

# Anomalous course of the carotid arteries in the retrooesophageal space: An unusual cause of chest pain

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## ABSTRACT

The differential diagnosis of chest pain, one of the most frequent symptoms referred in the emergency department, includes cardiac and noncardiac causes and represents a difficult challenge for clinicians. Noncardiac chest pain can be defined as the recurrence of chest pain episodes indistinguishable from coronary events after the exclusion of a cardiac cause. It may be of musculoskeletal, pulmonary, gastroenterological, psychosomatic or neurological aetiology, oesophageal disorders representing the most common detectable cause. In this report we describe a rare case of chest pain which appeared after dinner, due to an oesophageal spasm caused by the anomalous course of the carotid arteries. The case is relevant because it describes a very uncommon variant of the physiological course of the carotid arteries, and because it is unusual that a retro thoracic vascular abnormality can be related to the appearance of chest pain without dysphagia. Chest pain which appears after dinner in our case is probably due to the unusual anatomic connection between oesophagus and carotid arteries that probably begins to make stronger when the patient undertakes the supine position: for that reason nocturnal chest pain promptly relieves after the assumption of orthostatic or semi orthostatic decubitus. In conclusion, in a patient who refers the sudden appearance of nocturnal chest pain certainly unrelated to coronary artery disease, the physicians should consider the involvement of oesophageal system, maybe determined by vascular course abnormalities.

**Keywords:** Chest Pain; Carotid Arteries; Oesophageal Spasm

## 1. INTRODUCTION

Chest pain is one of the most frequent clinical symptoms

of the patients referring to the emergency department [1]. It is a frequent manifestation in both cardiac and noncardiac diseases, and the differential diagnosis represents one of the most difficult challenges for clinicians, including many conditions affecting thoracic and abdominal organs [2]. Failure to recognize potentially serious conditions such as acute coronary syndrome, aortic dissection, pneumothorax, or pulmonary embolism can rise to severe complications [3], otherwise, the inappropriate research of noncardiac causes of chest pain can determine needless hospital admissions, expansive tests, painful procedures, and anxiety [4]. The diagnosis of noncardiac chest pain is provided by the recurrence of chest pain episodes indistinguishable from coronary events after that a reasonable flow-chart allows to exclude a cardiac cause [5], until to the performance of coronary angiography, which shows a normal or an insignificant degree of obstruction in up to 30% of the cases [6]. Noncardiac chest pain may be of musculoskeletal, pulmonary, gastroenterological, psychosomatic or neurological aetiology. Oesophageal disorders are the most common cause of atypical chest pain [7]; the main underlying mechanisms include gastroesophageal reflux [8], oesophageal dysmotility [9] and oesophageal hypersensitivity [10].

In this report we describe a uncommon case of nocturnal chest pain which appeared after dinner, without any involvement of coronary arteries, and was relieved by the changes of decubitus.

## 2. CASE HISTORY

P.A., a 75 years old woman, referred to our Department of Internal Medicine and Cardiovascular Sciences in November 2008 for the appearance of repeated episodes of oppressive chest pain, each one about 20 minutes long, mainly during the night. For this reason, during the last months, the patient referred two times to the Emergency Department of the nearest Public Hospital and performed ECG and cardiac isoenzymes, resulted in normal range.

She was affected with permanent atrial fibrillation

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starting about seven years before and reported a 15-years history of essential hypertension with retinopathy and left ventricular hypertrophy.

Moreover, three years ago she was thyroidectomised for the appearance of a benign strum with retrosternal expansion and tracheal deviation.

At the admission, the objective examination, ECG, cardiac isoenzymes and routine laboratory analysis resulted in normal range.

Chest X-ray revealed enlargement of cardiac silhouette, echocardiography showed left ventricular hypertrophy and biatrial dilatation with normal systolic function. Carotid ultrasound examination showed mild atherosclerosis in both carotid axis.

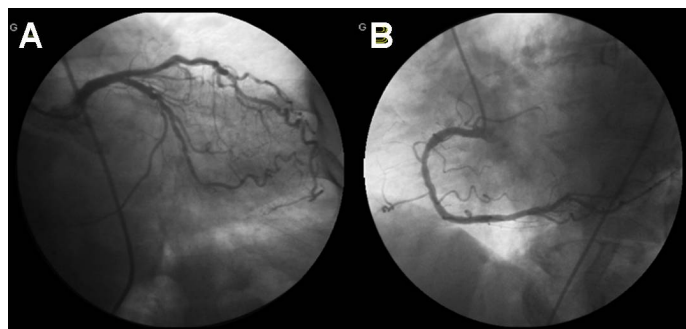
The patient performed a coronary angiogram which revealed multivessel atherosclerosis without significant stenosis (**Figure 1**), so she was treated with nitroglycerin and amlodipin, with a reduction of the number and the intensity of nocturnal chest pain episodes.

