พยาธิสภาพที่พบในไส้ติ่งที่ได้รับการวินิจฉัย ณ โรงพยาบาลสุรินทร์

Pathological findings of vermiform appendix in Surin Hospital

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ABSTRACT

Background : Acute appendicitis is the most common caused for acute emergency acute abdominal operation in patients with acute abdominal pain. Frequently, tissue of vermiform appendix is ignored without pathological examination and report.

Objective : To study the pathology of vermiform appendix, determine the rate of acute inflammation, and evaluate the variables that might influence the accuracy of clinical diagnosis of acute appendicitis.

Materials and Methods : All appendectomy specimens during 2004-2008 at Surin Hospital, Surin Province, Thailand were studied. Frequency of various pathological finding, and the association between variables and the accuracy of clinical diagnosis of acute appendicitis were determined.

Results : The studies comprised of 4,300 appendices with clinical suspicion of acute appendicitis. The incidence of inflamed appendices was 73.9% (3,179/4,300 cases). Of these, 1,411 (44.4%) were male and 1,768 (55.6%) were female. The rate of ruptured appendicitis was 11.5% including 218 cases (44.1%) of male and 276 cases (55.9%) of female. Statistical analysis revealed association between the accuracy of clinical diagnosis of acute appendicitis and gender (P = 0.0001). Other pathological finding included 14 cases of parasitic infestation, 66 cases of fibrous obliteration, 3 cases of carcinoid tumor, 11 cases of tuberculosis, 5 cases of mucocele, 2 cases of endometriosis, 1 case of adenocarcinoma, 4 cases of metastatic carcinoma, and so on.

Conclusion : Acute appendicitis is the most common pathologic cause of appendectomy, and various abnormal findings can be found. Pathological examination of the vermiform appendix is necessary in all cases.

Key words : Vermiform appendix, acute appendicitis, carcinoid tumor, adenocarcinoma

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บทคัดย่อ

เหตุผลของการวิจัย : ไส้ติ่งอักเสบเป็นภาวะที่ต้องได้รับการวินิจฉัยและการผ่าตัดเร่งด่วนหรือฉุกเฉินบ่อยที่สุด ในผู้ป่วยที่มีอาการปวดท้อง โดยเกิดขึ้นอย่างเฉียบพลัน บ่อยครั้งที่ชิ้นเนื้อของไส้ติ่งถูกละเลยหรือทิ้งไป โดยไม่ได้รับการวินิจฉัยทางพยาธิวิทยา

วัตถุประสงค์ : เพื่อศึกษาการเกิดพยาธิสภาพของไส้ติ่ง,วิเคราะห์อัตราการเกิดการอักเสบและพยาธิสภาพที่อาจจะเกิดขึ้นได้ และวิเคราะห์สาเหตุที่มีผลต่อการวินิจฉัยภาวะไส้ติ่งอักเสบได้อย่างถูกต้อง

สถานที่ศึกษา : กลุ่มงานพยาธิวิทยากายวิภาค โรงพยาบาลสุรินทร์

รูปแบบการวิจัย : การวิจัยเชิงพรรณนา

วิธีการศึกษา : รวบรวมรายงานผลการวินิจฉัยทางศัลย์พยาธิ และวิเคราะห์ข้อมูลชิ้นเนื้อของไส้ติ่งที่ได้รับการผ่าตัด ณ โรงพยาบาลสุรินทร์ ตั้งแต่ 1 มกราคม พ.ศ. 2547 ถึง 31 ธันวาคม พ.ศ. 2551

