

수막종에서 혈관내피성장인자의 발현과 종양주변부 부종*

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= Abstract =

Expression of Vascular Endothelial Growth Factor and Peritumoral Brain Edema in Intracranial MeningiomasTae Young Kim, M.D., Jong Tae Park, M.D.,
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Objective : Vascular endothelial growth factor(VEGF), an endothelial cell specific cytokine, is a potent angiogenic growth factor implicated in the tumor angiogenesis and increases vascular permeability dramatically. Peritumoral brain edema(PTBE) occurs in 40 - 60% of meningiomas. Many causative factors have been investigated, but the mechanism of PTBE associate with meningioma is unclear. VEGF has been implicated as one of the causative factors of PTBE. This study was designed to determine whether the extent of VEGF expression is correlated with degree of PTBE in meningiomas.

Methods : Meningioma tissue samples from 40 patients(7 men and 33 women, mean age 53 ± 13 years) who underwent surgery were examined retrospectively for the expression of VEGF immunohistochemically. The extent of PTBE was estimated by using preoperative CT or MRI as an edema index(EI). In addition to VEGF, several causative factors including tumor size, location, histologic type, microvasculature(CD31) were compared with EI.

Results : Twenty - six meningiomas demonstrated PTBE, and the other 14 did not. Of the 40 patients of meningiomas, 28 were positive(17 were 1+ and 11 were 2+) for VEGF. The EI increased significantly just as VEGF was strongly expressed($p=0.006$). Microvascular proliferation was also closely correlated with the extent of peritumoral brain edema($p<0.05$).

Conclusion : These data suggest that VEGF expression and microvascular proliferation are closely correlated with PTBE in meningioma.

KEY WORDS : Vascular endothelial growth factor · Brain edema · Meningioma · Microvasculature.

<p>서 론</p> <p>60%</p>	<p>가</p> <p>(vascularity),</p> <p>가 가</p> <p>가</p> <p>histamine, sero- tonin, bradykinin, polyamines, prostaglandins, plasmi- nogenic activator,</p> <p>(oxygen free</p>
---------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1999

radical)
18)23)

(microvasculature)

(vascular endothelial growth factor :
VEGF)

가

가

8)10)12)19)

가

가

대상 및 방법

가 40

33

53 ± 13

7

Worth Health Organization(WHO)

CT

MRI

(edema index : EI)

1

가 1

1. 혈관내피성장인자 및 미세혈관의 면역화학조직염색

(immunoperoxidase)

antifactor VIII

CD31

1 : 40

murine (Oncogene Research Product, Cam -
bridge, MA),

1 : 40

mouse JC70(anti - CD31)(Dako Patts, Glost -
rup, Denmark)

4 μm

3%

5

geneous peroxidase)

(Pepsin)

Immuno/DNA

4

protein blocker 10

2 10

AEC Mayer's hematoxylin

universal mount

CD31

200

3 (0 : , 1+ :

, 2+ :)

CD31

100

가 7

2. 종양 및 종양주변부 부종 용적의 측정

CT MRI

(a and b)

4/3 x abc

(c)

6)10)

3. 통계적 분석

SPSS - PC

±

rson

, p - value가 0.05

Pea -

결 과

가 가 (p=0.002),

가 (p=0.006) 가

가

가

(Table 1).

Table 1. Relationship between age, tumor volume, edema index according to the VEGF expression

VEGF	Age(years)	Tumor volume(cm ³)	EI ^a	No. of edema(%)	n
0	50.5 ± 4.0	65.3 ± 11.4	1.14 ± 0.06	5(41.7)	12
1+	55.6 ± 2.8	28.6 ± 9.2	1.84 ± 0.31	11(64.7)	17
2+	51.4 ± 4.0	59.3 ± 16.0	4.55 ± 0.15	10(90.7)	11

VEGF = vascular endothelial growth factor ; EI = Edema Index. Values are mean ± SE
 VEGF immunostaining intensity were rated on grading criteria : 0 = negative ; 1+ = trace ; 2+ = more than moderate. The EI was calculated by dividing the volume of the peritumoral edema and the tumor by that of the tumor. a There was a significant difference (p < 0.01)

Table 2. VEGF expression according to the peritumoral brain edema

Group	n	Age(years)	Tumor Volume(cm ³)	VEGF ^a
Tumor without PTBE	14	53.7 ± 3.9	49.1 ± 12.7	0.57 ± 0.17
Tumor with PTBE	26	52.5 ± 2.3	47.5 ± 8.8	1.19 ± 0.15

VEGF = vascular endothelial growth factor ; PTBE = peritumoral brain edema
 Values are mean ± SE. a There was a significant difference (p < 0.05)

