

**Original article:**

## **Evaluation of Morphological Variations in the Anatomy of Caecum and Appendix and its Surgical Significance: A Cadaveric Approach**

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### **Abstract**

**Background:** The present study was conducted to assess the Morphological Variations in the Anatomy of Caecum and Appendix.

**Materials and Methods:** A total of 20 adult cadavers were enrolled in the present study. Out of these 20 cadavers, 15 were males and 5 were females. Noting of the position of caecum, appendix and their peritoneal relation was done. Length and width of appendix was measured. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Results:** Length of caecum in males was 3.5 cm while in females was 3.1 cm. position of the caecum was on right iliac fossa in 95 percent of the cases while it was sub-hepatic region in the remaining one case. Shape of the caecum was normal adult type in 90 percent of the cases while in the remaining ten percent, it was conical type. Position of the appendix was right iliac fossa in 95 percent of the cases while in one case, it was sub-hepatic region.

**Conclusion:** The information of the anatomic and morphologic variation of appendix could help the surgeons while manging pathologies of these organs.

**Keywords:** Appendix, Caecum.

### **INTRODUCTION**

The diagnosis of acute appendicitis is predominantly a clinical one; many patients present with a typical history and examination findings. The cause of acute appendicitis is unknown but is probably multifactorial; luminal obstruction and dietary and familial factors have all been suggested.<sup>1</sup> Appendicitis is the most common abdominal emergency and accounts for more than 40 000 hospital admissions in England every year.<sup>2</sup> Appendicitis is most common between the ages of 10 and 20 years, but no age is exempt.<sup>3</sup> A male preponderance exists, with a male to female ratio of 1.4:1; the overall lifetime risk is 8.6% for males and 6.7% for females in the United States.<sup>3</sup> The appendix is nearly always visible with a helical CT scan. It is

claimed that an enlarged appendix with periappendiceal fat stranding is present in 93% of patients with appendicitis but there are additional signs of appendicitis.<sup>4</sup>

Surgeons should be familiar with surgery of the cecum and appendix because the diseases of this region, especially appendicitis, are the most common indications for surgical exploration. Usually, diagnosis of appendicitis and appendectomy are not difficult, but atypical location of the appendix or other anatomic anomalies can make the diagnosis of appendicitis and appendectomy difficult. In cases of atypical anatomy or diffuse clinical picture, especially in young adults or elderly patients, the spectrum of embryologic and anatomic anomalies must be kept in mind to make the correct treatment decision for individual patients. If doubt persists, explorative laparotomy must be performed to avoid overlooking rare, acute, intra-abdominal abnormalities.<sup>5-7</sup> This study was conducted to assess the morphological variations in the anatomy of caecum and appendix.

#### **MATERIALS AND METHODS**

The present study was conducted for assessing the morphological variations in the anatomy of caecum and appendix. A total of 20 adult cadavers were enrolled in the present study. Out of these 20 cadavers, 15 were males and 5 were females. Noting of the position of caecum, appendix and their peritoneal relation was done. Length and width of appendix was measured. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

#### **RESULTS**

Length of caecum in males was 3.5 cm while in females was 3.1 cm. position of the caecum was on right iliac fossa in 95 percent of the cases while it was sub-hepatic region in the remaining one case. Shape of the caecum was normal adult type in 90 percent of the cases while in the remaining ten percent, it was conical type. Position of the appendix was right iliac fossa in 95 percent of the cases while in one case, it was sub-hepatic region.

**Table 1: Variation of position of caecum**

<b>Position</b>	<b>Number</b>	<b>Percentage</b>
<b>Right iliac fossa</b>	19	95
<b>Sub-hepatic fossa</b>	1	5
<b>Total</b>	20	100

**Table 2: Variation of Shape of caecum**

<b>Shape</b>	<b>Number</b>	<b>Percentage</b>
<b>Normal adult type</b>	18	90
<b>Conical type</b>	2	10
<b>Total</b>	20	100

**Table 3: Variation of position of appendix**

Position	Number	Percentage
Right iliac fossa	19	95
Sub-hepatic fossa	1	5
<b>Total</b>	20	100

