t \) represents the radiotracer activity in the hepatobiliary area of interest at time \( t \).

In a study by Chen, et al., it was concluded that hepatobiliary imaging is superior in diagnosis of EGR compared to intragastric fluid sampling or endoscopy. It is hypothesized that the later exams may create false positives due to the altered mechanics the scopes or enteric tubes may create when placed into the gastrointestinal system. Conversely, HIDA scans are able to demonstrate true resting physiology and is a non-invasive exam, which is preferred for most patients [3]. However, the exposure to radiation and increase risk of false negatives has been argued to limit the utility of HIDA scans in evaluation of EGR [4].

In our particular case study, the initial management and endoscopy exam were unrevealing for the patient's episode of acute upper abdominal pain. It was the subsequent HIDA scan, however, that was able to simultaneously exclude gallbladder and bile duct pathology while making the diagnosis of EGR. It is a difficult diagnosis to make by clinical symptoms alone and therefore key imaging modalities, such as hepatobiliary scans, may be essential for appropriate medical care. Although some limitations may apply, it may be considered a highly sensitive exam that has qualitative and quantitative parameters for accurate diagnosis.

**Conflict of Interest Statement**

The authors involved in the creation and edit of this manuscript certify that they have no affiliations with or involvement in any organization or entity with any financial interest.

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