

Childhood Appendicitis in Regional Hospital

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Abstract

Background: Appendicitis is one of the most common intraabdominal conditions that needs surgery in children.

Objectives: The purpose of the study was to find the nature of childhood appendicitis which may be used as the representative data of regional hospitals in Thailand under universal coverage of national health care scheme.

Materials and Methods: Medical records of the patients aged under 15 years admitted to Chonburi hospital with the diagnosis of appendicitis and abdominal pain suspected of appendicitis between 2007 and 2010 were reviewed. The patients' data including demographics, modes and results of treatment were collected. Descriptive statistics were used to analyze the data.

Results: There were 660 patients in which 333 of them were referred cases (50.5%). Four hundred and seventy-five patients underwent appendectomies (72% of admitted cases). The average age of patients who had appendectomies was 9.6 years. Boys were predominated with 56.4%. Pathological specimens of the appendices were obtained in 463 patients which revealed appendicitis and normal appendix rates of 86.6% and 11.7% respectively. The appendicitis rupture rate was 35.4%. Enterobiasis was found in 1.7%. The highest rupture rate of 65.4% was found in the age group of 0-4 years. Patients with the symptom of abdominal pain between 24 and 48 hours had the highest rate of appendicitis rupture (70.7%). All patients had appendectomies performed within 24 hours after admission with the average time of 4 hours and 45 minutes. The median hospital stay was 3 days. One patient died of appendicitis rupture. Mortality rate was 0.2%.

Conclusions: The appendicitis rupture rate was high in children. This might be prevented by early diagnosis.

Key words: childhood appendicitis, regional hospital

INTRODUCTION

Appendectomy is one of the most common intraabdominal procedures performed in both children and adults.¹⁻³ The severity of appendicitis such as appendicitis rupture and sepsis increase with delayed treatment. The American Agency for Health Care Research and Quality is now adopting appendicitis rupture rate in children as a marker to monitor progress

towards alleviating disparities of health care in the United States. The acceptable rupture rate should be 30% at maximum.¹

History and physical examination have long been the hallmark of diagnosing acute appendicitis. The overall accuracy rate for the clinical diagnosis of acute appendicitis in children has been reported to be 54% to 70%.^{4,5} However, patients in pediatric age group

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may not be able to provide a good history of their symptoms and the etiology of abdominal pain is often unclear. In the attempt to improve diagnosis, attention has turned to radiologic imaging. Ultrasonography and computed tomography have been advocated as the imaging modalities of choice.^{6,7} The use of ultrasonography and computed tomography in such equivocal cases has been reported to be 29.2%.⁸ The most accurate radiologic imaging modality is computed tomography. Its sensitivity in diagnosing acute appendicitis has been up to 90%.⁹

Open appendectomy has been the operation of choice for all pediatric patients diagnosed of appendicitis at the Chonburi Hospital. The purpose of the study was to find the basic information in childhood appendicitis at the regional hospital setting.

MATERIALS AND METHODS

Medical records of patients aged under 15 years admitted to the Chonburi Hospital with diagnoses of appendicitis or abdominal pain suspected of appendicitis between April 1, 2007 and March 31, 2010 were reviewed. The following data were obtained: sex, age, referral hospital, date and time of admission and discharge, time of surgery, duration of abdominal pain, body temperature and white blood cell count at admission, intraoperative diagnosis, and pathological diagnosis. Descriptive statistics were used to analyze the data. The study was approved by the Institutional Review Board (Document No. 33/2553).

RESULTS

There were 660 patients admitted with the diagnosis of either appendicitis or abdominal pain

suspected of appendicitis. Three hundred and ninety-seven cases (60%) were boys and 263 cases (40%) were girls. Three hundred and thirty-three cases (50.5%) were referral patients. Six hundred and thirty-two patients (96%) were admitted through the Emergency Medicine Department and 28 cases (4%) were through the Surgical Out-patient Department.

Appendectomies were performed in 475 cases (72.0%). Clinical improvement without surgical conditions was found in 183 patients (27.7%). Salpingectomies were performed in 2 patients (0.3%). Of 475 appendectomies performed, there were 268 boys (56.4%) and 207 girls (43.6%) with the average age of 9.6 years (2 to 15 years). The average body temperature was 37.7°C (36.0 to 40.5°C). White blood cell counts were obtained from 462 patients with the average count of 16,635 cells/cu mm. (3,410 to 31,940 cells/cu mm.). Time from admission to the start of operation was recorded in 385 patients with the average of 4 hours and 45 minutes (20 minutes to 23 hours and 50 minutes).

