

(Methylene Chloride)

1

Abstract

A Case of Toxic Hepatitis in a Worker Exposed to a Cleansing Agent Mainly Composed of Methylene Chloride

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Objectives: To report a case of toxic hepatitis in a worker exposed to a cleansing agent mainly composed of methylene chloride.

Methods: A 27-year-old female worker who had worked in an inspection and packing position of semiconductor parts in a factory using methylene chloride as a metal cleansing solvent was hospitalized due to fever, chill and generalized aches. We evaluated her with blood tests, abdominal ultrasonographic scan and abdominal CT scan and also took her occupational history.

Results: The patient showed acute hepatitis in blood and radiologic tests after admission. The serologic tests for viral hepatitis A, B, C and autoimmune hepatitis were negative. She had no history of significant alcohol use, recent medication or drug allergy. After admission, her symptoms were improved and liver enzyme levels (AST and ALT) were markedly reduced. She returned to her workplace after discharge. Thereafter, however, her previous symptoms were recurred and she was hospitalized again 2 days after returning to her workplace. After this second admission, she showed acute hepatitis in blood tests and her symptoms were improved and liver enzyme levels were markedly reduced with the same pattern as those of the first admission. On the 11th day of the second admission, liver enzyme levels were normalized and she was discharged from hospital.

Conclusions: We presume that this patient's liver injury was related to the methylene chloride presence at her workplace due to her clinical symptoms, blood tests, radiologic tests and occupational history.

Key Words: Toxic hepatitis, Methylene chloride

(methylene chloride, CAS No. 00075-09-2) 가 (Kimbrough, 1972; Bond, 1996; , 1999). 가 가

(ACGIH, 2001). (, 1995; , 1999; , 1999; , 2002; , 2003),

CH₂Cl₂ 84.93 M.W. 2001; , 2002; , 2003),

250 ppm 가 (Dichloromethane), 가 (Methylene dichloride), 30(Freon (, 1995; , 1999). 30) 가 (American Conference of Governmental Industrial Hygienists, ACGIH, 2001) TLV-TWA 50 ppm

TLV carboxyhemoglobin(CoHb) 가 27 2003 9 17

(Lead frame) 1 8 . 9 30 10

(Stewart & Dodd, 1964; DiVincenzo et al., 1972; Peterson, 1978). 1 가 10 4 4 10 1~3 , 10 4~5 10 7

(ATSDR, 2000). , 1994 11 3 가 (Heppel et al., 1944; Haun et al., 1972; MacEwen et al., 1972; Morris et al., 1979), AST, ALT 15 IU/ , 11 IU/ 1994~95 2 가 (Ott et al., 1983; Miller et al., 1985; Horovitz & Zecler, 1995; Kelly, 1998).

174 cm, 76 kg,
 25.2 kg/m²,
 110/70 mmHg, 38.5, 78 / ,
 22 /

가
 (Fig. 1).

가

3~4 가

(Fig. 2). 9

가 AST 38 IU/ , ALT 185 IU/

4.28×10⁶ /mm³, 12.8 g/dℓ,
 6,660 /mm³(58.2%, 24.3%,
 13.4%, 2.3%, 1.8%),
 162,000 /mm³
 5.8 g/dℓ, 3.1 g/dℓ, 1.2
 mg/dℓ, 0.7 mg/dℓ AST 1,806 IU/
 , ALT 1,630 IU/ , 311
 IU/ , 9.9 mg/dℓ,
 0.7 mg/dℓ , (trace),
 (trace), (++)
 12.8 ,
 35.9

가 10

HBsAg/Ab, IgM-antiHBc, HBV-
 DNA Probe, HCV-Ab, HAV-Ab(IgM), HAV-
 Ab(IgG)

가

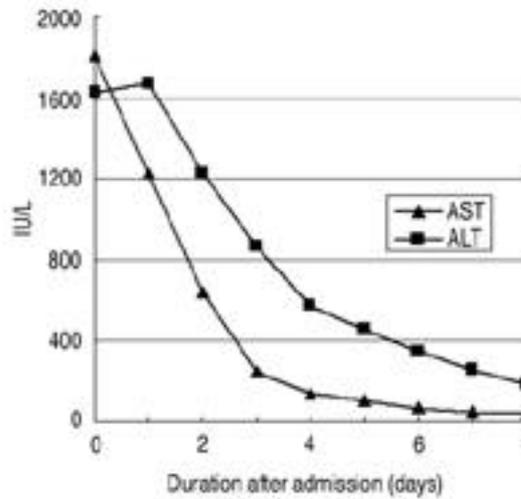


Fig. 2. The result of serial AST and ALT tests during 1st admission.

