Section: Surgery

Original Research Article

ANATOMICAL STUDY OF HUMAN VERMIFORM APPENDIX AND ITS CLINICAL IMPLICATIONS

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Abstract

Background: The Vermiform Appendix though considered to be a vestigial organ, is important in surgery for its propensity for inflammation, which results in "Acute Appendicitis". It is the most common cause of an acute abdomen in young adults all over world .The average length of the appendix is 6 to 9cm. The outer diameter ranges between 3 and 8mm.The mesoappendix, a triangular fold of peritoneum extends between terminal ileum and appendix, frequently ends short of the tip of the appendix Two appendicular vessels present in the free margin of the mesoappendix. If the appendix is of adequate length and mean caliber it will be useful in many re-constructive surgeries. The Aim Of The Study: To study the length ,external diameter of the vermiform appendix, extent of mesoappendix and number of appendicular artery in 50 cases during abdominal surgeries. **Materials & Methods:** 50 Vermiform appendix specimens were studied during abdominal surgeries conducted at surgical theatres in Government Rajaji hospital, Madurai Medical College. The parameters were studied and compared with other studies. **Results:** The average length was 7.68 cm .The external diameter ranged between 5mm to 12mm. Two appendicular arteries were seen in one specimen. Mesoappendix was incomplete in 40% cases in our study. **Conclusion:** A sound knowledge about the length, external diameter, extent of mesoappendix and its vascular supply is mandatory for interventional surgeons. Incomplete mesoappendix could be one of the reason for severity of appendicitis in childhood. Long vermiform appendix may cause problems like acute appendicitis, torsion etc .If the length of the vermiform appendix was adequate about 9 – 15cm and has adequate caliber, it will be used as conduit in many reconstructive surgeries.

INTRODUCTION

The vermiform appendix though considered to be a vestigial organ, is important in surgery for its propensity for inflammation, which results in the clinical syndrome known as "Acute Appendicitis". It is the most common cause of an acute abdomen in young adults all over the world.[1]

The length of the appendix varies from 2cm to 20cm with an average of 9cm.

The mesoappendix, a triangular fold of peritoneum extends between terminal ileum and appendix. It contains a variable amount of fat, lymphatics, nerves and frequently ends short of the tip of the appendix. Two appendicular vessels present in the free margin of the mesoappendix.[2]

The vermiform appendix is an epithelialized, vascularized, isoperistaltic conduit.

It has its own mesoappendix and can be isolated easily. If the appendix is of adequate length and mean caliber it will be useful in many re-constructive surgeries.[3]

MATERIALS AND METHODS

50 Vermiform appendix specimens were studied during abdominal surgeries conducted at surgical theatres in Government Rajaji hospital, Madurai Medical College. During surgical procedures, vermiform appendix was observed for its length, external diameter, number of appendicular artery and extent of mesoappendix. The values were noted and photographs were taken for documentation.

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RESULTS

In the present study, the length ranged between 4 to12cm. The average length
was 7.68cm. The external diameter in male ranged between 5mm – 10mm and the average diameter was 7.45mm. In females, external diameter ranged between 5 – 12 mm and the average was 6.87mm. There was single appendicular artery in 49 specimens and one specimen had double appendicular arteries. Mesoappendix was complete in 60% and incomplete in 40% cases.

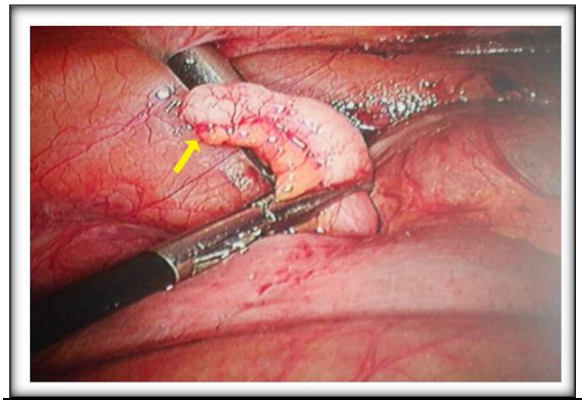

Figure 1: Complete Mesoappendix

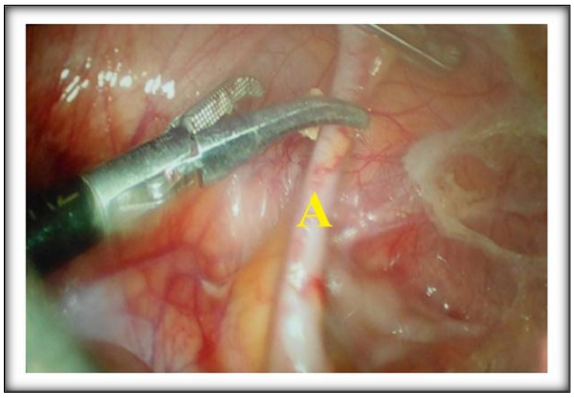

Figure 2: Long Vermiform Appendix

Table 1: Length of Vermiform Appendix

S.No	Length (cm)	In Males	In Females	%
1.	< 4	0	1	2
2.	4 – 7.9	18	10	56
3.	8 -11.9	12	6	36
4.	> 12	1	2	6

