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ORIGINAL ARTICLE

STUDY OF VERMIFORM APPENDIX WITH ITS ARTERIAL SUPPLY IN GUNTUR DISTRICT, ANDHRA PRADESH - A FETAL SPECIMEN STUDY

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ABSTRACT: AIM: To study the variations in anatomical aspects of vermiform appendix with regard to the structure, position, size and shape with an additional emphasis on pattern of vascular supply to it. **MATERIAL AND METHODS:** Study was carried out on 62 aborted human fetuses of different gestational age of both sexes. The specimens were preserved and dissected in standard way and position, structure and vascular patterns were studied in detail. **RESULTS:** Study showed that position of appendix was retrocaecal in 29.51% of the specimens and pelvic in 24.59%. In 96.72% specimens we found that appendicular artery was arising from inferior division of ileocolic artery, 3.27% it is found to be arising as branch of ileal artery. In one specimen vermiform appendix was absent. **CONCLUSION:** Our observations showed significant variations in the position of appendix in the fetal specimens and rest of the study is almost in consistent with existing literature with few differences.

KEYWORDS: Vermiform Appendix, Meso appendix, Arterial supply of appendix.

INTRODUCTION: The vermiform appendix is a blind ending tube, which opens in to the posterio-medial wall of the Caecum. While the position of its base is constant in relation to Caecum, the appendix may lie in variety of positions.[1] The walls of the appendix are composed of all the layers of intestine, but it is thick and contains a concentration of lymphoid tissue similar to the tonsil, hence called abdominal tonsil. There are reasonable arguments exist for suspecting that the appendix may have a function in immunity.[2]

Vermiform Appendix is supplied by appendicular artery which is a branch of ileo- colic artery (Abranch of superior mesenteric artery which is the artery of mid- gut.) Ileo- colic artery arises either separately or in common with right colic artery. Ileo- colic artery is the lowest branch arising from the right side of the superior mesenteric artery. It descends to the right under the parietal peritoneum to the right iliac fossa and divides into superior and inferior branches. The superior branch anastomoses with right colic artery. The inferior branch of ileo –colic artery passes over the superior border of the ileo- caecal junction and gives the following branches:

1. Ascending (Colic) branch passes upwards on the ascending colon and supplies it.
2. Anterior and posterior caecal arteries.
3. Appendicular artery.
4. Ileal branch: it supplies terminal part of ileum and anastomoses with terminal part of the superior mesenteric artery.

Appendicular Artery: It is a branch of lower division of ileo-colic artery which runs behind the terminal part of ileum to enter the meso-appendix, a short distance from the base of the appendix. Here it gives off a recurrent branch which anastomoses at the base of the appendix with a branch of posterior caecal artery.

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The appendicular artery approaches the tip of the appendix at first nearer to and then in the edge of the meso-appendix. The terminal part of the artery lies on the wall of the appendix and may be thrombosed in appendicitis resulting in distal gangrene or necrosis. The arterial supply of the appendix may vary considerably. There may be an accessory appendicular artery (Artery of Seshachalam), arising from posterior caecal artery.

Though most consider appendix as vestigial organ, it is having its importance due to its propensity for inflammation leading to acute appendicitis. The acute appendicitis is the most common cause of acute abdomen in young adults and Appendicectomy is the most frequently performed surgery. The diagnosis depends more on the clinical examination, and the signs and symptoms mostly depend on the position of the appendix.

