Characteristics and Treatment Outcomes of Colonic Diverticulitis in Hospitalized Patients in Thailand

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Background: *Colonic diverticular disease exhibits mucosal outpouchings through the large intestine. Common complications of this disease are diverticular bleeding and diverticulitis. The prevalence of the disease is age-dependent, and some patients with diverticulitis develop complications especially the elderly, the obese and those with co-morbid diseases. In a retrospective study in Chiang Mai, Thailand, the mortality rate was 3.6% at 30 days and 9.2% at 1 year.*

Objective: *To determine the financial burden, clinical characteristics and factors associated with severity and mortality of patients with colonic diverticulitis.*

Material and Method: *This was a retrospective study of in-patients from hospitals nationwide, and data were retrieved from three major health care system databases in the fiscal year 2010, searching for ICD code 10. Patients diagnosed with diverticular disease of the large intestine were included in this study, and baseline characteristics and clinical outcomes were analyzed. The study was approved by the institutional ethics committee of Rajavithi Hospital.*

Results: *One thousand seven hundred and fifty patients with colonic diverticulitis were enrolled in the study and their data were analyzed. The mean age of the patients was 61.15±16.12 years old, about 70% of patients had co-morbid diseases, and the incidence of complicated colonic diverticulitis was 14.51%. The median length of hospital stay (LOS) was 6 days, half of the patients underwent surgery, and the mortality rate was 3.26%. Multivariate regression analysis revealed that the parameters associated with disease severity were number of co-morbid diseases, the universal coverage health care system, and surgical treatment, while the parameters associated with mortality were having more than two co-morbid diseases and being in the universal coverage health care system.*

Conclusion: *Colonic diverticulitis was common in elderly patients and associated with co-morbid diseases. Most patients had mild severity but a high rate of surgery, and the mortality rate was higher than in western countries. Parameters associated with disease severity and mortality were having co-morbid disease, being in the universal coverage healthcare system and having surgical treatment.*

Keywords: *Colonic diverticulitis, Treatment outcome, Mortality rate, Length of stay (LOS)*

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Colonic diverticular disease exhibits mucosal outpouchings through the large bowel wall. This disease is common in western countries, especially in elderly patients. Its prevalence increases with age, being 5.0% at age 40, 30.0% at age 60 and 85.0% at age 80, and its most common location is at the sigmoid colon[1]. Common complications of this disease are diverticulitis and diverticular bleeding.

In Asian countries, the prevalence of diverticular disease is less common, and right-sided location is predominant. Data from a study in Japan found that 70% of incidences of the disease were located at the right colon, 16% at the left, and 14% at both sides of the colon[2]. Most patients are asymptomatic. In Thailand, the prevalence of colonic diverticular disease found in a double contrast barium enema study was 28.5% with predominant right side location[3]. Fifteen to twenty percent of patients had diverticulitis[4] and 20-25% of patients with diverticulitis, especially the elderly[5], developed complications such as perforation, peritonitis, obstruction and abscess formation; however, twenty percent of patients with diverticulitis were aged less than 50 years old. Clinically, colonic diverticulitis can be classified into two groups[6-9]: simple diverticulitis (75-90%) with little

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abdominal pain and few symptoms; and complicated diverticulitis (10-25%) with severe abdominal pain, fever, peritonitis and complications such as colonic perforation, obstruction, abscess or fistula. Complicated diverticulitis is more common in elderly, immunocompromised, or obese patients, or those with co-morbidity[10-12]. Patients with complicated diverticulitis tend to have more severe disease, and higher rates of morbidity and mortality; thus, they need aggressive management.

A retrospective study in Chiang Mai, Thailand, from 2000 to 2010, found that the mortality rate of patients with colonic diverticulitis was 3.6% at 30 days and 9.2% at 1 year[13]. The purposes of the present study were to identify characteristics, management outcomes, and hospital costs incurred by patients who were admitted with colonic diverticulitis in Thailand.

Material and Method

The protocol of this research was reviewed and approved by the ethics committee of Rajvithi Hospital (No. 054/2558).

The data of hospitalized patients and medical expense from nationwide hospital admission data for the fiscal year 2010 (October 1, 2009 to September 30, 2010) were collected from 3 sources: the universal coverage health care system (UC) from the national health security office (NHSO); the social security health care system (SS) from the social security office; and in-patient data from the government welfare medical expense health care system (GM) at the Department of the Comptroller General, Thailand. The study was reviewed and approved by the ethics review committee of Rajavithi Hospital.

Inclusion criteria were patients who had colonic diverticulitis as defined by the International Classification of Disease, 10th edition (ICD-10) codes for colonic diverticulitis. Patients with diverticular disease of the large intestine with or without perforation and abscess (K57.2 and K57.3 respectively) were included. Exclusion criteria were patients without definite diagnosis of colonic diverticulitis as defined by ICD-10 codes.