Six months later she returned to our Department com-

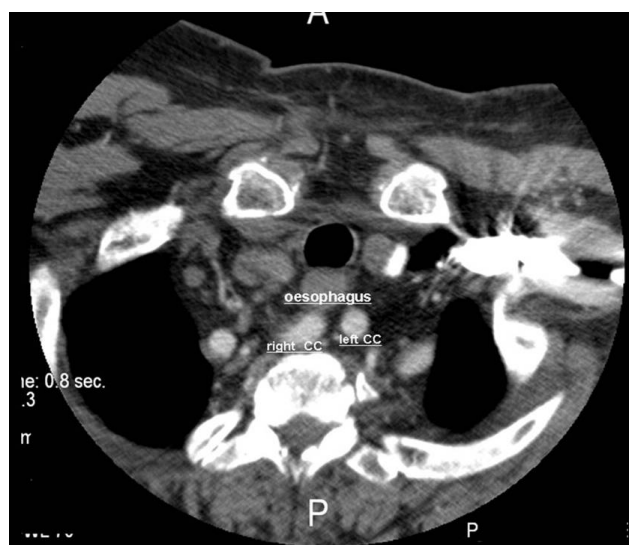
plaining the reappearance of the nocturnal chest pain, mainly after eating, related both to the entity and the duration of the dinner. For the persistence of these symptoms she performed an oesophagus-gastric endoscopy, which displayed mild oesophagitis and gastritis *Helicobacter Pylori* (HP) positive. However, medical treatment of gastroesophagitis and eradication of HP infection did not result in the recovery from the symptoms.

For this reason, two weeks later, the patient performed a total body CT scan which revealed the presence of mild dilatation and precocious division of the anony artery, with anomalous retrooesophageal course of both the common carotid arteries and drop of their bifurcation above the thyroid cartilage (**Figure 2**).

The unusual course of the common carotid arteries, near the pharyngeal and the proximal oesophageal walls, compressed the oesophagus, causing retrosternal chest pain which, about six months after the beginning of the symptoms, resulted mainly correlated to the dinner and the supine decubitus.



**Figure 1.** Coronary angiography: Mild atherosclerosis in both left (A) and right (B) coronary arteries.



**Figure 2.** Thoracic CT scan: Anomalous course of the common carotid arteries in the retrooesophageal space (CC: Common carotid artery).

### 3. DISCUSSION

Many oesophageal abnormalities, *i.e.* acid reflux from the stomach, spasm, obstruction or injury can determine thoracic pain [11], which is often indistinguishable from coronary chest pain.

In particular oesophageal spasm [12], which occurs in the presence or absence of acid reflux, may determine a squeezing pain very similar to the angina. Sublingual nitroglycerine often causes the prompt relief of oesophageal spasm, producing further mismatch between these syndromes.

In these cases the chest pain is not due to the oesophageal spasm, spontaneous or meal-related, because spasm and chest pain are not coincident. Probably oesophageal ischemia represents the cause of the chest pain [13].

Otherwise, the heart and the oesophageal system show a tight relationship [14], as demonstrated by the detection of main neural reflex arcs stretched from the oesophagus to the heart in both animals and humans.

Therefore, oesophageal stimulus with ice water, hydrochloric acid, and balloon inflation may influence coronary blood flow in humans, and oesophageal spasm often appears during a variety of cardiac procedures in patients with chest pain and normal coronary arteries [15].

At our knowledge, this is the first report in which chest pain represents the only symptom of oesophagus' vascular compression. In fact, in similar cases the majority of patients is asymptomatic or, more frequently, presents dysphagia lusoria [16]. However we report a case in which the first appearance of the disease is represented by episodes of chest pain relieved by the nitroglycerine administration. Only six months later the first occurrence, the chest pain showed a constant association with the meal and the subsequent assumption of the supine position after the dinner.

The anatomic characteristics of the supraortic system, with precocious division of the anonym artery and anomalous retrooesophageal course of both the common carotid arteries, are almost certainly the cause of the nocturnal chest pain. As proved, the assumption of a semiorthostatic decubitus determined a complete relief from the symptoms.

### 4. CONCLUSIONS

The common carotid arteries may bifurcate higher or lower than the usual levels; a high bifurcation being the most common [17]: In the case reported we found not only a lower bifurcation but also an anomalous retrooesophageal course of both carotid arteries. This very rare abnormality of the carotid course probably represents the cause of episodes of nocturnal chest pain which appear after the dinner and the assumption of the supine position

and can be relieved with the orthostatic decubitus.

In conclusion, in a patient who refers the sudden appearance of nocturnal chest pain certainly unrelated to coronary artery disease, the physicians should consider the involvement of oesophageal system, maybe determined by vascular course abnormalities.

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