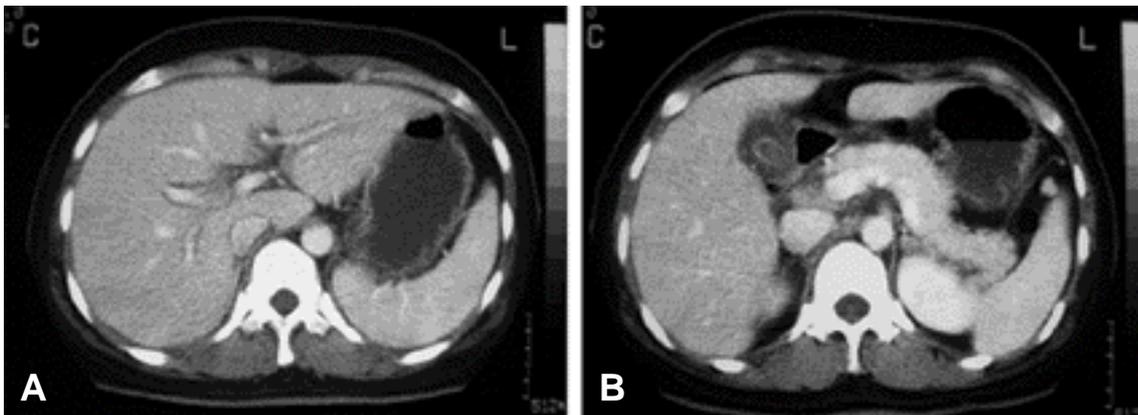


Fig. 1. Post-contrast abdominal CT scan on the 2nd day after 1st admission shows hepatomegaly with inhomogeneous parenchymal enhancement (A) and circumferential low density GB wall thickening (B) due to possible acute hepatitis.

20, 8, Ab, Ceruloplasmin, 31.4 mg/dℓ, 가 2

2, 10, 21, AST 829 IU/, ALT 803 IU/

100/60 mmHg, 39.2, 86 /, 24 /, (Fig. 3). 11, 12

4.01×10⁶, 11, 1, 5

/mm³, 11.8 g/dℓ, 4,970

/mm³(89.4%, 6.6%, 가

2.0%, 1.4%, 0.6%),

248,000 /mm³, 가

7.1 g/dℓ, 4.0 g/dℓ, 2.1

mg/dℓ, 0.9 mg/dℓ, AST 458 IU/ , 가

, ALT 259 IU/ , 207

IU/ , 11.9 mg/dℓ,

0.8 mg/dℓ , (-), (Fig. 4). 8

(-)

12.0 ,

35,7 , 가

HBsAg/Ab, IgM-antiHbc, HBV-DNA Probe, HCV-Ab, HAV-Ab(IgM), HAV-Ab(IgG) 가

, Anti-Nuclear Ab, Anti-Mitochondrial 2003 12 2 2003

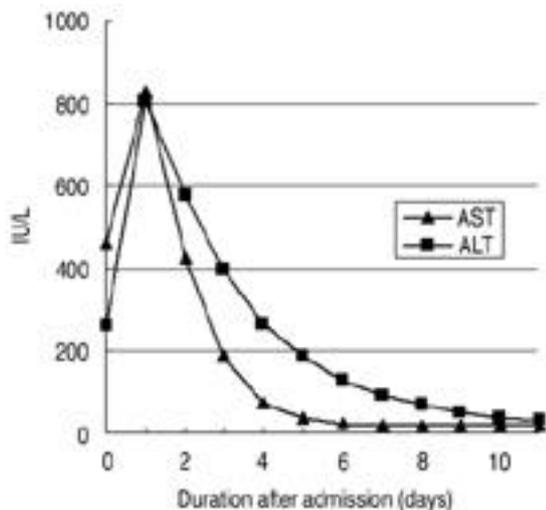


Fig. 3. The result of serial AST and ALT tests during 2nd admission.

NIOSH

Method 1005

가

SHI-

MAZU 14-B

가

28.38(23.03~32.70) ppm, 34.68 ppm

50 ppm 2001

94.0 ppm

가 50 ppm

가

(Cyclopropane)

(Heppel et al., 1944; Haun et al., 1972; MacEwen et al., 1972; Ott et al., 1983; Miller et al., 1985; Mizutani et al., 1988; Horovitz & Zecler, 1995; Kelly, 1998).

가

가

, Mizutani (1988)

ness) (stupor), (dull- (rats)
(drunkenness) . 가 가
20,000 ppm 가 가

가

가

(Clayton & Clayton, 1994).

