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Non-traumatic Perforation of Colon: A 5-year Retrospective Study at Uthaithani Hospital

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Abstract

Background: **Non-traumatic perforation of colon is a fatal surgical emergency that confronts with serious risks and high mortality influenced by leakage of several types of virulent bacteria inside the colon. This condition has various etiologies, which is difficult for accurate preoperative diagnosis, causing a problem for surgical decision.**

Objective: **We aimed to study the etiologies and the difficulties in diagnosis and management of this condition in our rural area and to identify factors related to mortality.**

Materials and Methods: **A retrospective study was conducted by reviewing medical records of patients with non-traumatic perforation of colon undergoing surgery during October 2004 and September 2009. The data were analyzed by using the statistics of number, percentage, mean, standard deviation, Chi-square, Fisher's extract and independent T-test.**

Results: **Forty two patients (20 males, 22 females) with non-traumatic perforation of colon were included in this study. The mean age was 59.3 ± 14.3 years (range 35-86). The mean duration of symptom to surgery was 34.3 ± 21.2 hours and the length of hospital stay was 11.02 ± 6.4 days. The most common presenting symptoms and signs were abdominal pain (97.6 %) and abdominal distension (95.2 %) respectively. Pneumoperitoneum was presented in 13 of 39 patients (33.3 %) by plain abdominal radiograph and ultrasonography was performed to confirm positive diagnosis in 83.3 % (10/12). The provisional diagnosis that was recorded was similar to the definitive diagnosis in 38.1 % (16/42). Sigmoid colon was the most common perforated site. Main operative procedure was simple suture perforated wounds with proximal loop colostomy. The most common etiology was ingestion of fruit seeds especially during its harvest season. Postoperative complications were bowel fistula, wound infection and dehiscence. There were 12 deaths which are due to underlying diseases, renal impairment and sepsis shock due to intra-peritoneal soiling (p-value ≤0.005).**

Conclusion: **Non-traumatic perforation of colon at Uthaithani Hospital commonly occurred in the elderly patients over 50 years of age. The main etiologies were ingestion of fruit seeds and ruptured diverticulitis. In this report it was revealed that the adjuvant tools of high suspicious indexes for this diagnosis were history of fruit seed ingestion, abdominal pain, distension and fever. To confirm diagnosis, the use of plain radiography and ultrasonography of the abdomen was suggested as selected tools. It also showed that mortality may be related to underlying diseases of patients and sepsis status due to feces-contaminated intraabdomen.**

Keywords: **non-traumatic perforation of colon, etiologies, suspicious diagnosis, mortality.**

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Introduction

Colonic perforation is a surgical emergency. There were some reports of traumatic colon injury published either on blunt or penetrating injuries.[1,2] In other conditions some clinicians have focused on non-traumatic perforation of colon which have various etiologies.[3] In general, it is well known that there were several types of normal flora bacteria inside the colon combining with anaerobic more than aerobic types. Whenever bacteria leaks outside the perforated colon, severe infection may involve intra-abdominal area leading to an abscess or sepsis. Finally, the mortality of these patients may be increased. This study aimed to increase the ability for accurate diagnosis at initial admission, to decrease some preventable risks and reduce morbidity or mortality. We reviewed our experience in patients with non-traumatic perforation of colon at the Uthaithani Hospital which might have different data compared to other previous reports.

Materials and Methods

We retrospectively reviewed the 5-year medical records of patients with colonic perforation who were admitted to Uthaithani Hospital from October 2004 to September 2009. Those with ruptured appendicitis or associated abdominal trauma or iatrogenic injury were excluded. The data included history of patients, age, gender, symptoms, duration of symptom, physical findings, length of hospital stay, diagnostic information including etiology of diseases, laboratory data, radiographic imaging, and treatment modules included operative procedures, complications and causes of death. They were analyzed by the statistics of number, percentage, mean, standard deviation, Chi-square test, Fisher's extract and T-test. The p-value ≤ 0.05 was represented as a significant relation.

