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Research Article

VARIATIONS IN ORIGIN OF RIGHT COLIC ARTERY SUPPLYING COLON

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ABSTRACT
Right colic artery depicts so many variations that it becomes difficult to assign the commonest pattern. Students of anatomy get confused so often when they find a pattern different from the one described in standard textbooks. The present study has been done on 30 cadavers to establish the branching pattern of right colic artery, prevalence of deviations from the usual description & to analyze the data in the light of accessible data.

Key Words: *Right Colic Artery, Variations, Colon*

INTRODUCTION
Right colic artery (RCA) originates near the middle of the superior mesenteric artery (SMA), or in common with the ileocolic artery (ICA). The artery runs transversely behind the parietal peritoneum to medial margin of the ascending colon, where it divides into ascending and descending branches. The descending branch anastomosing typically, but variably with the colic branch of the ileocolic and the ascending branch anastomosing with the right branch of the middle colic artery (MCA). The artery supplies the upper two third of the ascending colon and the right colic flexure (William *et al.,* 2000; Hollinshead, 1971 and Last, 1988).
Siddarth and Ravo (1988) described the varied blood supply of colon. It may be stated that the efficiency of a surgeon's hand is primarily dependent on the knowledge that guide it. In type A the right colic artery was absent in 2%. In type A1 It can arise as a single trunk in 38% cases and with MCA 52% in type A2 and rarely with ICA in 8% cases in type A3. An accessory RCA was present in 8% cases.
Kaufmann (1989) described the arterial blood supply of the ascending colon. It was supplied by ICA in the region of the caecum and by RCA near the right colic flexure and also stated that in 9 of the 10 cases a complete marginal artery was found.
Peters et al., (1995) described the replacement of the esophagus with colon can be successful in over 80% of patients screened by angiographic criteria. He described 5 types of pattern of SMA in 25 cases. In type 1) consisting of branches of SMA namely ileocolic artery, RCA and middle colic artery were arising independently from SMA in 17 cases (68%). In type 2) patient with an absent right colic artery were grouped but ICA and MCA were arising independently from superior mesenteric artery in 1 case (4%). In type 3) Patients with absence of MCA were grouped but RCA and MCA were arising independently from SMA in 2 cases (8%). In type 4) Patients with multiple right colic arteries were grouped in 1 case (4%). In type 5) Patients with multiple MCA were grouped 3cases (12%).

MATERIALS AND METHODS

Right colic artery belonging to thirty adult human cadavers {21 Male & 9 Female} from the department of Anatomy, Government Medical College, Patiala constituted the material for this study.

The abdominal cavity was opened by a cruciform incision passing through the whole thickness of anterior abdominal wall. After reflection of the flaps, the transverse colon along with its mesentery was lifted. The small intestine with its mesentery was retracted towards left thereby exposing the attachment of mesentery to the posterior abdominal wall. Right layer of the mesentery was stripped off to expose the superior mesenteric vessels in the root of mesentery Romanes (2000).

The branches of the SMA were traced, cleaned and their area of distribution was noted. Origin of superior mesenteric artery was defined. Then the vessels were exposed by removing the peritoneum between the root of mesentery and the ascending and transverse parts of the colon.

The whole specimen containing colon, its arterial supply and part of aorta was taken out from the cadaver, washed and fixed on thermocol sheet. The arteries were painted with red color to show complete branching patterns & photograph of the specimen is taken.

RESULTS

The right colic artery is that major artery, irrespective of origin, which is directed towards the ascending colon between the ileocaecal junction and the hepatic flexure.

Origin

It is evident from Table 1: - The RCA was arising as an independent branch from superior mesenteric artery in 19cases (63.3%) (Fig. 1). In 9 cases (30.0 %) it was arising as common trunk with middle colic artery (Fig. 2). In 2 cases (6.7%) it was seen arising as a common stem with ICA and MCA (Fig. 3).

