Japanese Journal of Gastroenterology and Hepatology

Case Report

High-Density Barium Swallow Protocol in Patients with Progressive, Solids-Only Dysphagia

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Received: 21 Apr 2020

Accepted: 02 May 2020

Published: 04 May 2020

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1. Abstract

In this essay, we describe a technical protocol specifically developed to optimize the performance of barium swallows in patients with progressive dysphagia for solids only.

We usually perform single-contrast, single-view, very high-density dynamic barium swallows in this kind of patients, in which a mechanical obstruction is highly likely

The high density of the barium, coupled with the increased viscosity due to the relatively small amount of water used, 9 ml for every 100g of barium sulphate product, dramatically maximize, in our experience, the demonstration of mucosal abnormalities, speeding the diagnostic process.

2. Introduction

Our group strongly believes in a clinically oriented, multidisciplinary approach to the patient with dysphagia, in which each diagnostic pathway should be tailored on the specific patient, following, though, pre-established general rules [1].

Even though the history taking still has and always will have a central role in formulating a differential diagnosis, allowing for the detection of the cause of the symptoms in between 60% and 80% of patients [2], it allows us to merely separate patients with dysphagia in two different categories: patients with dysphagia for solids and liquids, which are mainly neuromuscular patients and patients with dysphagia for solids only, the object of our attention in this paper, which are mainly patients with mechanical obstructions of different types (Figure 1).

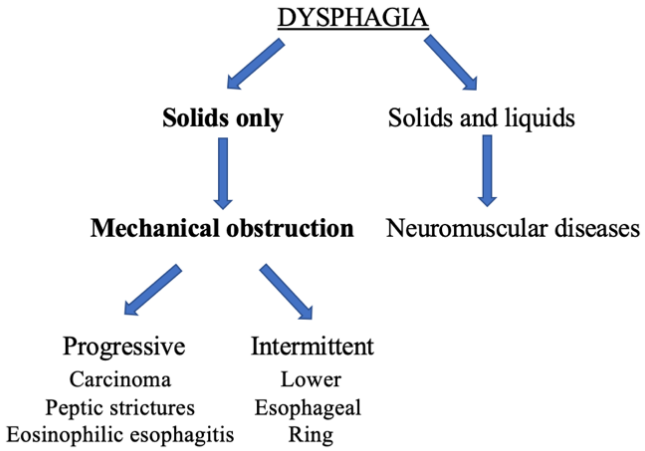

Figure 1: Clinically oriented differential diagnosis in patients with dysphagia.

Having said that, our approach to the patient with dysphagia, is identical to that of [1], believing in the importance that all dysphagic patients should start with a barium swallow, followed by endoscopy when in case of mechanical obstruction.

That is why we specifically developed a fast, efficient and highly sensible protocol for patients with suspected esophageal obstructions.

3. Discussion

The benefits of very high barium solutions in swallowing studies are well known and documented [4], especially in patients with oropharyngeal dysphagia [5], in which higher density and higher viscosity of barium solutions, lengthen transit time, exasperating and making the swallowing impairment much more evident.

We took this concept and put it at work in a slightly different type of patient, with a much lower dysphagia and mechanical obstructions problems, our idea being that slowing down the whole swallowing process, it is possible to recreate the real-life, solid-food dysphagia scenario, allowing the barium to perfectly adhere to the esophageal wall, and wall abnormalities, just like cast in a mold. Thinner barium solutions may cause the transit to be fast enough to skip lesser parietal lesions [4].

That is the rationale behind our choice of a 335% w/v barium sulphate solution, complying with the IDDSI Food Standards Type 4 (Pureed Food) and tested accordingly [5, 6]; the final result should be a very dense and homogeneous drinkable cream

While we aim to slow esophageal transit, we aim to quicken up the whole protocol as well, while reducing the patient's radiation exposure by at least two thirds, using just one view; we do prefer frontal views, but Left Anterior Oblique might be used as a substitute, according to personal preference.

The acquisition is dynamic and set at 6 frames per second. Once having excluded recent GI surgery, our advice is to start acquiring two swallows using two 5 ml boli.

A third 10 ml bolus, setting the dynamic acquisition at 3 frames per second, is optional and used in case of need.