Baseline characteristics of patients and clinical outcomes were analyzed including age, gender, geographic location of residence, co–morbid diseases, level of hospital, health care system types, surgical treatment, mortality rates, length of hospital stay and cost of hospitalization.

Sample size was calculated using ratio formulas. The prevalence of complicated colonic diverticulitis in hospitalized patients with colonic diverticulosis (10%) was used to calculate the patient sample size[10]. The author set a power of 80% and a *p*-value of less than 0.05 as statistically significant. The appropriate number of subjects was determined to be 1,700.

Statistical analysis

Chi-square test or Fisher's exact test were used for qualitative variables and the Student t-test for quantitative variables. SPSS for Windows (SPSS, Chicago, IL, USA version 17.0) was used to analyze the data, and a *p*-value of less than 0.05 was considered statistically significant. Primary outcomes were incidence of complicated colonic diverticulitis, surgical rates and mortality rates of patients. Secondary outcomes were factors that were associated with complicated diverticulitis and patient mortality rates.

Results

One thousand seven hundred patients were enrolled in the present study. Baseline characteristics of patients are summarized in Table 1. There were more males than females (932 and 818 respectively), the mean age (mean $\pm$ SD) was 61.15$\pm$16.12 years, and more than half of the patients (968, 55.3%) were aged over 60 years old. Over half of the patients came from the central region of Thailand (953, 54.5%, 414, 23.7%, 253 patients, 14.5% and 130, 7.4% from the Central, Northern, Northeastern, and Southern regions respectively). More than two thirds of patients had co-morbid diseases (30.1% had no co-morbid diseases, and 45.5%, 16.3% and 8.1% had 1-3, 4-6, and more than six co-morbid diseases, respectively). Over half of the patients (57.4%) used the universal coverage health care system (UC), 27.7% were covered by the government welfare medical expense health care system (GM), and 14.9% availed of the social security fund health care system (SS). Most patients were admitted to tertiary care hospitals (48.6% tertiary care hospitals, 30.6% secondary care hospitals, 14.5% private hospitals and 6.2% primary care hospitals). Median (min-max) length of hospital stay was six (1-140) days, most patients stayed in the hospital for less than 7 days, and over half of the patients had abdominal surgery. Median (min-max) hospital cost was 19,910 (309-1,601,580) baht with half of the patients incurring a cost of less than 20,000 baht.

Baseline characteristics of patients classified by health care system are shown in Table 2. Female

Table 1. Baseline characteristics of patients

Factors	n (%)
Sex	
Male	932 (53.3)
Female	818 (46.7)
Age	
Mean ± SD	61.15±16.12
Median (min-max)	62.85 (18-97)
Age group (years)	
18-35	132 (7.5)
36-59	650 (37.1)
60+	968 (55.3)
Region	
Northern	414 (23.7)
Northeast	253 (14.5)
Central	953 (54.5)
Southern	130 (7.4)
Number of co-morbid diseases	
No disease	527 (30.1)
1-3 diseases	796 (45.5)
4-6 diseases	285 (16.3)
More than 6 diseases	142 (8.1)
Health care system	
Government welfare medical expense	485 (27.7)
Social security fund	260 (14.9)
Universal coverage	1,005 (57.4)
Hospital level	
Primary	109 (6.2)
Secondary	536 (30.6)
Tertiary	851 (48.6)
Private	254 (14.5)

patients using the SS system outnumbered males (68.5 vs. 31.3%), and the SS group had fewer patients (8.5%) aged more than sixty years old (compared to 70.4% GM and 58.4% UC, $p<0.001$). The mean age of SS patients was 43.24 years (compared to 69.27 years in the GM group and 61.87 years in the UC group, $p<0.001$). Fewer patients in the SS system had more than three co-morbid diseases compared with the other two health care systems (10.3% compared with 31.1% in the GM group, and 24.8% in the UC group, $p<0.001$). Most patients in ss system were admitted to private hospitals. Most patients in UC and GM groups were admitted to tertiary hospitals (22.3% in SS group, 70.3% in GM group, 45.0% in UC group, $p<0.001$).

Clinical outcomes according to health care system are summarized in Table 3. Patients in the UC system had more complicated diseases (17.5% compared to 10.5% and 10.4% in the GM and SS groups respectively, $p<0.001$) and UC patients also had a higher mortality rate (4.5%) than those in the other two groups (2.3% in the GM group and 0.4% in the SS group, $p<0.001$). Patients in the SS system had a shorter mean length of hospital stay (6.55 days compared with 9.49 and 9.58 days in the GM and UC groups respectively, $p<0.001$), and their median hospital cost (26,916 baht) was higher than that of patients in the other two systems (17,605 baht in the GM group, and 18,930.5 baht in the UC group, $p<0.001$); but no there were no significant differences in surgical treatment rates.

