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Research Article

# A STUDY OF ANATOMICAL VARIATIONS IN THE ARTERIAL SUPPLY OF VERMIFORM APPENDIX

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## ABSTRACT

Acute appendicitis is the most common cause of acute abdomen in young adolescents and appendectomy is often the first major surgical procedure performed by a surgeon. During routine dissection, appendicular artery came from trunk of ileocolic artery in one specimen. Appendicular artery originated directly from trunk of inferior division of ileocolic artery in 8 specimens and in remaining 39 specimens from ileal branch. Appendicular artery originating from posterior caecal artery in 1 specimen and from superior division in 1 specimen were noted. Recurrent branch of appendicular artery in 5 specimens and accessory appendicular artery arising from posterior caecal artery in 7 specimens only were also noted. The knowledge of variations involving arterial supply of appendix is helpful during surgical procedures and radiological evaluations.

**Keywords:** Vermiform Appendix, Appendicular artery, Accessory appendicular artery.

## INTRODUCTION

Acute appendicitis still remains as one of the most common surgical emergency and variations in position of appendix, age of the patient and degree of inflammation make the clinical presentation of appendicitis notoriously inconsistent. Acute appendicitis is the most common cause of acute abdomen in young adolescents and appendectomy is often the first major surgical procedure performed by a surgeon even during training<sup>1</sup>. Blood supply to appendix is mainly from appendicular artery, a branch of ileocolic artery. Accessory appendicular artery is a branch arising from posterior caecal artery which can lead to significant intraoperative and postoperative hemorrhage. Recurrent appendicular artery is a branch from main appendicular artery which anastomoses with posterior caecal artery and may form a large anastomosis at the base of appendix. Obstruction is main reason of appendicitis leading to ultimate arterial compromise and perforation. Extent of mesoappendix is also important, whether it reaches tip of the appendix or falls short of it, as this will change the risk due to poor blood supply of the tip which is supplied by main appendicular artery which is an end artery. Detailed analysis of the arterial vascularization of the appendix is necessary before its removal for reconstructive microsurgery<sup>2</sup>.

The appendicular artery, a branch of ileocolic artery has a variable origin from the ileocolic or its terminal branches like ileal, anterior caecal artery, posterior caecal artery or arterial arcade. It is an end artery representing the entire arterial supply of the organ. Although the appendix is well supplied by arterial anastomosis at its base, the appendicular artery is an end artery from midpoint upwards and its close proximity to the wall makes it susceptible to thrombosis during episodes of acute inflammation<sup>3</sup>.

## MATERIALS AND METHODS

This study has been undertaken in Chalmeda Anandrao Institute of Medical Sciences, Bommakal, Karimnagar Dist, Andhra Pradesh, India from July 2010 to July 2012. The sample size taken is 50 adult human cadavers irrespective of age and sex from dissection hall of anatomy department.

### MATERIALS

Required specimens of caecum and appendix were obtained from the cadavers during routine dissection from dissection hall of Chalmeda Anandrao Institute Of Medical Sciences, Karimnagar. .

### METHODS

All specimens were taken during routine dissection after completing the dissection of anterior abdominal wall,

peritoneum and various viscera (Stomach, liver). Mesentery of small intestine was exposed in the infra colic compartment by turning the transverse colon and its mesocolon upwards. The oblique attachment of the mesentery of the small intestine was traced on the posterior abdominal wall, loops of jejunum and ileum turned to left side then cut through the right layer of peritoneum of the mesentery along the line of its attachments to posterior abdominal wall and stripped it from the mesentery, removed fat from mesentery to expose superior mesenteric vessels in its root and their branches. Branches to caecum, appendix and terminal ileum traced after tracing ileocolic artery course. Appendix was identified by tracing the taeniae on the external surface of colon and caecum. Specimen were cleaned by routine dissection method and cleared specimen were brushed with the solution of acetone and quick fix glue and allowed to dry so that all branches will stand in bold relief. Photographs of the selected specimens taken at suitable magnification and specimens preserved in 10% formalin jars.

**RESULTS**

The appendix is supplied by appendicular artery which is a branch of inferior division of ileocolic artery and it is an end artery which runs behind the terminal part of ileum and enters

the mesoappendix at a short distance from its base runs along the free border of mesoappendix and gives a recurrent branch to base which anastomoses with a branch from posterior caecal artery. The main artery runs towards the tip of appendix first lying near to and then in the free border of mesoappendix. Terminal part of artery lies actually on the wall of appendix near the tip and get thrombosed in appendicitis leading to gangrene and perforation.

