



Anatomical Deviations in the Position of Vermiform Appendix – Cadaveric Study

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Abstract

Back ground

Vermiform appendix is the only organ in the body that has no constant anatomical position. It is so named because of its worm like appearance. Most common surgical cause of abdominal pain is appendicitis; its diagnosis is affected by anatomical variations of the vermiform appendix, because this is the most variable abdominal organ in terms of position and organ relations.

Objectives

To examine anatomical features and different positions of the vermiform appendix in human cadavers.

Methods

This study was carried on 45 human cadavers irrespective of sex and age from the Department of Anatomy at over a periods of 12 months.

Results

Mean length of appendix was found to be 3.98 ± 1.27

cm. Mean outer girth was 2.17 ± 0.26 cm. Mean distance of Vermiform Appendix from ileocaecal junction was found to be 2.11 ± 0.43 cm. Commonest position was retrocaecal (44%), followed by pelvic (21 %), postileal (9%), subcaecal (13%) and midinguinal (10%).

Conclusion

Variations in position of vermiform appendix will help the surgeons to make a diagnosis of appendicitis and aware about appendiceal rupture.

Keyword

Vermiform Appendix, Cadavers, Different Positions.

Introduction

The vermiform appendix is a narrow worm like diverticulum which arise from the posteromedial wall of the caecum about 2cm below the ileocecal junction and has no constant position. The length of appendix

varies from 2 to 20cms with an average of 9cm¹. The vermiform appendix is considered as a vestigial organ occupying variable positions. Acute appendicitis is the most common cause of acute abdomen in young adolescents and it is often the first major surgical procedure performed by a surgeon in training^{2,3}. The appendix usually lies in the right iliac fossa. The base of appendix is fixed whereas the remaining part may occupy any of the following positions which indicated with an hour hand of a clock. Retrocaecal (12 o'clock), Pelvic (4 o'clock), Subcaecal (6 o'clock), Preileal & Post ileal (2 o'clock), Promonteric (3 o'clock) positions. But there is no definite rule about the position of the vermiform appendix. It is thought that the position appendix is closely related to development of caecum and is highly variable⁴. A thorough knowledge of normal anatomy and variations in the position of appendix is the important for the surgeons while performing surgery such as appendectomy.

With this rationale in mind, this study has been undertaken to investigate certain anatomical features and different positions of the vermiform appendix and caecum in cadavers.

Methods

Fourty five (45)cadavers allotted to MBBS students were selected . The study was conducted at Department of Anatomy. Both male and female cadavers were included in the study. The present study was undertaken inform march 2020 to February 2022. The sample size was 45 adult human cadavers irrespective of age and sex from dissection hall of Anatomy department. Specimen were cleaned by routine dissection method and cleared specimen were brushed with the solution of acetone. Appendices were identified by tracing the taeniae coli on the external surface of colon and caecum and then positions of

appendix were noted. Photographs of the selected specimens taken at suitable magnification and specimens preserved in 10% formalin jars. The vermiform appendix was located by following the anterior taenia coli and its position was determined. Based on position, the appendix was categorized into retrocaecal, pelvic, preileal, postileal, paracolic, subcaecal and paracaecal groups. Photographs were taken of cadaveric appendix specimens. The length of the appendix from the base to the tip was measured with the help of thread. Thread's length was measured by measuring scale and the values were recorded.

Statistical Analysis

Data was entered in MS Excel 2010 and analyzed using SPSS 18.0.

Results

The following observations were made in specimens taken from 45 human cadavers irrespective of age and sex. Mean length of appendix was found to be 3.98 ± 1.27 cm. Mean outer girth was 2.17 ± 0.26 cm. Mean distance of Vermiform Appendix from ileocaecal junction was found to be 2.11 ± 0.43 cm. Position of appendix: Retrocaecal/retrocolic, Pelvic, Subcaecal, Pre ileal, Postileal and Midinguinal. Photograph 1-4 showing various position of appendix. Commonest position of appendix noted is retrocaecal / retrocolic [34%] followed by pelvic position [28%], post ileal [17%], subcaecal [11%] and midinguinal [8%]. We had not noted any pre ileal position or any ectopic position of appendix (table 1).

Discussion

The vermiform appendix has base, body and tip. Base of appendix has constant relationship with caecum, i.e on posteromedial aspect of caecum 2cm below ileocaecal opening but the tip can point in various directions and depending on the position of tip

appendix.