Because there are certain other conditions which may mimic appendicitis such as Meckal's diverticulitis or intusucception in children, salpingitis or ectopic pregnancy in females, diverticulitis colonic carcinomas in elderly, hence a thorough knowledge about the anatomy of appendix essential for surgeon. With the help of this knowledge surgeon can anticipate and overcome any complications that may arise during the surgical procedure due to abnormal positions or arterial supply of appendix.[3,4,5,6,7]

MATERIAL AND METHODS: The present work is aimed to study the vermiform Appendix with its arterial supply. The material of our study includes 62 dead fetuses of both sexes (Male & Female). The dead fetuses are obtained freshly from labour rooms of the department of Obstetrics & Gynecology, Government General Hospital, Guntur, Andhra Pradesh. Dissection was carried out in the dissection hall, department of Anatomy, Guntur medical college, Guntur. The age of the fetuses is determined by measuring crown- rump length. The features such as development of nails, subcutaneous tissue, distribution of hair and vernix-caseosa are taken into consideration to determine the age if crown-Rump length of the fetuses is less.

METHOD OF PRESERVATION: The preservative fluid is injected in to the fetuses for preservation.
Composition of the preservative fluid:

1. 10% Formalin: 25c.c
2. Glycerine: 15 c.c
3. Water: 215 c.c

Total 255 c.c

Immediately after the fresh fetuses are brought from the Obstetrics & Gynecology department, age of fetuses is determined and the preservative fluid is injected through one of the arteries of the umbilical cord (or) femoral artery. A small quantity i.e. about 30.c.c. of preservative fluid is injected into the abdominal cavity. About 40c.c. of preservative fluid is injected through orbits and fontanelle into the brain. All the fetuses after injecting preservative fluid were immersed in the tank containing preservative solution, which is filled with 10% formalin, 2% carbolic acid and water, for about one week to ten days.

MODE OF DISSECTION: An incision is made vertically extending from xiphisternum to pubic symphysis and abdomen is opened. The greater omentum is cut; the coils of small intestine, transverse colon and transverse mesocolon are mobilized towards the upper abdomen to visualize the ileocaecal junction and vermiform appendix.

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Based on the direction of tip of the appendix position is noted. Other measurements like length and breadth are measured by sliding calliper. Arterial supply and extent of mesoappendix were studied.

RESULTS: In our present study we observed that the shape of appendix in fetal specimens is narrow, tubular with blind end, but in one specimen appendix is totally absent. The position of the appendix and their percentages were given in the table-1. Figure-01 and Figure-02 shows para-caecal and pre-ileal positioned appendix. In Our observation 91.8% of the specimens the mesoappendix was complete and in 8.19% it is incomplete i.e. it fails to reach the distal 1/3rd of appendix.

When we observed the origin of appendix, in 85.24% of specimens it is from postero-medial aspect of the wall of the caecum and in 11.47% of specimens it arising from medial aspect of the wall of the caecum. We also observed that in 3.27% it is from the dependent part of the anterior surface of the wall of caecum in between the two saccules. The length of appendix varied from 8mm to 40mm with average length of 24.10mm and the breadth was 1mm to 6 mm with an average of 2.67mm.

The arterial supply of appendix showed that the appendicular artery origin was mainly as single artery from inferior division of ileocolic artery and the other variations were mentioned in the Table-2. We also found in one of the specimen Single appendicular artery arising from inferior division of ileocolic artery and additional branches to the appendix from posterior caecal artery and ileal artery (Figure-4).

The course of appendicular artery is varied depending on the position of the caecum and appendix. After its origin it is seen running downwards and passing behind the terminal part of the ileum and entering the mesoappendix a short distance from the base of the appendix and lying in the free border of the mesoappendix. In one specimen appendix is completely absent (Figure-5).

DISCUSSION: Caecum and vermiform appendix are developed from a caecal diverticulum which bulges from caudal limb of the mid gut close to the apex of the intestinal loop. The upper part of the diverticulum dilates to form the Caecum, and lower part persists as the narrow tube of the vermiform appendix.