Intraoperative diagnosis comprised 322 (67.8%) acute appendicitis, 20 (4.2%) gangrenous appendicitis, 122 (25.7%) appendicitis ruptures, 5 (1.1%) appendiceal abscesses, and 6 (1.3%) normal appendices. Pathological specimens of the appendices were obtained in 463 patients. Three hundred and ten specimens from acute appendicitis were reported to be 222 (48.0%) acute appendicitis, 32 (6.9%) appendicitis ruptures, 48 (10.4%) normal appendices, and 8 (1.7%) enterobiasis. Twenty specimens from gangrenous appendicitis were reported to be 15 (3.2%) acute appendicitis and 5 (1.1%) appendicitis ruptures. One hundred and twenty-seven (27.4%) specimens from intraoperative ruptures and abscesses were all confirmed appendicitis (Table 1).

Table 1 Intraoperative and pathological diagnosis of appendicitis

Finding	Acute	Gangrene	Rupture	Abscess	Normal	Total
Intraoperative finding	(n = 322) 67.8%	(n = 20) 4.2%	(n = 122) 25.7%	(n = 5) 1.1%	(n = 6) 1.3%	(n = 475) 100%
With pathological results	(n = 310) 67%	(n = 20) 4.3%	(n = 122) 26.3%	(n = 5) 1.1%	(n = 6) 1.3%	(n = 463) 100%
Acute	48.0%	3.2%	-	-	-	51.2%
Rupture	6.9%	1.1%	26.3%	1.1%	-	35.4%
Normal	10.4%	-	-	-	1.3%	11.7%
Enterobiasis	1.7%	-	-	-	-	1.7%

Table 2 Appendicitis rupture among age group

Age group (years)	Number of ruptures	Number of appendectomies	Appendicitis rupture rate (%)
0-4	20	31	64.5
5-9	68	173	39.3
10-15	76	259	29.3

Table 3 Pathological findings among duration of abdominal pain

Pain duration (hours)	Acute appendicitis (n = 188)	Ruptured appendicitis (n = 133)	Normal appendix (n = 47)	Enterobiasis (n = 8)	Total (n = 376)
<12	67.4%	12.5%	18.8%	1.2%	100% (n = 80)
12-24	60.1%	25.0%	11.3%	3.6%	100% (n = 168)
24-48	19.5%	70.7%	9.8%	-	100% (n = 82)
>48	37.0%	50.0%	10.8%	2.2%	100% (n = 46)

The appendicitis rupture rates among age groups were 64.5% for age group 0-4 years, 39.3% for age group 5-9 years, and 29.3% for age group 10-15 years (Table 2).

Three hundred and seventy-six appendectomies having records of the duration of abdominal pain were as follows: 80 (21.3%) less than 12 hours, 168 (36.7%) between 12-24 hours, 82 (21.8%) between 24-48 hours, and 46 (12.2%) more than 48 hours.

The appendicitis rupture rates found among duration of abdominal pain were as follows: 12.5% in less than 12 hours, 25.0% in between 12-24 hours, 70.7% in between 24-48 hours, and 50.0% in more than 48 hours (Table 3).

The median of hospital stay for all appendectomies was three days. One patient died of appendicitis rupture. The mortality rate was 0.2%.

DISCUSSION

Chonburi Hospital, as a regional hospital, received the referred cases of childhood abdominal pain associated with appendicitis in 50.5%. Only 72.0% of admission had appendectomy performed. Among appendectomies, intraoperative diagnoses of appendicitis and normal appendix were 98.7% and 1.3% respectively. Pathological diagnosis of appendicitis was 86.6%. Normal appendix was 11.7%. Enterobiasis, which was one of the causes of appendicitis², was found in 1.7%. The appendiceal

rupture rate in this study was 35.4%. Rupture rate in pediatric age group varied between 20% and 76% with a median of 36%. Rupture rate in children aged under 5 years was 82% and aged under 1 year was nearly 100%.¹⁰ The highest rupture rate of 64.5% in this study was found in children under 4 years of age. The highest rupture rate of 70.7% was found in abdominal pain duration 24-48 hours. The lowest rupture rate of 12.5% was found in abdominal pain duration under 12 hours. Various studies showed that delayed operation within 12-24 hours after admission did not increase rupture rate.^{10,11} In this study, the average time from admission to operation was 4 hours and 45 minutes. The average body temperature of 37.7 degrees Celsius and average white blood count of 16,635 were found. Fever and leucocytosis were similar to that of Meier et al.⁸ Nevertheless, fever and levels of leucocytosis could not be used to differentiate between rupture and non-rupture appendicitis.⁹

CONCLUSIONS

Appendiceal rupture rate is high in pediatric age group. Imaging modalities such as ultrasonography and computed tomography which help in the diagnosis of acute abdominal pain in children with high accuracy should be used for early diagnosis of appendicitis. This study may represent clinical features and characteristics of childhood appendicitis at regional hospitals in Thailand.

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