ORIGINAL ARTICLE

A Study of Anatomical Positions of Vermiform Appendix in Human Cadaver

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Abstract

Background *Vermiform appendix is considered as a vestigial structure situated in right iliac fossa. It is long and narrow tubular structure with small lumen that is blocked at the end and suspended my mesoappendix. It basically consists of lymphoid follicles present between mucosa and muscle layer. The position of appendix is found to be variable in population and the study of these variations helps in correct interpretations of CT and MRI scans done in cases of appendicitis and during surgical procedures.* ***Methods****: The study was done in the Department of Anatomy, Rajiv Gandhi Institute of Medical Sciences, RIMS, Adilabad. A total of 28 human Cadavers were dissected in the Anatomy and variations of the presentations were studied. The study included 21 (75%) male and 7 (25%) female cadavers.* ***Results:*** *The positions of appendix were detected by dissection; the most common position of appendix was pelvic position in male was in 11 (52.38%) of the total 21 male cadavers. In female cadavers 3 (42.86%) of the total 7 cadavers studied were having the pelvic presentation. Therefore pelvic presentation was found in 50% of all cadavers studied. The lengths of appendices were measured from the base of the appendix to the tip of the appendix and in males the minimum length was found to be 4.5 and maximum length was found to be 7.5 cms. The Mean length of the male was found to be 5.95 ± 0.92 cms. Similarly in female cadaver the minimum length was found to be 4.5 cms and maximum length was found to be 6.0 cms and the Mean length of all the cases was found to be 5.5 ± 0.48 cms.* ***Conclusion****: Appendix has great variations in different races and communities. It was observed in this group of population that most common presentation was pelvic type and the relations of all the appendices dissected was same no abnormalities were found. Appendicitis is not an uncommon condition and requires surgery. General surgeons and practitioners must have the knowledge about variations and presentations of appendix for better surgical outcomes.*

Keywords*: Anatomical Positions, Vermiform Appendix.*

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Introduction

Vermiform appendix is a part of gastrointestinal tract located in right iliac fossa. There is no definite rule about the position of vermiform appendix and vermiform appendix is closely related to the development of caecum. [1] The attachment of base of appendix to the caecum remains constant, the tip has variable positions ranging from retrocaecal, pelvic, sub caecal, paracolic, ileal and post ileal position. It is connected by the short mesoappendix to the lower part of ileal mesentery. The mesoappendix has a free border which carries the blood supply to the organ, by the appendicular artery, a branch from the ileocolic artery. [2] The first comprehensive study on appendix was undertaken by Gladstone and Wakeley, studied 3000 anatomic dissections in 1924. Prior to this, other authors had stated their belief, from observations at necropsy or operations, that the majority of appendixes are situated anteriorly and that they are free and hang over the brim of pelvis. Its length varies between 2 to 20 cms average 9 cms. [3] The base of appendix is connected to the caecum, but its tip can be placed in different directions. The diversity of directions is categorized into six

locations: Retrocaecal, Pelvic, Subcaecal, Pre Ileal, postileal, inguinal and Ectopic. [4-6] Acute Appendicitis is one of the important causes of acute abdomen that may require surgical intervention. Acute inflammatory changes from appendix may initiate inflammation of other organs which leads to diagnostic errors and life-threatening complications that it can cause. [4] One of the oldest Diagnostic methods over 100 years back was the McBurney's point. This is located at the junction of lateral 1/3rd and Midial 2/3rd of a line joining the umbilicus with right anterior superior iliac spine. In order to test its validity, the relationship between McBurney's point and the appendix was determined in 275 cases. Only in 35% of appendix bases were found to lie within 5 cms of McBurney's point and 15% were more than 10 cms distance. 75% of the appendix bases were below and medial to a line joining the umbilicus with right anterior superior iliac spine. [7] Therefore since the position of appendix is variable, the site of tenderness and pain may be misleading. [8] With this background we in the present study tried to study the positions of appendix in human cadavers in this area.

Materials and Methods

The study was done in the Department of Anatomy, Rajiv Gandhi Institute of Medical Sciences, RIMS, Adilabad. A total of 28 human Cadavers were dissected in the Anatomy and variations of the presentations were studied from 2008 to 2018. The study included 21 (75%) male and 7 (25%) female cadavers.

