

## Variation in Anatomical Position of Vermiform Appendix in 100 operative cases among North Indian Population

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### Abstract

Acute Appendicitis is the most common abdominal surgical emergency. Luminal obstruction of the appendix progresses to suppurative inflammation and perforation, which causes generalised peritonitis or an appendix mass/abscess. Classical features include periumbilical pain that migrates to the right iliac fossa, anorexia, fever, and tenderness and guarding in the right iliac fossa. Atypical presentations are particularly common in preschool children. A clinical diagnosis is possible in most cases, after a period of active observation if necessary; inflammatory markers and an ultrasound scan are useful investigations when the diagnosis is uncertain. Treatment is by appendectomy after appropriate fluid resuscitation, analgesia and intravenous antibiotics. Its different positions presents with different clinical presentation this will lead to misdiagnosis appendicitis with other medical or surgical conditions and diagnosis will be delayed.

**Keywords:** Appendix, Luminal obstruction, position of appendix

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### Introduction

Vermiform appendix (from the Latin appendix: “dangling” + “vermis” + “form”, i.e.: “dangling worm-shaped thing”) is a diverticulum of the cecum and marks the beginning of the colon in the confluence of taenias. The appendix is posterior-medially attached to the cecum, about 2 cm below the ileocecal junction[1]. Appendix is a midgut organ and is first identified at 8 weeks of gestation as a small outpouching of the cecum, as a midgut organ the blood supply of the appendix is derived from the Superior mesenteric artery[2]. The ileocolic artery, one of the major named branches of the Superior mesenteric artery which courses through the mesoappendix. The mesoappendix also contains lymphatics of the appendix, which drain to the ileocecal nodes, along with the blood supply from the Superior mesenteric artery. As gestation progress the appendix becomes more elongated and tubular as the cecum rotates medially and becomes fixed in the right lower quadrant of the abdomen. The appendix is of variable sizes (5-35cm in length) but averages 8-9 cm in length in adults. The appendiceal mucosa is of the colonic type, with columnar epithelium, neuroendocrine cells and mucin producing goblet cells lining its tubular structure[2].

The base of appendix is connected to the cecum, but its head can be placed in different situations. The diversity of situations is categorized into six locations:

- Retrocecal
- Pelvic
- Subcecal
- Preileal
- Retroileal/Post-ileal
- Ectopic[3-6]

Knowledge of these anatomic variations is important to the surgeon because the variable position of the appendiceal tip may account for differences in clinical presentation and in the location of the associated abdominal discomfort.

### Materials and methods

Total of 100 patients of operated case of appendectomy were taken in the study which was conducted in a tertiary care centre of North India. Out of which 66 male & 34 were females. Appendectomy was done Open and Laproscopically. The following positions of appendix were defined as follows;

- **Pelvic:** the tip of appendix directed downwards, over the psoas major surpassing the upper edge of the lower pelvis.
- **Retrocecal:** the tip of appendix courses upward behind the cecum.
- **Pre-ileal:** the distal part of appendix located in anterior-superior to the terminal ileum.
- **Post-ileal:** the distal part of the appendix located in posterior-superior to the terminal ileum.
- **Subcecal:** the appendix is located under the cecum.
- **Ectopic:** the appendix located in position other than the above locations.

### Result

A total of 100 post appendectomy patients were taken among which 66 were males and 34 were females. The most common position of appendix irrespective of sex was RETROCECAL 42%, followed by PELVIC 22%, POST ILEAL 12%, PREILEAL 8%, SUBCECAL 8%, ECTOPIC 8%. The most common age group presenting with acute appendicitis and undergoing Appendectomy (open/laparoscopic) were between 21-40 years (males 29%, females 17%), and least common age group presenting with acute appendicitis and undergoing Appendectomy were <=10 years (males 7%, females 4%).

