รายงานผู้ป่วย • Case Report

ความผันแปรของตำแหน่งไส้ติ่งในศพคนไทยอีสาน

โกวิท ไชยศิวามงคล[1], ธนรัฐ จันทอุปพี[1], นวพร เตชาทวีวรรณ[1], ยรรยง ทุมแสน[1], ธัณย์สิตา อนันต์ธีระกุล[1], สมสุดา ทีปสว่าง[1], สิทธิชัย เอี่ยมสะอาด[1], ตวงปราชญ์ ศรีกุลวงศ์[2]

[1]*ภาควิชากายวิภาคศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น จังหวัดขอนแก่น 40002*

[2]*โรงพยาบาลหนองคาย อำเภอเมือง จังหวัดหนองคาย 43000*

Position Variation of Vermiform Appendix in Northeast Thai Cadavers

Kowit Chaisiwamongkol[1], Thanarat Chantaupalee[1], Nawaporn Techataweewan[1], Yanyong Toomsan[1], Tansita Aranateerakul[1], Somsuda Teepsawang[1], Sitthichai Iamsaard[1], Tuangprat Srikulwong[2]

[1]*Department of Anatomy, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand*

[2]*Nongkai Hospital, Ampur Maueng, Nongkai 43000, Thailand*

หลักการและวัตถุประสงค์: ไส้ติ่งอักเสบแบบเฉียบพลันเป็นสาเหตุหนึ่งที่พบได้ในผู้ป่วยที่มาโรงพยาบาลด้วยอาการปวดท้องแบบเฉียบพลันและบ่อยครั้งที่ศัลยแพทย์ไม่สามารถตรวจหาไส้ติ่งตรงตำแหน่งปกติ ซึ่งอาจนำไปสู่การผ่าตัดที่ผิดพลาดได้ ดังนั้นการศึกษาถึงรายละเอียดเกี่ยวกับความผันแปรของตำแหน่งไส้ติ่งนอกจากจะเป็นการรวบรวมข้อมูลการผันแปรของตำแหน่งไส้ติ่ง ในระดับมหกายวิภาคศาสตร์แล้ว ยังมีความสำคัญในการใช้ข้อมูลนี้เพื่อพิจารณาในการผ่าตัดไส้ติ่งในตำแหน่งที่ถูกต้อง การศึกษานี้จะเป็นหนึ่งข้อมูลที่สำคัญของโลกที่อาจถูกบรรจุไว้ในองค์การอนามัยโลกโดยข้อมูลมาจากคนไทยอีสาน การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาและรวบรวมข้อมูลการผันแปรของตำแหน่งไส้ติ่งในระดับมหกายวิภาคศาสตร์ ของคนไทยอีสาน เพื่อสร้างมาตรฐานทางด้านอุบัติการณ์และมิติทางสัณฐานวิทยา

วัสดุและวิธีการ: ใช้อาจารย์ใหญ่จากคนไทยอีสานจำนวน 102 ร่าง มาชำแหละอย่างเป็นระบบ ทางมหกายวิภาคศาสตร์ การตรวจหาความผันแปรตำแหน่งของไส้ติ่งทำโดยการไล่ตามหาของ teniae coli ทั้งสามไปจนบรรจบกันนี้เป็นฐานของไส้ติ่ง (the base of the vermiform appendix) ซึ่งคือการพบกันเพื่อก่อรูปตามแนวยาวของท่อกล้ามเนื้อเรียบ ความยาวของไส้ติ่งจะถูกวัดด้วย vernier caliper และถูกคำนวณเป็นร้อยละของความผันแปรต่อจำนวนร่างอาจารย์ใหญ่ทั้งหมด

ผลการศึกษา: จากอาจารย์ใหญ่ 102 ร่าง (ชาย 70 ร่าง และ หญิง 32 ร่าง) พบว่าชนิดของไส้ติ่งที่พบมากที่สุดคือ post-ileal ซึ่งคิดเป็นร้อยละ 37.25 ขณะที่ชนิดที่ถูกพบน้อยที่สุด

Background and objective: The acute appendicitis is a common and serious cause of acute abdominal pain. Oftentimes, the surgeons could not find the vermiform appendix in its usual position. A detailed study of variation positions of the vermiform appendix is necessary for an appropriate treatment. The data could also contribute to the collection of the world such as the World Health Organization from a population of the Northeast Thailand. This study aims to study and accumulate the gross anatomical data on position variation of the vermiform appendix in the Northeast Thailand cadavers. The incidence and morphometry of the structure were established.