Results

A total of 42 patients (20 males and 22 females) with non-traumatic perforation of colon undergoing surgery were included. All cases were diagnosed as colonic perforation without prior history of trauma or abdominal surgery. However, six cases gave a history of Sandorica seed ingestion before diagnosis (Figure 1). An epidemiology of this event occurred commonly during the harvest season of this fruit within the period from May to August. Overall patients had a mean age of 60.5 ± 12.6 years (range 35-86) (Table 1). They had concomitant diseases such as hypertension, diabetes mellitus, heart diseases, chronic renal failure, steroid

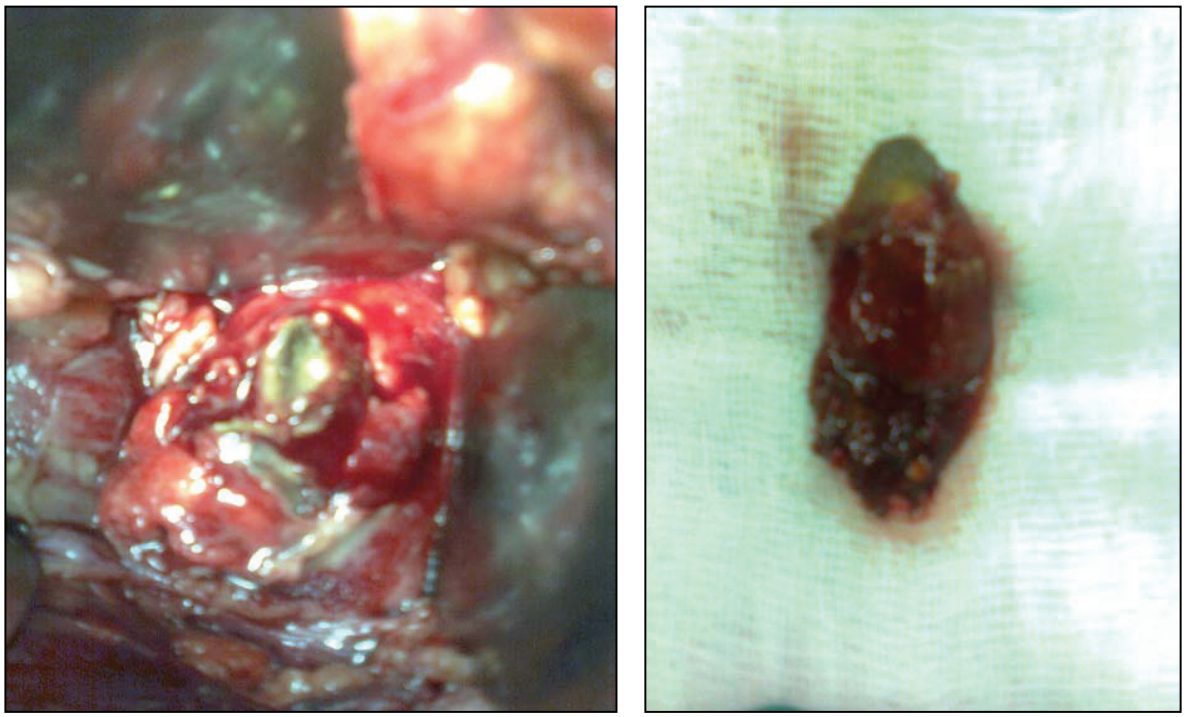

Figure 1 Colonic perforation due to Sandorica seed ingestion

Table 1 Age and sex of patients with colonic perforation

	Sex		Age (years)					
	Male	Female	31-40	41-50	51-60	61-70	71-80	81-90
Number of case	20	22	5	4	9	13	9	2
(%)	47.6	52.4	11.9	9.5	21.4	30.9	21.9	4.8

Table 2 Concomitant conditions vs. dead case

	No.	No. of death
Hypertension	4	-
Diabetes mellitus	2	1
Heart diseases	2	2
Steriod intake	3	2
Cirrhosis	1	1
Chonic renal failure	1	1

Table 3 Presenting symptoms

	No.	%
Abdominal pain	41	97.6
Nausea/vomiting	10	23.8
Constipation	5	11.9
Diarrhea	8	19.04
Fever	12	28.6
Chill	2	4.8
Lower GI bleeding	3	7.1

