

:

1

2

3

:

(transarterial chemoembolization, TACE)

:

78

22 4 (1 ;

TACE

[n=30], 2 ;

1 TACE

[n=37], 3 ;

2

TACE

[n=11], 4

;

[n=22])

Factor VIII

200 um

:

4.50, 4.08, 1.64, 2.05

25.53, 20.00, 18.36, 12.32

가

(p < 0.01).

TACE

가 가

:

가 가

. TACE

(Transarterial chemoembolization,

(7 - 10).

TACE)

가

가

가

가

(1 - 4).

TACE

TACE

TACE

, ,

, , , , , ,

(5, 6).

TACE

(peribiliary plexus)

150

가 가

78

TACE

1

2

3

(1 ; TACE

2004

[n=30], 2 ;

1 TACE

2006 2 1

2006 5 10

[n=37], 3 ;

2

TACE

[n=11]).

22

4

가

Factor VIII

54 (25 - 73)

60 (46 - 71)

200 um

81% (63/78)

73% (16/22)

(inner

capillary layer)

1 4.50, 2 4.08,

(outer venous layer)

3 1.64 2.05

(Fig. 1).

200

1 25.53, 2 20.00, 3 18.36

12.32

(p < 0.01) (Table 1).

가

T - test, (oneway ANNOVA test) T - test (p < 0.01). TACE

TACE

(correlation

analysis)

CT

TACE

가

(p < 0.05) (Fig. 2).

가 가

Table 1. Number of Microvessels in Each Groups

	Group 1 (n=30)	Group 2 (n=37)	Group 3 (n=11)	Group 4 (n=22)
Inner layer of PBP *	4.50 + 3.72	4.08 + 3.87	1.64 + 2.29	2.05 + 2.21
Outer layer of PBP **	25.23 + 14.64	20.00 + 9.3	18.36 + 15.62	12.32 + 5.02

