



Morphometric study of Inferior Mesenteric Artery & it's Branches

KEYWORDS

Inferior Mesenteric Artery, Superior Mesenteric Artery, Colon, Abdominal aorta

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ABSTRACT The arterial supply of the abdomen is unique for each individual. The conventional description and illustration of the arterial blood supply to the intestinal tract are too incomplete which may mislead the surgeons in the intestinal surgery. Surgical procedure for diseases of colon is one of the most common operative procedures performed by the surgeons. The blood supply to the intestinal tract is mainly from the superior mesenteric artery (SMA) & inferior mesenteric artery (IMA), branches from abdominal aorta. We studied the morphology of the Inferior mesenteric artery (IMA) & it's branches in formalin preserved cadavers at the department of Anatomy, MGM Medical College, Navi Mumbai, India. This study was conducted to enlighten our knowledge about colonic blood supply.

INTRODUCTION-

The arterial supply of the abdomen is unique for each individual, much the same way as a fingerprint.¹ The conventional description and illustration of the arterial blood supply to the intestinal tract, especially to the descending colon, sigmoid flexure in most standard textbooks of anatomy and surgery are too incomplete, inaccurate and misleading to be relied upon in the intestinal surgery. Surgical procedure for diseases of colon continues to be one of the most common operative procedures performed by the surgeons. Inferior Mesenteric Artery (IMA) is artery of hind gut. It arises from abdominal aorta few cm above it's bifurcation. It supplies left 1/3 of transverses colon, descending colon, sigmoid colon, upper part of rectum.

The colon has a variant blood supply; this factor should be taken into consideration while planning the colonic surgery. A thorough knowledge of the normal and variant anatomy of the major unpaired arteries originating from the abdominal aorta and their variants is necessary to accomplish a successful, uncomplicated abdominal operation.

The current clinical interest of these anatomic finding is to laparoscopic colon surgeon. During laparoscopic colon surgery, these vessels must be isolated without the possibility of its direct palpation. This study was conducted to enlighten our knowledge about colonic blood supply.

AIM:

- To study the morphology of the Inferior mesenteric artery (IMA) & it's branches.

OBJECTIVES:

- To identify the origin of the IMA and trace their branches.
- To measure the length of the main artery.
- To study the course of inferior mesenteric artery.
- To observe the anatomical variations of inferior mesenteric artery.

MATERIAL AND METHODS:

After approval from institutional ethical committee, the study was conducted between Sept 2010 – Sept 2012 in the Anatomy dissection hall of the MGM Medical College and hospital of Navi Mumbai. Fifty adult human formalin fixed cadavers, irrespective of sex were used in this study.

OBSERVATION-

In all cadavers SMA, IMA were identified. Distance between them, Distance of IMA from Bifurcation of Aorta, Length of Branches of IMA, was measured & results are tabulated.

Figure 7. Measurement of IMA from origin to bifurcation



20A

Fig. 1 showing IMA, it's branches & measurement

ORIGIN:

In all the 50 cadavers, IMA originated from abdominal aorta few cm proximal to bifurcation of aorta [Table 1].

Origin	Aorta	Other
Numbers of Cadavers	50	0
Percentage (%)	100%	0

Table 1: Origin of IMA

DISTANCE FROM BIFURCATION OF AORTA:

IMA took origin from the aorta 2-5cm (mean 3.62cm) proximal to its bifurcation [Table 2].

No of cadavers	Mean (cm)	Median (cm)	SD (cm)	Min (cm)	Max (cm)
50	3.62	3.70	0.796	2	5

Table 2: Distance of IMA from Bifurcation of Aorta

DISTANCE BETWEEN SMA AND IMA:

Mean distance between origin of SMA and IMA was 6.6 cm [Table 3].

No	Mean (cm)	Median (cm)	Mode (cm)	S D (cm)	Min (cm)	Max (cm)
50	6.66	6.40	5	1.184	5	10

Table 3: Distance between SMA and IMA

BRANCHES OF IMA :

In most of our cases IMA gave three branches. There was only a single case in which LCA was absent and additional branch from SMA supplied left colon [Table 4, Chart 1].