ผลการศึกษา : ไส้ติ่งที่ได้รับการผ่าตัดจากการวินิจฉัยสงสัยว่าเป็นไส้ติ่งอักเสบทั้งหมด 4,300 ราย พบว่า ผลการวินิจฉัยทางศัลย์พยาธิวิทยา พบว่าเป็นไส้ติ่งอักเสบทั้งหมด 3,179 ราย คิดเป็นร้อยละ 73.9 เป็นเพศชาย จำนวน 1,411 ราย (ร้อยละ 44.1) และเพศหญิง จำนวน 1,768 ราย (ร้อยละ 55.6) อัตราการเกิดภาวะไส้ติ่งอักเสบแตกพบ จำนวน 494 ราย คิดเป็นร้อยละ 11.5 เป็นเพศชาย 218 ราย (ร้อยละ 44.1) และเพศหญิง 276 ราย (ร้อยละ 55.9) จากการวิเคราะห์ข้อมูลโดยใช้โปรแกรมคอมพิวเตอร์ (Statistical Package for The Social Science) โดยหาความสัมพันธ์ระหว่างความถูกต้องของการตรวจวินิจฉัยภาวะไส้ติ่งอักเสบและเพศ พบว่ามีนัยสำคัญทางสถิติ พยาธิสภาพอื่นๆที่พบได้แก่หนอนพยาธิ 14 ราย, พังผืดอุดตัน 66 ราย, เนื้องอกชนิด carcinoid 3 ราย, วัณโรคของไส้ติ่ง 11 ราย, ถุงน้ำเมือกของไส้ติ่ง 5 ราย, ภาวะเยื่อบุโพรงมดลูกเจริญผิดที่ 2 ราย มะเร็งชนิดต่อม (adenocarconoma) 1 ราย, มะเร็งที่เกิดจากเยื่อบุผิวแพร่กระจาย (metastatic carcinoma) 4 ราย

สรุป : ไส้ติ่งอักเสบเป็นพยาธิสภาพที่พบบ่อยที่สุดที่ต้องได้รับการผ่าตัดไส้ติ่งออก นอกจากนี้ยังมีพยาธิสภาพอื่นๆ ที่สามารถเกิดขึ้นได้ ฉะนั้นการส่งตรวจชิ้นเนื้อทางศัลย์พยาธิของไส้ติ่งมีความจำเป็นที่จะต้องทำทุกราย

INTRODUCTION

Vermiform appendix is an underdeveloped residual of the cecum and partially anchorored by the mesentery extension from adjacent ileum, and has no known function, but is the important organs in acute abdomen condition, and acute appendicitis is the most common cause of abdominal surgery. However, various pathological changes can occur in the appendix, and some conditions may lead to serious problems to the patients. The author studied the pathologic findings of vermiform appendix, determined the rate of acute inflammation of appendix in cases of clinical suspicion of acute appendicitis, and evaluated the variables that might influence the accuracy of clinical diagnosis of acute appendicitis.

MATERIAL AND METHODS

All appendectomy specimens diagnosed at the department of Anatomical Pathology, Surin Hospital, Surin Province, Thailand during 2004 to 2008 were studied. The medical records, pathology request forms and pathological record were evaluated to determine the age, gender, clinical history and pathological diagnosis. Hematoxylin-eosin stained slides were done. The literatures on the pathologic entities affecting the appendix were reviewed. Descriptive statistical analysis was carries out using SPSS for window version 11.0 and manifested the frequency of various pathologic findings, and association between variables (gender and age) and the accuracy of clinical diagnosis of acute appendicitis. Chi-Square Test was employed, with considered statistical significance if p value< 0.05.

RESULTS

A total of 4,300 appendectomy specimens were performed during the studied period, with clinical suspicion of acute appendicitis. The majority of the specimens were operated in Surin Hospital. The minority of specimens was received from community and private hospital in Surin province. In 4,300 cases, there were 44.4% of male and 55.6% of female. The male to female ratio was 1:1.25. The mean age was 35 years (SD = 19.07). The oldest case was 96 year-old. The youngest was 1 year.

The pathological changes of the cases with clinical suspicion of acute appendicitis were summarized in Table 1. These findings included 3,176 cases (73.9%) of definite acute inflammation of the appendices that were out of 4,300, including acute appendicitis (56.6%), acute suppurative appendicitis (4.5%), acute gangrenous/necrotizing appendicitis (1.4%) and ruptured appendicitis (11.5%).Of the 3,179 cases, 1,411 (44.4%) were male and 1,768 (55.6%) were female, with a ratio of 1:1.2 approximately (Table 2). The distribution among age range was shown in Table 3.

Table 1 Pathological findings in cases of clinical suspicion of acute appendicitis.

