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Case Report

A rare case report of origin of common colic trunk and Right gastro epiploic artery from superior mesenteric artery

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Abstract: The branches of Superior mesenteric artery (SMA) ileocecal, right colic and middle colic arteries and those from Inferior mesenteric artery (IMA) are the left colic, sigmoid arteries, supply large intestine from cecum to the sigmoid colon. These arteries form a continuous anastomotic arterial arcade by dividing into 2 branches in opposite directions parallel to the large intestine called marginal artery**.** In routine dissection of abdominal region for undergraduate students (2015-2016 batches) an unusual arterial variation was observed. During the dissection of mesentery and mesenteric vessels, branches of superior mesenteric artery were carefully dissected and two rare branches were found to take origin from it. They are right gastro epiploic artery and the common arterial trunk for right, middle, left colic arteries from superior mesenteric artery. Anatomical variations of splanchnic arteries can be explained on embryological basis. Colon is ideal for salvage procedures like oesophageal reconstruction owing to its length, mucosal acid resistance and its rich blood supply. Perfusion to the colon can be compromised by changes in the systemic circulation or by anatomic or functional changes in the local mesenteric vasculature. The knowledge is essential in colonic surgeries performed in various indications and reinforces the importance of pre operative angiography to avoid post operative complications.
Keywords: Colon, marginal artery, angiography

INTRODUCTION

The circulation to the large intestine and rectum is derived from the superior mesenteric artery (SMA), inferior mesenteric artery (IMA), and internal iliac arteries. The colorectal circulation is relatively constant except for rare individual anatomic variations [1].

The branches of SMA participating in blood supply of cecum, ascending colon and transverse colon are ileocecal, right colic and middle colic arteries and those from IMA are the left colic to the descending colon along with left portion of transverse colon, sigmoid arteries to the sigmoid colon. These arteries form a continuous anastomotic arterial arcade by dividing into 2 branches in opposite directions parallel to the large intestine called marginal artery [2].

OBSERVATION/CASE REPORT

In routine dissection of abdominal region for undergraduate students (2015-2016, batch) an unusual arterial variation was observed in a male cadaver. During the dissection of mesentery and mesenteric vessels, branches of superior mesenteric artery were carefully dissected and two rare branches were found to originate from it. They are right gastro epiploic artery and the common arterial trunk for right, middle and left colic arteries from superior mesenteric artery.

Right gastro epiploic artery considerably larger in its calibre, took origin from right postero medial aspect of trunk of SMA, passed deep to superior mesenteric vein on its right side, gave inferior pancreatico duodenal branches, turned towards left side along greater curvature of stomach and supplied major part of it and ended by anastomosing with small left gastro epiploic artery.

Middle colic artery the anterior branch of SMA was found to be replaced by an arterial trunk which had 3 branches that run in 3 directions. The branch to the right side supplied major part of ascending colon by dividing into ascending and descending branches, branch in the middle supplied the

transverse colon by dividing into right and left branches and the left branch supplied descending colon by dividing into ascending and descending branches. The right branch anastomosed with branch of ileocolic artery and the left branch anastomosed with ascending branch of sigmoidal branch of inferior mesenteric artery. It was found that right colic artery was absent and ileocolic artery was the only branch from the right side of SMA. There was no left colic artery and only common sigmoidal trunk took origin from the left side of inferior mesenteric artery. It was inferred from the above observation that it was a common colic trunk with right colic, middle colic and left colic branches taking origin from SMA and it is rarest in occurrence not mentioned so far in the literature (fig 1 and fig 2).

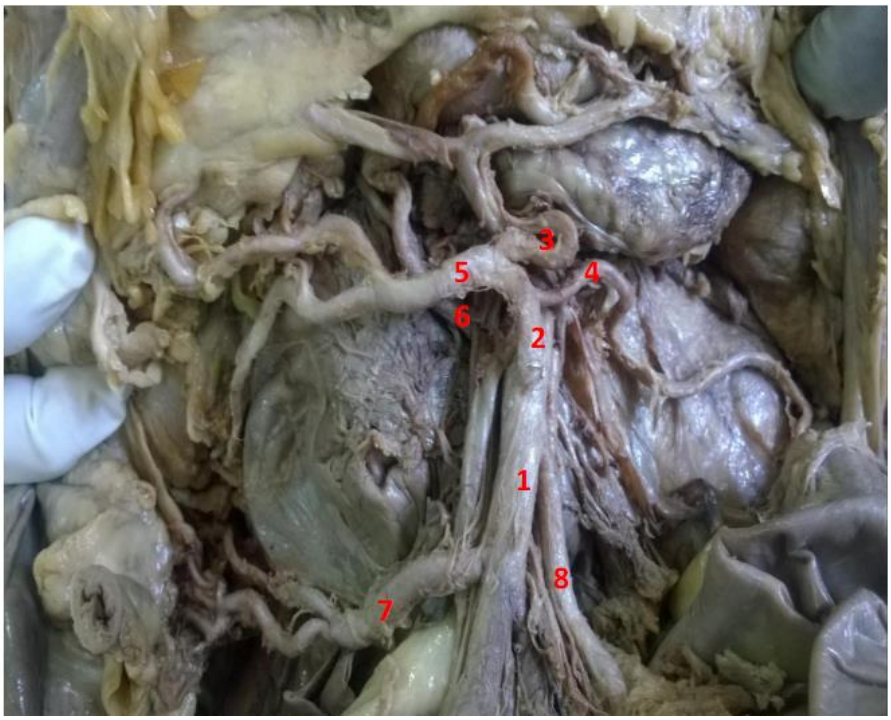

Fig: 1 –Showing origin of common colic trunk and right gastro epiploic artery from superior mesenteric artery.
1-Superior mesenteric artery(SMA), 2-common trunk for left , right and middle colic arteries, 3-middle colic branch, 4-left colic branch, 5-right colic branch, 6-right gastro epiploic artery from SMA, 7-ileo colic artery, 8-jejunal & ileal branches.

