

# The middle colic artery originating from the coeliac trunk

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*A case is reported of an anomalous origin of the middle colic artery. The middle colic artery originated from the coeliac trunk (CT) instead of the superior mesenteric artery, the normal place of origin. The colon receives its blood supply from the superior and inferior mesenteric arteries. Since modern colon surgery requires a more detailed anatomy of blood supply, many articles have been published on the anatomy and variations of the arteries of the colon. However, the incidence of such an anomaly is low and there have been few previous reports. These arterial variations underscore the importance of performing vascular studies prior to major abdominal surgery.*

**Key words:** superior mesenteric artery, blood supply for modern colon surgery

## INTRODUCTION

The middle colic artery has been noted as a variable artery [1, 10], although it usually emerges from a superior mesenteric artery or its major branches [6]. It may be absent in between 3% and 5% of cases [9, 10, 14, 15] and in very rare instances, at a rate of 0.5 to 1%, it may arise from the coeliac trunk or one of its branches. A middle colic artery originating from a coeliac trunk was considered as evidence for the ventral longitudinal anastomosis of the primitive vitelline arteries in the embryo [16].

The absence of studies in radiological anatomy made this contribution very important for knowledge of arterial disposition in modern diagnostic procedures for this region [17].

## CASE REPORT

During the dissection of a 59-year old cadaver, it was detected that the middle colic artery originated in the coeliac trunk. In addition to its normal branches, the coeliac trunk had a middle colic artery which had a diameter of 0.6 cm and stretched towards the transverse colon.

The anomalous middle colic artery ran directly downward from its origin and passed in front of the aorta before splitting into two branches. The two branches supplied the transverse colon, splenic flexure and the proximal descending colon. The middle colic branch of the superior mesenteric artery was absent. The right colic artery arose from the ileocolic branch of the superior mesenteric artery causing anastomosis with the anomalous artery.

In the present case, the artery supplying the entire transverse colon and proximal descending colon originated from the coeliac trunk, apparently replacing the middle colic branch of the superior mesenteric artery.

## DISCUSSION

A survey of the literature shows that in one case the middle colic artery was found to originate from the proximal segment of the splenic artery [2] and in another from the splenic artery [11] and the inferior mesenteric artery [3].

Middle colic arteries originating from the coeliac trunk occur at a rate of 0.5% to 1%, [1]. The middle

colic artery originating atypically from the bed of CT is reported only in a single case [8].

In a series of 100 cases, where the goal was to identify the regions supplied by the middle colic artery, 4 types of arterial origin were found [4].

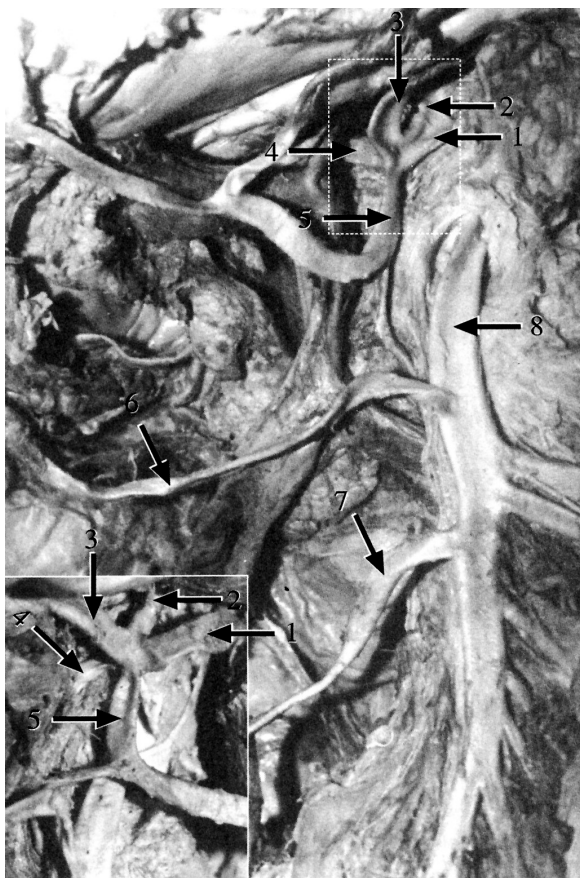
In one of these cases the middle colic artery was observed as a middle mesenteric artery between the superior and inferior mesenteric arteries [18], while in another case an angiogram demonstrated a third mesenteric artery arising from the aorta between the superior and inferior mesenteric arteries and supplying the splenic flexure [5].

In a further study in which the findings are compared with Adachi's classification, two cases were found which did not belong to any classification of Adachi's. One of these had anastomosis between the hepatic artery and the superior mesenteric artery and the other the middle colic artery arising from the hepatic artery [13].