As an example, we will use the images we acquired in a 34-year-old male with progressive distal esophageal dysphagia and suspected mechanical obstruction, which was later confirmed to have a squamous carcinoma of the distal esophagus. In figures from 2 to 4 we can see the irregular profile of the distal esophagus, gradually shaping up as the barium goes down. As the distal esophagus can be now considered an irregular, rigid mold, the thick barium delineates and permeates wall irregularities, outlining the irregular mucosal profile (Figure 2, 3) and highlighting filling defects (Figure 4). Applying a densitometric filter to the frame we see in (Figure 4), we can appreciate how the thick, dense barium slowly progressed towards the cardias, delineating the irregular distal esophagus (Figure 5).

After two 5 ml boli, the protocol was deemed completed and the patient sent to endoscopy for the diagnosis.

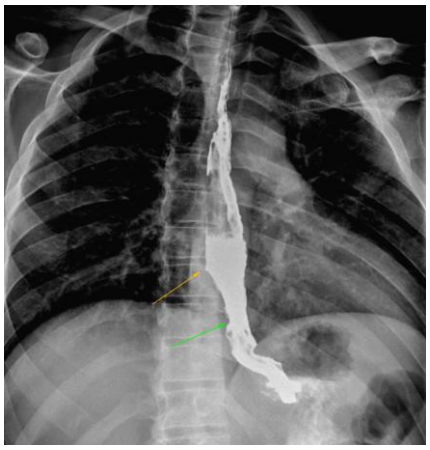

Figure 2: Frontal view. Mucosal abnormality (between the orange and green arrows) on the right margin of the distal esophagus.

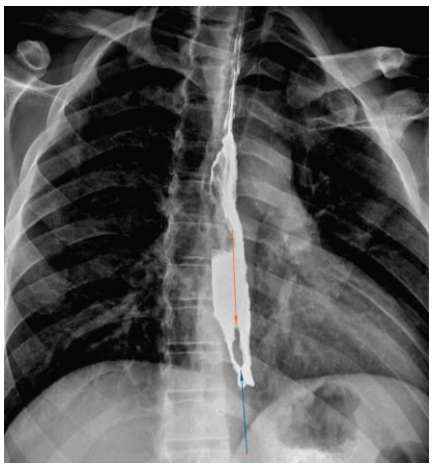

Figure 3: Frontal view. Filling defect (between the orange and blue arrows) on the posterior esophageal wall, due to an endouminal projection of the squamocellular carcinoma.

Figure 4: Frontal view. Barium slowly spilling down (yellow arrow), delineating the mucosal irregularities of the right and posterior walls of the distal esophagus.

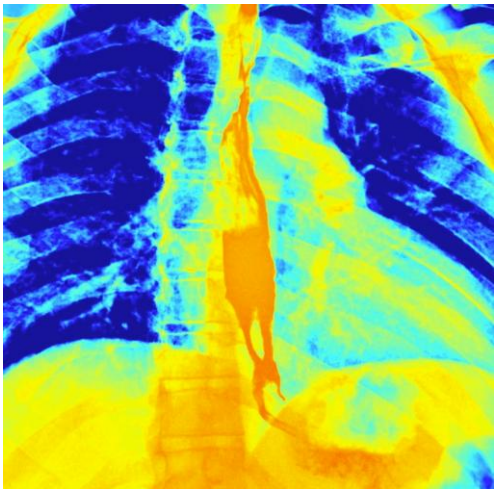

Figure 5: Frontal view, densitometric filter applied (medium-high barium density= orange; high barium density= red). Barium slowly casting through the irregular distal esophagus, the denser barium arriving first.

4. Conclusion

As clarified in this case, which typifies the kind of patient we aim this protocol to this high-density, dynamic barium swallow is intended for quick and precise diagnosis when suspecting a mechanical obstruction in a patient with progressive dysphagia. The high-density barium solution allows a more accurate perception of the mucosal profile and even precise measurements of the abnormalities (that are, however, more easily obtained in the subsequent staging CT), just by slowing down significantly the transit of the bolus. In case of mixed clinical presentation, we currently use the more complete dynamic esophagogram protocols described in these two case reports [7,8].

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