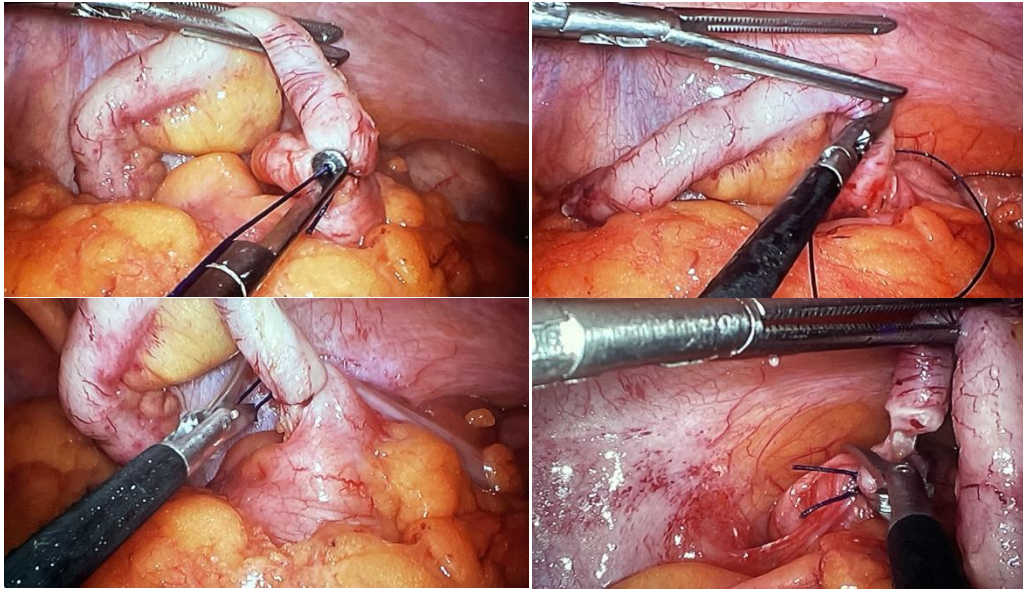
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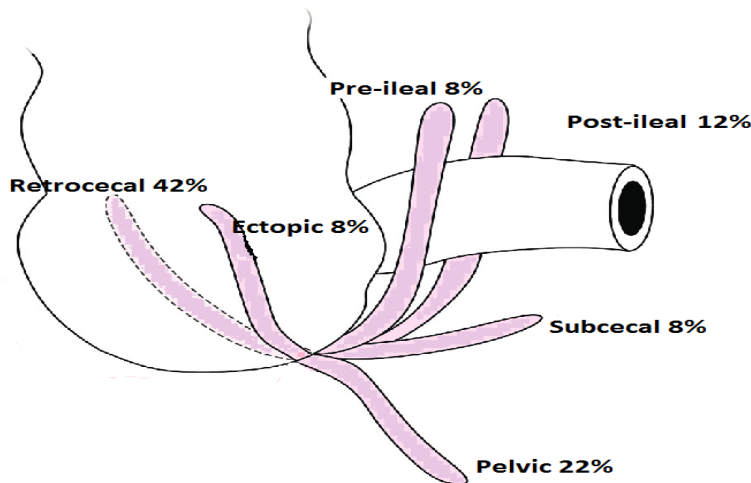
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**Table 1: Various positions of appendix with respect of various age group and sex**

Age	Sex	Retrocecal	Pelvic	Subcecal	Preileal	Postileal	Ectopic
≤10	M(7%)	5%	0%	0%	0%	1%	1%
	F(4%)	3%	1%	0%	0%	0%	0%
11-20	M(22%)	8%	5%	2%	3%	3%	1%
	F(5%)	3%	1%	1%	0%	0%	0%
21-40	M(29%)	11%	5%	2%	2%	4%	5%
	F(17%)	6%	6%	1%	2%	2%	0%
>40	M(8%)	3%	3%	1%	0%	1%	0%
	F(8%)	4%	1%	1%	0%	1%	1%



**Fig 1: Laparoscopic Appendectomy (Courtesy - GMC Jammu)**



**Figure 2: Position of Appendix in 100 operated cases**

**Discussion**

In this study cases of 100 Random cases of acute appendicitis were taken which have under gone operative intervention (Open /Laparoscopic) in one of the Tertiary care centre of Northern India. The most common position found was Retrocecal. L. Ajmani and K. Ajmani in India[7], Ojeifo et al. in Bosnia[8], and Clegg-Lampsey et

al. in Ghana[9] have reported that the most common position of appendix is retrocecal and pelvic, several authors have recorded hundreds of references under their appropriate subdivisions. Therefore, the references reviewed in the current study were purposely limited, and are summarized in table below

Authors	n	Age (years)	Sex	Retro	Pelv	Sub	Pre-ileal	Post-ileal	Parace
Iqbal et al. <sup>48</sup>	500	1-60	M/F	57%	28.6%	-	4%	9.4%	5%
Setty e Katikireddi <sup>47</sup>	90	Adults/Fetuses	M/F	50%	15%	10%	-	-	-
Bakar et al. <sup>39</sup>	56	18-67	M	53.5%	30.3%	3.5%	-	12.5%	-
Tofighi et al. <sup>27</sup>	400	-	M/F	7%	55.8%	19%	1.5%	12.5%	-
Ghorbani et al. <sup>37</sup>	200	-	M/F	7%	55.8%	19%	1.5%	12.5%	-
Mwachaka et al. <sup>40</sup>	48	-	M/F	27.1%	25%	4.2%	18.8%	18.8%	2.1%
Willekens et al. <sup>1</sup>	94	27-88	M/F	7.5%	66%	-	-	12%	8.5%
Salwe et al. <sup>38</sup>	60	-	M/F	56.6%	25%	-	15%	3.3%	-
Souza et al. <sup>6</sup>	377	18-89	M/F	43.5%	9.3%	24.4%	2.4%	14.3%	5.8%
Rao et al. <sup>43</sup>	50	Adults	M/F	66%	26%	4%	2%	2%	-
Patel e Naik <sup>49</sup>	50	40-50	M/F	64%	30%	2%	-	4%	-
Mohammad et al. <sup>42</sup>	693	0-99	M/F	71.7%	14.7%	3.5%	1.2%	1.2%	-

Source: Authorized by the authors.

M, male; F, female; Retro, retrocecal; Pelv, pelvic; Sub, subcecal; Parace, paracecal.

Fig 2:Reported study

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.

In our study most common position found is retrocecal Signs and symptoms show degree of discrepancy depending upon the position of the appendix. This will leads to misdiagnosis appendicitis with other medical or surgical conditions and diagnosis will be delayed. This will leads to development of an advanced appendicitis, high incidence of gangrene, perforation, peritonitis which could be life threatening for the patient, so knowledge regarding various positions of appendix is important for the surgeon to elude various vicious complications and outcome.

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