Pathological finding	Number	%
Acute inflammation of vermiform appendix	**3,179**	**73.9**
Acute appendicitis	2,433	56.6
Acute suppurative appendicitis	193	4.5
Acute gangrenous/necrotizing appendicitis	59	1.4
Ruptured appendicitis	494	11.5
Periappendicitis	**40**	**0.9**
Others	**1,081**	**25.1**
Congestion	4	0.1
Chronic appendicitis	6	0.1
Reactive lymphoid hyperplasia	726	16.9
Fibrous obliteration	66	1.5
Parasitic infestation	14	0.3
Eosinophilia	214	5.0
Carcinoid tumor	3	0.1
Metastatic carcinoma	4	0.1
Endometriosis	2	0.0
Tuberculosis	11	0.3
Fecalith	23	0.5
Diverticulum	1	0.0
Mucocele	5	0.1
Adenocarcinoma	1	0.0
Others	1	0.0
Total cases	**4,300**	**100**

Of the 494 patients with ruptured appendicitis, 218 cases (44.1%) were male and 276 cases (55.9%) were female, with a ratio 1:1.2.

The rate of acute inflammation of the appendices in male was 78.2%, which higher than in female (70.8%). The statistical analysis revealed association between the accuracy of clinical diagnosis of acute appendicitis and gender ($p = 0.0001$), with no correlation with age range ($p = 0.0001$) (Table 4).

Table 2 Comparison of pathological findings in cases of clinical suspicion of acute appendicitis with gender.

Pathological finding	Gender				
	Total	Male		Female	
	Number	Number	%	Number	%
Acute inflammation of appendix	**3,179**	**1,411**	**44.4**	**1,768**	**55.6**
Acute appendicitis	2,433	1,062	43.6	1,371	56.4
Acute suppurative appendicitis	193	97	50.3	96	49.7
Acute gangrenous/necrotizing appendicitis	59	34	57.6	25	42.4
Ruptured appendicitis	494	218	44.1	276	55.9
Periappendicitis	**40**	**14**	**35.5**	**26**	**65.0**
Others	**1,081**	**378**	**35.0**	**703**	**65.0**
Congestion	4	1	25.0	3	75.0
Chronic appendicitis	6	3	50.0	3	50.0
Reactive lymphoid hyperplasia	726	219	30.2	507	69.8
Fibrous obliteration	66	17	25.8	49	74.2
Parasitic infestation	14	10	71.4	4	28.6
Eosinophilia	214	107	50.0	107	50.0
Carcinoid tumor	3	3	100.0	0	0
Metastatic carcinoma	4	4	100.0	0	0
Endometriosis	2	0	0.0	2	100.0
Tuberculosis	11	2	18.2	9	81.8
Fecalith	23	9	39.1	14	60.9
Diverticulum	1	0	0.0	1	100.0
Mucocele	5	2	40.0	3	60.0
Adenocarcinoma	1	0	0.0	1	100.0
Others	1	1	100.0	0	0.0
Total cases	**4,300**	**1,803**	**41.9**	**2,497**	**58.1**

Table 3 Comparison of pathological findings in cases of clinical suspicion of acute appendicitis with age range.

Pathological finding	Age range						
	Total	≤ 15 year		16-60 year		> 60 year	
	Number	Number	%	Number	%	Number	%
Acute inflammation of	**3,179**	**590**	**18.5**	**2,154**	**67.8**	**435**	**13.7**
Acute appendicitis	2,433	462	19.0	1,703	70.0	268	11.0
Acute suppurative appendicitis	193	37	19.2	121	62.7	35	18.1
Acute gangrenous/ necrotizing appendicitis	59	8	13.6	45	76.3	6	10.2
Ruptured appendicitis	494	83	16.8	285	57.7	126	25.5
Periappendicitis	**40**	**4**	**10.0**	**29**	**72.5**	**7**	**17.5**
Others	**1,081**	**251**	**23.2**	**708**	**65.5**	**122**	**11.3**
Congestion	4	2	50.0	1	25.0	1	25.0
Chronic appendicitis	6	0	0	2	33.3	4	66.7
Reactive lymphoid hyperplasia	726	216	29.8	459	63.2	51	7.0
Fibrous obliteration	66	0	0	36	54.5	30	45.5
Parasitic infestation	14	4	28.6	7	50.0	3	21.4
Eosinophilia	214	24	11.2	165	77.1	25	11.7
Carcinoid tumor	3	0	0	1	33.3	2	66.7
Metastatic carcinoma	4	0	0	4	100.0	0	0
Endometriosis	2	0	0	2	100.0	0	0
Tuberculosis	11	0	0	9	81.8	2	18.2
Fecalith	23	4	17.4	16	69.9	3	13.0
Diverticulum	1	0	0	1	100.0	0	0
Mucocele	5	1	20.0	3	60.0	1	20.0
Adenocarcinoma	1	0	0	1	100.0	0	0
Others	1	0	0	1	100.0	0	0
Total cases	**4,300**	**845**	**19.7**	**2,891**	**67.2**	**564**	**13.1**

Table 4 Comparison of gender and age range with diagnostic classification age range.