Fig 2: Common colic trunk and its distribution to colon
1-common colic trunk for left, right and middle colic arteries, 2-middle colic branch, 3-left colic branch, 4-right colic branch

DISCUSSION:

The right colic artery, to the ascending colon, is the most variable of the colic arteries. Most commonly right colic arises from the right side of superior mesenteric artery but it may originate instead from middle colic or the ileocolic arteries. [2].

Steward and Rankin [3] in their study found this origin from superior mesenteric artery to be 40%, middle colic 30% ,ileocolic to be 12% and its abscence in 18%.In general right colic artery supplies upper 2/3 of ascending colon and a small right sided part of transverse colon by its ascending and descending branches.

Siddarth and Ravo [4] described the varied blood supply of colon. In their study Right colic artery single trunk was seen in 38% cases, with MCA 52% in type A2 and rarely with ICA in 8% cases. Peters *et al.;* [5] described 5 types of pattern of SMA in 25 cases but variation of this type was not mentioned.

A study on Right colic artery in thirty adult human cadavers by Arvinder Pal *et al.;* [6] found right colic arising as a common trunk with middle colic in 30% of cases.

Michels *et al.;* [7] found Right colic arterial origin from the superior mesenteric in 38%, an origin with middle colic in 52% and one with ileocolic in 8%; Basmaijian [8] and Sonneland *et al.;* [9] agreed that it arises more commonly with either middle colic or the ileocolic.

The middle colic artery normally arises from the superior mesenteric, either while this vessel lies behind the pancreas or as its lower border. It may arise in common with inferior pancreatico duodenal arteries. The vessel usually passes into mesocolon at the lower border of the neck of the pancreas but at some times passes through the pancreas to reach the mesocolon; in either case, of course, it is subject to possible damage during operations upon pancreas. In the mesocolon the main stem of the artery lies as a rule somewhat to the right of midline .A variable distance from the wall of the colon the artery divides into right and left branches, or sometimes into 3 branches [2]. In the present case the division of middle colic artery was into 3 extensive branches that replaced the main right and left colic arteries.

The transverse colon has usually been regarded as the most vulnerable to gangrene following occlusion of the middle colic artery, because of the variability of the blood supply to the marginal artery of this portion of the bowel: The right colic artery may be absent or may arise from middle colic artery; the left colic artery also varies in its size but its absence is very rare Greenberg [10] found once in 74 cases.

The Knowledge of such variation is essential while performing hemi colectomy as commonly done for carcinoma of colon where the only usual resection includes not only the affected part of colon, its lymphatic drainage area but also the adjacent bowel supplied primarily by the vessels removed.

The first major branch of inferior mesenteric artery is the left colic artery. Pooja *et al.;* [11] reported a rare variation (1/20 cases) in the branching pattern of SMA common trunk of Left colic artery (LCA1) and Accessory splenic artery (ASA) took origin from anterior aspect of SMA.A small accessory left colic artery (LCA2) also was found from inferior mesenteric artery.

The variations in origin of right gastroepiploic artery were rarely mentioned. Its origin from the SMA was reported by Sakamoto [12]. Since this artery has been used along with internal mammary artery in cases of triple vessel disease for coronary arterial bypass grafting such variations should be borne in mind [13, 14].

Anatomical variations of splanchnic arteries can be explained on embryological basis. . The ventral splanchnic branches develop initially as paired vessels, which then coalesce in the median line to form the four roots for the gut, the four roots being connected by the ventral longitudinal anastomoses. First three roots coalesce to form the celiac trunk and the fourth root develops into superior mesenteric artery which migrates caudally with the ventral migration of the gut. If the separation takes at higher level, one of the celiac branches arises from the superior mesenteric artery and thus responsible for these variations [15].

Colon is an ideal for salvage procedures like oesophageal reconstruction owing to its length, mucosal acid resistance and its rich blood supply [16].

Earlier, the standard procedure that was carried out for left colonic interposition graft required the mobilization of splenic and hepatic flexures of colon. This was done after the ligation of middle colic artery in which case left colic artery served as the only source of blood supply. Performing such interposition carried a major risk of damaging the arterial or venous collaterals which otherwise would serve as major source for graft perfusion [17].

An extensive collateral circulation protects the intestines from transient periods of inadequate perfusion. Colonic ischemia is usually the result of a sudden, but usually transient, reduction in blood flow, the effects of which are particularly prominent at the "watershed" regions of the colon. Perfusion to the colon can be compromised by changes in the systemic

circulation or by anatomic or functional changes in the local mesenteric vasculature [18-20].

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