Table 1: Origin of Right Colic Artery

Mode of Origin	Parent artery	No. of cases	Percentage
As an independent branch	SMA	19(14 M & 5 F)	63.3%age
Common trunk with MCA	SMA	9(5M & 4F)	30%age
Common trunk with MCA &ICA	SMA	2(2M)	6.7%age

Table 2: BRANCHING OF RIGHT COLIC ARTERY (Fig. 1)

Branches	No. of cases	Percentage
Ascending	30 (21 M & 9 F)	100%
Descending	30 (21 M & 9 F)	100%

Branches

It is evident from Table 2 that in the present study of 30 cases the RCA was seen dividing into ascending and descending branches in 100% cases. (Fig. 1)

Area supplied by right colic artery

In the present study of 30 (21 M & 9 F) cases the RCA supplied ascending colon and hepatic flexure in all the cases (Fig. 7). In no case it was seen as a duplicate artery and none of the cases studied it was found absent.

Figure 1: Showing Origin of Ileocolic Artery (ICA), Right Colic Artery (RCA) and Middle Colic Artery (MCA) independent from Superior Mesenteric Artery (SMA). MA indicate Marginal Artery, IMA indicate Inferior mesenteric Artery & SA indicate sigmoid artery

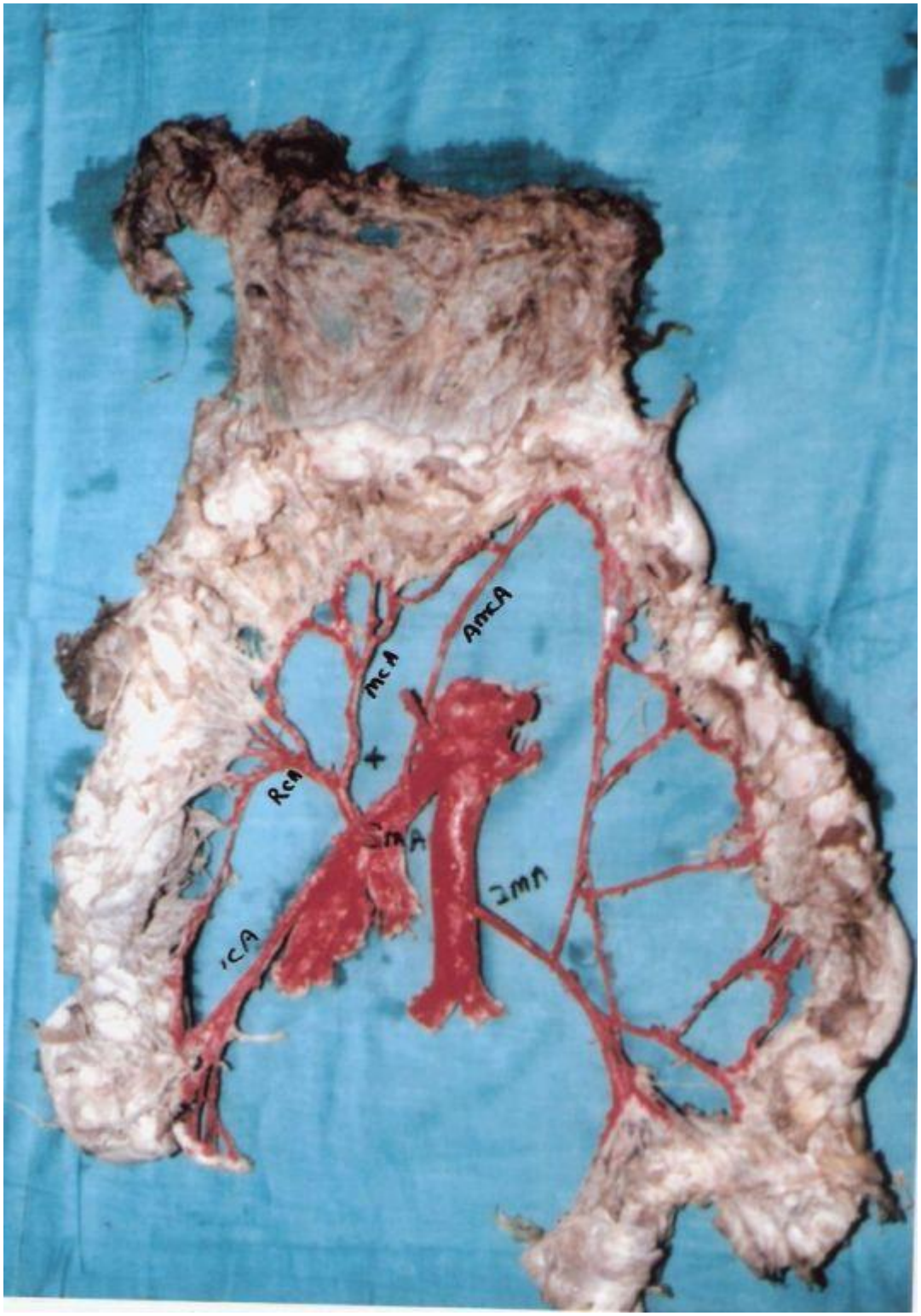

Figure 2: Showing Origin Right of Colic Artery (RCA) and Middle Colic Artery (MCA) as a common trunk from Superior Mesenteric Artery (SMA). * Indicate common stem of RCA and MCA. AMCA indicate aberrant middle colic artery.