Origin of Appendix: In the present study (Consisting of 62 dead fetuses), appendix is originated from posteromedial aspect of wall of the caecum in 52(85.24%) fetuses, and this finding is correlating with the descriptions of authors Quain,[8] Cunningham,[9] and R.D.Lockhart.[10] In 7(11.47%) specimens the appendix is arising from medial aspect of wall of the caecum. In 2(3.27%) foetuses appendix is originated from dependent part of the anterior surface of the wall of caecum in between two saccules. This finding is in agreement with the description of Hamilton.[11] and Morris.[12]

Position of Appendix: Normally the position of appendix posterior to caecum is due to the disposition of its blood vessels within mesoappendix from the dorsal aspect. A variation in the normal position of the appendix, when inflamed makes the clinical presentation of the appendicitis notoriously inconsistent.[13] As we have already mentioned in the introduction the presentation of signs and symptoms of the acute appendicitis depends on the position of the appendix, the results of our study showed a lot of variation in the percentage of retrocaecal position of the appendix when compared to other authors observations on adult bodies.

(Comparison was given in the Table-3). Our study showed only 29.51% (Retrocaecal) whereas majority of other authors stated that it is the dominant position.[14,15,16,17]

Other striking observation is about the paracaecal position, our study (19.67%) showed significant difference when compared to other researchers work, where they stated that it is seen in only 2% and some have not mentioned about it.[14,15,16,17,18] But the findings of those authors were based on the work done on adult cadavers. Even when we compared our work with the study on fetuses by Setty SNRS.[19] there is difference in percentage of occurrence in retrocaecal position of appendix (54%).

The importance given to the mesoappendix is due the fact that the free border of the mesoappendix carries blood supply to the appendix, because of this reason incomplete mesoappendix may lead to reduced blood supply to the tip of organ making it more prone to become gangrenous and hence early perforation occurs during inflammation.[20] In present study Meso-appendix is complete in 91.8%(56) and in 5(8.19%) foetal specimens it is incomplete, this is coinciding with the descriptions of meso-appendix by the other authors.[4,8,9,10,12,14] But our study is not in consistent with the study of S. Umamaheswar Rao where they found that mesoappendix was found to be complete in only 34% of adult specimens and incomplete in 66%.[21]

In one fetal specimen it is found that appendix is absent. Many authors like Fawcett and Piquard (Quoted in Quain's), Ernest Gardner and Lee McGregor, also discussed about absence of appendix.[8,22,23]

Arterial Supply to Appendix: Appendicular artery, a branch of ileocolic artery is the main blood supply to appendix. Accessory appendicular artery is a branch arising from posterior caecal artery which can lead to significant intra operative and post-operative hemorrhage.[24] Accessory appendicular artery presence was mentioned by Setty SNRS in their research article.[25] in present study 59(96.72%) fetuses revealed that the appendicular artery is arising from inferior division of ileocolic artery as single artery. This finding is in agreement with the description of Morris, Sahana, Hollinshed and woodburne.[12,16,26,27] In 2(3.27%) fetuses, the artery is arising as a branch of ileal artery; similar descriptions were given by Henry Hollinshed, woodburne.[26,27]

In 4 fetuses, an additional branch from ileal artery to the appendix is observed and in another 4 fetal specimens, an additional branch arising from posterior caecal artery is also found. These findings are in accord with the descriptions of Last and Gray.[1,14]

CONCLUSION: In the present study on 62 dead fetal specimens position of appendix is retrocaecal (29.51%), pelvic (24.59%) and paracaecal (19.67%), but our results were not matching with the existing literature were it says retrocaecal is the commonest (upto74%). This may be due to the fact that the literature is mainly based on the findings in adult bodies. The information available regarding the vermiform appendix in fetal bodies is not extensive; hence more studies are required to standardize these aspects in the fetal specimens. Rest of our study is almost in consistent with other authors but with few differences.

