

## Unusual Anatomical Variation of Celiac Trunk and Hepatic Artery: A Case Report

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### Abstract

Celiac trunk variation and hepatic artery variation are often challenging for gastrointestinal and hepatobiliary surgeons to treat. The normal anatomy of the celiac trunk consists of the common hepatic, splenic, and left gastric arteries. Here, we report an unusual anatomical variation of the celiac trunk and left hepatic artery in a patient with gastric cancer. A 69-year-old man with gastric cancer visited our hospital for surgical treatment. An abdominal computed tomography scan of the patient showed that the gastroduodenal artery originated directly from the celiac trunk. During laparoscopic gastrectomy, the right gastric artery originating from the gastroduodenal artery was observed. The patient's celiac trunk comprised the right hepatic, gastroduodenal, splenic, and left gastric arteries with an aberrant left hepatic artery. The aberrant left hepatic artery was well preserved, and no postoperative complications were observed.

**Keywords:** *Celiac Trunk; Gastroduodenal Artery; Aberrant Left Hepatic Artery; Anatomical Variation*

### Abbreviations

EGD: Esophagogastroduodenoscopy; CT: Computed Tomography

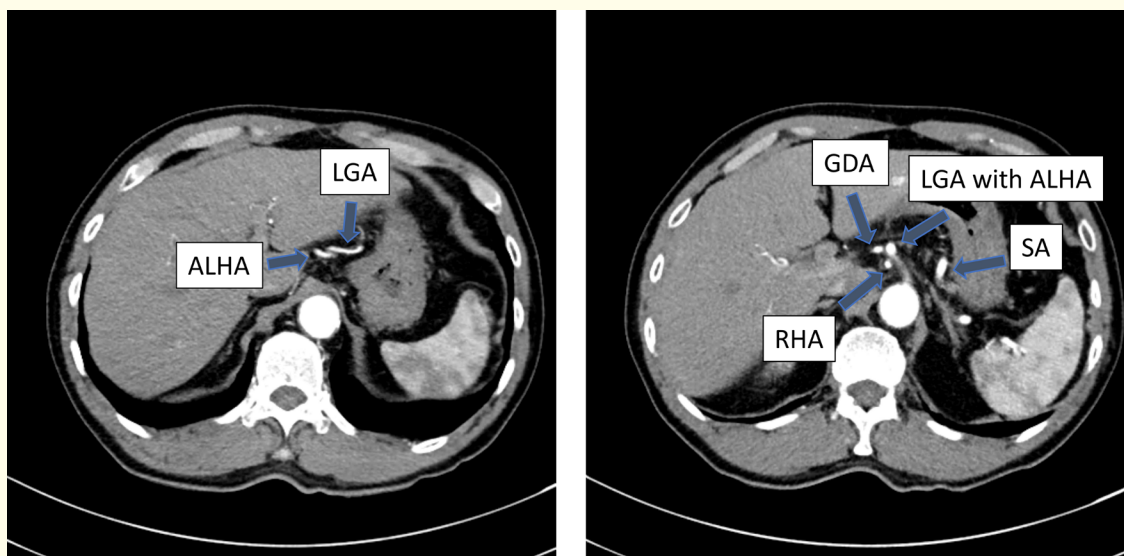
### Introduction

Celiac trunk and hepatic artery variations are often challenging for gastrointestinal and hepatobiliary surgeons to treat. In normal anatomy, the celiac trunk is the first branch of the abdominal aorta where it supplies blood to the abdomen. It is usually divided into the splenic, common hepatic, and left gastric arteries. The common hepatic artery is subdivided into the gastroduodenal, right gastric, and proper hepatic arteries, and it branches to the left and right hepatic arteries. This anatomical pattern of the celiac trunk has been reported in 89% of cases in several studies [1] and was first described by Haller in 1756 [2]. Here, we report an unusual anatomical variation of the celiac trunk and left hepatic artery in a patient with gastric cancer.