(total GOT, m-GOT)

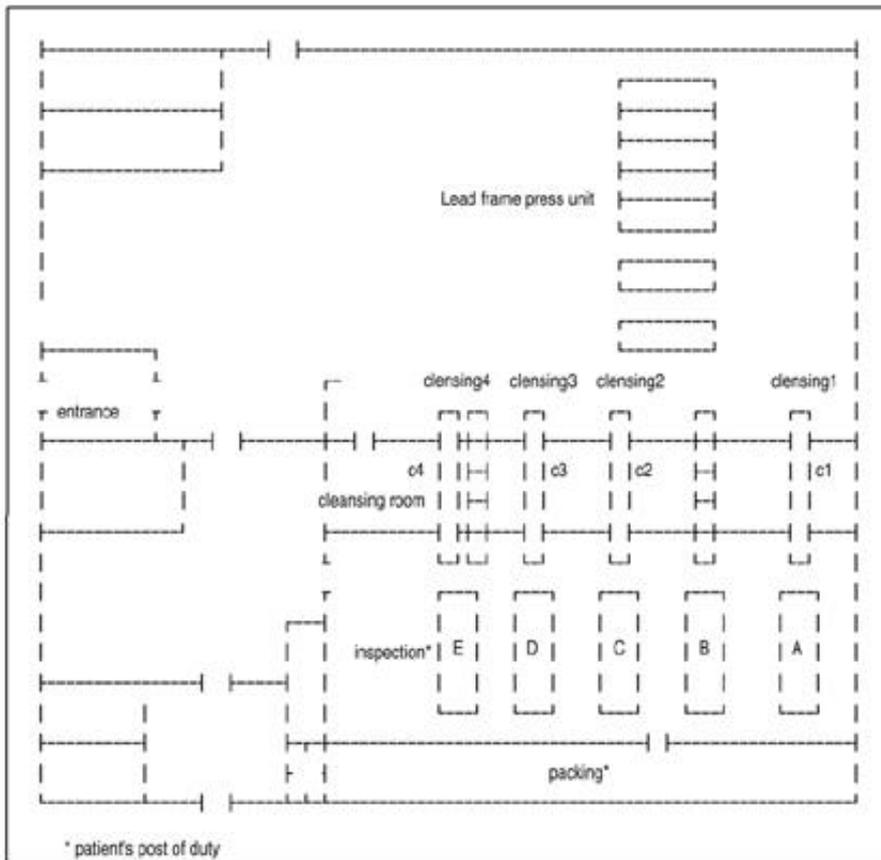


Fig. 4. A plane figure of Lead frame manufacturing process.

가 가 ALT 가

Heppel (1944) 5,000 ppm -

6 8 ALT

3 가 , ,

10,000 ppm 8 가 ,

ATSDR(2000)

MacEwen (1972) 5,000 ppm

(mice), 4

Haun (1972) 25-100 ppm

100

, 25 ppm cytochrome P-450 IIE1

가 , theta-class glu-

tathione transferase(GST) 가

, 100 ppm

가

20% 가 , 가

(species), 가

80% 가

cytochrome P-450

IIE1 formyl chlo-

ride가 glutathione transferase

S-chloromethyl glu-

tathione formaldehyd하

Horovitz & Zecler

(1995) (ACGIH,

29 2 2001).

Kelly(1998) 1.5 lobin(COHb)

COHb

, NIOSH

68 ppm(3.3~154.4 ppm) (Soden et al., 1996).

, 7.2 ppm(1.5~10.4 ppm)

24 (Ghittori et

Carboxy-hemoglo al., 1993).

bin(COHb), COHb

6.4% . Ott (1983) 60~475

ppm

(organs) (pre-
sumptive diagnosis)
, 1995; , 2001).
(Genetic polymor-
phisms) (Thomas et
al., 1987; Carpenter et al., 1996; Garte &
Crosti, 1999).
Danan & Benichou(1993)
RUCAM
가
가
가
(Harrison, 1990). 5 90
1995; , 1999; (, 1999), 15 가 가 1
ALT 가 50% 8
(, 1999),
가
(, 2001), ALT가 2 가
2002), (, 가
(, 2003)
RUCAM
가
13
(Harrison, 1997; Dienstag & Isselbacher,
2001). ALT 50% 4
ALT 가 2
가
(Richard &
Marc, 2000)가
Wilson 가

Wilson 가
 가
 가

(Methylene chloride)

1

ACGIH(2001) (2002) TLV-TWA 50 ppm 27
 가

가 250 ppm C 가 A, B

가 (MSDS) 100%

2

(1999) 가 12

가 가

K-P ()

가 가 1999. pp 25-7. 가

가 7(1):186-90. 1 1995;

- 2002-8 . 2002.
- 2002;69-70.
- Trichloroethylene 1 . 2003;15(1):111-7.
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