



VARIATION IN ANATOMICAL POSITION OF VERMIFORM APPENDIX AMONG POPULATION OF GWALIOR REGION: A CADAVERIC DISSECTION BASED STUDY

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ABSTRACT

Vermiform appendix is a tubular worm like structure and has different anatomical positions and length. Knowledge of different anatomical positions of appendix is important for the surgeons for making clinical diagnosis and management of acute appendicitis. The aim of present study is determination of these variations of vermiform appendix among Gwalior region population. The present study was conducted on 100 cadavers in last five years duration, in department of Anatomy, G.R. Medical College, Gwalior (M.P.). In this study, the different anatomical positions of the appendix were pelvic, subcecal, retroileal, retrocecal, ectopic, and preileal in 62%, 18%, 10%, 5%, 3%, and 1% of the bodies, respectively. In one cadaver the appendix was congenitally absent. The mean length of vermiform appendix was 91.2 mm and 80.3 mm in men and women, respectively. No association was found between sex and anatomical position of vermiform appendix. Anterior anatomical position was the most common position for vermiform appendix. It is inconsistent with most related reports from western countries. It might be possible that some factors, such as race, geographical changes, and dietary habits, play roles in determining the position of vermiform appendix.

KEYWORDS :

1. INTRODUCTION

Vermiform appendix is a tubular worm-like structure of the digestive tract which usually lies in right lower quadrant of abdomen. It arises during embryological life from the posteromedial wall of the cecum, about 2 cm below the ileocecal valve¹. The first comprehensive study made of the position of the appendix was completed by Gladstone and Wakeley in 1924, who studied 3000 anatomic dissections. Previous to this, other authors had stated their belief, from observations at necropsy or operation, that the majority of appendices are situated anteriorly and that they are free and hang over the brim of the pelvis¹. Though a remarkably constant structure in man, the appendix is nevertheless occasionally subject to the extremes of variation, that is, total suppression and duplicity. Its length varies from 2 to 20 cm, in average 9 cm². The base of appendix is connected to the cecum, but its tip can be placed in different situations. The different positions are based and classified according to the tip of appendix and categorized into six locations: retrocecal, pelvic, subcecal, preileal, retroileal, and ectopic^{3,4,5,6}.

Acute appendicitis is the most common cause of acute abdomen among young patients. However it may also be seen in any age group⁴. Some studies have shown that age, race, sex, geographic region, and diet can affect the position of appendix³. Mortality rate of nonperforated appendicitis is 0.1% which is slightly higher than the mortality rate of a general anesthesia. But, the mortality rate in perforated appendicitis is about 3%, while it may be as high as 15% in the elderly population⁴. Dejanlić et al. have evaluated 65 patients who underwent open appendectomy in Serbia. They have reported pelvic position as the most common position for vermiform appendix (57.71%) and paracecal as the least one (3.07%)⁷.

Acute appendicitis is mainly diagnosed by medical examination and clinical evaluation. There is no definitive diagnostic laboratory test or imaging⁸. Knowing common position(s) of the appendix helps on-time diagnosis of acute

appendicitis. Variable positions of the appendix may mislead physicians to make a wrong decision or diagnosis of other diseases. Delayed diagnosis of acute appendicitis may lead to its perforation and subsequent abscess or peritonitis. So, accurate information about the anatomical location of appendix can improve prognosis of the disease.

The present study was performed to determine the anatomical positions of the appendix and its length as well as their relationship with age and sex on the cadavers.

2. MATERIALS AND METHOD

The present study was conducted on 100 bodies (76 males and 24 females). They were randomly selected from the cadavers present in department for dissection purposes. They were from different ages and sexes. The inclusion criteria were cadavers in the department which belongs to Gwalior region only and donated for study and research purposes. Disintegrated cadavers, decomposed cadavers, cadavers with congenital anomalies, old or new abdominal surgery, and any reason which might change the anatomical position of the appendix were excluded from the study. Anatomical location of the appendix was determined during dissection. Appendix length was measured in millimeters with a ruler by one of the authors. Sex of the bodies was determined based on the observed phenotype, and their age was recorded based on their identity document. The collected data was analyzed using SPSS software version 16.0. We used descriptive parameters and chi-square test for analysis and reporting of the results.

3. RESULTS

This study was done on 100 bodies: 76 of them (76%) were male and 24 (24%) were female. The mean age of the study population was 39.3 years.

