The Meandering Mesentric Artery: Imaging anatomy, Surgical Radiological Pearls Revisited

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Learning objectives

To Describe the Collateral circulation and Surgical Importance of Dangerous Area of Collon with Highlighting of Meandering Mesentric Artery on MDCT angio studies.

To Understand the significance of the knowledge of the presence of Meandering Mesentric artery in Patients undergoing Colonic Surgery Preoperatively.

Images for this section:

![Image](image_url)

**Fig. 21:** Meandering mesentric anatomy origin
Fig. 22: 3D VR CT Angiography showing IMA and its Branches including meandering mesenteric Artery
Background

The Meandering mesentric Artery is a Thick tortuous Vessel That makes a crucial communication Between Middle Colic artery and Ascending branch of left Colic Artery especially in Advanced Atheroscerotic Disease.

The SMA forms the central axis around which the intestines rotate during embryogenesis.

It originates from the aorta approximately 1cm below the celiac artery, at the level of L1..It then courses posterior to pancreas and spleen at the level of L1.It then courses inferiorly behind the body of the Pancreas emerging below the Pancreas ascending anteriorly toward the third portion of duodenum. There it supplies the appendix, cecum, ascending colon hepatic flexure and proximal 2/3rds of transverse colon via the Ileocolic, Right Colic and Middle colic branch arteries respectively.

Additionally it supplies the entire small bowel via a series of 12-20 jejunal and ileal branches that arise from its Left side.

The Middle colic artery is the highest of the three colic branches of SMA arising just inferior to the Uncinate process of Pancreas just 4cm from the origin. It commonly divides in to early right branch which supplies the right transverse colon and hepatic flexure, anastomosing with the ascending branch of right colic artery and a left branch that supplies the distal one half of transverse colon on left.

The Left branch travels through the mesentery along the side of distal one half of transverse colon where it most often communicates with ascending branch of Left colic artery through the Marginal artery of Drummond.

Anatomic variations of this artery include absence (4-20%), presence of an accessory middle colic artery (10%), Middle colic artery being the main supply of Splenic flexure in 33% of cases.

IMA branches from Ventral aorta at the level of L3.It subsequently courses to the left and branches in to Left Colic, Sigmoid and Superior rectal arteries. The left Colic artery which is the highest branch of IMA divides in to ascending and descending arteries both of which communicate with the marginal arcade.

The arterial supply to the left colon is from the IMA by means of its left colic and sigmoid branches. There are three branching patterns of the left colic artery. In type 1, the left colic artery arises from the IMA; in type 2, the left colic and the first sigmoidal artery have a
common trunk; and in type 3, the left colic and first sigmoidal arteries arise simultaneously from the IMA.

**Meandering artery of Moscowitz:**

The mesenteric circulation has a rich system of collateral vessels that provide a potential mechanism for maintaining adequate perfusion to the colon when major mesenteric branches are surgically ligated. These collaterals, which play an important role in colonic surgery, are those between the SMA and IMA, and primarily include the marginal artery of Drummond and the arc of Riolan.

**The meandering artery of Moskowitz** represents an additional collateral pathway between the SMA and IMA; however, some controversy exists regarding the true origin of the meandering artery of Moskowitz, because some believe that it represents a dilated arc of Riolan, whereas others believe that it is a separate discrete anastomotic channel. **The meandering artery of Moskowitz** courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.

The **marginal artery of Drummond** is the major collateral arcade between the SMA and IMA, is located within the mesentery of the colon, and lies about 2-3 cm from the mesenteric border of the bowel supplying the vasa recti. This collateral arcade is composed of branches from the ileo colic and right, middle, left colic, and sigmoidal arteries. The marginal artery is usually a continuous vessel that runs parallel to the colon; it is better developed in the left colon and is inconsistent or poorly developed in the right colon in 25%-75% of patients.

**There are two watershed points**: the Griffiths' point at the splenic flexure where branches of the middle and left colic artery meet, and the less important Sudek's point at the recto-sigmoid junction where the last sigmoid branch and the superior haemorrhoidal artery meet.

The **arc of Riolan** represents a set of collateral branches located centrally within the mesentery and forms a communication between the middle colic and left colic arteries in a region that usually does not have major branches. It is present in 7%-10% of the population.