Variables	Diagnostic classification						Chi-square
	Total		Acute		Non acute		*p*-value
	Number	%	Number	%	Number	%	
Gender							**0.0001**
Male	1,803	41.9	1411	78.2	392	21.9	
Female	2,497	58.1	1768	70.8	729	29.2	
Age (years)							**0.0001**
0 ≤ 15	845	19.7	590	69.8	255	30.2	
16 - 60	2,891	67.2	2,154	74.5	737	25.5	
> 60	564	13.1	435	77.1	129	22.9	
Total	**4,300**	**100**	**3,179**	**73.9**	**1,121**	**26.1**	

There were 40 cases (0.9%) of periappendicitis. The majority of cases were female (26 cases and 65%) with the male to female ratio of 1:1.8 (Tables 1 and 2).

Other pathological changes were also revealed, including appendiceal congestion, chronic appendicitis, reactive lymphoid hyperplasia, fibrous obliteration, parasitic infestation, eosinophilia, and fecalith as well as 3 cases of carcinoid tumor, 1 case of metastatic carcinoma, 2 cases of endometriosis, 11 cases of tuberculosis, 1 case of diverticulum, 5 cases of mucocele and 1 case of adenocarcinoma. Parasitic infestation comprised of 9 cases of enterobiasis, 1 case of ascaris lumbricoides and 4 of unspecified type of parasite.

The overall incidence of carcinoid tumor was 0.1% (3 cases out of total 4,300 cases). All were male with age range from 16 to 76 years. One case of the tumor was located at the tip and two cases were unspecified.

The primary adenocarcinoma of the appendix was mucinous type and found in 46-year-old female. The tumor was 4.0x3.0x2.5 cm. in size and invaded muscular layer and serosa with vascular invasion.

DISCUSSION

Acute appendicitis is the most common cause of acute abdomen. The exact mechanism of appendicitis is not well characterized, but the etiology is most likely multifactorial. A combination of ischemic mucosal damage and bacterial overgrowth with some luminal obstruction appear to be the likely pathogenesis[1, 2] Appendiceal inflammation is associated with obstruction in 50% to 80% of cases, usually in the form of a fecalith and, less commonly, a gallstone, tumor, or ball of worms (oxyuriasis vermicularis). Continued secretion of the mucinous fluid in the obstructed

viscus presumably leads to a progressive increase in intraluminal pressure sufficient to cause eventual collapse of the draining veins. Ischemic injury then favors bacterial proliferation with additional inflammatory edema and exudation, further embarrassing the blood supply. Nevertheless, a significant minority of inflamed appendices have no demonstrable luminal obstruction, and the pathogenesis of the inflammation remains unknown[3].

The gross appearance of acute appendicitis is variable and can be localized or diffuse. In early stage, the appendix might appear unremarkable to the naked eyes. The serosa might appear normal or show only patchy areas of vascular congestion. Later, fibrinous exudates can be seen and the appendix usually dilated and edematous, with external diameter exceeding 1 cm.[1, 3]. The appendix might become thickened, and peri appendiceal changes such as abscess, gangrenous changes and purple black discoloration might be present. Perforations can occur in more advanced stages[2].

The microscopic findings are also variable. The histologic criterion for the diagnosis of acute appendicitis is neutrophilic infiltration of the muscularis propria. Usually, neutrophils and ulcerations are also present within the mucosa. Since drainage of exudate into the appendix from alimentary tract infection also induces a mucosal neutrophilic infiltrate, evidence of muscular wall inflammation is requisite for the diagnosis[3, 4]. As the inflammatory process worsens, there is abscess formation within the wall, along with ulcerations and foci of suppurative necrosis in the mucosa. This state constitutes acute suppurative appendicitis. Further appendiceal compromise leads to large areas of hemorrhagic green ulceration of the mucosa and green-black gangrenous necrosis through the wall, extending to the serosa, creating acute gangrenous appendicitis, which is quickly followed by rupture and suppurative peritonitis[3, 4] and may cause serious effects to the patients[3, 4].

