

## Non-Traumatic Colon Perforation

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**Purpose:** Despite advances in surgery, antimicrobial therapy and postoperative intensive care, severe secondary peritonitis, caused by colonic perforation, remains a potentially fatal affliction. The appropriate surgical management of colonic perforation has always been a controversial issue, and one that continues to evolve. The differences in patient's characteristics, due to their medical problems, general conditions, peritonitis grade, or causes of perforation, influence both the surgical decision and the outcome. The aim of this study was to evaluate and compare the incidence, management and outcome of patients with different causes of non-traumatic colon perforation.

**Methods:** Between February 1993 and February 2002, 42 patients underwent emergency operations for non-traumatic colon perforations. We compared the morbidity and mortality with age, cause, perforation site, extents of peritonitis and surgical procedure. In patients with colorectal-cancer, we assessed the outcomes as perforation types; the perforation of the tumor itself, diastatic perforations proximal to an obstructing tumor and tumor stages.

**Results:** The causes of perforation were cancerous in 17 (40.5%), idiopathic in 7 (16.7%), diverticular in 5 (11.9%), colitis in 4 (9.5%), adhesion & strangulation in 4 (9.5%), stercoral in 3 (7%) and enema induced in 2 (4.8%). The morbidity and mortality in this study was high 76.2 and 26.2%, respectively. The morbidity and mortality was increased as the intra-abdominal fecal contamination increased ( $P < 0.05$ ). but there were no correlations between the complication rate, age, cause, perforation site or operation procedure. In patients with colorectal cancer, there were no correlations between the morbidity and mortality, perforation type or tumor stages.

**Conclusion:** A non-traumatic colon perforation is associated with high morbidity and mortality. The prognosis of patients is determined by the grade of their peritonitis. Early diagnosis and prompt surgical management will result in better outcomes for patients with non-traumatic colon perforations. (J Korean Surg Soc 2003;64:49-55)

**Key Words:** Non-traumatic colon perforation

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**Table 3.** Associated major medical problems

	Non cancer group (n=25)	Cancer group (n=17)	Total no. (%)
CVA*	4	4	8 (19)
NIDDM <sup>†</sup>	1		1 (2.4)
Hypertension	1	1	2 (4.8)
BPH <sup>‡</sup>		1	1 (2.4)
Schizophrenia	1		1 (2.4)
Immunosuppression	2		2 (4.8)
COPD <sup>§</sup>	2	3	5 (11.9)
Cushing syndrome	1		1 (2.4)
CRF	1		1 (2.4)
Total no.	13	9	22 (52.4)

\*CVA = cerebrovascular accident; <sup>†</sup>NIDDM = non-insulin dependent diabetes mellitus; <sup>‡</sup>BPH = benign prostate hypertrophy; <sup>§</sup>COPD = chronic obstructive pulmonary disease; CRF = chronic renal failure.

4)

Hinchey's stage  
 42 Hinchey's stage II 10 (23.8%), stage III  
 14 (33.3%), stage IV 18 (42.9%)  
 stage IV가  
 7 (16.7%) 가 ,  
 Hinchey's stage II 4 (9.5%)  
 가  
 Hinchey's stage IV 6 (14.3%) 가  
 Hinchey's stage IV가 11 (26.2%) 가  
 (Table 4).

5)

7 (16.7%), 15 (35.7%)  
 20 (47.7%)

6)

**Table 4.** Nature and grade of peritonitis

	Cancer group (n=17)		Non cancer group (n=25)	Total no. (%)
	Perforation tumors	Diastatic perforation		
Hinchey's stage I				
Hinchey's stage II	4		6	10 (23.8)
Hinchey's stage III	2	4	8	14 (33.3)
Hinchey's stage IV	1	6	11	18 (42.9)
Total no. (%)	7 (41.8)	10 (58.2)	25 (59.5)	42 (100)

**Table 5.** Type of surgical procedure nature and grade of peritonitis

Hinchey's stage	Surgical procedure					Total no. (%)
	Resection with PA*	Hartmann procedure	Simple closure	Simple closure with diversion	Exteriorization	
Stage I						
Stage II		6	2	1	1	10 (23.8)
Stage III	1	9	4			14 (33.3)
Stage IV	1	9		5	3	18 (42.9)
Total no. (%)	2 (4.8)	24 (57.1)	6 (14.3)	6 (14.3)	4 (9.5)	42 (100)

\*PA = primary anastomosis.

24 (57.1%), 6 (14.3%), Exteriorization 4 (9.5%), (4.8%) . Hinchey's stage II 6 , 2 , Exteriorization 1 , Hinchey's stage III 9 , 4 1 , Hinchey's stage IV 9 , 5 , Exteriorization 3 1

(Table 5).

7)

25.8 32 (76.2%) 11 (26.2%), 6 (14.3%), ARDS 4 (9.5%), 3 (7.1%), 2 (4.8%), 3 (7.1%), 2 (4.8%), 1 (2.4%)

(Table 6).

11 (26.2%) 6 (18.7%), ARDS 4 (12.4%) 1 (3.1%) 19 (76.5%) 가 13 (76.5%) 8 (32%) 3 (17.6%) 17 13 (76.5%)

가 6 (85.7%)

가 7 (70%) (P > 0.05).