PBP; peribiliary plexus, *, p=0.014, **, p=0.001

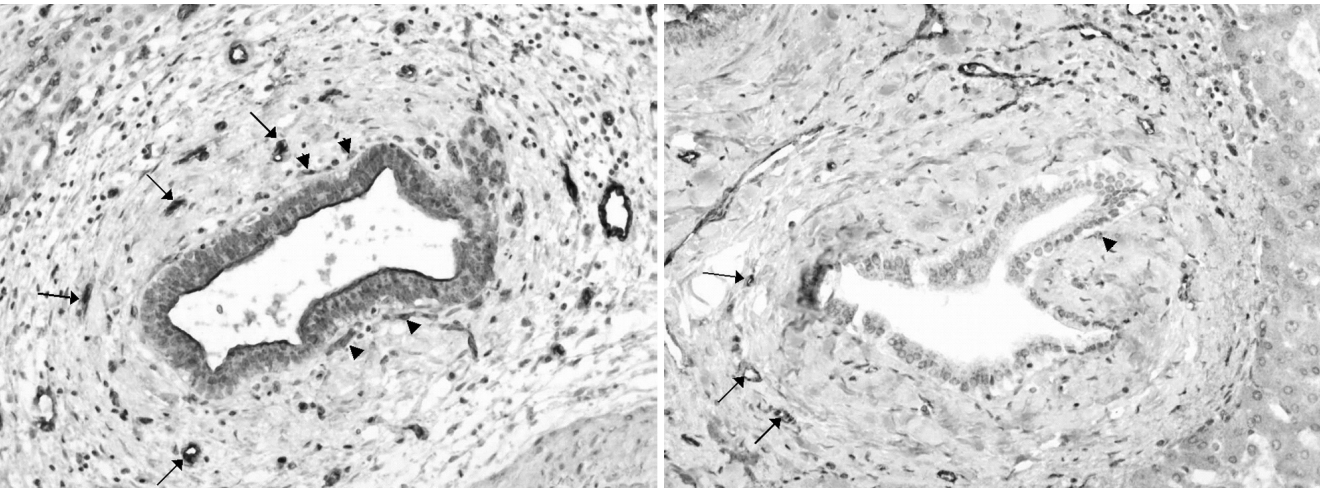


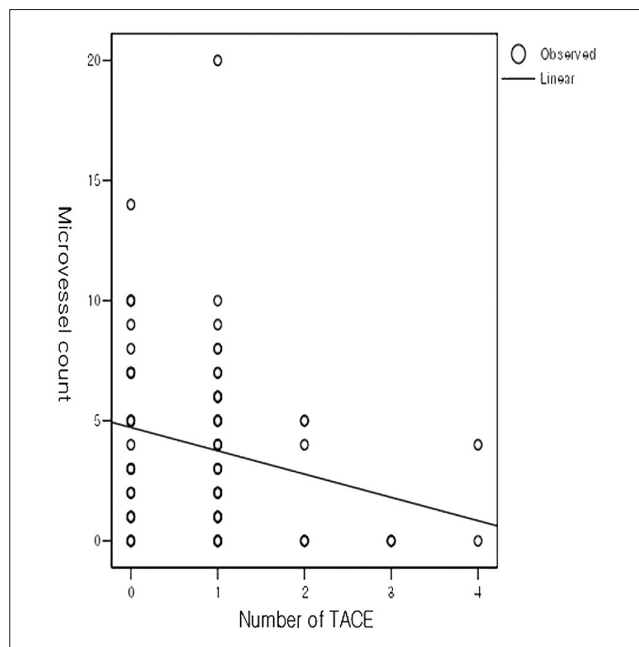
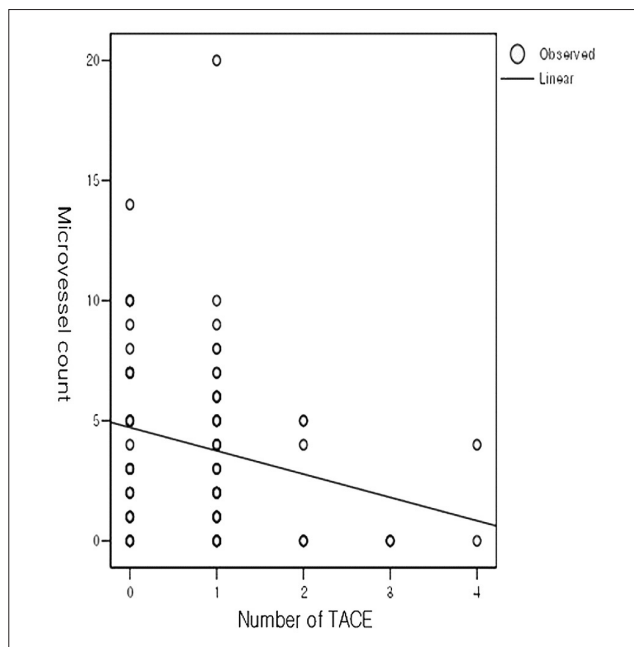
Fig. 1. A. Immunohistochemical stain for factor VIII related antigen in patient who underwent hepatectomy without preoperative transarterial chemoembolization. Microvessels in the inner capillary layer (arrow heads) and outer venous layer (arrows) of peri-biliary plexus are highlighted and counted separately (× 200).

B. Immunohistochemical stain for factor VIII related antigen in patient who underwent hepatectomy with two preoperative transarterial chemoembolization. There are markedly decreased microvessels in the inner capillary layer (arrow head) and outer venous layer (arrows) of biliary plexus (× 200).

Table 2. Number of Microvessels in Cases with Biloma and Bile Duct Necrosis on Microscopic Findings

	Case 1	Case 2	Case 3	Case 4
Inner layer of PBP	0	0	0	0
Outer layer of PBP	15	4	14	3
Time of TACE	3	2	3	1

PBP; peribiliary plexus, TACE; transarterial chemoembolization

**Fig. 2.** Correlation between number of TACE and microvessels count in inner layer of peribiliary plexus. The number of microvessels in inner layer of peribiliary plexus was decreased as the number of TACE ($p=0.035$) was increased.**Fig. 3.** Correlation between number of TACE and microvessels count in outer layer of peribiliary plexus. The number of microvessels in outer layer of peribiliary plexus was decreased as the number of TACE ($p=0.185$) was increased.