Parameters associated with disease severity are shown in Table 4. The incidence of complicated colonic diverticulitis was 14.51% (254 out of 1,750 patients). The baseline characteristics of patients with complicated colonic diverticulitis and simple colonic diverticulitis in terms of gender, age group and geographic region were not significantly different. Factors associated with complicated colonic diverticulitis were type of health care system ($p<0.001$), co-morbid diseases (80.7 vs. 75.3%, $p<0.001$), surgical treatment (80.7 vs. 50.9%, $p<0.001$) and level of hospital admission ($p = 0.028$). Patients with complicated colonic diverticulitis had greater length of hospital stay (10 vs. 6 days, $p<0.001$), and higher hospital cost (51,608.5 vs. 16,846 baht, $p<0.001$) than patients with simple colonic diverticulitis. Multivariate regression analysis (Table 5) revealed that the factors associated with complicated colonic diverticulitis were having 4-6 co-morbid diseases (odds ratio (OR) 1.91, 95% CI 1.17-3.10), having more than six diseases (OR 4.06, 95% CI 2.41-6.85), being in the universal coverage health care system (OR 1.85, 95% CI 1.26-2.71), and having surgical treatment (OR 4.28, 95% CI 2.45-7.48).

Parameters associated with disease mortality are shown in Table 6. The overall mortality rate of patients with colonic diverticulitis was 3.36%, and was not affected by patients' gender or geographic region. Factors associated with patients' mortality rates were: age (mean ± SD) (71.37±10.96 vs. 60.8±16.15 years, $p<0.001$); having 4-6-co-morbid diseases (28.07 vs. 15.89%, $p<0.001$); having more than 6 co-morbid diseases (54.39% vs. 6.55%, $p<0.001$); type of health care system ($p<0.001$); hospital care level ($p = 0.010$); surgical treatment ($p<0.001$); and disease severity (13.8% vs. 36.8%, $p<0.001$). Patients who died had greater length of hospital stay (11 vs. 6 days, $p<0.001$) and higher hospital charges (18,984.5 vs. 95,607 baht, $p<0.001$) than patients who survived. Multivariate regression analysis (Table 7) showed that the factors that were associated with patient mortality rates were having 4-6 co-morbid diseases (OR 19.11, 95% CI 2.390-

Table 2. Baseline characteristics of patients classified by health care system

Parameters	Health care system, n (%)			Total, n (%) (n = 1,750)	*p*-value
	Government Welfare Medical Expense (GM) (n = 485)	Social Security Fund (SS) (n = 260)	Universal Coverage (UC) (n = 1,005)		
Sex					<0.001*
Male	246 (50.7)	178 (68.5)	508 (50.5)	932 (53.3)	
Female	239 (49.3)	82 (31.5)	497 (49.5)	818 (46.7)	
Age					
Mean ± SD	69.27±13.49	43.24±11.73	61.87±14.63	61.15±16.12	<0.001*
Median (min-max)	72.11 (19-95)	43 (19-71)	63.47 (18-97)	62.85 (18-97)	
Age group (years)					<0.001*
18-35	2 (0.4)	80 (30.8)	50 (5.0)	132 (7.5)	
36-59	124 (25.6)	158 (60.8)	368 (36.6)	650 (37.1)	
60+	359 (70.4)	22 (8.5)	587 (58.4)	968 (55.3)	
Region					<0.001*
Northern	107 (22.1)	30 (11.5)	277 (27.6)	414 (23.7)	
Northeast	62 (12.8)	12 (4.6)	179 (17.8)	253 (14.5)	
Central	283 (58.4)	207 (79.6)	463 (46.1)	953 (54.5)	
Southern	33 (6.8)	11 (4.2)	86 (8.6)	130 (7.4)	
Number of co-morbid diseases					<0.001*
No co-morbid disease	107 (22.1)	127 (48.8)	293 (29.2)	527 (30.1)	
1-3 co-morbid diseases	227 (46.8)	106 (40.8)	463 (29.2)	796 (30.1)	
4-6 co-morbid diseases	101 (20.8)	23 (8.8)	161 (16.0)	285 (16.3)	
>6 co-morbid diseases	50 (10.3)	4 (1.5)	88 (8.8)	142 (8.1)	
Hospital level					<0.001*
Primary	23 (4.7)	1 (0.4)	85 (8.5)	109 (6.2)	
Secondary	121 (24.9)	22 (8.5)	393 (39.1)	536 (30.6)	
Tertiary	341 (70.3)	58 (22.3)	452 (45.0)	851 (48.6)	
Private	0 (0.0)	179 (68.8)	75 (7.5)	254 (14.5)	

* Significant at $p<0.05$

152.870, $p = 0.005$), having more than six co-morbid diseases (OR 80.58, 95% CI 9.75-666.16, $p<0.001$), and using the universal coverage health care system (OR 2.46, 95% CI 1.16-5.21, $p = 0.019$).