In the literature, the accuracy of clinical diagnosis of acute appendicitis is approximately 80% and false-positive diagnoses are more common in female than the male[5] This study revealed the slightly lower the rate of definite acute inflammation of appendices in male was 78.2% and higher than in female (70.8%). Statistical analysis showed association between the accuracy of clinical diagnosis of acute appendicitis and gender (P= 0.0001).

The differential diagnosis of the appendicitis is often a clinical challenge because appendicitis can mimic several abdominal conditions. The differential diagnosis of appendicitis must include cholecystitis and biliary colic, gastroenteritis, enterocolitis, diverticulitis, pancreatitis, perforated duodenal ulcer, renal colic and urinary tract infection (UTI). In pediatric patients, consider mesenteric lymphadenitis and intussusception.

In women of childbearing age who are not pregnant, the differential diagnosis of appendicitis must be also included ovarian cyst torsion, mittelschmerz, ectopic pregnancy, and pelvic inflammatory disease[6].

True chronic inflammation of the appendix is difficult to define as a pathologic entity, although occasionally granulation tissue and fibrosis associated with acute and chronic inflammation of the appendix suggest an organizing acute appendicitis. Much more frequently, recurrent acute attacks underline a seemingly chronic condition[3]. However, the fibrotic change with some degree of infiltration by lymphocytes and plasma cells may be diagnose as chronic appendicitis, and is possibly of the acute appendicitis that subsided in the past[4].

Parasitic infestation is the presence of parasite and/or egg in the lumen or wall of the appendix. In this study, the majority of cases were enterobiasis (pinworm). Enterobius vermicularis is one of the most common human helminthic infestation usually found in the appendix of children. The incidence is approximately 1-3% of appendectomy specimen. Pinworms are more often seen in negative appendices[5]. Worms and their ova are usually found in the lumen of the appendix with prominent eosinophilic infiltration without tissue destruction[2]. Eosinophilia or eosinophilic appendicitis is characterized by a diffuse eosinophilic infiltration with or without granulomas. These changes are frequently associated with parasitic infestations[5].

Carcinoid tumor is a rare neuroendocrine tumor, but is the most common neoplasm arising in the appendix, and account for 50-77% of all appediceal neoplasm. Their incidence rate is 0.075 new cases per 100,000 populations per years. Approximately 19% of all carcinoids are located in the appendix. They occur at all ages but most common in the third, fourth and fifth decades. There is a preponderant in women[7,8]. The overall incidence in this study is about 0.1% (3 out of total 4,300 cases), but most report cases are usually found in men. One case is locates at tip and 2 cases are unspecified. The tumor presents as a mass of neoplastic cells forming discrete islands, trabeculae, stands, glands, or undifferentiated sheets. The tumor cells are monotonously similar, having scan, pink granular cytoplasm and round to oval stippled nuclei, and usually exhibit reactivity for chromogranin and synaptophysin by immunohistochemical technique[4].

Adenocarcinoma is a rare tumor at this site, and may present either as acute appendicitis or as a mass in the right iliac fossa in a middle-aged or elderly patient[7]. In this study, the primary adenocarcinoma is found in 1 case, and metastatic carcinoma is found in 4 cases. Mucinous adenocarcinoma of the appendix may be associated with condition pseudomyxoma peritonei. This is due to escape of mucus- secreting tumor cells through the wall of the appendix into the peritoneal

cavity[7]. Anaplastic adenocarcinomatous cells can be found, distinguishing this process from mucinous spillage. Instances in which pseudomyxoma peritonei is accompanied by both appendiceal and ovarian mucinous adenocarcinomas are usually ascribed to spread of an appendiceal primary lesion, although the ovary has been thought of as a common primary site[3,9].

In summary, acute appendicitis is a clinical diagnosis, considering almost entirely on the history and physical examination. If the clinical picture is unclear, investigations are useful for excluding other differential diagnoses. The diagnosis should be made and the appendix removed before it becomes gangrenous or ruptures. Macroscopic and microscopic examinations are very useful because a variable of pathologic features can affect the appendix. Microscopic examination of the appendix is warranted even when it appears normal on gross examination, because the gross examination might miss important pathologic findings such as adenocarcinoma, carcinoid tumor and infections.

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