Materials and Methods: A detailed dissection for descriptive study. A total number of 102 cadavers donated by the Northeast Thailand population were carefully dissected. The identification of the urinform appendix site was done by following the three teniae coli caudally to its base where the three muscular lands meet to form a complete longitudinal, smooth muscular tube. The length was measured using the vernier caliper and the percentage was calculated.

Results: Among 102 specimens, the most common type of vermiform appendix is the post-ileal at 37.25% while the least common called the pre-ileal and paracecal types is at 3%. The length of 6 cm is the most frequent group. The average length ±SD of both genders is 6.127±2.028 cm.

คือ pre-ileal และ paracecal โดยแต่ละชนิดนี้คิดเป็นร้อยละ 3 ความยาวของไส้ติ่งที่พบได้มากที่สุดคือ 6 ซม. ซึ่งค่าเฉลี่ย ±SD ของความยาวของไส้ติ่งทั้งสองเพศ คือ 6.127±2.028 ซม.
สรุป: เราพบว่าชนิดไส้ติ่งที่พบมากที่สุดในคนไทยอีสานคือ post-ileal คือ 37.25% ค่าเฉลี่ยของความยาวไส้ติ่งในเพศชายและหญิง คือ 6.329±2.012 ซม. และ 5.688±2.023 ซม. ตามลำดับ
คำสำคัญ: ไส้ติ่ง, cecum, gut rotation, rotation axis, vermiform appendix, position variation, morphometry, mesoappendix, teniae coli, situs inversus

Conclusion: This study discovered that the most common type of position variation of vermiform appendix is the post-ileal type at 37.25%. The average length in male and female cadavers are 6.329±2.012 cm. and 5.688±2.023 cm., respectively.
Keywords: cecum, gut rotation, rotation axis, vermiform appendix, position variation, morphometry, mesoappendix, teniae coli, situs inversus

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Introduction

The vermiform appendix is named after its gross anatomy morphology, closely resemble the worm. It develops by the evagination from the distal end of the cecum to form the appearance like an appendage, hence its most meaningful name[1]. Its length varies a great deal, 8 cm. in some and longer in the others up to 13 cm. Its average length and diameter are 8 cm. and 6-8 mm., respectively. Its base is attached to the posteromedial surface of the cecum about 2.5 cm. below the ileo- cecal junction. It is completely covered by the mesoappendix which is the same sheet of the mesentery of the small intestine. The mesoappendix contains the appendicular vessels and nerves.

The vermiform appendix normally lies in the right iliac fossa. Its base projects to the McBurney's point on the skin of the right side of the anterior abdominal wall. This is actually at the junction of lateral one third and middle third of the line joining the right anterior superior iliac spine (ASIS) to the umbilicus. Microscopically, the vermiform appendix is a muscular tube containing a large amount of lymphoid tissue[2]. Due to the growth rate of the lateral wall of cecum which is greater than the medial wall, the base of the cecum is pulled to the medial side[3].

The location of vermiform appendix can vary widely. This happens because of the complicated processes of development of the gastrointestinal tract, i.e rotation counterclockwise of the midgut loop and umbilical herniation, abdominal re-entry, and growth lengthwise of the limbs of the midgut loop. The most unfortunate case of surgery often occurs that the surgeons could not find the appendix because it was caught somewhere along the course of rotation. They might have lost the patient unwillingly at the cost of their deepest sorrow. Recognizing the vermiform appendic variation, scientists have been studying its position as early as 1933[4]. Only two surgeons in Thailand published the incidence of the position anomaly from the operating room[5, 6].

Therefore, study of the position anomaly and morphometry of the vermiform appendix in the Northeast Thai cadavers was carried out. This is to provide gross anatomical information for the surgeons and to contribute to the medical world for updating the data.

