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Original Research Article

ANATOMICAL VARIATIONS OF CAECUM AND APPENDIX: A CADAVERIC STUDY

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ABSTRACT

Background: The caecum acts as a guide in the operation of intestinal obstruction. Vermiform appendix manifests wide range of anatomical and topographical variations. In appendicitis these variations cause different clinical presentations .A sound knowledge of normal anatomy and variations of caecum and appendix is very important to the operating surgeon.

Aim of the study: To study the morphometry of caecum and appendix and ileocaecal orifice in adult embalmed cadavers and correlate these parameters with previous studies.

Materials and Methods: This study was conducted during routine cadaveric dissections performed in Department of anatomy, MVJ Medical college and research hospital, Bangalore. Twenty five cadavers were studied for the morphometry of ceacum and appendix.

Results: Length of caecum ranged from 2.2 -7cm. Width of caecum ranged from 3-8.5cm. Majority of the caecum studied were of the adult type. As far as the position of appendix was concerned ,the pelvic type was most common. Length of appendix was ranged from3-9cm.Outer girth of appendix was ranged from0.5-1.1cm.Distance between appendicular orifice to lower end of caecum was ranged from0.3-5cm. Out of twenty five speceimens studied, in three specimens appendicular orifice was completely obliterated. Diameter of appendicular orifice ranged from 0-0.7cm.Distance between appendicular orifice and ileocaecal orifice ranged from 1.5-5 cm. Diameter of Ileocaecal orifice ranged from 0.5-1.6cm.In twenty one specimens shape of the ileocaecal orifice was transversely oval. Two were longitudinally oval and one was triangular. Length of upper flap of ileocaecal valve ranged from1-2.2cm.Length of lower flap of ileocaecal valve ranged from 1.5-3.5cm.

Conclusion: Morphology of caecum and appendix was studied in detail. Above mentioned parameters of appendix and caecum were comparable with the findings of previous studies except the position of appendix where in pelvic type was the commonest type observed in our studies. In this study special emphasis was given to shape, diameter and measurements of the valves of ileocaecal orifice. These parameters have not been dealt with in previous studies.

KEY WORDS: Caecum, Vermiform appendix, anatomical variations.

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INTRODUCTION

The caecum is a large blind pouch of large intestine lying in the right iliac fossa below the ileocaecal valve continuing distally as the

ascending colon. The blind-ending vermiform appendix usually arises on its medial side at the level of the ileal opening [1]. Caecal bud appears at about sixth week of intrauterine life. Temparorily it lies in the right upper quadrant, from here it descends into right iliac fossa. During this process the distal end of caecal bud forms a narrow diverticulum , the appendix [2]. Due to differential growth of caecal wall, appendix comes to lie in the medial aspect. Tip of the appendix is directed in various positions. Accordingly it is classified into sub caecal, retrocaecal, splenic, promontoric pelvic and mid inguinal type.

Caecum is an asymmetrical cul-de-sac accordingly it is classified under following types. Foetal type, infantile type, adult type and exaggerated type. Length of appendix varies from 2-20 cm.28cm long appendix has been reported [3].

Appendicitis is a medical emergency that requires a prompt surgery to remove the appendix. The high incidence of concomitant diseases and the multiplicity of differential diagnostic possibilities allow the disease to progress rapidly [4]. Despite of advances in laboratory investigations diagnosis of appendicitis remains a challenge. The caecum acts as a guide in the operation of intestinal obstruction. Sometimes the terminal part of the ileum is telescopically invaginated into the caecum and ascending colon at the ileocaecal junction and produces intestinal obstruction. This phenomenon is known as intussusceptions.

Type of caecum, length of appendix, diameter of ileoceacal orifice, length and shape of ileocaecal valve vary in different individuals. A thorough knowledge of these variations are helpful for the operating surgeon.

MATERIALS AND METHODS

This study was conducted during routine cadaveric dissections performed in Department of anatomy , MVJ Medical college and research hospital, Bangalore. Twenty five cadavers were studied for the morphometry of ceacum and appendix. Parameters were measured using measuring tape and thread. Measurements were taken for the following parameters.

Type of caecum, length and width of caecum, position length and diameter of appendix, diameter of appendicular orifice, diameter of ileocaecal orifice ,length and shape of ileocaecal valves ,distance between appendicular orifice to lower end of caecum, distance between appendicular orifice and ileocaecal orifice.

RESULTS

Table 1: Type of Caecum.

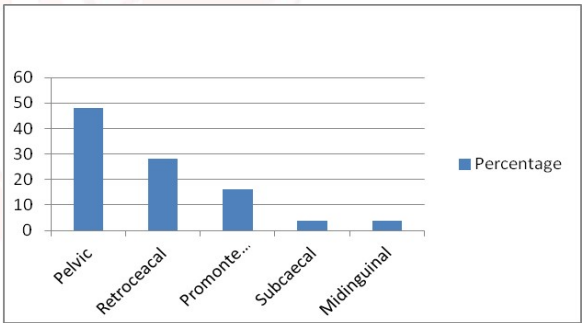
Type Of Caecum	Number (Percentage)
Adult	19(76%)
Exaggerated	4(16%)
Foetal	2(8%)

External measurements of Caecum: Length of caecum was 4.7±0.42 SD (range: 2.2 -7cm).Width of caecum was 5.69±2.8SD(range:3-8.5cm).

Table 2: Position of appendix.