## DISCUSSION

The appendix in humans is a narrow extension from the terminal end of the cecum, with dimensions of about 10 cm by 7–8 mm, and has an internal (luminal) diameter of 1–3 mm. The appendix has been considered, variably, an evolutionary vestige and a synapomorphy uniting all hominoids (apes and humans). The lack of a known function of the appendix has long been associated with the thought that the human appendix is an evolutionary remnant of a cecum that is utilized to ferment plant material. Charles Darwin, for example, noted the apparent lack of a function of the appendix in humans, and concluded that it must be an evolutionary remnant from a primate ancestor that ate leaves.<sup>5</sup> The arrangement of the alimentary canal derived from the midgut exhibits a wide range of alterations. Generally, as a rule, the large intestine extends from the ileocecal valve to the anus. The cecum descends to its adult position in the right iliac fossa during the establishment of the midgut loop, with a substantial decline in the size of the right lobe of the liver, followed by sequential rotation and fixing. It has an average length of 6 cm and a width of 7.5 cm, and it is surrounded on both sides by the peritoneum.<sup>6</sup> This study was conducted to assess the Morphological Variations in the Anatomy of Caecum and Appendix.

Length of caecum in males was 3.5 cm while in females was 3.1 cm. position of the caecum was on right iliac fossa in 95 percent of the cases while it was sub-hepatic region in the remaining one case. Shape of the caecum was normal adult type in 90 percent of the cases while in the remaining ten percent, it was conical type. Position of the appendix was right iliac fossa in 95 percent of the cases while in one case, it was sub-hepatic region. Data from the previous literature shows that the cecum, with the vermiform appendix, forms the first section of the colon. The pouchlike cecum is approximately 6 cm in length and approximately 8 cm in width and is variable in shape. The cecum shows all distinctive features of the colon, such as teniae, haustra, and fatty epiploic appendices. It is located below the point where the ileum joins the colon. Two incisures, one on the ventral side and one on the dorsal side, are called the ventral and dorsal cecocolic incisures. These incisures delineate the cecum against the ascending colon. Inside of the cecum, these structures correspond to the frenula of the ileocecal valve of Bauhin. The dome-shaped haustrum, located at the lowest position of the cecum in the standing position, forms the bottom of the cecum, the cecal fundus. The teniae join each other at the base of the appendix and form a continuous longitudinal muscular layer on the outside of the appendix (the free tenia leads to the hidden appendix and functions as an appendix pointer). In the range of the orifice of the vermiform appendix, lateral trains of muscle fibers branch from each tenia and mesh intensively with the inner annular muscle layer. Such a meshing of muscle fibers is also present at the apex of the appendix.<sup>7-10</sup> Delić J et al assessed the variations in the position and point of origin of the vermiform appendix. There were investigated variations of appendix vermiformis in the place of

origin and position. The investigations were carried out on 50 human preparations of adults of both sexes, unintentional choice. The position and relation between *intestinum caecum* and *appendix vermiformis* were determined by forensic medical and pathoanatomical autopsy. Place of origin of *appendix vermiformis*, from wall of *intestinum caecum* is determined by anatomical dissection. *Intestinum caecum* has a variable shape and it occurs in two forms: conical, which dominates (56%) and square (44%). It has constant position in *fossa iliaca dextra* in 100% of 50 investigated cases. *Appendix vermiformis* is fully variable organ as for position and the place of origin from the wall of *intestinum caecum*. Dominantly (52%) it has rising position, and two subtypes are present: retrocecal (more expressed-38%) related to the retrocolic subtype (14%). Very frequent position of *appendix vermiformis* is a falling one (32%), in which pelvic position is more frequent (26%) related to descendent position (6%). *Appendix vermiformis* is located subcaecally in 8% of total number of investigated cases, found in three subtypes. It is found out that ostium *appendicis vermiformis* has a variable position in the wall of *intestinum caecum*. It is predominantly placed in the middle of the lower pole of the *intestinum caecum* (58%), in medial wall it is present in 32%, of all investigated, and in the lateral wall in the least number case 10%. The results of these investigations point out how important is to know variable anatomies of *appendix vermiformis*, for the clinical image of acute appendicitis is undoubtedly caused by the variable anatomical relations.<sup>11</sup>

## CONCLUSION

The information of the anatomic and morphologic variation of appendix could help the surgeons while managing pathologies of these organs.

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