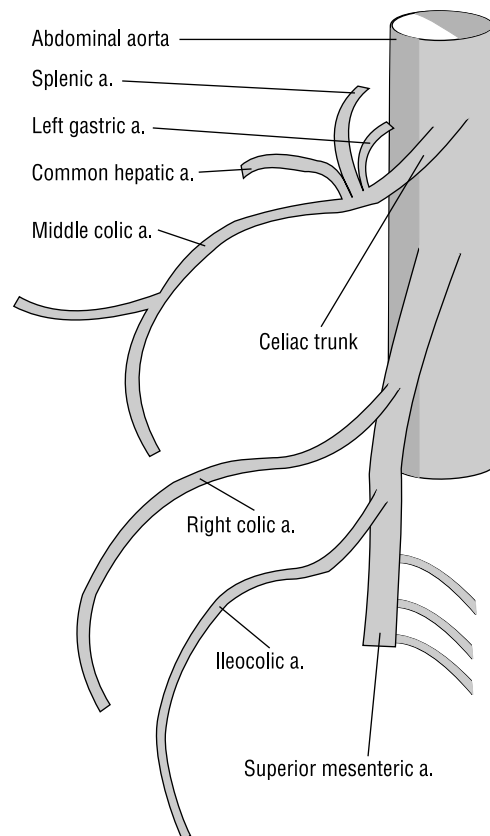
In another study aimed at radio-anatomical detection of the middle colic artery in infants of between 0 and 1 year of age the authors tried to establish the most frequent origin and distribution patterns of the middle colic artery. The search consisted of 50 cases and it was possible to distinguish 5 fundamental types of vascular origin and two basic types of distribution [12].

Moreover, in another case, anastomosis was observed between the middle colic artery and the dorsal pancreatic artery [7]. Although the incidence of such an anomalous artery is extremely rare, such a possibility should always be taken into consideration in the absence of the middle colic branch of the superior mesenteric artery.

In general, it is acknowledged that abdominal angina occurs only when there is a serious obstruction in at least 2 of the 3 splanchnic vessels, mesenteric arteries and the coeliac trunk. However this common view does not take into account the anatomical variation of the arteries that supply blood to the intestine.



**Figure 1.** Photograph of a variation in the anatomical origin of the middle colic artery. 1 — coeliac trunk, 2 — left gastric artery, 3 — splenic artery, 4 — common hepatic artery, 5 — middle colic artery, 6 — right colic artery, 7 — ileocolic artery, 8 — superior mesenteric artery.



**Figure 2.** Illustration of a variation in the anatomical origin of the middle colic artery.

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## REFERENCES

1. Adachi B (1928) *Das Arteriensystem des Japaner*. Bd 2. Maruzen. Kyoto.
2. Amonoo-Kuofi HS, el-Badawi MG, el-Naggar ME (1995) Anomalous origins of colic arteries. *Clin Anat*, 8: 288–293.
3. Benton RS, Cotter WB (1963) A hitherto undocumented variation of the inferior mesenteric artery in man. *Anat Rec*, 145: 171–173.
4. Koizumi M, Horiguchi M (1990) Accessory arteries supplying the human transverse colon. *Acta Anat (Basel)*, 137: 246–251.
5. Lawdahl RB, Keller FS (1987) The middle colic artery. *Radiology*, 165: 371–372.
6. Lorenzini L, Bertelli L, Lorenzi M (1999) Arterial supply in the left colonic flexure. *Ann Ital Chir*, 70: 691–698.
7. Makomaska-Szaroszyk E, Fiedor P (1989) A case of anastomosis between the dorsal pancreatic artery and the middle colic artery. *Folia Morphol (Warsz)*, 48: 147–149.
8. Makowski M, Bartlewicz J, Krzanowski M, Nizankowski R, Szczeklik A (2000) Atypical origin of the middle colic artery originating from the bed of CT. *Pol Arch Med Wewn*, 104: 859–862.
9. Mayo CW (1955) Blood supply of the colon; surgical considerations. *Surg Clin North Am*, 35: 1117–1121.
10. Michels NA, Siddharth P, Kornblith PL, Parke WW (1962) The variant blood supply to the small and large intestines; its importance in regional resections. *J Int Cell Surg*, 39: 127–170.
11. Murokami T, Mabuchi M, Giuvarasteanu I, Kikuta A, Ohtsuka A (1998) Coexistence of rare arteries in the human celiaco-mesenteric system. *Acta Med Okayama*, 52: 239–244.
12. Pereira WF, Ures S, Prates JC (1984) Anatomico-radiological study of the middle colic artery in children from 0 to 1 year. *Arq Gastroenterol*, 21: 187–195.
13. Shoumura S, Emura S, Utsumi M, Chen H, Hayakawa O, Yamahira T, Isono H (1991) Anatomical study on the branches of the celiac trunk (IV). Comparison of the findings with Adachi's classification. *Kaibogaku Zasshi*, 66: 452–461.
14. Steward JA, Rankin FW (1933) Blood supply of the colon; surgical consideration. *Arch Surg*, 26: 843–891.
15. Sonneland J, Anson BJ, Beaton LE (1958) Surgical anatomy of the arterial supply to the colon from the superior mesenteric artery based upon a study of 600 specimens. *Surg Gynecol Obstet*, 106: 385–398.
16. Tandler J (1904) Zur Entwicklungsgeschichte der menschlichen Darmarterien. *Anat Heft*, 23: 188–209
17. Ures S, Prates JC, Ures J (1981) Anatomy-radiological study of the origin of the arteria ascendens, a colic branch of the ileocolic artery. *Arq Gastroenterol*, 18: 60–66.
18. Yoshida T, Suzuhi S, Sato T (1993) Middle mesenteric artery; an anomalous origin of a middle colic artery. *Surg Radiol Anat*, 15: 361–363.