Table 4 Etiologies of colonic perforation

Etiologies	No.	%	Male	Female	No. of death	%
Ingestion F.B.[1] (seed)	14	33.3	6	8	3	21.4
Diverticulitis	11	26.2	6	5	2	18.2
Colonic ulcer	9	21.4	3	6	4	44.4
Carcinoma tumor	6	14.3	3	3	3	50
Incarcerated groin hernia	1	2.4	1	-	-	-
Intussusception	1	2.4	1	-	-	-

1 = foreign body

intake, and cirrhosis (Table 2). The main symptoms were abdominal pain (97.6 %), vomiting (23.8 %), ileus or obstruction (11.9 %), fever (33.3 %), diarrhea (19.04 %) and lower GI bleeding (7.1%) that mainly found with colonic ulcer perforation (Table 3). The mean duration of symptoms to surgery was 39.5 ± 32.1 hours (range 9-140). The etiologies were 14 cases of foreign body ingestion (all of them were Sandorica seeds), 11 cases of diverticulitis, 9 cases of colonic ulcer, 6 cases of carcinoma tumor, each one case of incarcerated groin hernia and colonic intussusception (Table 4). On physical examination, all cases were slightly to moderately dehydrated. The abdomen was guarding, rigidity and distended in 85.7% (36/42), and with generalized tenderness in 78.5% (33/42), localized tenderness at effected part of abdominal region 21.4 % (9/42). Bowel sounds were hypoactive or absent. Plain films of abdomen were performed in 92.8 % (39/42) and two-third (26/39) showed generalized ileus whereas one-third (13/39) showed intra-abdominal free air. Abdominal ultrasonography was done in 28.6 % (12/42) with correct diagnosis in 83.3 % (10/12). The most preoperative diagnosis was peritonitis and the diagnosis of colonic perforation was found as same as to postoperative diagnosis in 16 cases (38.1 %). During pre-operative period, fluid resuscitation was applied in all cases and intravenous broad-spectrum antibiotics were given. Then laparotomy explorations were performed with various procedures compared with their dead cases (Table 5). The most common procedure was simple closure of the perforated wound requiring trimming or wedge-shape excision of the margins and proximal loop colostomy. The most common site of colonic perforation was sigmoid colon (Table 6). Regarding colon carcinoma, one case had severe obstruction at sigmoid colon leading to cecal perforation, but other malignant perforations were from direct invasion of colonic origin in three cases and gynecological origin in two cases. There were some postoperative

Table 5 Operative procedures

	No.	No. of death	%
Hartmann's resection + colostomy	4	1	25
Sutured wound[2] + proximal loop colostomy	26	5	19.2
Resection + EEA[3] + proximal loop colostomy	2	-	-
Resection + EEA	5	2	40
Right haft colectomy	3	2	66
Sutured wound + toilet + drainage	2	2	100

2 = colonic perforated wound, 3 = end to end anastomosis

Table 6 Sites of colonic perforation

	Cecum	Ascending	Transverse	Sigmoid	Rectum
Ingestion F.B. (seed)	-	-	-	12	2
Diverticulitis	2	1	1	5	2
Colonic ulcer	2	1	-	6	-
Carcinoma tumor	1	-	-	4	1
Incarcerated groin hernia	-	-	-	1	-
Intussusception	1	-	-	-	-

Table 7 Factors related to mortality with non-traumatic perforation of colon

Factor	Survival cases (n = 30)	%	Dead cases (n = 12)	%	p-value
Male	14	46.7	6	50	0.85
Female	16	53.3	6	50	
Age (year; mean ± SD)	59.7 ± 13.3		62.2 ± 11.2		0.71^T
Duration of symptoms (hour; mean ± SD)	34.2 ± 21.2		36.7 ± 35.9		0.75^T
Length of hospital stay (day; mean ± SD)*	12.3 ± 5.1		7.8 ± 8.5		0.034^T
Underlying disease*	6	20	7	58.3	0.026
Fever or chill	8	26.7	6	50	1.67
Shock at initial admission*	3	10	5	41.7	0.03^F
Positive diagnosis before surgery	13	43.3	3	25	0.32
WBC ≥15000 cell/mm^3	16	53.3	6	50	0.85
Blood creatinine ≥2 mg%*	2	6.7	4	33.3	0.046^F
Intra-abdominal soiling* (moderate to severe)	4	13.3	8	66.7	0.001^F

* = significant, F = Fisher's extract test, T = independent T-test

complications such as wound dehiscence (3 cases), wound infection (2 cases), bowel fistula and pneumonia (1 case). Some patients needed nutrition support. Causes of death were sepsis (9 cases), heart failure, renal failure and aspirated pneumonia.