Materials and Methods

One hundred and two cadavers, 70 males and 32 females, aged 45 to 87 years were carefully dissected in the Department of Anatomy, Faculty of Medicine, Khon Kaen University. The length of the appendix was measured by the vernier caliper and the percentage was calculated. The identification of appendix was assured by following the three teniae coli caudally to the base of the vermiform appendix. The classification of appendix position is followed Vajarabhongsa Bhudhisawasdi[7].

Results

It is very interesting that the higher incidence in the male than female cadavers is found in 6 position types and only the retrocecal type of which both genders are equal at 4% (Table 1).

For the more convenient communication, the types of position variation of vermiform appendix is presented in Figure 1 below.

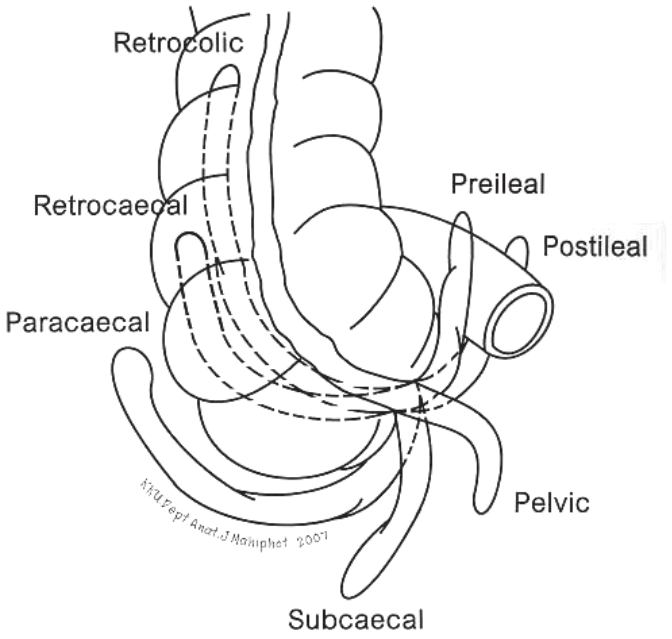

Figure 1 This drawing shows the various type of the vermiform Appendix (1)

Redrawn from: Bhudhisawasdi V. Surgical Diseases of the Vermiform Appendix. Bangkok: Ruaen - Kaew Publishing Co. 1987: 21.[7]

Table 1 Types of position anomaly of the vermiform appendix in Northeast Thai cadavers and incidence

Position type	Male N (%)	Female N (%)	Total N (%)
Post-ileal	25 (24.5)	13 (12.75)	37 (37.25)
Subcecal	15 (14.70)	4 (3.92)	19 (18.62)
Pelvic	7 (6.86)	5 (4.90)	12 (11.76)
Retrocolic	9 (8.82)	3 (2.94)	12 (11.76)
Retrocecal	4 (3.92)	4 (3.92)	8 (7.84)
Pre-ileal	2 (1.96)	1 (0.98)	3 (2.94)
Paracecal	3 (2.94)	-	3 (2.94)
Appendectomized cadaver	5 (4.9)	2 (1.96)	7 (6.86)
Total	**70**	**32**	**102**

The length of the vermiform appendix was carefully measured with a vernier caliper. The results are tabulated as below (Table 2)

Only 95 cadavers were measured the length of the vermiform appendix carefully by a vernier caliper, because 5 male and 2 female cadavers were appendectomized. The results are tabulated as shown in Table 2.

Table 2 Lengths of vermiform appendix in centimeters

Lengths (cm.)	Finding frequency		
	Males	Females	Total number (%)
2	0	1	1 (0.98)
3	3	4	7 (6.86)
4	6	4	10 (9.80)
5	17	5	22 (21.57)
6	20	9	29 (28.43)
7	8	4	12 (11.76)
8	6	3	9 (8.82)
9	5	0	5 (4.90)
10	2	1	3 (2.94)
11	1	1	2 (1.96)
12	1	0	1(0.98)
13	1	0	1(0.98)
Total subjects	**70**	**32**	**102 (100)**
Mean	**6.329**	**5.688**	
±SD	**2.012**	**2.023**	

The average length ±SD of vermiform appendix : in both genders is 6.127 ± 2.028 cm.
: in the male cadavers is 6.329 ± 2.012 cm.
: in the female cadavers is 5.688 ± 2.023 cm.

