

### A Comparison of Safety between the Operative and Nonoperative Management of Traumatic Liver Injury

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**Purpose:** The aim of this study was to evaluate the safety of the nonoperative management of traumatic liver injuries.

**Methods:** The medical records of 67 patients, with traumatic liver injury, between January 1998 and December 2001, were reviewed retrospectively, with respect to the cause of injury, combined injury, hemodynamic stability, amount of transfusion, liver injury grade, length of hospital stay and complications.

**Results:** Of the 67 patients, 30 were treated operatively (Group A), and 37 nonoperatively (Group B). The initial systolic blood pressure in Group A was significantly lower than that in Group B (81.33±23.00 vs 108.10±20.66 mmHg, P<0.001). The amount of transfusion for hemodynamic stability were 2.83 and 0.89 units (P<0.01), and the mean total transfusion requirement and injury grade were 10.30 and 1.29 units (P<0.001). 3.63±0.99 and 2.48±1.12 (P<0.001) for Groups A and B. The duration of intensive care unit stay in Group A was significantly shorter than that of Group B (6.70±6.12 vs. 3.13±4.00 days, P<0.01), but there was no difference in total length of hospital stay. The complication rates in Groups A and B were 63.3 and 21.8%, respectively (P<0.01), and the most common complications were respiratory problems, such as pleural effusion, pneumonia, atelectasis and pulmonary edema. Five patients in Group A died, 2 from hypovolemic shock, and one each from disseminated intravascular coagulation,

multiple organ failure, and respiratory failure, but no patients in Group B died.

**Conclusion:** Nonoperative management is safe for hemodynamically stable patients with traumatic liver injury, regardless of the injury severity, but close observation and frequent physical examinations must be adhered to. (J Korean Surg Soc 2003;64:229-235)

**Key Words:** Traumatic liver injury, Operative management, Nonoperative management

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1998 1 2001 12

**Table 1.** Age & sex distribution

Age	Operative group (n=30)		Nonoperative group (n=37)		Total (%)
	Male	Female	Male	Female	
4 (5.97)	09	1	0	3	0
10~19	2	1	6	2	11 (16.41)
20~29	1	3	5	3	12 (17.91)
30~39	8	1	5	2	16 (23.88)
40~49	5	1	2	2	10 (14.92)
50~59	1	2	2	1	6 (8.95)
60~69	1	1	2	1	5 (7.46)
70~	0	2	1	0	3 (4.47)
Total	19	11	26	11	67 (100%)

P=0.102.

**Table 2.** Cause of injury

Causes	Operative group	Nonoperative group	Total(%)
Traffic accident	21	26	47 (70.14)
Fall down	3	7	10 (14.92)
Violence	0	1	1 (1.49)
Industrial accident	2	3	5 (7.46)
Penetrating injury	4	0	4 (5.97)
Total	30	37	67 (100%)

**Table 3.** Diagnostic methods

	Operative group	Nonoperative group	Total
CT	24	36	60
DPL	3		3
CT+DPL	3	1	4

CT = computed tomography; DPL = diagnostic peritoneal lavage.

30  
37  
American Association for the Surgery of Trauma (AAST) 1994 Organ Injury scaling (OIS)

Chi-square test

P-value<0.05

Student t-test

1)

4 79  
30 가  
39.3 (5~79 ), 32 (4~72 )  
67 45 , 22  
가  
19 : 11(1.7 : 1), 26 : 11(2.3 : 1)  
(Table 1).

2)

가 47 가  
가 10 , 가  
5 , 가 4 , 가  
1 (Table 2).

3)

24 ,  
3 , 3 , 36

1  
 (Table 3). 9.79±2.01 g/dl 11.47±1.76 g/dl  
 4) 가 , 가  
 , 2.83±2.64 unit, 0.89±1.12 unit 가  
 , 10.30±11.05 unit,  
 1.29±1.83 unit

(Table 4).

(Table 5).

5) 81.33±23.00 mmHg,  
 108.10±20.66 mmHg

6) AAST OIS Grade IV가 20  
 (29.85%) 가 Grade 3.00±1.20 .  
 Grade I 1 , Grade II 3 , Grade III 7 , Grade IV  
 14 , Grade V 5 Grade 3.63±0.99 ,  
 Grade I 9 , Grade II 9 , Grade III, Grade IV ,  
 Grade V 1 Grade 2.48±1.12  
 (P < 0.05)(Table 6).