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Position of Appendix		Percentage
Retro-caecal		29.51%
Pelvic		24.59%
Para-caecal		19.67%
Splenic	Post-ileal	9.84%
	Pre-ileal	6.55%
Mid-inguinal		6.55%
Promontoric		3.27%

Table 1: Shows position of Appendix

Origin of Appendicular Artery		Present Study in%
Inferior division of I.C.A- Single		96.72%
As a Branch of ileal artery		3.27%
Additional branch	Posterior caecal artery	Present
	Ileal artery	Present

Table 2: Shows origin of Appendicular Artery

Name of the author	Retro-caecal	pelvic	Para-caecal	splenic		Mid-inguinal	Promontoric
				Post ileal	Pre ileal		
Grey.[14]	65.28%	31.01%	-	0.4%	1%	2.26%	-
Datta.[15]	60%	30%	2%	2%		Rare	Rare
S.N. Sahana.[16]	74%	21%	2%	0.5%	1%	1.5%	Rare
Golalipur.[17]	32.4%			2.6%	18.8%		33.3%
Benerjee.[18]	68%	16%			8%	4%	-
S.Das.[4]	70%	25%	2%	1%	1%	2%	-
Present study	29.51%	24.59%	19.67%	9.84%	6.55%	6.55%	3.27%

Table 3: Position of the Appendix in Fetal Specimens

Figure 1: Para-caecal position appendix (A- Appendix).

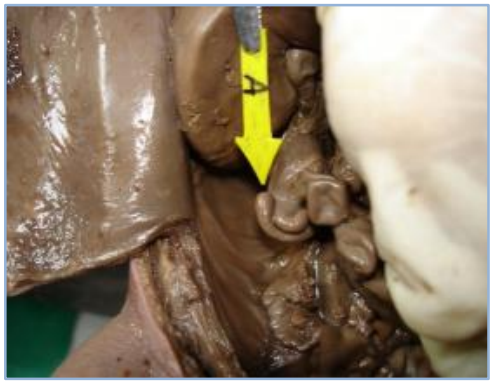

Figure 1

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Figure 2: Pre-ileal positioned appendix (A- Appendix, C- Caecum).

Figure 2

Figure 3: Promontoric positioned appendix and appendix arises from postero- medial aspect of wall of caecum. (A- Appendix).

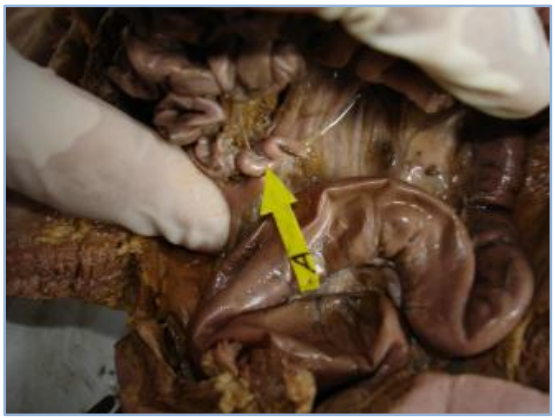

Figure 3

Figure 4: Single Appendicular artery (AA) arises from inferior division of ileocolic artery and additional branches to the appendix from posterior Caecal artery and ileal artery.

Figure 4

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Figure 5: Absent Appendix and Caecum is in the right lumbar region and ileum entry in to Caecum from medial aspect. (C- Caecum, IL- Ileum)

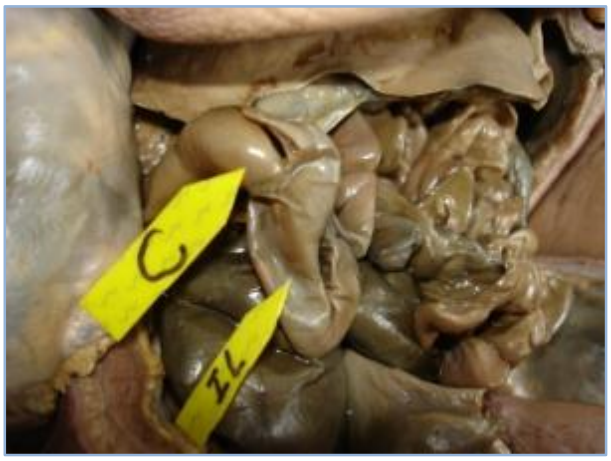

Figure 5

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