### Case Report

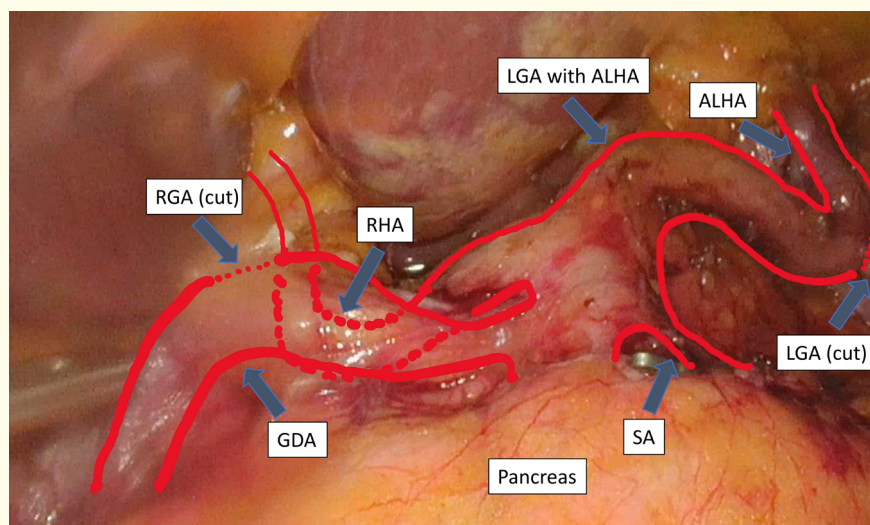
A 69-year-old man diagnosed with gastric cancer following an esophagogastroduodenoscopy (EGD) visited our hospital for surgical treatment. One of the patient's parents died from gastric cancer, and there was no history of medical abnormalities other than mild hyperlipidemia. On EGD, a 1.5 × 1.5 cm Borrmann type IIc + IIa gastric cancer was observed at the great curvature, anterior wall, and proximal antrum of the stomach. Histologic examination of the biopsy confirmed a moderately differentiated adenocarcinoma. A total laparoscopic

distal gastrectomy was scheduled by the Division of Upper Gastrointestinal Surgery, and preoperative workup was initiated, including a computed tomography (CT) scan of the chest and abdomen. The CT scan showed no regional or distant metastasis; however, vascular variation of the celiac trunk was observed. The left hepatic artery originated from the left gastric artery, instead of the common hepatic artery, and the gastroduodenal artery was divided directly from the celiac trunk (Figure 1). A laparoscopic distal gastrectomy with regional lymph node dissection was performed with careful preservation of the aberrant left hepatic artery. During laparoscopic surgery, the right gastric artery was found to originate from the gastroduodenal artery, instead of the common hepatic artery (Figure 2). Common hepatic artery defined by Song, *et al.* should contain at least one segmental hepatic artery and the gastroduodenal artery [3]. As a result, the celiac trunk of the patient consisted of the right hepatic artery, gastroduodenal artery, splenic artery, and left gastric artery with an aberrant left hepatic artery. No abnormal laboratory findings of increased AST, ALT, or bilirubin levels was seen postoperatively. The patient fully recovered after surgery and was discharged without any complications.



**Figure 1:** Abdominal CT scan of the patient.

Abbreviations: GDA: Gastroduodenal Artery; LGA: Left Gastric Artery; ALHA: Aberrant Left Hepatic Artery; RHA: Right Hepatic Artery; SA: Splenic Artery.



**Figure 2:** Variation of arteries in laparoscopic gastrectomy.

Abbreviations: GDA: Gastroduodenal Artery; LGA: Left Gastric Artery; RGA: Right Gastric Artery; ALHA: Aberrant Left Hepatic Artery; RHA: Right Hepatic Artery; SA: Splenic Artery.

### Discussion

Identifying the course and origin of hepatic arteries is very important before gastric and hepatobiliary surgeries to ensure the safety of surgery and oncological resection. Recent advancements in CT protocols and reconstruction methods make preoperative detection of arterial variations possible during operation scheduling [4].

A left hepatic artery originating from the left gastric artery is a relatively common variation usually found during upper abdominal surgery. However, there are many debates about the safety and efficacy of ligating the aberrant left hepatic artery during abdominal surgery, especially during a gastrectomy. In some reports, only transient liver dysfunction was reported [5]. However, other studies have reported severe complications, including abscess, cholangitis, liver necrosis, liver failure, and mortality [6,7]. In advanced gastric cancer cases, the left aberrant hepatic artery is usually ligated during the gastrectomy and a lymph node dissection is performed to achieve favourable oncologic outcomes. In early gastric cancer patients, we usually try to preserve the aberrant left hepatic artery to ensure safety during the procedure. In a study by Ang RRG, *et al.* preserving the aberrant left hepatic artery during a laparoscopic gastrectomy showed no statistically significant difference in surgical outcomes, including operation time, blood loss, postoperative stay, and complication rate [8].

The gastroduodenal artery originating directly from the celiac trunk was reported by Sureka, *et al.* in 2013 (0.33% of cases [2/600]) [9]. This vascular variation might be of concern to the surgeon planning to perform an operation involving a gastroduodenal artery ligation. For example, a pylorus-preserving pancreaticoduodenectomy can lead to partial stomach ischaemia caused by discontinued arterial flow from the right gastric artery.

### Conclusion

Numerous studies have reported anatomical variations in the celiac trunk and hepatic arteries. However, unclassified variations in the celiac trunk still exist [10]. Surgeons who are planning to treat areas involving the celiac trunk and hepatic arteries should be cautious of variations in vascular anatomy.

### Acknowledgements

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### Conflict of Interest

The author has no conflict of interest.

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