To identify predictor of poor outcome in these patients, various factors related to the mortality were studied (Table 7). After discharge, all patients had the first follow-up visit within two weeks. Colostomy was closed at least three months later especially in the cases with diverting colostomy without evidence of distal colonic obstruction demonstrated by barium enema.

Discussion

Non-traumatic perforation of colon has been reported previously.[3-5] The common etiologies were complicated diverticulitis, cancer and benign ulcer with mortality rate of 14-19.7%. In one report, perforated carcinoma was the most common cause with overall mortality of 26.6 %.[5] In addition, foreign body ingestion as a cause had also been reported and the common perforated sites were iliocecal and rectosigmoid region.[6] Foreign bodies had been identified as the seeds of fruit such as pickle plum.[7] In

Thailand the colonic perforation caused by ingestion of Sandorica seed has been published.[8] In this report, the most common cause of colonic perforation was ingestion of the Sandorica seeds whereas others were diverticulitis, ulcer, cancer, obstructed hernia and intussusception. To decrease the incidence of colonic perforation, promotion of changing the unusual ingestion behavior should be empowered. The condition was difficult for pre-operative diagnosis as in this report was shown positive in 38.1 %. To overcome this problem, high-index of suspicion should be made in the following presentations: history of foreign body ingestion, symptoms of lower abdominal pain, abdominal distension and fever or chill. Plain abdominal radiography and ultrasonography were helpful in suspected cases. The accurate pre-operative diagnosis is beneficial in the operative plan i.e. postoperative colostomy status. CT scan was also proved to be useful in diagnosing various causes in non-traumatic colorectal perforation[9], especially in suspected diverticulitis.[10] CT scan has a higher sensitivity than ultrasonography in the case with gaseous dilated bowel or obesity.

All patients should be operated at suitable time after resuscitation and intravenous antibiotics administration while bowel preparation could not be applied. The operative procedure decisions were dependent on the intra-abdominal conditions and patient status. Whenever the bowel looked compromised and patient's condition is unstable, malnourished or immunocompromised, resection and diversion should be performed as in cases of cancer or ulcer perforation linked to this report.[11] In all cases with perforation from seed ingestion, we sutured the perforated site and diverted with proximal loop colostomy. Using the Hinchey Staging System including pericolic abscess, retroperitoneal or pelvic abscess, purulent peritonitis and fecal peritonitis, patients with complicated cases of diverticulitis can be divided into stage I to IV respectively.[12] There were two cases of stage II and nine cases of stage III or IV. Both cases in Hinchey stage II survived probably because they had less severe intra-abdominal infection. The procedures for treatment of perforated diverticulitis varied depending on the decision of each surgeon at that time. The previous report showed no difference in term of outcome between primary repair only and Hartmann's procedure.[13] We noted that all two patients who were treated by suture perforated wound plus toilet and drainage eventually had bowel leakage and died. It may be an unsuitable procedure for the patients in that condition. To predict the outcome of this condition, several factors were studied. The results revealed that age, gender and duration of symptom prior to surgery had no correlation with outcome. In addition, symptom of fever or chill, WBC ≥15,000 cell/mm^3 had no significant correlation. The significant factors correlated with poor outcome were concomitant diseases and clinical signs of sepsis such as shock, renal insufficiency and moderated or severe intraperitoneal soiling.

Conclusion

We analyzed 42 patients with non-traumatic perforation of colon who were admitted to Uthaithani Hospital during a 5-year period from October 2004 to September 2009. Common etiologies were ingestion of fruit seeds, ruptured diverticulitis, colonic ulcer and cancer. High index of suspicion should be considered in patients presenting with history of seed ingestion, lower abdominal pain or distension and fever. Investigations include plain radiography of abdomen combined with ultrasonography. There were 28.6 % of dead cases and factors correlated with mortality were underlying diseases, sign of shock, renal impairment and amount of feces-contaminated intraperitoneum. The unusual behavior of fruit seed ingestion was also important to control in the population.

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