**Images for this section:**
Fig. 7: Ascending branch of left colic artery: The meandering Mesenteric artery:3D VR image
Fig. 12: CTA of Tri lobed abdominal aortic aneurysm with associated Meandering Mesenteric artery and Arc of Riolan
Fig. 15: The meandering artery of Moskowitz courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.
Fig. 23: Meandering mesenteric artery Visualized in a Patient with right femoral artery aneurysm
Findings and procedure details

The meandering artery of Moskowitz represents an additional collateral pathway between the SMA and IMA; however, some controversy exists regarding the true origin of the meandering artery of Moskowitz, because some believe that it represents a dilated arc of Riolan, whereas others believe that it is a separate discrete anastomotic channel. The meandering artery of Moskowitz courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.

Whereas the Arc of Buhler connects the celiac and SMA vascular supplies, the Arc of Riolan (AoR) helps connect the SMA and IMA.

The SMA and IMA routinely anastomose through the Marginal Artery of Drummond and the AoR is essentially a shunt bypassing this smaller, more tortuous vessel... shunting between the proximal middle colic artery of the SMA and the proximal left colic artery of the IMA.

Some studies report the AoR as occurring in 7-10% of the population. CTA or conventional angiogram is the easiest way to identify the artery, which is usually a very large and tortuous artery of uniform caliber in the left upper quadrant of the abdomen. It may not always be easy to see its origin from the middle colic, but usually its connection to the left colic is more clear. Differentiation of the Arc of Riolan from the Marginal artery of Drummond is straightforward in that 1) the Marginal artery of Drummond is never tortuous and runs parallel to the descending colon, and 2) the Marginal artery is rarely visualized on angiogram without vasodilators.

The AoR can be important as an anastomotic channel in the setting of stenosis or occlusion of either the SMA or IMA.... the direction of flow in the artery helping to differentiate one from the other.

It can also be important in the setting of distal abdominal aortic occlusion with anastomoses to the iliac arteries through the superior rectal artery and then to the lower extremities through the external iliac artery. It has been claimed that in total abdominal aortic occlusion, the anastomotic arteries can dilate to 2-3x their normal diameter, and reduce in size after aortic thrombectomy.
**Fig. 17:** The Meandering mesentric Artery is a Thick tortuous Vessel That makes a crucial communication Between Middle Colic artery and Ascending branch of left Colic Artery especially in Advanced Atheroscerotic Disease.

**References:** chippendale apts- 1-7-12 near Golconda cross roads, flat 202, Vijaya diagnostics and research - Hyderabad/IN
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Fig. 20: Meandering artery of Moscowitz: The mesenteric circulation has a rich system of collateral vessels that provide a potential mechanism for maintaining adequate perfusion to the colon when major mesenteric branches are surgically ligated. These collaterals, which play an important role in colonic surgery, are those between the SMA and IMA, and primarily include the marginal artery of Drummond and the arc of Riolan. The meandering artery of Moskowitz represents an additional collateral pathway between the SMA and IMA; however, some controversy exists regarding the true origin of the meandering artery of Moskowitz, because some believe that it represents a dilated arc of Riolan, whereas others believe that it is a separate discrete anastomotic channel.

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Images for this section:
Fig. 2: Meandering mesenteric artery: MIP image from CTA
**Fig. 3:** Atherosclerotic Abdominal Aorta: Meandering mesenteric artery and marginal arcade are present
**Fig. 4:** Atherosclerotic Abdominal Aorta: Meandering mesenteric artery and marginal arcade are present
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Fig. 15: The meandering artery of Moskowitz courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.
Fig. 16: The meandering artery of Moskowitz courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.
**Fig. 1:** CT Angiography showing origin of IMA and Upper branch of left colic artery-
Meandering mesenteric artery
Conclusion

The meandering artery of Moskowitz represents an additional collateral pathway between the SMA and IMA; however, some controversy exists regarding the true origin of the meandering artery of Moskowitz, because some believe that it represents a dilated arc of Riolan, whereas others believe that it is a separate discrete anastomotic channel. The meandering artery of Moskowitz courses along the base of the colonic mesentery and represents a connection between the proximal segment of the middle colic artery and the ascending branch of the left colic artery.

The AoR can be important as an anastomotic channel in the setting of stenosis or occlusion of either the SMA or IMA.... the direction of flow in the artery helping to differentiate one from the other or as a predictor of Splanchic isemia before cardiac by pass surgeries, Abdomnal Aortic surgeries, Colonic interpositional and divisional Surgeries.

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References