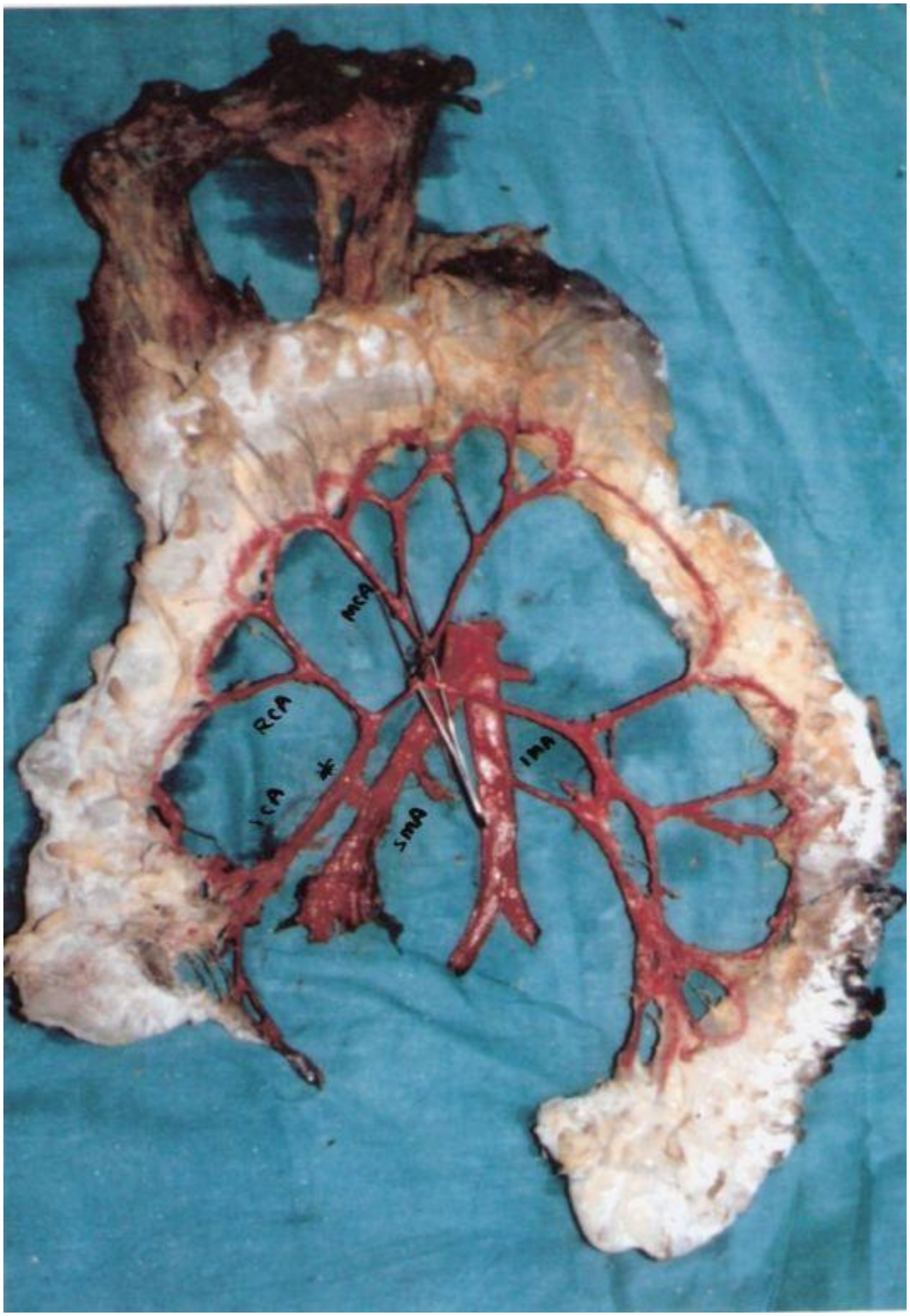

Figure 3: Showing Origin of Right Colic Artery (RCA), Middle Colic Artery (MCA) and Ileocolic Artery (ICA) as a common trunk from Superior Mesenteric Artery (SMA). * Indicate common stem of ICA, RCA and MCA.

DISCUSSION

The RCA to the ascending colon is the most variable of the colic arteries. The variations in its origin and course may account for the fact that Steward and Rankin (1933) found no vessel was willing to identify as a right colic in 18 % of their cases, while Michels *et al.,* (1965) failed to identify one in only 2%. Origin in the 82% in which Steward and Rankin (1933) identified the vessel were from the SMA in 40%, with the middle colic in 30%, and with the ileocolic in 12%.

Sonneland *et al.,* (1958) stated that out of 600 specimens studied right colic artery arose as a single vessel in 78% of cases; 2 vessels in 8.7% of the cases, and 3 vessels in 0.7% of the cases and in 12.6% cases the right colic artery was found to be absent. They also observed that in only 28.3% cases right colic artery arose from the SMA as an independent artery and in 59.1% cases it arose from one or more colic arteries of SMA origin, namely ileocolic, middle colic, or RCA in various combinations; Michels *et al.,* (1965) found an origin from the superior mesenteric in 38%, an origin with middle colic in 52% and one with ileocolic in 8%; Basmaijian (1955) agreed that it arises more commonly with either middle colic or the ileocolic. Michels *et al.,* (1965) found an accessory RCA in 8%.