In one specimen appendicular artery came from trunk of ileocolic artery (Photo.1). Appendicular artery originated directly from trunk of inferior division of ileocolic artery in 8 specimens (Photo. 2a & 2b) and in remaining 39 specimens from ileal branch (Photo.3a, 3b & 3c). We also noted appendicular artery originating from-

1. Posterior caecal artery - 1specimen (Photo.4)
2. Superior division -1specimen (Photo.5)

Recurrent branch of appendicular artery was noted in 5 specimens only (Photo.3b, 3c & 5). The accessory appendicular artery supplies other parts of appendix but not the tip. We also noted accessory appendicular artery in 7 specimens only arising from posterior caecal artery (Photo. 6a & 6b).

**Table 1: Showing origin of appendicular artery**

Origin of Appendicular artery	Ileocolic Artery Trunk	Superior division	Inferior division	Ileal Branch	Posterior Caecal artery	Anterior Caecal artery	Colic branch	Arterial Arcade
Number of specimens	1	1	8	39	1	-	-	-

1. Commonest origin of appndicular artery is from ileal branch of inferior division of ileocolic artery 78%.
2. Directly from trunk of inferior division 16%.
3. From posterior caecal artery 2%.
4. Directly from trunk of ileocolic artery 2% .
5. From superior division 2%.

**Table 2: Showing arteries supplying appendix**

Name of artery	Recurrent appendicular artery	Accessory appendicular artery
Number of specimens	5	7

1. Recurrent appendicular artery noted in 10% specimens.
2. Accessory appendicular artery in 14% only.

**Photograph No. 1**



**Photograph No.2a**





**ABBREVIATIONS USED IN PHOTOS:**

C-Caecum

I-Ileum

A-Appendix

ICA-Ileocolic artery. SD- Superior division ID- Inferior division

ACA- Anterior caecal artery

PCA- Posterior caecal artery

ILA- Ileal artery

AA- Appendicular artery

AAA- Accessory appendicular artery

**DISCUSSION**

Appendix is supplied by appendicular artery. The main appendicular artery passes behind terminal ileum first near to base and then in the free margin of mesoappendix. The terminal part lies directly on the wall of appendix and get thrombosed in inflammatory process. H.A.Kelly et al<sup>3</sup>, Koster and Weintrobe<sup>4</sup>, Anson B J and Maddoc MJ<sup>5</sup>, Beaton et al<sup>6</sup> and Bruce et al<sup>7</sup> described that appendix is supplied by single artery. In the present study 43 specimens received single appendicular artery i.e 86%. Shah and Shah<sup>8</sup>, Michels et al<sup>9</sup>, Solanke<sup>10</sup>, Katzurskj<sup>11</sup> and Ronald A Bergman<sup>12</sup> described single and double appendicular arteries but in the present study double appendicular artery was not seen. Wakely<sup>13</sup>, Shah and Shah, Beaton and Anson et al, Michels et al, Solanke and Ajmani<sup>14</sup> described the origin of appendicular artery from ileocolic artery.

In the present study one specimen received appendicular artery directly from trunk i.e 2%. William and Warwick<sup>15</sup> described origin of appendicular artery from inferior division and in present study the origin of appendicular artery was directly from the inferior division in 8 specimens (16%).

Beaton et al, Anson B J et al, Michels et al, Solanke and Rist et al<sup>16</sup> mentioned the origin of appendicular artery from ileal branch of inferior division. In the present study this was the commonest origin in 39 specimen's i.e 78%.

Origin of main appendicular artery from ileal branch of inferior division of ileocolic artery mentioned by Solanke as 32% , by Beaton et al as 35% and by Michel et al as 50%. In the present study posterior caecal artery gave origin to appendicular artery in one specimen only i.e 2%.

Posterior caecal artery giving origin to main appendicular artery mentioned by Beaton et al in 5% and by Michel et al in 4%. Solanke not mentioned posterior caecal artery giving origin to main appendicular artery.

One specimen received appendicular artery from superior division directly i.e 2%. Dr.srinivasiah<sup>17</sup>, William and Warwick described recurrent branch from appendicular artery to the base of appendix which anastomoses with a branch from posterior caecal artery, five specimens received such branch in the present study i.e 10%. Shah and Shah, Michel et al, Solanke, William and Warwick, Ajmani, Liucid et al<sup>18</sup> and Van Damme<sup>19</sup> described accessory appendicular artery originating from variable sources (Table no. 6) but they all mentioned posterior caecal artery giving origin to accessory appendicular artery. In the present study 7 specimen received accessory appendicular artery from posterior caecal artery i.e 14%.

**CONCLUSION**

The knowledge of various variations involving arterial supply of appendix should be borne in mind during surgical and radiological evaluations. Knowledge of such variations help in interpretation of diseases and also helpful during surgical procedures and dissections

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