

**Original article**

## **Analysis of Variability in the Position of the Tip of Appendix: An Institutional Based Study**

**Shaik Siraj Ahmed<sup>1</sup>, Ajay Reddy A<sup>2</sup>**

<sup>1</sup>Associate Professor, Department of Anatomy, Malabar Medical College Hospital & Research Centre, Modakkallur, Calicut, Kerala, India.

<sup>2</sup>Assistant Professor, Department of General Surgery, Madha Medical College & Research Institute, Chennai, Tamil Nadu, India.

Corresponding Author:

Dr. Ajay Reddy A, Assistant Professor, Department of General Surgery, Madha Medical College & Research Institute, Chennai, Tamil Nadu, India.

Date of Acceptance: 03 August 2013

### **ABSTRACT**

**Background:** The appendix, or vermiform appendix, is a routinely evaluated structure during emergency imaging. 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. Hence, the present study was conducted for evaluating variability in the position of the tip of appendix.

**Materials & Methods:** The present study was conducted for evaluating variability in the position of the tip of appendix. A total of 100 cadaveric bodies were included. During the autopsy, the appendix's anatomical placement was discovered. One of the writers assessed the length of the appendix in millimeters using a ruler, while another measured the mesoappendix's completeness. The corpses' age was documented using their identity certificate, and their sex was ascertained using the phenotypic that was seen.

**Results:** There were 56 males and 46 females. Anatomical locations of the appendix were as follows: pelvic in 60 percent, subcaecal in 15 percent, retroileal in 12 percent, retrocecal in 8 percent, ectopic in 3 percent, and preileal in 2 percent. In 55 percent of the cases, appendix length was between 80 to 119 mm.

**Conclusion:** The diagnosis of acute appendicitis may be made more quickly and easily due to the high prevalence of anterior location and full mesoappendix.

**Key words:** Position, Tip, Appendix.

### **INTRODUCTION**

The appendix, or vermiform appendix, is a routinely evaluated structure during emergency imaging. Etymology derives from the Latin "vermiform" which translates to "worm-shaped," its common morphological appearance. Its endocrine cells produce amines and hormones to assist with various biological control mechanisms, whereas the lymphoid tissue is

involved with maturation of B lymphocytes and production of IgA antibodies [s-3 ml of mucus daily. Emergency radiologists need to identify and evaluate the appendix.<sup>1,2</sup>

Knowledge of the variations in the position of the vermiform appendix is important because, in appendicitis, its variable positions may produce variable symptoms and signs which mimic other diseases. Further, understanding of these variations is important during other intra-abdominal procedures. The length of the vermiform appendix is important in influencing the differential diagnosis of acute abdomen.<sup>3,4</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>

According to the literature, the appendicular artery originates from the iliac ramus in 35% of cases, from the division of the ileocolic artery in 28% of cases, from the anterior cecal artery in 20% of cases, from the posterior cecal artery in 12% of cases, from the ileocecal artery in 3% of cases, and from the ascending colic ramus in 2% of cases. The veins accompany the arteries. Drainage of the lymph is provided by the ileocolic lymph nodes, located along the superior mesenteric artery, and by celiac nodes into the cisterna chyli (Pecquet's reservoir). Near the ileocolic valve, some minor lymphatic nodes, called the prececal and retrocecal nodes, lie directly under the serous membrane of the cecum.<sup>6</sup> Hence; the present study was conducted for evaluating variability in the position of the tip of appendix.

#### **MATERIALS & METHODS**

The present study was conducted for evaluating variability in the position of the tip of appendix. A total of 100 cadaveric bodies were included. There were 56 males and 46 females. Excluded from the research were cases with severe burns, deteriorated or disintegrated cadavers, cadavers with congenital abnormalities, abdominal surgeries, intestinal distension, peritonitis, and any other condition that may alter the anatomical location of the appendix. During the autopsy, the appendix's anatomical placement was discovered. One of the writers assessed the length of the appendix in millimeters using a ruler, while another measured the mesoappendix's completeness. The corpses' age was documented using their identity certificate, and their sex was ascertained using the phenotypic that was seen.

#### **RESULTS**

The present study was conducted for evaluating variability in the position of the tip of appendix. A total of 100 cadaveric bodies were included. There were 56 males and 46 females. Anatomical locations of the appendix were as follows: pelvic in 60 percent, subcecal in 15 percent, retroileal in 12 percent, retrocecal in 8 percent, ectopic in 3 percent, and preileal in 2 percent. In 55 percent of the cases, appendix length was between 80 to 119 mm.