Discussion

The typing of vermiform appendix after its position variations as to where they were found both by appendectomy and dissection could be regarded as well documented worldwide. It was explained more clearly by relating its position to its immediate relationship in situ, be it named by surgeons or anatomists. If it is found behind the cecum, its name will be retrocecal position type, for instance. To complete the list, the following are the types including our series.

1. paracecal position type 2. pelvic position type
3. post-ileal position type 4. pre-ileal position type
5. retro-cecal position type 6. retro-colic position type
7. subcecal position type

The base of the appendix in our series is about 2.0-2.5 centimeters distal to the ileo-cecal valve. This is in agreement with the available data listed in table 3. In development, the base of the vermiform appendix has changed from the middle of the funnel-shaped bottom of the cecum in the childhood into a postero-medial wall in adulthood. This is due to the faster growth rate of the lateral wall than the medial wall[3]. The lateral wall grows to become a blind end suitable for housing the fecal material. In some cases this change of the base could be at the ileo-cecal junction. We found none of this in our population pool.

In the previous studies, the length of the vermiform appendix length are reported different by at 6.0-9.0 cm[8], 1.0-30.0 cm[9], 8.0-13.0 cm[10] and 0.62-23.1 cm[11], respectively. As shown in Table 2 the present study reveals range of 2-13 centimeters in length. This is possibly related to the height of the Caucasian and the Asian, the taller and the longer. Among the specimens studied, it appears that the males have a longer vermiform appendix than the females.

The anomalies besides the position were also reported. Agenesis of vermiform appendix is 4 per 50,000 infants[12]. The duplication of appendix occurs in 1 out off 25,000 births[13]. None of these two were found in this study.

Table 3 Position variation and incidence of vermiform appendix in fervions reports

(Cumulative Data)

Author/year	Location Type or position Classification Incidence						
Sample size	1	2	3	4	5	6	7
Azmari 1983: 100 cadavers					5+6 to be 58%		
Bakheit 1999 Patients	11.7%	21.1%			58.3%		
Chummy 1999 Patients		Most common			2nd most common		
Delie 2002 : 50 cadavers					30 from 50	3 from 50	8 from 50
Grunditz 1983 Patients					17%		
Cha-rern-set-tha maha1997 : 1054 patient							
Katzariski 1979 : 103 cadavers		43.6%			22.3%		
O' Connell 2000	2%	21.0%	5%	1%	74%		1-5%
Ojeifo 1989 : 447 cadavers		Most common		2nd common	3rd common		
Chaisiwamongkol 2006 : 102 cadavers from Northeast Thailand		12.0%	37.25%	3.0%	8.0%	12.0%	19.0%
Clegg. Lamptey 2006 : 1358 Autopsies	2.4%	21.6%	3.8%	4.9%	67.3%	-	-
Ahmed 2007 : 303 patients	3.6%	51.2%	22.1%	3%	20.1%	-	-

Legends : 1 = paracecal position type 2 = pelvic position type 3 = post-ileal position type
4 = pre- ileal position type 5 = retro-cecal position type
6 = retro-colic position type 7 = subcecal position type

For a convenience, in updating the position variation data of the vermiform appendix, Table 3 presented above also includes the present findings for the completion.

It must be noted that there are no other abnormality than the position variation in this study. Nevertheless, the situs inversus or the mirror image of the abdominal viscera where the liver is in the left upper quadrant and the stomach lies in the right upper quadrant has been reported[14].

The first midgut loop rotation around the axis of the developing superior mesenteric artery and the yolk stalk is seen as it rotates counter clockwrise about 90° which brings the caudal limb of the loop into a close contact with the cranial limb. The second rotation continues for another 180° to cause the cecum and the appendix to be in its normal position, the right iliac fossa. The colon is consequently set in its adult position. The colon develops from the caudal limb of the gut loop while the cranial limb gives rise to the ileum and jejunum.

For the most common post-ileal position, it could be explained that the aftermath of the second rotation and the coil of jejunum with ileum while moving into the right upper quadrant could pull the vermiform appendix into a position behind the end part of the ileum. The growth of lateral wall of the cecum causes the base of the vermiform appendix to move in that direction concomitantly. The proof could be made by the dissection of the embryos aging up to 8 weeks.

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