Discussion

Colonic diverticular disease usually occurs in the elderly population and is common in western countries though with geographic and racial variability[14]. Current evidence shows that a low fiber diet, abnormal colonic pressure, motility disorder and change of colonic structure contribute to diverticular formation[4]. Data from a study of Asian countries showed an increase in the prevalence of this disease[2-4]. Diverticulitis is a common complication of colonic diverticular disease, which manifests itself with abdominal pain and fever, and it is the third-highest ranked reason for hospital admission for gastro-intestinal disease in the USA[15]. Ten to twenty percent of patients develop complicated diverticulitis with high morbidity and mortality rates[11,16]. Many studies have shown that low fiber intake and obesity are associated with the risk of diverticulitis[17-19]. The present study found that demographic data with respect to gender and age were not significantly different from those of western countries. There was significant geographic variation in rates of hospitalizations for acute diverticulitis: the largest number of patients came from the central region of Thailand, and the reasons for this may be related to the high density of population in the

Table 3. Clinical outcomes classified by health care system

Factors	Health care system n (%)			Total (n = 1,750)	*p*-value
	Government welfare medical expense (GM) (n = 485)	Social security fund (SS) (n = 260)	Universal coverage (UC) (n = 1,005)		
Severity					<0.001*
Complicated disease	51 (10.5)	27 (10.4)	176 (17.5)	254 (14.5)	
Simple disease	434 (89.5)	233 (89.6)	829 (82.5)	1,496 (85.5)	
Length of stay (day)					
Mean ± SD	9.49±11.19	6.55±4.84	9.58±12.92	9.1±11.62	
Median (min-max)	6 (1-100)	5.5 (1-40)	6 (1-140)	6 (1-140)	0.017*
≤7 days	279 (57.5)	192 (73.8)	603 (60.0)	1,074 (61.4)	
8-14 days	129 (26.6)	56 (21.5)	266 (26.5)	451 (25.8)	
>14 days	77 (15.9)	12 (4.6)	136 (13.5)	225 (12.9)	
Hospital cost (baht)					<0.001*
Median (min-max)	17,605 (1,260-786,540)	26,916 (895-428,522)	18,930.5 (309-1,601,580)	19,910 (309-1,601,580)	<0.001*
≤20,000	266 (54.8)	91(35.0)	519 (51.7)	876 (50.1)	
20,001-40,000	102 (21.0)	84 (32.3)	237 (23.6)	423 (24.2)	
>40,000	117 (24.1)	85 (32.7)	248 (24.7)	450 (25.7)	
Surgical treatment					0.099
Yes	248 (51.1)	147 (56.5)	572 (56.9)	967 (59.3)	
No	237 (48.9)	113 (43.5)	433 (43.1)	783 (44.7)	
Discharged status					0.001*
Dead	11 (2.3)	1 (0.4)	45 (4.5)	57 (3.3)	
Alive	474 (97.7)	259 (99.6)	960 (95.5)	1,693 (96.7)	

area, their dietary behavior and obesity. Most patients had co-morbid diseases and were admitted to tertiary level hospitals. The surgical treatment rate was higher than in other studies, and the median length of hospital stay was 6 days that is longer than found in other studies[15,24].

With regard to health care systems, there were differences in multiple demographic data in each health care system. Patients with social security fund health care system (SS) were younger and had fewer co-morbid diseases than those in the other two health care systems, and they also fewer severe diseases and lower mortality rates. Patients in the universal coverage health care system had a significantly higher rate of complicated diseases (17.5% compared to 10.5% in the GM group and 10.4% in the SS group, $p<0.001$) and a higher mortality rate (4.5% compared to 2.3% in the GM group and 0.4% in the SS group, $p<0.001$). This may be due to the fact that patients in this group were older and had a greater number and severity of co-morbid diseases.

The prevalence of complicated colonic diverticulitis was similar to that of other studies[9,11]. Multivariate regression analysis revealed that many factors were associated with complicated colonic diverticulitis, but the factors that were strongly related to disease severity were having more than six co-morbid diseases (OR 4.06, 95% CI 2.41-6.85) and surgical treatment (OR 4.28, 95% CI 2.45-7.48). In other studies, about 15-20% of patients with acute diverticulitis required surgical treatment during admission[20-22], and up to 50% of patients with complicated diverticulitis required surgical treatment[23]. In this study, the surgical rate was higher than in other studies, and this may be due to the more advanced ages and higher prevalence of co-morbid diseases in the patients in this study. The number of co-morbid diseases had a significant effect on severity of disease, and patients with more than three co-morbid diseases had a higher incidence of complicated colonic diverticulitis. Patients in the universal coverage health care system also had a greater rate of complicated colonic diverticulitis, and this may