**Table 1: Anatomic location**

Location	Number	Percentage
Pelvic	60	60
Subcaecal	15	15
Retroileal	12	12
Retrocecal	8	8
Ectopic	3	3
Preileal	2	2
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 2: Appendix length**

Appendix length	Number	Percentage
Less than 40 mm	2	2
40 to 79 mm	30	30
80 to 119 mm	55	55
More than 119 mm	13	13
<b>Total</b>	<b>100</b>	<b>100</b>

## DISCUSSION

The appendix can have a variable length, ranging from 5 to 35 cm, average of 9 cm. The origin is relatively constant, typically arising near the ileocecal valve, from the posteromedial cecal border or from the cecal fundus. From there, the appendix can have a variable course, retrocecal being most common. Alternative routes include retroileal, preileal, pelvic, cross midline, and as far as into the hepatorenal recess.<sup>8-10</sup> New research on the vermiform appendix has shed light on its function. In further understanding the function of the appendix, this information should not negatively impact the clinical judgment in the event of appendicitis. Although the appendix and its pathology have been noted for centuries, it still presents a challenge in the operating room. The most common emergency surgical procedure performed is an appendectomy. Its highly variable position within the abdomen can cause confusion for clinicians. However, improved imaging modalities have heightened the physician's ability to diagnose disease of this organ.<sup>11</sup> Hence; the present study was conducted for evaluating variability in the position of the tip of appendix.

The present study was conducted for evaluating variability in the position of the tip of appendix. A total of 100 cadaveric bodies were included. There were 56 males and 46 females. Anatomical locations of the appendix were as follows: pelvic in 60 percent, subcaecal in 15 percent, retroileal in 12 percent, retrocecal in 8 percent, ectopic in 3 percent, and preileal in 2 percent. In 55 percent of the cases, appendix length was between 80 to 119 mm. In a previous study conducted by Ramsden WH et al determined the relationship between McBurney's point and the appendix on 275 double contrast barium enemas (DCBE). A wide spread of distribution of the site of the appendix base was seen. Only 35% of appendix bases were found to lie within 5 cm of McBurney's point, and 15% were more

than 10 cm distant. Seventy-five per cent of appendix bases were below and medial to a line joining the umbilicus with the right ASIS. These findings are in agreement with world-wide studies conducted by the World Organisation of Gastroenterology which showed that less than half of all patients with appendicitis have tenderness maximal over McBurney's point. A record was also made in 93 cases of the position of the appendix in relation to the caecum.<sup>7</sup> Ahmed I et al `determined the frequency of the various positions of the appendix at laparoscopy. The positions of the appendix and the caecum were determined after insertion of the laparoscope, prior to any other procedure and the relative frequencies calculated. A total of 303 (102 males and 201 females) patients with a median age of 52 years (range 18-93 years) were studied. An emergency appendectomy was performed in 67 patients, 49 had a diagnostic laparoscopy, 179 underwent a laparoscopic cholecystectomy and eight had other procedures. The caecum was at McBurney's point in 245 (80.9%) patients, pelvic in 45 (14.9%) and high lying in 13 (4.3%). The appendix was pelvic in 155 (51.2%) patients, pre-ileal in 9 (3.0%), para-caecal in 11 (3.6%), post-ileal in 67 (22.1%) and retrocaecal in 61 (20.1%) patients. Contrary to the common belief the appendix is more often found in the pelvic rather than the retrocaecal position. There is also considerable variation in the position of the caecum.<sup>11</sup>

### CONCLUSION

The diagnosis of acute appendicitis may be made more quickly and easily due to the high prevalence of anterior location and full mesoappendix.

### REFERENCES

1. Yeo. Shackelford's surgery of the alimentary tract. 6. Saunders; Philadelphia: 2007.
2. Schumpelick V, Dreuw B, Ophoff K, et al. Appendix and cecum: embryology, anatomy, and surgical applications. *Surg Clin North Am.* 2000;80(1):295–318.
3. Paul U. K., Naushaba H., Alam M. J., Begum T., Rahman A., Akhter J. Length of vermiform appendix: a postmortem study. *Bangladesh Journal of Anatomy.* 2011;9(1):10–12.
4. Banerjee A., Kumar I. A., Tapadar A., Pranay M. Morphological variations in the anatomy of caecum and appendix—a cadaveric study. *National Journal of Clinical Anatomy.* 2012;1(1):30–35.
5. Pittman-Waller V. A., Myers J. G., Stewart R. M., et al. Appendicitis: why so complicated? Analysis of 5755 consecutive appendectomies. *American Surgeon.* 2000;66(6):548–554.
6. Lippert H, Papst R Arterial Variations in Man. Miinchen, JF Bergmann, 1995.
7. Ramsden W. H., Mannion R. A. J., Simpkins K. C., deDombal F. T. Is the appendix where you think it is—and if not does it matter? *Clinical Radiology.* 1993;47(2):100–103
8. Spalluto LB, Woodfield CA, DeBenefectis CM, Lazarus E. MR imaging evaluation of abdominal pain during pregnancy: appendicitis and other nonobstetric causes. *Radiographics.* 2012;32(2):317–334.
9. Nikolaidis P, Hwang CM, Miller FH, Papanicolaou N. The nonvisualized appendix: incidence of acute appendicitis when secondary inflammatory changes are absent. *Am J Roentgenol.* 2004;183(4):889–892.
10. Simonovsky V. Sonographic detection of normal and abnormal appendix. *Clin Radiol.* 1999;54(8):533–539.

11. Ahmed I, Asgeirsson KS, Beckingham IJ, Lobo DN. The position of the vermiform appendix at laparoscopy. *Surg Radiol Anat.* 2007;29(2):165-168. doi:10.1007/s00276-007-0182-8.