Briefly, dissection was done by vertical incision from the Xiphisternum to public symphysis is given after abdomen is opened, the stomach is identified, the greater omentum is reflected. The caecum and appendix are traced. The anterior relations are noted the position of an appendix is confirmed by the direction of the tip of the appendix. The mesentery is cleaned and ileocolic artery identified. The branches of the ileocolic artery, namely superior and inferior divisions are traced. The branches of the inferior division of ileocolic artery are dissected. The presence of recurrent appendicular artery and accessory appendicular artery, of the mesoappendix, is noted. After lifting the caecum, posterior relations are also observed. Mesoappendix is cut and an appendix is straightened and the length of the appendix is measure from base to apex. The circumference of the appendix at the base is measured with a thread and then measured on a scale. The diameter is calculated; the length of the caecum and the length of the ascending colon is measured and noted. The lateral wall of caecum is opened and the appendicular orifice is noted and variations if present are noted.

Results

In this 10 year study the number of cadavers dissected were 28 and of the total 28 male were 21 (75%) and female cadavers were 7 (25%).The positions of appendices were detected by dissection; the most common position of the appendix was pelvic position in male was in 11 (52.38%) of the total 21 male cadavers. In female cadavers, 3 (42.86%) of the total 7 cadavers studied were having the pelvic presentation. Therefore pelvic presentation was found in 50% of all cadavers studied. The next common presentation of the appendix was Retrocaecal in 5(17.85%) of the total number of cases studied followed by Postileal position studied in 4 (14.28%) of the cases. Numbers of cases of subcaecal were in 3 (10.71%) cadavers and Pre ileal position was seen in 2 (7.1%) cases see (table 1)

Table 1: **Positions of appendices**

Position	Male	Female	Total	%
Retrocaecal	3	2	5	17.85
Subcaecal	2	1	3	10.71
Pelvic	11	3	14	50
Post ileal	3	1	4	14.28
Pre ileal	2	0	2	7.1
Total	21	7	28	100

The lengths of appendices were measured from the base of the appendix to the tip of the appendix and in males, the minimum length was found to be 4.5 and maximum length was found to be 7.5 cms. The Mean length of the male was found to be 5.95 ± 0.92 cms. Similarly in female cadaver studied the minimum length was found to be 4.5 cms and maximum length was found to be 6.0 cms and the Mean length of all the cases was found to be 5.5 ± 0.48 cms given in table 2.

Figure 1 & 2: The positions of appendix in dissected specimens

Table 2: Lengths of appendices

	Male			Female		
	Min [cms]	Max [cms]	Average	Max [cms]	Min [cms]	Average
Retrocaecal	4.5	7.5	5.83	5.5	6.0	5.75
Retrocolic	5.0	7.0	6	5.5	5.5	5.5
Pelvic	4.5	7.5	6.13	4.5	5.5	5
Post ileal	4.5	6.5	5.5	5.5	5.5	5.5
Pre ileal	5.5	6.0	5.75	-	-	-
Mean ± SD	5.95 ± 0.92			5.5 ± 0.48		

Discussion

In the present study, the most common type of presentation of the appendix was found to be Pelvic type in 50 % of cadavers. The lowest presentation was Preileal 7.1%. Our study was in agreement with findings by other authors in the same area. [9-13] In a study by Ajmani ML *et al*; in a study in Uttar Pradesh (UP), India found the commonest presentation to be Retrocaecal. They also found the average length of an appendix to be 9.5 cms in male and 8.7 cms in the female. [14] In this study we found the average length of an appendix in a male cadaver to be 5.95 cms and female cadaver to be 5.5 cms. These variations could be due to the different geographical location in India. This study was conducted in Adilabad of Telangana state of South India. Sheela D Kadam *et al*; in the Karad District of Maharashtra state in India found the most common presentation was pelvic 68.4% and the average length 5.42 cms. [15] These findings were consistent with our findings. Arindom Banerjee *et al;* studied morphological variations of caecum and appendix in 25 Adult cadavers and found that in 24 cases the appendix was situated in right iliac fossa and in 1 case in sub hepatic region. The length of the appendix was 6.3 cms. Meso appendix was complete in 4 cases and remained short in 21 cases. The tip of the appendix was retrocaecal in 68% of cases, ileal in 8%, Prometric in 16%, mid-inguinal in 4%, and sub hepatic in 4% of cases. [16] AbuBakar SM *et al*; in 56 postmortem cases of age ranging from 18-67 years found the most common position of the appendix was retrocolic 53.5%, followed by pelvic in 30.3%, post-ileal in 12.5%, and sub caecal in 3.5% of cases. [17] Tofighi H *et al;* studying in Iranian cadavers found the anatomical position of an appendix to be pelvic type in 55.8% of cases agreeing with findings in the present study. [9] Ojeifo *et al*; [11] in Bosnia and Clegg Lamptey *et al*; [18] in Ghana the most common position of appendix were retrocaecal and pelvic. It, therefore, appears that there are many factors involved in determining the position and the size of appendices particularly the ethnicity of the population.