(Fig. 3).

0.9, 1.0, 0.7 ng/mL

TACE , , ,

TACE

가 (Fig. 2, 3).

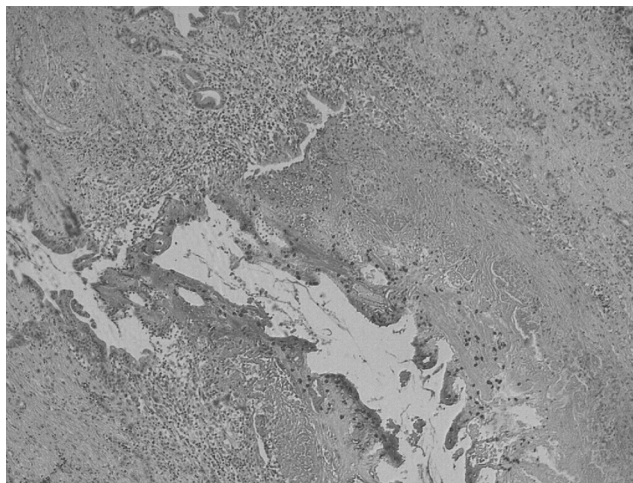
가 4

(Fig. 4). CT

1 . 4

TACE가 , 3

15 9 (Table 2).

**Fig. 4.** Bile duct necrosis. A large bile duct shows extensive necrosis of lining epithelium, bile spillage and periductal inflammation (H & E, $\times 100$).

75%

25%

25%가 가

(perisinusoidal and intrasinusoidal sphincter)

(11, 12).

가

(12).

(transvasal),

(transplexal)

가

(transsinusoidal),

가
가 가

(13).

가

(interlobular vein)

(5, 8, 10, 20).

(10)

(11, 14). TACE

(9, 10, 15 - 18). Kobayashi (15)

가

Tsuji (19)

가 . TACE

TACE

가

가

가

가 가
가

(12).

가 가

(15).

10 - 100 um

5 -

10 um

TACE

(11). TACE

0.5% -

1.7%

가

(5, 6, 10).

(10)

가

. Kobayashi (9)

TACE

56

7

(12.5%)

TACE

48

4

(8.3%)

4

1

CT

3

CT

TACE

Kobayashi (9)

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Microvascular Injury of the Peribiliary Plexus Associated with Transarterial Chemoembolization: A Study of Surgical Specimens¹

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Purpose: We attempted to evaluate the relationship between transarterial chemoembolization (TACE) and injury to the peribiliary plexus by evaluating the number of microvessels in the peribiliary plexus of surgical specimen.

Materials and Methods: Surgical specimens were obtained from 78 hepatocellular carcinoma patients and 22 patients with liver metastases. They were divided into 4 groups (Group 1; hepatocellular carcinoma without TACE [$n = 30$], Group 2; hepatocellular carcinoma receiving preoperative TACE once [$n = 37$], Group 3; hepatocellular carcinoma receiving preoperative TACE more than two times [$n = 11$] and Group 4; metastatic carcinoma of the liver patients without a history of liver disease [$n = 22$]). Immunohistochemical staining for factor VIII-related antigen was performed in all the specimens and the number of microvessels in the inner capillary layer and the outer venous layer of the bile duct ($> 200 \mu\text{m}$ in diameter) was counted.

Results: The mean numbers of microvessels in the inner capillary layer were 4.50, 4.08, 1.64 and 2.05, and those in the outer venous layer were 25.23, 20.00, 18.36 and 12.32 for the 4 groups, respectively. The number of microvessels in group 4 was statistically fewer than that of group 1 ($p < 0.01$). In the hepatocellular carcinoma patients, the number of microvessels was decreased as the number of TACE sessions was increased.

Conclusion: The number of microvessels in the peribiliary plexus is increased in chronic liver disease patients. It may be from the increased portal pressure and flow stagnation in the sinusoidal and portal venules. TACE can have an effect on microvascular injury of the peribiliary plexus, and this can be a cause of bile duct necrosis and biloma.

Index words : Liver, angiography
Liver, blood supply
Hepatic arteries, chemotherapeutic embolization

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