The result obtained in the present study is supported by Steward and Rankin (1933), Sonneland *et al.,* (1958), Siddarth and Ravo (1988), Kaufmann (1989), Peters *et al.,* (1995) and Gracia-Ruiz *et al.,* (1996).

In the present study RCA was arising as an independent branch from SMA in 19 cases (63.3%) and in 9 cases (30.0%) it was arising as a common trunk with MCA. In 2 cases (6.7%) it was seen arising with a common stem with ileocolic and MCA.

In the present study there was no incidence of double, triple & multiple right colic arteries where as Sonneland *et al.,* (1958) described double and triple colic arteries in 8.7% & 7.0% cases respectively. Peters *et al.,* (1995) described multiple right colic arteries in 4.0% cases.

In the present study there was no incidence of absence of RCA as described by Sonneland et al (1958) in 12.6% cases and by Steward and Rankin (1933) in 19.0% cases.

In the present study there was no incidence of accessory RCA as described by Siddarth and Ravo (1988) in 8.0% cases.

CONCLUSSION

From the result of this study it is concluded that variants of the classic patterns are the rule, not exception. As we know during Surgery, variants for the individual patients are not merely interesting anatomic fact, but may be a matter of life and death.

The fact that single colic arteries may be ligated experimentally or by mishap during and operation and the marginal artery should not be and excuse of carelessness. These arteries of the colon should be ligated purposefully and the only when the occasion demand. The arteries of the colon are variable in size and position and the two adjacent vessels should be investigated before one artery is occluded.

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