Conclusion

Appendix has great variations in different races and communities. It was observed in this group of population that most common presentation was pelvic type and the relations of all the appendices dissected were same no abnormalities were found. Appendicitis is not an uncommon condition and requires surgery.

General surgeons and practitioners must have the knowledge about variations and presentations of appendix for better surgical outcomes.

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References

1. Moore KL, Dalley AF. Clinically oriented anatomy. 4th ed. Philadelphia: Williams and Wilkins 1999;350-54.
2. Golalipour MJ, Arya B, Azarhoosh R, Jahanshahi M**.** Anatomical variations of vermiform appendix in south-east caspion sea. J Anat Soc India 2003; 52(2):141-43.
3. S. Standing H, Ellis JC, Healy, D Johnson, A Williams, P Collins, Gray's anatomy. In Alimentary System, Churchill Livingstone, New York, NY, USA, 39th edition, 2005; 1189-90.
4. Schwartz SJ. Shires GT. Spencer FC. Daly JM. Fischer JE. Galloway AC. Principles of surgery Schwartz. In: The Appendix 7th edn; Vol 3. MC Graw-Hill. Philadelphia 1999; :1383-85.
5. Sabiston DC, Courtney M. Sabiston's textbook of surgery, the biological basis of modern surgical practice in Appendix. 16th ed; Vol 2; W.B. Saunders Company. Philadelphia. 2001; 918.
6. Williams PL. Bannister LH. Berry MM. Collins P. Dyson M. Dussek JE. Gray's Anatomy. In Alimentary system. 38th ed. Churchill Livingstone, New York. 1995;1775-76.
7. Omar MK, Anne EB, John HW. McBurney's point fact or fiction. Academic unit of surgery Whiflington Hospital, London. Ann R Coll Surg Engl 1990; 72:304-08.
8. Ranganathan TS. Text book of Anatomy, 5th Edition Chand and company New Delhi 1993; 330-32.
9. Tofighi H, Taghadosi-Nejad, Abbaspour A, et al; The Anatomical Position of Appendix in Iranian Cadavers. International Journal of Medical Toxicology and Forensic Medicine. 2013;3(4): 126-30.
10. Katzurskj MM, Gopal Rao UK, Brady K. Blood supply and position of the vermiform appendix in Zambians Medical Journal of Zambia. 1979;13(2):32-34.
11. Ojeifo JO, Ejiwunmi AB, Iklaki J. The position of the vermiform appendix in Nigerians with a review of the literature. West Afr J Med. 1989;8(3):198-204.
12. Rahman MM, Khalil M, Rahman H, Mannan S, Sultana SZ, Ahmed S. Anatomical Positions of Vermiform Appendix in Bangladeshi People. J Bangladesh Soc Physiol. 2006;1:5-9.
13. Kumar Paul U, Naushaba H, Begum T, Alam J. Position of Vermiform Appendix: A Postmortem Study. Bangladesh Journal of Anatomy. 2009;7(1):34-36.
14. Ajmani Ml, Ajmani K. The position, length and arterial supply of vermiform appendix. Anat Anz 1983; 153(4): 369-74.
15. Sheela DK, Priya P, Doshi MA, Kadam AD , Mohite H. Morphological variations of vermiform appendix and caecum: a cadaveric study. Int J Anat Res 2017; 5(2.3):3983-87.
16. Arindom Banerjee et al. Morphological variations in the anatomy of caecum and appendix -A cadaveric Study – National Journal of clinical anatomy 2012;1:30-35.
17. AbuBakar SM, M Shamin, Gazi MA, M Sarwar. Negative co-relation between age of the subject and length of appendix in Bangladeshi males. Arch Med Sci 2013; 9(1):55-67.
18. JNA Clegg-Lamptey, H Armah, SB Naaeder, N A Adu-Aryee, Position and susceptibility to inflammation of vermiform appendix in Accra, Ghana. East African Medical Journal 2006; 83(12): 670–78.