ORIGINAL RESEARCH

Anatomy of Inferior Mesenteric artery: A cadaveric study

V Abeysuriya[1], S Hewawardhane[1]

[1]*Faculty of Medicine, University of Kelaniya*

Abstract

Introduction: A comprehensive knowledge of the varied anatomy of the inferior mesenteric artery (IMA) can be important in surgeries in the region of the colon and rectum.

Methods: We analyzed 50 fresh cadavers in the department of Anatomy, Faculty of Medicine Ragama from 2022 to 2024. Latarjet's classification was used for the IMA branching pattern. The anatomical relationships of the IMA left colic artery (LCA), sigmoidal artery (SA), and superior rectal artery (SRA) were observed, and the length from the origin of the IMA to the point of branching into the LCA or common trunk of LCA and SA was measured. The relationship between LCA and inferior mesenteric vein (IMV) was also observed. The data was presented as the value / percentage.

Results: Majority showed Type A branching pattern 35/50 (70%). The respective lengths from the origin of the IMA to the beginning of LCA were measured and expressed as (mm) (mean ± SD) for each type; Type A 33.4 ± 4.7, Type B 36.5 ± 5.4, Type C 39.2 ± 8.6. The number of LCA under IMV in type A (51%); type B (54%); type C (62%) respectively. There was no statistically significant difference among the three types.

Conclusion: Our study showed that type A branching pattern of LCA was the commonest. It is also observed that almost similar incidence of LCA traversing above and beneath the IMV.

Keywords: Inferior mesenteric artery, Left colic artery, Sigmo-rectal artery, Rectal cancer, Colonic cancer.

DOI: https://doi.org/10.4038/slaj.v8i1.226

Sri Lanka Anatomy Journal 2024; 8(I): 73–76

Corresponding author
V Abeysuriya
E-mail: vasithaabey@hotmail.com

https://orcid.org/0000-0002-0986-7917

Introduction

A comprehensive knowledge of the anatomy of the inferior mesenteric artery (IMA) is essential for the surgical procedures related to left colon and rectum, such as low-tie technique of IMA during anterior resection for rectal cancer (1-5). Presence of varied types of branching patterns of the IMA may results in these surgical procedures being more technically demanding (5-8). The objectives of this study were to assess the patters of branching of IMA, the distances from the root of the IMA to the origin of the LCA and its course and its intersection from the inferior mesenteric vein (IMV).

Methods

We analyzed 50 fresh cadavers in the department Anatomy, Faculty of Medicine, Ragama from 2022 to 2024. The Ethical clearance was obtained. No conflict of interest.

Dissection procedure

The small intestine was retracted cephalad and then the sigmoid colon mesentery was dissected up to the origin of the IMA. Further dissection was carried out along the IMA down to the point of branching into the LCA or common trunk of LCA and sigmoid artery (SA). The dissection was then carried out from the LCA until the IMV was seen. The anatomical relationships of the IMA, LCA, SA, and superior rectal artery (SRA) were observed, and the length from the origin of the IMA to the point of branching into the LCA or common trunk of LCA and SA was measured by a vernier caliper. The relationship between LCA and IMV was also observed.

Classification of the IMA branching pattern

Latarjet's classification was used (1). Type A: LCA arose independently from IMA; Type B: LCA and SA branched from a common trunk from IMA; Type C: LCA, SA, and SRA branched off at the same point.

Statistical analysis

All experimental data were analyzed using the SPSS software version 17.0 (SPSS Inc., Chicago, IL, USA). The count data were presented as the value / percentage.

Results

Type A was noted in 35/50 cadavers (70%); type B, LCA and SA branched from a common trunk of the IMA was observed in 6/50 (12%); and type C, LCA, SA, and SRA branched at the same location were seen in 9/50 (18%). The respective lengths from the origin of the IMA to the beginning of LCA were measured and expressed as (mm) (mean ± SD) for each type; Type A 33.4 ± 4.7, Type B 36.5 ± 5.4, Type C 39.2 ± 8.6. The number of LCA under IMV in type A 17/35 (50%); type B 3/6 (50%); type C 5/9 (60%) respectively. There was no statistically significant difference among the three types (Figures 1 and 2).

Discussion

The available data showed various branching types of the LCA and majority were in type A.

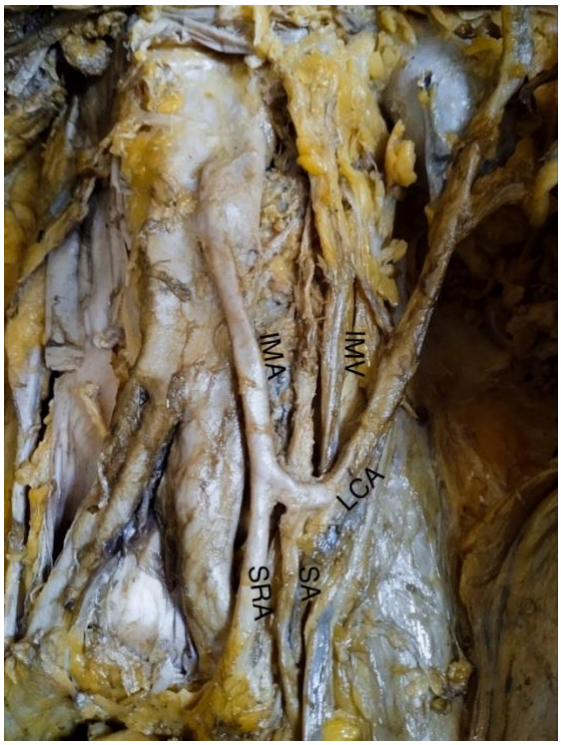

Figure 1: Type A: LCA arises independently from IMA
IMA-Inferior mesenteric artery; IMV – Inferior mesenteric vein; LCA – Left colic artery; SRA – Sigmo -rectal artery; SA – Sigmoidal artery