Moreover, a retrocaecal appendix may lie behind a caecum distended with gas and thus it may be difficult to elicit tenderness on palpation in the right iliac region. Irritation of the psoas muscle conversely may cause the patient to keep the right hip joint flexed (psoas sign). An appendix hanging down in the pelvis may result in absent abdominal tenderness in the right lower quadrant but deep tenderness may be experienced just above the pubic symphysis. In pelvic appendicitis, diarrhea results from an inflamed appendix being in contact with rectum. Rectal or vaginal examination may reveal tenderness of the peritoneum in the pelvis on the right side. An inflamed appendix when it is in contact with the urinary bladder may cause increased frequency of micturition. If such an inflamed appendix perforates, a localized pelvic peritonitis may result. Long retrocolic inflamed appendix also called sub hepatic appendix and it causes confusion with cholecystitis. In retrocaecal and retrocolic variety of appendix, the chances of gangrenous complication are more because in these cases blood vessels get kinked. In preileal position appendix directs towards the spleen and if it becomes inflamed it is liable to result in general peritonitis and is the most dangerous position. Postileal appendix called missed appendix is common in children and in early adult life. Postileal inflamed appendix may cause diarrhea. Perforation of the appendix or transmigration of bacteria through the inflamed appendicular wall results in infection of the peritoneum of the greater sac. Inflammation of atypically located vermiform appendix may initiate inflammation of other organs which leads to diagnostic errors and life threatening complications^{17,18}

Ojeifo Jo et al [1989]⁸, Liucid et al [1997]⁹ and R J Last [2006]¹⁰ described retrocaecal/ retrocolic as

commonest position with frequency ranging from 58 to 65%. In the present study retrocaecal/ retrocolic is the commonest position with 38% frequency.

Katzurskj M.M et al [1979]¹¹ and Gotalipour M et al [2003]¹² mentioned pelvic as common position of appendix. In the present study it is second common position with 28% frequency. In the present study subcaecal position [10%] was comparable with Solanke [11.2%] and Gotalipour [12.8%]. No pre ileal position of appendix noted .

Midinguinal position described as rare by all authors, but in the present study the occurrence was 4%.

Solanke [1970] observed ileocaecal position in 29.2% and in the present study post ileal position was 20%. Wakeley [1933] mentioned ectopic position in 0.05%, in the present study no such position noted. Buschard & Kjaddgaard [1973]¹³ mentioned anterior positions more frequent i.e pelvic and ileocolic than posterior positions i. eretrocaecal and subcaecal type which is comparable with the present study.

Average length of appendix was 5.93 cm with range from 2.8 cm to 12 cm. Length of the vermiform appendix varies from 2 cm to 20 cm, with an average length of 9 cm¹³. Ajmani and Ajmani (1983) found average length of the appendix as 9.5 cm in male and 8.7 cm in female¹⁴. Thus, in the present study length of vermiform appendix was comparable to the study conducted by previous authors.

In our study , average outer girth of appendix was 2.8 cm with range from 1.4 cm to 5.3 cm. Distance of vermiform appendix from the ileocaecal junction varies from 2 cm - 3 cm, with an average of 2.5 cm¹⁵. The origin of appendix is about 2.5 cm below the ileocaecal valve from the posteromedial aspect of caecum¹⁶.

Therefore, both the outer girth and distance of vermiform appendix from the ileocaecal junction in the present study outer girth of appendix was comparable to the study conducted by previous authors.

In human beings due to lack of definition of its true function, the vermiform appendix was considered as a rudimentary and vestigial organ. But if the position, length, outer girth and distance from ileocaecal junction of vermiform appendix are detected, it will help to decrease the complications of appendicular pathology¹⁷.

Conclusion

This study was carried out in 45 human cadavers irrespective of age and sex. With reference to position of appendix the commonest position was retrocaecal or retrocolic (34%) followed by pelvic (28%). It is to be noted that pre ileal appendix was not observed in the present study. Therefore, it is very important for the surgeons to be aware of the possible variations in the positions of vermiform appendix, which may pose challenging, diagnostic and therapeutic problems while doing many abdominal surgeries.

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Table 1: Displaying the different position of appendix

Position of Appendix	No. of Specimens	Percentage%
Retrocaecal/ Retrocolic	12	34
Pelvic	10	28
Post ileal	6	17
Pre ileal	-	-
Midinguinal	3	8
Subcaecal	4	11

Photographs 1 & 2: Showing the Retrocaecal and Pelvic Position of Appendix



Photographs 3 & 4: Showing the Postileal and Subcaecal Position of Appendix