**Table 4.** Combined injury

	Operative group	Nonoperative group	Total
Intraabdominal organ injury			
Renal injury	5	5	10
Spleen injury	5	4	9
Pancreatic injury	2	1	3
Mesentery tearing	3	0	3
Diaphragm rupture	2	0	2
Bladder rupture	1	0	1
Small bowel perforation	1	0	1
Colon injury	1	0	1
Extraabdominal organ injury			
Rib fracture & intrathoracic injury	15	22	37
Long bone fracture	9	8	17
Pelvic bone fracture	4	4	8
Head injury	3	4	7
Vertebra fracture	1	2	3
<b>Total</b>	<b>52</b>	<b>50</b>	<b>102</b>

7) 6.70±6.12 ,  
 3.13±4.00 가  
 19.10±10.09 , 17.32±13.23  
 가 (Table 7).  
 8) 27 (40.3%) 19  
 (63.3%), 8 (21.8%)  
 (P<0.05). 16 ,  
 9 , 3 , 2 가  
 3 , , ,  
 가 1 (Table 8). 5  
 (7.46%) (P=0.015)  
 2 , ,

**Table 5.** Hemodynamic state and amount of transfusion

	Operative group	Nonoperative group	P value
Initial systolic bp. (mmHg)	81.33±23.00	108.10±20.66	0.000*
Initial pulse rate (beats/min)	98.76±21.12	92.86±24.85	0.306
Initial hemoglobin (g/dl)	9.79±2.01	11.47±1.76	0.001
Initial wbc (/mm <sup>3</sup> )	11933.66±5601.68	10891.89±4734.55	0.412
Initial transfusion (unit)	2.83±2.64	0.89±1.12	0.001
Total transfusion (unit)	10.30±11.05	1.29±1.83	0.000*

\* = P < 0.001.

Table 6. Distribution of hepatic injury grade

OIS grade	Operative group (%)	Nonoperative group (%)	Total (%)
I	1 (3.33)	9 (24.32)	10 (14.92)
II	3 (10.00)	9 (24.32)	12 (17.91)
III	7 (23.33)	12 (32.43)	19 (28.35)
IV	14 (46.66)	6 (16.21)	20 (29.85)
V	5 (16.66)	1 (2.70)	6 (8.95)
Total	30	37	67 (100)

OIS = organ injury scale according to the american association for the surgery of trauma (AAST). P < 0.001.

Table 7. Admission periods

	Operative group	Nonoperative group	P value
ICU days	6.70±6.12	3.13±4.00	0.008
Hospital days	19.10±10.09	17.32±13.23	0.547

ICU = intensive care unit.

Table 8. Complications

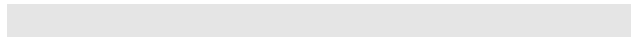
	Operative Total group	Nonoperative group	
Pleural effusion	11	5	16
Pneumonia	5	4	9
Atelectasis	2	1	3
Wound infection	3	0	3
Pulmonary edema	2	0	2
Bile leakage	1	0	1
Intraabdominal abscess	1	0	1
Incisional hernia	1	0	1
Renal infarction	0	1	1

P=0.001.

Table 9. Causes of death

	Number of patient
Hypovolemic shock	2
Disseminated intravascular coagulation	1
Multiple organ failure	1
Respiratory failure	1
Total	5 (7.46%)

, 1 (Table 9).



가

가

가

가

가

1972 Riche Fonkalsrud(1)가 2

4

가 (2-6)

Mirivis (7)

가

가 70.1%

가

가

(8) Corica Powers(9)

가

, Cox (10)

가

37

1

(89%)

가

(11)

가

60

가	(20)	. Hammond (22)
(1)	가	121.8±6.4 mmHg, 89.6±6.9 mmHg
Pachter (12,13)	.	,(23) Goan ,(18)
	Croce (5)	
가 가	가	98.76±21.12 , 92.86±24.85
, 가	가	, Goan ,(18) Hammond
	(22)	
	가	9.79±2.01
Grade III	Grade I	(20,22)
(15) Grade IV, V	, Knudson ,(14) Boon	
Meredith (16)	가 가	2.83±2.64 unit,
	0.89±1.12 unit	
	가	10.30±11.05 unit, 1.29±1.83
	unit	
	Pachter ,(13) Croce (5)	1.9 unit
	,(17)	(20) 0.6 unit
가	가	. Holland (24)
(12)		2 unit
	가	1.29 unit (20)
(18)	(19)	2 unit
	27 가 Grade III	Grade
IV가 1	(20) 88	9 가
Grade IV	, 1 가 Grade V	가 7
Durham (21)	22	10 unit
Meredith (16)	Grade III	(25,26)
	70	
Karen (17)	Grade IV 10 , Grade V 5	가
2	48	Grade IV가
	37	가
30 (81%)가	Grade III	(23)
V가 1	Grade IV가 6 , Grade	
	Grade (I-III)	가
	Grade IV, V	가
	가	, 3.13
	가	19.1 , 17.3
	(20)	가
	, 16.5	가
30	Croce ,(5) Meredith (16)	
가	가 18	가
	가 8 ,	Bynoe
	(27) Karen (17)	
가 4	3	
2	가	
1		
108.10±20.66 mmHg		(28)

19 (63.3%), 8  
 (21.6%)  
 20~55% (10,29)  
 63.3% (20)  
 가  
 (2,8,10,19,20,28-30)  
 (30) Durham (21)  
 2 (0.09%)  
 8 (21.6%)  
 가  
 9~20% (5,10,11,22,29)  
 Durham  
 (21)  
 13% 30 5  
 (16.6%)  
 가 2 ,  
 1 (2)  
 3 1  
 가  
 Durham (21) 1  
 (2) 2

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