Table 4. Parameters associated with disease severity

Parameters	Severity, n (%)		*p*-value
	Complicated diverticulitis (n = 254)	Simple diverticulitis (n = 1,496)	
Male	139 (54.7)	793 (53.0)	0.612
Age			0.649
Mean ± SD	60.73±15.34	61.23±16.25	
Median (min-max)	62.50 (19-91)	62.89 (18-97)	
Age group (years)			0.700
18-35	16 (6.3)	116 (7.8)	
36-59	94 (37.0)	556 (37.2)	
60+	144 (56.7)	824 (55.1)	
Region			0.121
Northern	45 (17.7)	369 (24.7)	
Northeast	40 (15.7)	213 (14.2)	
Central	149 (58.7)	804 (53.7)	
Southern	20 (7.9)	110 (7.4)	
Number of co-morbid diseases			<0.001*
No disease	49 (19.3)	478 (32.0)	
1-3 diseases	107 (42.1)	689 (46.1)	
4-6 diseases	51 (20.1)	234 (15.6)	
More than 6 diseases	47 (18.5)	95 (6.4)	
Health care system			<0.001*
Government welfare medical expense	51 (20.1)	434 (29.0)	
Social security fund	27 (10.6)	233 (15.6)	
Universal coverage	176 (69.3)	829 (55.4)	
Hospital level			0.028*
Primary	8 (3.1)	101 (6.8)	
Secondary	80 (31.5)	456 (30.5)	
Tertiary	138 (54.3)	713 (47.7)	
Private	28 (11.0)	226 (15.1)	
Length of stay (day)			<0.001*
Median (min-max)	10 (1-129)	6 (1-140)	
≤7 days	60 (23.6)	1,014 (67.8)	
8-14 days	109 (42.9)	342 (22.9)	
>14 days	85 (33.5)	140 (9.4)	
Hospital cost (baht)			<0.001*
Median (min-max)	51,608.5 (910-1,601,580)	16,846 (309-786,540)	
≤20,000	28 (11.0)	849 (56.8)	
20,001-40,000	70 (27.6)	353 (23.6)	
>40,000	156 (61.4)	294 (19.7)	
Surgical treatment			<0.001*
Yes	205 (80.7)	762 (50.9)	
No	49 (19.3)	734 (49.1)	

* Significant at $p<0.05$

be because patients in this health care system had more severe co-morbid diseases and more difficult, or delayed, diagnosis due to unclear clinical presentation or delayed visits.

The mortality rate in the present research was higher than in other studies (3.8 vs. 0.6-2.2%)[15,23]. Many factors were associated with patient mortality; however, multivariate regression analysis showed that the only

Table 5. Logistic regression analysis of parameters associated with disease severity

	Crude OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
Region				
Central	Reference		Reference	
Northern	0.66 (0.46-0.94)	0.021*	0.64 (0.42-0.96)	0.033*
Northeast	1.01 (0.69-1.48)	0.946	0.90 (0.56-1.46)	0.673
Southern	0.98 (0.59-1.63)	0.941	0.74 (0.40-1.38)	0.344
Number of co-morbid diseases				
No disease	Reference		Reference	
1-3 diseases	1.51 (1.06-2.17)	0.023*	1.44 (0.96-2.18)	0.080
4-6 diseases	2.13 (1.39-3.24)	<0.001*	1.91 (1.17-3.10)	0.009*
More than 6 diseases	4.83 (3.06-7.62)	<0.001*	4.06 (2.41-6.85)	<0.001*
Health care system				
Government welfare medical expense	Reference		Reference	
Social security fund	0.99 (0.60-1.61)	0.956	1.34 (0.70-2.56)	0.378
Universal coverage	1.81 (1.30-2.52)	<0.001*	1.85 (1.26-2.71)	0.002*
Hospital level				
Secondary	Reference		Reference	
Primary	0.45 (0.21-0.96)	0.038*	0.64 (0.29-1.41)	0.266
Tertiary	1.18 (0.86-1.63)	0.311	1.05 (0.72-1.51)	0.817
Private	0.70 (0.44-1.11)	0.129	0.67 (0.36-1.25)	0.209
Surgical treatment				
No	Reference			
Yes	5.63 (3.33-9.52)	<0.001*	4.28 (2.45-7.48)	<0.001*

* Significant at $p<0.05$

factors associated with patient mortality were having more than three co-morbid diseases and using the universal coverage health care system. The number of co-morbid diseases was more strongly associated with patient mortality than was use of the universal coverage health care system (OR = 19.11-80.58, $p<0.001$ in more than three co-morbid diseases compared to 2.46, $p = 0.019$ in the UC system). Patients in the universal coverage health care system may have had differences in severity of co-morbid diseases or delay in diagnosis that could have caused higher mortality rates than in other health care systems. Patients' age, disease severity and surgical treatment were related to patient mortality, but were not associated with patient mortality in this study. The differences in the results of this study and those of other research may be due to the different inclusion criteria adopted in this study for diagnosis and evaluation of severity of disease as well as variations in the statistical methods of data analysis; multivariate regression analysis was used in this study. Limitations of this study were the fact that health care data sets were not collected for research purposes, some clinical information was lacking. There were also limited clinical variables, investigation and details of management; furthermore, data were collected only in hospitalized patients and may not represent the general population of people with diverticulitis.