Branch	Number	Percentage(%)
LCA	49	98%
Sigmoid Artery	50	100%
Superior Rectal Artery	50	100%

Table 4: Branches given by IMA

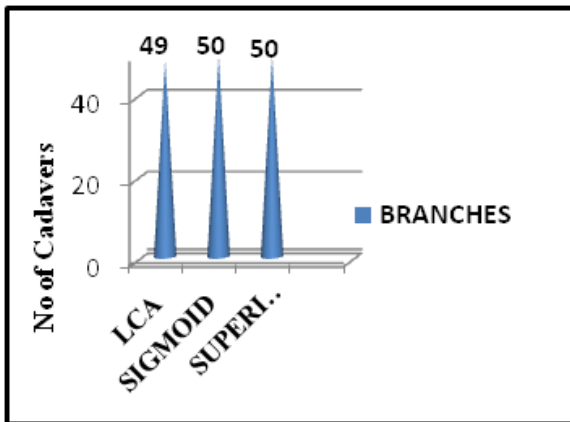


Chart 1: Branches of IMA

LENGTH OF MAIN TRUNK AND BRANCHES:

Length of artery from its origin to its division was measured. Length of IMA, LCA, and Sigmoid artery was 3.25, 14.45 and 4.7 cm respectively [Table 5].

Artery	Mean (cm)	Median (cm)	Mode (cm)	SD (cm)	Min (cm)	Max (cm)
IMA	3.25	3.1	3.1	0.91	1	5.2
LCA	14.4	11.9	11*	1.74	8	13.1
Sigmoid	4.7	4.8	4	0.94	1.6	6.3

Table 5: Length of Branches of IMA & its Branches

DISCUSSION-

INFERIOR MESENTRIC ARTERY

ORIGIN:

Generally IMA is very stable, arises directly from abdominal aorta.² In all our 50 cases it arises from abdominal aorta 100%. Lippert H and Pabst R had mentioned the frequency of the variation in which the IMA arise from SMA to be <0.1%.³ The angiographic demonstration of a common origin of the IMA and renal artery had been reported by some authors. ⁴ A rare case of common trunk of CA, SMA and IMA (celiaco-bimesentric trunk) was reported.⁵ Benton RS and Cotter WB had reported an extremely rare variation of double IMA, which arose from the abdominal aor-

ta.⁶ Kahn P and Abrams HL had analyzed the IMA patterns in 142 cases by angiographic study and IMA was present in all of them.⁷

In the Michels NA et al. study, 400 cadavers dissected to observe variant blood supply of the descending colon, rectosigmoid and rectum, but did not mention any case of common trunk of SMA and IMA.⁸ Sierocinski W had studied arterial supply of descending colon in 100 cadavers; IMA was constant in all of them and common trunk was not noted. ⁹

DISTANCE FROM BIFURCATION OF AORTA:

Distance of IMA from bifurcation of aorta found in various other studies is enumerated in following table [Table 6].

Author	No	Mean	Range
George R ¹⁰	92	4.6 cm	2.7-8.2 cm
Michels NA ⁸	127	-----	3-5 cm
Griffith JD ¹¹	100	-----	2.5-5 cm
McGregor AL ¹²	-----	-----	3-8 cm
Present study	50	3.62 cm	2- 5 cm

Table 6: Distance of IMA from bifurcation of aorta found in present study and past studies

DISTANCE BETWEEN SMA AND IMA :

Distance between root of SMA and IMA was measured [Table 7].

Author	No	Mean	Rang
George R ¹⁰	95	7.1cm	4.2-10.3 Cm
Present study	50	6.6 cm	5- 10 cm

Table 7: Distance between SMA And IMA in present and past study

BRANCHES OF IMA:

IMA gave three branches LCA (98%), sigmoid and superior rectal artery (100%).In 2% of cases LCA was absent. The LCA was absent Lee McGregor in 6% of cases.¹²

Few cases of variant branches of IMA had been reported in past. Piersol GA and Eisendrath DN had described lower polar artery from IMA but there were no statistical data on the prevalence of this arrangement.^{13, 14} In past few authors had reported cases of accessory renal artery sharing its origin with renal artery.¹⁵

LENGTH OF IMA AND BRANCHES:

Length of IMA, LCA and sigmoid arteries before its division was calculated [Table 8].

Author	IMA		LCA		Sigmoid	
	Mean	Range	Mean	Range	Mean	Range
McGregor AL ¹²	3.8	----	-	-	-	-
Michels NA ⁸	3.5	2-7	-	-	-	-
Griffith JD ¹¹	----	2.5-3.7	-	-	--	-
Present Study	3.2 cm	1-5.2 cm	11cm	8-13.1cm	4.7cm	1.6-6.3 cm

Table 8: Measurement of Arteries in various studies

CONCLUSION-

In all 50 cases IMA originated from abdominal aorta, 3.62 cm \pm 0.76 proximal to bifurcation of aorta. Distance between SMA and IMA was 6.66cm \pm 1.18.

Branches of IMA were LCA, Sigmoid and Superior rectal artery in 98%, 100%, and 100% of cases. LCA was absent in 2% of cases. Mean length of IMA, LCA and Sigmoid were 3.26cm \pm 0.91, 14.45cm \pm 1.74 and 4.7cm \pm 0.946 respectively.

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