Position Of Appendix	Number (Percentage)
Pelvic Type(4 O'clock)	12(48%)
Retrocaecal(12 O'clock)	7(28%)
Promontoric Type(3 O' Clock)	4(16%)
Subcaecal(11 O' Clock)	1(4%)
Mid-Inguinal Type	1(4%)

Fig. 1: Position of Appendix.



External measurements of appendix and ileocaecal orifice: Length of appendix was 5.3±1.06SD(range:3-9cm).Outer girth of appendix was 0.6 (range:0.5-1.1).Distance between appendicular orifice to lower end of caecum was 1.41±0.141SD(range:0.3-5) Diameter of appendicular orifice: Out of twenty five, in three specimens orifice was completely obliterated. Diameter of appendicular orifice was 0.5cm (range:0-0.7cm).Distance between appendicular orifice and ileocaecal orifice was 2.5±0.141SD (range:1.5-5). Diameter of Ileocaecal orifice was 1.4±0.07SD (range: 0.5-1.6).In twenty one specimens shape of the ileocaecal orifice was transversely oval. Two are longitudinally oval and one was triangular. Length of upper flap of ileocaecal valve was 1.48±0.49SD(range:1-2.2).Length of lower flap

of ileocaecal valve was 1.82±0.07SD(range: 1.5-3.5).

DISCUSSION

According to previous studies mean length of ceacum was 6cm and mean breadth is 7.5 cm. In present study mean length was 4.7±0.42 and beadth was 5.69±2.8, which is slightly lower than the previous studies.

Table 3: Comparison of dimensions of caecum of present study with previous studies.

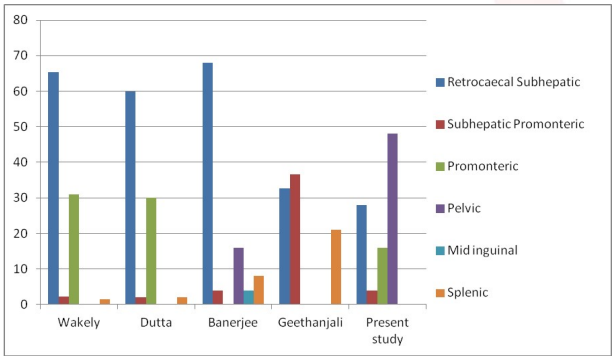
Name of the author	Mean length (cm)	Mean breadth (cm)
Standring [1]	6	7.5
Moore [5]	5-7 range	-
Romanes [6]	6	7.5
Banerjee [7]	6.3±0.99	6.8±0.16
Present study	4.7±0.42	5.69±2.8

In present study pelvic position of appendix was the commonest. Pelvic position has been previously reported as the commonest position by Katzurskj et al [11] (43%).But in other studies retrocaecal position was the commonest position.

Table 4: Comparison of position of vermiform appendix of present study with previous studies.

Name of the author	Retro caecal	Sub hepatic	Promonteric	Pelvic	Mid inguinal	Splenic
Wakely [8]	65.28%	2.26%	31%	-	-	1.40%
Dutta [9]	60%	2%	30%	rare	Rare	1-2%
Banerjee [7]	68%	4%	-	16%	4%	8%
Geethanjali [10]	32.69%	-	36.54%	-	-	21.10%
Present study	28%	4%	16%	48%	4%	-

Fig. 2: Comparison of position of vermiform appendix of present study with previous studies.



Size of appendix: In present study length of appendix was 3 to 9 cm (mean 4.75cm ±1.06SD) which is in the range described by previous authors. In the present study outer girth of appendix was 0.6cm which is closely related to values reported by Banerjee[7],0.7±0.28SD.

Table 5: Length of appendix.

Name of the author	Mean length (cm) range
Standring [1]	Feb-20
Romanes [6]	Feb-15
Banerjee [7]	Apr-13
Moore [5]	8 (average)

Distance of Vermiform appendix from the ileocaecal junction varies from 2cm-3cm,with an average of 2.5 [12]. In present study distance of Vermiform appendix from the ileocaecal junction varied from 1.5cm-5cm,with an average of 2.5.Thus in present study distance of Vermiform appendix from the ileocaecal junction was comparable to the study conducted by previous authors.

The ileocaecal orifice is readily visible at double contrast barium enema examination. Very few authors have described the diameter and length of upper and lower flap of ileocaecal valve.In present study, diameter of Ileocaecal orifice was 1.4±0.07SD . In twenty one specimens shape of the ileocaecal orifice was transversely oval. Two were longitudinally oval and one was triangular. Length of upper flap of ileocaecal valve was 1.48±0.49SD(range:1-2.2).Length of lower flap of ileocaecal valve was 1.82±0.07SD(range: 1.5-3.5).These parameters are helpful for operating surgeons during intussusceptions and for radiologists dealing with tumours.

CONCLUSION

Morphology of caecum and appendix was studied in detail. Above mentioned parameters of appendix were compared with the findings of previous studies.This study determined the average length and other parameters of caecum and appendix .The results of this study confirmed with the findings of previous studies except position of appendix, where in pelvic position was the commonest position in our study .In other studies retrocaecal position was the commonest position. As appendix is the most variable organ in the abdomen these findings are helpful to operating surgeon during appendicitis.

In this study special emphasis was given to shape, diameter and measurements of the valves of ileocaecal orifice. These parameters will be helpful for operating surgeons during

intussusceptions and for radiologists dealing with tumours.

Conflicts of Interests: None

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