Conclusion

Colonic diverticulitis was common in the elderly and was associated with co-morbid diseases. Most patients had mild severity but high rates of surgery. The mortality rate was higher than in western countries, and the factors in this study associated with disease severity and mortality were number of co-morbid diseases, universal coverage healthcare system and surgical treatment.

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What is already known on this topic ?

Colonic diverticulitis is a common complication of colonic diverticulitis with high rates of

Table 6. Parameters associated with disease mortality

Factors	Discharged status, n (%)		Total, n (%) (n = 1,750)	*p*-value
	Alive (n = 1,693)	Dead (n = 57)		
Sex				0.862
Male	901 (96.7)	31 (3.3)	932 (53.3)	
Female	792 (96.8)	26 (3.2)	818 (46.7)	
Age				
Mean ± SD	60.8±16.15	71.37±10.96		
Median (min-max)	62.4 (18-97)	72.89 (40-92)		
Age group (years)				<0.001*
18-35	132 (100)	0 (0)	132 (7.5)	
36-59	642 (98.8)	8 (1.2)	650 (37.1)	
60+	919 (94.9)	49 (5.1)	968 (55.3)	
Region				0.864
Northern	402 (97.1)	12 (2.9)	414 (23.6)	
Northeast	244 (96.4)	9 (3.6)	253 (14.5)	
Central	920 (96.5)	33 (3.5)	953 (54.5)	
Southern	127 (97.7)	3 (2.3)	130 (7.4)	
Number of co-morbid diseases				<0.001*
No disease	526 (99.8)	1 (0.2)	527 (30.1)	
1-3 diseases	787 (98.9)	9 (1.1)	796 (45.5)	
4-6 diseases	269 (94.4)	16 (5.6)	285 (16.3)	
More than 6 diseases	111 (78.2)	31 (21.8)	142 (8.1)	
Health care system				0.001*
Government welfare medical expense	474 (97.7)	11 (2.3)	485 (27.7)	
Social security fund	259 (99.6)	1 (0.4)	260 (14.9)	
Universal coverage	960 (95.5)	45 (4.5)	1,005 (57.4)	
Hospital level				0.010*
Primary	108 (99.1)	1 (0.9)	109 (6.3)	
Secondary	516 (96.3)	20 (3.7)	536 (30.6)	
Tertiary	817 (96.0)	34 (4.0)	851 (48.6)	
Private	252 (99.2)	2 (0.8)	254 (14.5)	
Length of stay (day)				<0.001*
Median (min-max)	6 (1-140)	11 (1-129)		
≤7 days	1,054 (98.1)	20 (1.9)	1,074 (61.4)	
8-14 days	439 (97.3)	12 (2.7)	451 (25.7)	
>14 days	200 (88.9)	25 (11.1)	225 (12.9)	
Hospital cost (baht)				<0.001*
Median (min-max)	18,984.5 (309-849,377)	95,607 (5,785-1,601,580)		
≤20,000	875 (99.8)	2 (0.2)	777 (44.4)	
20,001-40,000	414 (97.9)	9 (2.1)	423 (24.2)	
>40,000	404 (89.8)	46 (10.2)	450 (25.7)	
Surgical treatment				<0.001*
Yes	922 (54.5)	45 (78.9)	967 (55.3)	
No	771 (45.5)	12 (21.1)	783 (44.7)	
Severity	233 (13.8)	21 (36.8)	254 (14.5)	<0.001*

* Significant at $p<0.05$

morbidity and mortality. The severity and mortality of the disease are related to multiple factors such as aging, co-morbid disease and obesity.

There is little information available about the

Table 7. Logistic regression analysis of parameters associated with mortality

	Crude OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
Age ≥60 years	5.16 (2.43-10.96)	<0.001*	0.17 (1.82-0.78)	0.166
Number of co-morbid diseases				
No disease	Reference			
1-3 diseases	6.02 (0.76-47.62)	0.089	3.81 (0.46-31.57)	0.215
4-6 diseases	31.29 (4.13-237.18)	0.001*	19.11 (2.39-152.87)	0.005
More than 6 diseases	146.90 (19.85-1,087.43)	<0.001*	80.58 (9.75-666.16)	0.000
Health care system				
Government welfare medical expense	Reference			
Social security fund	0.17 (0.02-1.30)	0.09	0.85 (0.09-8.40)	0.886
Universal coverage	2.02 (1.04-3.94)	0.04	2.46 (1.16-5.21)	0.019
Hospital level				
Secondary	Reference			
Primary	0.22 (0.03-1.67)	0.143	0.31 (0.04-2.51)	0.271
Tertiary	1.23 (0.69-2.20)	0.480	0.76 (0.38-1.49)	0.421
Private	0.19 (0.04-0.82)	0.026	0.39 (0.08-1.99)	0.257
Length of stay (day)				
≤7 days	Reference			
8-14 days	1.44 (0.70-2.97)	0.323	0.92 (0.39-2.14)	0.846
>14 days	6.59 (3.59-12.09)	<0.001*	0.86 (0.36-2.00)	0.726
Surgical treatment				
No	Reference			
Yes	17.08 (2.35-124.40)	0.005	7.16 (0.92-55.45)	0.060
Severity	3.65 (2.10-6.37)	<0.001*	1.34 (0.67-2.66)	0.409

* Significant at $p<0.05$

about characteristics and treatment outcomes of colonic diverticulitis in Thailand.