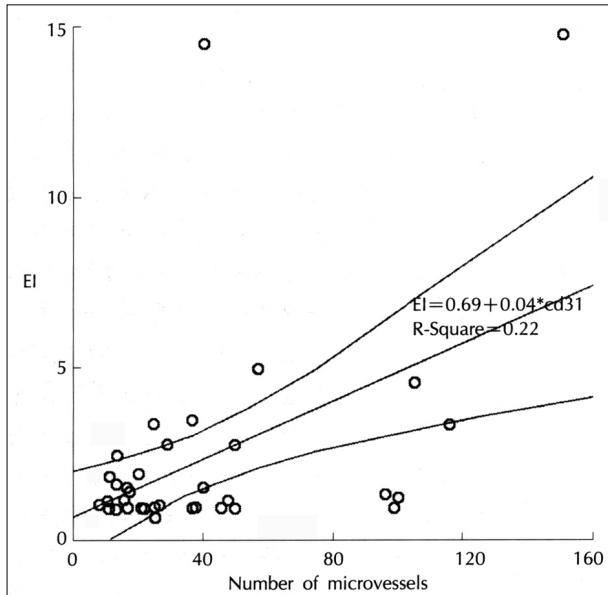


Fig. 1. Correlation between edema index(EI) and microvasculature in meningiomas(p < 0.01)

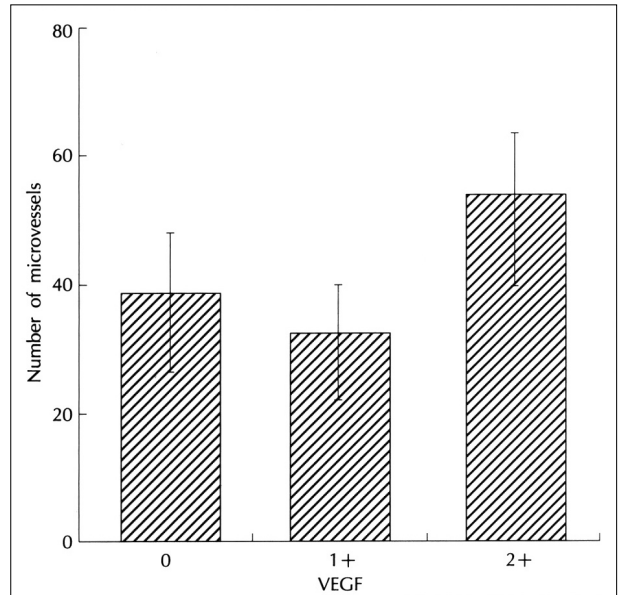


Fig. 2. There was no significant correlation(p = 0.567) between the number of microvessels and VEGF expression in meningiomas.

1. 혈관내피성장인자의 발현정도에 따른 부종인자의 상관관계

가 12 , 가 17
 , 11 , (14) 0.57 ± 0.17
 , (26) 1.19 ± 0.15
 .
 0 41.7%, 1+ 64.7%, 2+
 90.7% 가 가
 가 가
 () 1.14 ± 0.06, 1.84 ± 0.31, 4.55 ± 0.15
 (p = 0.006)(Table 1). 40

26 (64.5%) ,

가 .

(p < 0.05)(Table 2).

2. 미세혈관의 발달정도에 따른 부종지수와 혈관내피성장인자의 발현정도와 상관관계

가 (p=0.002)(Fig. 1).

가 2+ (Fig. 2).

고 찰

. Kohn¹⁵⁾ (circulating macro- molecules) (extravasation) vesicularvacuolar organelles

가 가¹²⁾ vascular leakage가

18)23)

8)11)24)

40 60%

1)11)

8)11-14)19)21)

가

가

(p=0.006).

가

가

가

가

가

8)

가

가 (VEGF)가

가

2)3)7)21)

mRNA가 upregulation

가

8)9)11)12)19)

가

가

가

가

. Bates Curry²⁾

가 (hydraulic conducti- vity) 가

, platelet - derived growth factor, epidermal and fib- roblast growth factor, sex steroid receptors

(fenestration),

(pinocytic vesicle) 가,

9)17)23)

(widened intracell- ular junctions),

(widened intracell- ular junctions),

가

7)9)21). Roberts Palade²¹⁾

estrated endothelium)

(fen -

가

(obliteration of subarachnoid plane)

가
(pial supply)

4-6)10)22)25)

(arachnoid)

가

Yoshioka²⁵⁾

가

가

가

가

가

가

가

CD31

가 (Fig. 2).

가 가

가

가
3)8)12)24)

가 9)16),
가

8)19),

가

19)

가
(capillary hemangioblastoma)

. Pietsch

가
(medulloblastoma)

dymoma)

(epen-

가

13)14)20),

19).

가

• : 2000 3 22

• : 2000 6 17

• :

570 - 711

344 - 2

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