According to the results, anatomical locations of the appendix were as follows: pelvic in 62 individuals (62%), subcecal in 18 individuals (18%), retroileal in 10 individuals (10%), retrocecal in 5 individuals (5%), ectopic in 3 individuals (3%), and

preileal in 1 individuals (1%). In one cadaver the appendix was congenitally absent. The most common anatomical location was pelvic location for both sexes. Subcecal, retroileal, retrocecal, ectopic, and preileal locations were in the following places in both sexes, respectively. No anatomical position of the preileal was observed in female population.



The minimum length of appendix was 18 millimeters and its maximum length was 176 millimeters. The average length of appendix was 91.2 mm for men and 80.3 mm for women. When appendix was classified according to its length, the most individuals lie in length range from 80 to 119 mm.

Table 1: Frequency Distribution (Percent) Of Appendix Length.

Length	Appendix Absent	<40 mm	40-79 mm	80-119 mm	>119 mm
Frequency (%)	1%	2%	28%	54%	15%

Table 2: Association Between Length of Appendix and Age.

Length of appendix (mm)				
	<40	40-79	80-119	>119
Age in years				
<10	1	5	1	1
11-19	0	2	1	2
20-39	1	13	24	6
40-54	0	3	9	4
>55	1	7	14	4

In this study, a significant association was found between the appendix length and different age groups (P value < 0.001). Appendix length was significantly greater in men (P value = 0.01).

4. DISCUSSION

In our study, the most common position of appendix was pelvic position and the least common position was preileal. Our findings were similar to studies of Katzurski et al⁹, Ojeifo et al.¹⁰, Rahman et al.¹¹, and Paul et al.¹². However, there are some different findings in other studies. L. Ajmani and K. Ajmani in India¹³, Ojeifo et al. in Bosnia¹⁰, and Clegg-Lampthey et al. in Ghana¹⁴ have reported that the most common position of appendix is retrocecal and pelvic. It seems that many factors, including race, are involved in determining the position of the appendix. Our findings were similar to studies of Denjalić et al.⁷ and Gholalipour et al., conducted in Iran¹⁵, who have evaluated the patients in surgery ward, study of Yabunaka et al.¹⁶ who have evaluated the size of appendix by sonography, and study of Ahmed et al.¹⁷ who have estimated the appendix size during therapeutic laparotomy. The most common position of appendix has been pelvic position in all of these studies. Variable positions of vermiform appendix may have

an effect on the diagnosis of appendicitis, which is one of the most common causes of acute abdomen¹⁸.

If the location of appendix was viewed in relation to the cecum, it can be divided into anterior (pelvic and pre- and retroileal) or posterior (retrocecal and paracecal) locations⁵. The anterior location of appendix was seen in more than 75% of our studied population. So, early diagnosis of appendicitis and shorter duration of surgery and hospitalization are expected among Iranian patients. This can reduce the complications of appendicitis surgery⁸.

Pelvic position is the most common location of the appendix in both males and females. Its frequency was 32 (67%) in female population and 80 (52.2%) in male population. It indicates that pelvic location is most frequently seen in females. On the other hand, it has been hypothesized that the vermiform appendix is a mobile organ whose position may change with various situations⁶.

In our study, the length of the appendix was longer in men than in women. It is similar to studies of Katzurski et al.⁹, Gholalipour et al.¹⁵, and L. Ajmani and K. Ajmani¹³, but contrary to studies of Bakheit and Warille¹⁹ and Rahman et al.¹¹ that have reported that length of the appendix in women is longer than in men. Searle et al. believes that after an initial growth period during early infancy up to about 3 years, the appendix achieves its adult proportions and does not continue to grow throughout childhood²⁰. However, we found that individuals with older age have longer length of the appendix.

We showed that frequency of incomplete mesoappendix is highest in the age group below 10 years. Incomplete mesoappendix may reduce blood supply to the tip of the appendix and make it prone to gangrene and perforation. It may imply poor outcome of acute appendicitis in children. Incomplete mesoappendix could be one of the reasons of the severity of appendicitis in childhood.

In conclusion, high incidence of anterior position and complete mesoappendix in our population entail that diagnosis of acute appendicitis could be sooner and easier in our population and its complications, such as perforation and gangrene, might be less than other populations. Also, the duration of open or laparoscopic surgery and patients' hospitalization are expected to be reduced.

5. Conflicts of Interest

There is no conflict of interests.

6. REFERENCES

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