What this study adds ?

Colonic diverticulitis is common in the elderly and is associated with co-morbid diseases. Most patients in this study had mild severity but a higher rate of surgery compared with patients in other studies. The mortality rate was higher than in western countries, and the parameters associated with disease severity and mortality were co-morbid disease, the universal coverage healthcare system, and surgical treatment.

Potential conflicts of interest

None.

References

1. Young-Fadok TM, Roberts PL, Spencer MP, Wolff BG. Colonic diverticular disease. Curr Probl Surg 2000; 37: 457-514.
2. Miura S, Kodaira S, Shatari T, Nishioka M, Hosoda Y, Hisa TK. Recent trends in diverticulosis of the right colon in Japan: retrospective review in a regional hospital. Dis Colon Rectum 2000; 43: 1383-9.
3. Lohsiriwat V, Suthikeeree W. Pattern and distribution of colonic diverticulosis: analysis of 2877 barium enemas in Thailand. World J Gastroenterol 2013; 19: 8709-13.
4. Heise CP. Epidemiology and pathogenesis of diverticular disease. J Gastrointest Surg 2008; 12: 1309-11.
5. Kang JY, Melville D, Maxwell JD. Epidemiology and management of diverticular disease of the colon. Drugs Aging 2004; 21: 211-28.
6. Parra-Blanco A. Colonic diverticular disease: pathophysiology and clinical picture. Digestion 2006; 73 (Suppl 1): 47-57.
7. Stollman N, Raskin JB. Diverticular disease of the colon. Lancet 2004; 363: 631-9.
8. Jacobs DO. Clinical practice. Diverticulitis. N Engl J Med 2007; 357: 2057-66.
9. World Gastroenterology Organisation. WGO Practice guideline-diverticular disease [Internet]. 2007 [cited 2015 May 8]. Available from: http://www.worldgastroenterology.org/guidelines/

global-guidelines/diverticular-disease
10. Schwesinger WH, Page CP, Gaskill HV 3rd, Steward RM, Chopra S, Strodel WE, et al. Operative management of diverticular emergencies: strategies and outcomes. Arch Surg 2000; 135: 558-63.
11. Chapman J, Davies M, Wolff B, Dozois E, Tessier D, Harrington J, et al. Complicated diverticulitis: is it time to rethink the rules? Ann Surg 2005; 242: 576-83.
12. Anaya DA, Flum DR. Risk of emergency colectomy and colostomy in patients with diverticular disease. Arch Surg 2005; 140: 681-5.
13. Padunwanitchkul P, Pisespongsa P, Praisontarangkul O, Thongsawat S, Chitapanarux T, Leerapun A, et al. Natural history of diverticular diseases in Chiang Mai, Thailand. Thai J Gastroenterol 2013; 14: 176-84.
14. Commane DM, Arasaradnam RP, Mills S, Mathers JC, Bradburn M. Diet, ageing and genetic factors in the pathogenesis of diverticular disease. World J Gastroenterol 2009; 15: 2479-88.
15. Peery AF, Dellon ES, Lund J, Crockett SD, McGowan CE, Bulsiewicz WJ, et al. Burden of gastrointestinal disease in the United States: 2012 update. Gastroenterology 2012; 143: 1179-87.e1-3.
16. Feingold D, Steele SR, Lee S, Kaiser A, Boushey R, Buie WD, et al. Practice parameters for the treatment of sigmoid diverticulitis. Dis Colon Rectum 2014; 57: 284-94.
17. Aldoori WH, Giovannucci EL, Rockett HR, Sampson L, Rimm EB, Willett WC. A prospective study of dietary fiber types and symptomatic diverticular disease in men. J Nutr 1998; 128: 714-9.
18. Strate LL, Liu YL, Aldoori WH, Syngal S, Giovannucci EL. Obesity increases the risks of diverticulitis and diverticular bleeding. Gastroenterology 2009; 136: 115-22.e1.
19. Schauer PR, Ramos R, Ghiatas AA, Sirinek KR. Virulent diverticular disease in young obese men. Am J Surg 1992; 164: 443-8.
20. Rafferty J, Shellito P, Hyman NH, Buie WD. Practice parameters for sigmoid diverticulitis. Dis Colon Rectum 2006; 49: 939-44.
21. Salem L, Anaya DA, Flum DR. Temporal changes in the management of diverticulitis. J Surg Res 2005; 124: 318-23.
22. Morris AM, Regenbogen SE, Hardiman KM, Hendren S. Sigmoid diverticulitis: a systematic review. JAMA 2014; 311: 287-97.
23. Ricciardi R, Baxter NN, Read TE, Marcello PW, Hall J, Roberts PL. Is the decline in the surgical treatment for diverticulitis associated with an increase in complicated diverticulitis? Dis Colon Rectum 2009; 52: 1558-63.