3 , 가

(P > 0.05).

TNM 13 stage II 7 (41.1%) 가 stage III 4 (23.5%), stage I stage IV 1 , 3 (17.6%) stage II, III, IV 1

(P > 0.05).

19 (76%) , 5 (20%) 가 가 4 (16%), 3 (12%), 2 (8%),

**Table 6.** The Postoperative complications

Postoperative complications	Total no. (%)
Wound infection	11 (26.2)
Sepsis and septic shock	6 (14.3)
ARDS*	4 (9.5)
Stoma necrosis	3 (7.1)
Leakage	3 (7.1)
Pulmonary complications	2 (4.8)
Intra-abdominal abscess	2 (4.8)
UGI bleeding <sup>†</sup>	1 (2.4)
Total no. (%)	32 (76.2)

\*ARDS = acute respiratory distress syndrome; <sup>†</sup>UGI = upper gastrointestinal.

1 (4%) 12% 3 , 2 , 2 1 (P > 0.05).

32 (76.2%) (Hinchey's stage) , Hinchey's stage II 7 (16.7%), stage III 8 (19%), stage IV 17 (40.5%) 가 26% Hinchey' stage IV 10 (23.9%), stage III 1 (2.4%) 가 가 (P < 0.05)(Table 8).

Woodhall (8)

1980

2 , 10 (1,9-11)

Yilmazlar (12) 50 53%, (13) 50 28.9% 71 45.2% 가 가 1 : 1 (14) 1.3 : 1

Table 7. Morbidity and mortality

A.		No. (%)	Morbidity (no.)	Mortality (no.)	P-value
Age	< 60	12 (28.6)	83.3% (10)	25% (3)	NS*
	> 60	30 (71.4)	73.3% (22)	26.7% (8)	
Cause	Cancer	17 (40.5)	76.5% (13)	17.7% (3)	NS*
	Diverticulitis	5 (11.9)	60% (3)	40% (2)	
	Stool impaction	3 (7)	100% (3)	0% (0)	
	Colitis	4 (9.5)	75% (3)	50% (2)	
	Enema induced	2 (4.8)	50% (1)	0% (0)	
	Adhesion & strangulation	4 (9.5)	100% (4)	25% (1)	
	Idiopathic	7 (16.7)	71.4% (5)	42.9% (3)	
Perforation site	Ascending colon	4 (9.5)	75% (3)	0% (0)	NS*
	Transverse colon	8 (19)	37.5% (3)	0% (0)	
	Descending colon	1 (2.4)	100% (1)	0% (0)	
	Sigmoid colon	18 (40.5)	82.4% (14)	29.4% (5)	
	Rectum	11 (26.2)	72.7% (8)	45.5% (5)	
Extent of peritonitis	Hinchey's stage II	10 (23.8)	70% (7)	0% (0)	< 0.05
	Hinchey's stage III	14 (33.3)	57.1% (8)	7% (1)	
	Hinchey's stage IV	18 (42.9)	94.4% (17)	55.6% (10)	
Operation procedure	Resection with anastomosis	2 (4.8)	100% (2)	0% (0)	NS*
	Hartmann procedure	24 (57.1)	75% (18)	20.9% (5)	
	Simple closure	6 (14.3)	50% (3)	0% (0)	
	Simple closure with diversion	6 (14.3)	100% (6)	33.3% (2)	
	Exteriorization	4 (9.5)	75% (3)	75% (3)	
<b>B. Mortality and morbidity in cancer group (17 patients)</b>					
		No. (%)	Morbidity (no.)	Mortality (no.)	P-value
TNM stage	I	1 (5.9)	100% (1)	0% (0)	NS*
	II	10 (58.9)	41.1% (7)	10% (1)	
	III	4 (23.5)	100% (4)	25% (1)	
	IV	2 (11.8)	50% (1)	50% (1)	
Perforation type	Diatatic perforation	10 (58.2)	70% (7)	30% (3)	NS*
	Perforating tumors	7 (41.8)	85.7% (6)	0% (0)	
Total no.		17			

\*NS = not significant.

Yilmazlar (12) , , ,  
 50% 가 ,  
 40.5% 가 , 16.7%  
 , , , , ,  
 . Yoh (5) Julian (15) (14) 38.4% 가  
 가 ‘ ,

40.5% 가 , , ,

Stephan (16) Sasaki (24) Gonzales (25)

tumor stage

Hinchey (6) Mulherin Sawyer(26)

가

Hinchey's stage IV가 40.5%,

23.9% 가

Kriwanek (17) Biondo (10)

가 가

가

ARDS (67.6 ) 가

Stephan (16) Glenn (18) 가 가

가 TNM

stage

6.7 35% (19,20)

8 (32%)가 7 (28%)

가 가

가 AR DS &

가

Paolo (21) Umpleby and Williamson (22)

가

REFERENCES

REFERENCES

가

85.7%

70%

3 가

Stephan (16) 가

가

(76%) (76.5%)

32% 17.6%

Schrock (23)

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