Table 2: Comparison of External Diameter of Vermiform Appendix

S.No	Name of Author	Average (mm)
1.	Hollinshead 1971	6
2.	Arindom Banerjee 2012	7.8
3.	Manisha 2013	7.045
4.	Uma Maheswarrao 2015	M 12.42 F 10.80
5.	Present study	7.19

Table 3: Comparison of Extent of Mesoappendix

S.NO	NAME OF STUDY	EXTENT of MESOAPPENDIX	
		COMPLETE %	INCOMPLETE %
1.	Golalipour 2003	34.2	65.8
2.	Rehman 2009	24	76
3.	Janardhanarao 2014	16	84
4.	Uma Maheswara Rao 2015	34	66
5.	Present study	60	40

DISCUSSION

The vermiform appendix is a narrow blind-ended intestinal diverticulum. It is
round worm-like (L vermis), hence called Vermiform Appendix. It joins the postero-medial wall of caecum 2cm inferior to the ileocaecal junction. It usually lies in the right iliac fossa but its tip varies in position.[2]
The average length of the appendix is 6 to 9cm, but it can vary from<1 to >30cm.
The outer diameter ranges between 3 and 8mm 4. In the present study, the length ranged between 4 to12cm. The average length was 7.68 cm. In a study done by Desouza et al, the average length was higher about 11.4cm and was used as a conduit in bladder and biliary tract surgeries in children[5]. Ravindra Kumar Boddeti reported an unique 28cm long vermiform appendix located in retrocaecal position. It may cause problems like acute appendicitis, torsion etc., and simulate enteritis and salphingitis in inflammed conditions.[6]
In the present study, maximum external diameter ranged between 5mm to 12mm.
The average diameter in male and female were 7.45mm and 6.87mm respectively which coincides with the observations of Manisha et al where the external diameter ranged about 7 mm in male and 6mm in female.[7]

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Outer diameter of appendix more than 6mm in ultrasonography is a sign of acute
Appendicitis. Retten Bachar stated diameter more than 6mm helps to confirm acute appendicitis with sensitivity 100% and accuracy 79 % 8. The diameter was very high in Uma Maheswara Rao's study more than > 10mm. Increased thickness may be related to their dietary habits.[9].
According to Bailey & love the mesoappendix which extends from terminal
ileum to vermiform appendix subjects to great variation. Sometimes even the whole extent of appendix was devoid of mesoappendix. The appendicular artery present in the mesoappendix, which is an end artery may not reach the tip leading to ischaemic necrosis and subsequent gangrenous appendicitis.[1]
In the present study complete extension of mesoappendix was more than
incomplete variety similar to the study of Geethanjali[10]. In a study done by Rahman et al, two – third extension of mesoappendix was 45%. The half extension of mesoappendix was 31%. Whole extension seen in 24%.[11] Complete extension of mesoappendix was more than incomplete. Incomplete extension dominates in study of Janardhanarao[12] and Uma Maheswara Rao.[9] The frequency of incomplete mesoappendix was highest in the age group below 10 years. Incomplete mesoappendix could be one of the reason for severity of appendicitis in childhood.
In the present study, single Appendicular Artery was present in 49 specimens (98%). One specimen had 2 arteries – one arising from inferior division of ileocolic artery and one from posterior caecal artery. Hosmani veeresh reported the origin of Appendicular Artery from inferior division of ilocolic artery in 46.15%, directly from ileocolic artery in 19.23%, from arterial arcade in 3.84% and an accessory appendicular artery in 23% of specimens.[13] The accessory appendicular artery also called the artery of Seshachalam, was a branch of posterior caecal artery. Janardhana Rao M identified an accessory appendicular artery in the free border of mesoappendix and it anastomosed with posterior caecal artery in 2%.[12] Dual blood supply found in 39.8%. Pelvic position was predominant and dual blood supply would he cause for rarity of appendicitis in Africans.[14] The area of tenderness in appendicitis depend upon the length, position and direction of appendix.[15]
Continent urinary diversion is widely accepted by both urologist and patient for urinary reconstruction after cystectomy. Atul Thakre reported Robot – Assisted simultaneous reconstruction of a continent urinary diversion using Mitrofanoff principle and a Malone Antegrade Continent Enema with divided appendix in Paediatric cases.[16]
Michael Rink states that Malone Ante grade continence enema had been used in paediatric population with idiopathic chronic constipation. MACE done open (or) laproscopically, is a simple procedure with the appendix conduit.[17] Appendiceal tunnelling procedures are simple to perform and remains an attractive and reliable continence mechanism.[18]
Appendix was used as a Biliary conduit for Choledochal cyst, Biliary atresia and Alagille syndrome in children, due to the role played by the presence of lymphoid follicles in the wall of the appendix.[19]
Free micro transfer of vermiform appendix for creation of tracheo – oesophageal fistula in post laryngectomy patients for voice reconstruction as reported by H.C Chen.[20]

CONCLUSION

Good knowledge about the length, external diameter, vascular supply of vermiform appendix and extent of mesoappendix is mandatory for interventional surgeons. Incomplete mesoappendix could be one of the reason for severity of appendicitis in childhood. Long vermiform appendix may cause problems like acute appendicitis, torsion etc., and simulate enteritis, salphingitis in inflammed conditions. The vermiform appendix with adequate length and caliber, can be used as conduit in many reconstructive surgeries.

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