คุณลักษณะและผลการรักษาของโรคกระเปาะลำไส้ใหญ่อักเสบในผู้ป่วยที่รับการรักษาตัวในโรงพยาบาลในประเทศไทย

สยาม ศิรินธรปัญญา

ภูมิหลัง: โรคกระเปาะลำไส้ใหญ่หมายถึงการยื่นของเยื่อบุลำไส้ใหญ่เข้าไปในผนังลำไส้ใหญ่ทำให้มีการโป่งพองของผนังลำไส้ออกมาทางด้านนอก ภาวะแทรกซ้อนที่พบบ่อยได้แก่ การมีเลือดออกจากกระเปาะลำไส้ใหญ่และการอักเสบของกระเปาะลำไส้ใหญ่ ผู้ป่วยที่มีการอักเสบของกระเปาะลำไส้ใหญ่บางรายเกิดภาวะแทรกซ้อนซึ่งพบได้บ่อยในผู้ป่วยสูงอายุ มีโรคร่วมและอ้วน การศึกษาแบบย้อนหลังในเชียงใหม่ ประเทศไทย พบอัตราการเสียชีวิตของผู้ป่วยร้อยละ 3.6 ที่ 30 วันและร้อยละ 9.2 ที่ 1 ปี

วัตถุประสงค์: เพื่อศึกษาความชุกของโรคกระเปาะลำไส้ใหญ่อักเสบแบบรุนแรง จำนวนวันที่รักษาตัวในโรงพยาบาล อัตราการผ่าตัด ภาวะแทรกซ้อน และอัตราการเสียชีวิตของโรคกระเปาะลำไส้ใหญ่อักเสบในประเทศไทย

วัสดุและวิธีการ: การศึกษาย้อนหลังจากข้อมูลผู้ป่วยโรคกระเปาะลำไส้ใหญ่อักเสบที่รับการรักษาตัวในโรงพยาบาลในประเทศไทยในปี พ.ศ. 2553 ที่ได้ Code ของ ICD 10 จากฐานข้อมูล สปสช. ศึกษาความรุนแรงของโรค อัตราการผ่าตัด ภาวะแทรกซ้อนและอัตราการเสียชีวิตของโรคกระเปาะลำไส้ใหญ่อักเสบในประเทศไทยและศึกษาปัจจัยต่าง ๆ ที่มีผลต่อการดำเนินโรคและนำปัจจัยดังกล่าวมาวิเคราะห์ต่อไป

ผลการศึกษา: วิเคราะห์ข้อมูลของผู้ป่วยโรคกระเปาะลำไส้ใหญ่อักเสบจำนวน 1,750 คน ที่เข้ารับการรักษาตัวในโรงพยาบาลอายุเฉลี่ย 61.15±16.12 ปี ร้อยละ 70 ของผู้ป่วยมีโรคร่วม อุบัติการณ์ของกระเปาะลำไส้ใหญ่แบบรุนแรงเท่ากับร้อยละ 14.51 ระยะเวลาเฉลี่ยของการนอนโรงพยาบาลเท่ากับ 6 วัน ครึ่งหนึ่งของผู้ป่วยได้รับการรักษาด้วยการผ่าตัด อัตราตายของผู้ป่วยเท่ากับร้อยละ 3.26 จากการวิเคราะห์ตัวแปรหลายตัวแบบถดถอย พบว่าปัจจัยสัมพันธ์กับความรุนแรงของโรคได้แก่ จำนวนโรคร่วมมากกว่าสามโรคขึ้นไป, สิทธิการรักษาแบบประกันสุขภาพถ้วนหน้า และการรักษาด้วยการผ่าตัด ปัจจัยที่สัมพันธ์กับอัตราการเสียชีวิตได้แก่ จำนวนโรคร่วมมากกว่าสามโรคขึ้นไปและสิทธิการรักษาแบบประกันสุขภาพถ้วนหน้า

สรุป: โรคกระเปาะลำไส้ใหญ่อักเสบพบได้บ่อยในผู้ป่วยสูงอายุและสัมพันธ์กับโรคร่วมอื่น ๆ ผู้ป่วยส่วนใหญ่อาการไม่รุนแรง อัตราการเสียชีวิตสูงกว่าในประเทศตะวันตก ปัจจัยที่สัมพันธ์กับความรุนแรงของโรคและอัตราการเสียชีวิตได้แก่ จำนวนโรคร่วมมากกว่าสามโรคขึ้นไป, สิทธิการรักษาแบบประกันสุขภาพถ้วนหน้า และการรักษาด้วยการผ่าตัด