Figure 2: Type C: LCA, SA, and SRA branch off at the same point
IMA-Inferior mesenteric artery; IMV – Inferior mesenteric vein; LCA – Left colic artery; SRA – Sigmo -rectal artery; SA – Sigmoidal artery

In our study, the branching patterns of the IMA was classified into three groups. In keeping with the literature, we found that type A was the commonest type in our study as well. According to the literature in studies that measured the length from the origin of the IMA to the LCA were ranging from Type A 34.1 ± 7.7 Type B 38.5 ± 8.4 Type C 40.2 ± 10.6 (1-5). We observed that our study findings were in keeping with the available literature. In our study the number of LCA under IMV in type A 17/35 (50%); type B 3/6 (50%); type C 5/9 (60%) respectively. These findings were also almost similar to the published data (1-6).

A clear understanding of the vascular anatomy of the IMA and IMV is required to conduct left colon and rectal surgical procedures. In surgical resection for rectal cancer, according to the location of the tie of the IMA, it is divided into the high-tie of the IMA at its origin and the low-tie of the IMA below the branching point into the LCA with preservation of the LCA (3, 4, 7-10). In traditional rectal cancer surgery, a high tie of the IMA was preferred. However, based on evidence, currently the preferred approach is the low-tie technique. In the past traditional high technique was preferred since it was thought that maximum lymph node harvesting will reduce the metastasis by lymph node clearance (7-12).

However recent evidence showed that positivity of lymph nodes is a prognostic indicator not a factor for reducing the metastasis. Furthermore, studies suggest that anastomotic perfusion is diminished after the high-tie of the IMA (3-8). Consequently, postoperative poor anastomotic perfusion increased the incidence of anastomotic leakage (7-9, 10, 11). Therefore, the low-tie technique with preservation of the LCA to maintain the blood supply is recommended (10-12). The multiple types of branching of vessels of the IMA makes surgery in this region technically demanding.

Conclusion

Our study showed that type A branching pattern of LCA was the commonest. It is also observed that almost similar incidence of LCA traversing above and beneath the IMV. Further studies will enhance the comprehensive knowledge of the anatomy LCA and its relationship to the IMA.

References

1. Kobayashi M, Morishita S, Okabayashi T, Miyatake K, Okamoto K, Namikawa T, Ogawa Y, Araki K. Preoperative assessment of vascular anatomy of inferior mesenteric artery by volume -rendered 3D - CT for laparoscopic lymph node dissection with left colic artery preservation in lower sigmoid and rectal cancer. World J. Gastroenterol 2006; 12: 553-555.
2. You X, Wang Y, Chen Z, Li W, Xu N, Liu G, Zhao X, Huang C. Clinical study of preserving left colic artery during laparoscopic total mesorectal excision for the treatment of rectal cancer. Zhonghua Wei Chang Wai Ke Za Zhi 2017; 20: 1162-1167.
3. Hinoi T, Okajima M, Shimomura M, Egi H, Ohdan H, Konishi F, Sugihara K, Watanabe M. Effect of left colonic artery preservation on anastomotic leakage in laparoscopic anterior resection for middle and low rec cancer. Wld J Surg 2013;37:2935-2943.
4. Komen N, Slieker J, de Kort P, et al.,. High tie versus low tie in rectal surgery: comparison of anastomotic perfusion. Int J Colorectal Dis 2011; 26: 1075-1078.
5. Shen J, Li M, Du Y, Xie D, Qu H, Zhang Y. Long-term outcomes of laparoscopic low anterior resection of rectal carcinoma with preservation of the left colic artery. Zhonghua Wei Chang Wai Ke Za Zhi 2017; 20: 660-664.
6. Yasuda K, Kawai K, Ishihara S, Murono K, Otani K, Nishikawa T, Tanaka T, Kiyomatsu T, Hata K, Nozawa H, Yamaguchi H, Aoki S, Mishima H, Maruyama T, Sako A, Watanabe T. Level of arterial ligation in sigmoid colon and rectal cancer surgery. World J Surg Oncol 2016; 14: 99.
7. Miyamoto R, Nagai K, Kemmochi A, Inagawa S, Yamamoto M. Three-dimensional reconstruction of the vascular arrangement including the inferior mesenteric artery and left colic artery in laparoscope-assisted colorectal surgery. Surg Endosc 2016; 30: 4400-4404.
8. Hida J, Okuno K. High ligation of the inferior mesenteric artery in rectal cancer surgery. Surg Today 2013; 43: 8-19.
9. Dworkin MJ, Allen-Mersh TG. Effect of inferior mesenteric artery ligation on blood flow in the marginal artery-dependent sigmoid colon. J Am Coll Surg 1996; 183: 357-360.
10. Huang J, Zhou J, Wan Y, Lin Y, Deng Y, Zhou Z, Qiu J, Wang J, Huang M. Influences of inferior mesenteric artery types and Riolan artery arcade absence on the incidence of anastomotic leakage after laparoscopic resection of rectal cancer. Zhonghua Wei Chang Wai Ke Za Zhi 2016; 19: 1113-1118.
11. Patroni A, Bonnet S, Bourillon C, Bruzzi M, Zinzindohoué F, Chevallier JM, Douard R, Berger A. Technical difficulties of left colic artery preservation during left colectomy for colon cancer. Surg Radiol Anat 2016; 38: 477-484.
12. Sekimoto M, Takemasa I, Mizushima T, Ikeda M, Yamamoto H, Doki Y, Mori M. Laparoscopic lymph node dissection around the inferior mesenteric artery with preservation of the left colic artery. Surg Endosc 2011; 25: 861-866.