

_____ : 1990 ,

_____ : 1997 12 1999 6 3 , 1 , 6 1 11 vacuum pillow

chest marker leg marker X Diaphragm

control 1 cm CT-simulator CT-simulator 가 5 mm

90% 10 Gy 1 2 3 30 Gy 4

_____ : 12 11 1 (9%)

(36%) 3 111 cc 184 cc

X, Y, Z 5 mm ,

_____ :

1950 가 가

^{1 3)} 1975 가 1990 가 가

^{4 6)} 가 가 가

1 1980 가 Scandinavian ¹²⁾(stereotactic

body frame, Precision TherapyTM) ,

^{7 11)} (whole body stereotactic radiosurgery)

2000 9 22 2000 11 21

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1997 12 1999 6

8 :

11
11
22 58 52
3 , 1 ,
7 가 6
2 , 1 , 1 ,
1 , 1 1
3 cc 111 cc 33 cc (Table 1).
3 18 12

1.

vacuum pillow
vacuum pillow

Table 1. Patients Characteristics

Case	Age/ Sex	Primary Site	RT site	PTV [†]
1	58/ M	HCC [*]	Lung	13 cc
2	52/ M	Hpx [†]	Lung	12 cc
3	36/ M	HCC	Liver	107 cc
4	58/ M	HCC	Liver	98 cc
5	51/ M	HCC	Lung	16 cc
6	22/ M	AVM [§]	Neck	33 cc
7	56/ M	HCC	Liver	7 cc
8	32/ M	Sarcoma	Lung	18 cc
9	50/ M	Trachea	Lung	3 cc
10	54/ M	Lung	Liver	111 cc
11	45/ M	Breast	Lung	42 cc

*Hepatocellular carcinoma, [†]Hypopharynx, [†]Planning Target Volume, [§]Arteriovenous malformation

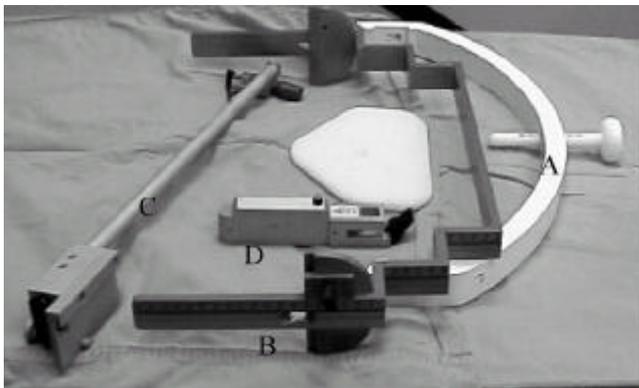


Fig. 1. Components of stereotactic body frame.
A) Diaphragm control, B) Stereotactic arc, C) Leg marker, D) Chest marker

Fig. 1 . chest marker
() 2
leg marker
2.
X-
1 cm diaphragm control
X-
3. (CT-Simulation)
chest marker leg
Diaphragm control
marker
stereotactic arc
X, Z
Y
level control
stereotactic arc
1 cm , 2 5 mm
4. (Treatment Planning)
AcQ-Sim
가
5 mm
5 mm 1 cm
Dicom 3
(Render planning system)
4 7 3 noncoplanar
(Dose Volume Histogram)
Complication Probability) (Normal Tissue
가
5. (Set-up error)
5 mm

X, Y, Z
 4
 6. 2. 3
 30 Gy 10 Gy 3
 2 10 3 X, Y, Z
 90%
 15 20% 5mm (Table 3). X
 1 3 mm, Y 2 5 mm Z 2 4 mm
 7. 3.
 1
 가 50% 가
 2 3
 6 X
 가
 1.
 1 (9%) 1
 4 (36%) 5 10
 6 45%가^{13, 14)} 가
 (Table 2). 1
 가 가 5 10 mm 가 X, Y, Z 5 mm
 가 4

Table 2. Response of Stereotactic Radiosurgery

	No. of Patients	Complete Response	Partial Response	No Response
Primary HCC*	3	1 [†]	0	2
Liver metastasis	1	0	0	1
Lung metastasis	6	0	3	3
AV malformation [‡]	1	0	1	0
Total	11	1 (9%)	4 (36%)	6 (55%)

*Hepatocellular carcinoma, [†]Pathologic complete response,

[‡]Arterio-venous malformation

Table 3. Set-up Accuracy

Case	X-axis (mm)	Y-axis (mm)	Z-axis (mm)
1	3	2	3
2	1	3	2
3	2	2	2
4	2	2	3
5	2	3	3
6	3	5	4
7	3	2	3
8	2	4	3
9	3	3	2
10	2	3	3
11	3	3	3

8 :

Uematsu ¹⁷⁾ 80% , Blomgren ¹⁸⁾
(Image fusion) 60 70%
20 30%

가 (table) 가
gantry couch

vacuum pillow

1 2
5

mm

가
가

가

¹⁹⁾

가

diaphragm control

± 10 mm

diaphragm control

diaphragm control ,

가

^{15, 16)}

가 1 (9%), 가 4 (36%)

Uematsu ¹⁷⁾ 66

2

Blomgren ¹⁸⁾ 40

9 (22.5%)

11 (27.5)

%)

10 Gy 3

Uematsu ¹⁷⁾ 4 12 Gy 4 15 32

78 Gy Blomgren ¹⁸⁾ 10 20 Gy 1 3

20 50 Gy

가가

가

90%

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Abstract

**Preliminary Results of Stereotactic Radiosurgery Using
Stereotactic Body Frame**

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Purpose : To evaluate efficacy and complication of stereotactic radiosurgery using stereotactic body frame.

Methods and Materials : From December 1997 to June 1999, 11 patients with primary and metastatic tumors were treated with stereotactic radiosurgery using stereotactic body frame (Precision Therapy™). Three patients were treated with primary hepatoma and seven with metastatic tumor from liver, lung, breast, trachea and one with arteriovenous malformation on neck. We used vacuum pillow for immobilization and made skin marker on sternum and tibia area with chest marker and leg marker. Diaphragm control was used for reducing movement by respiration. CT-simulation and treatment planning were performed. Set-up error was checked by CT-Simulator before each treatment. Dose were calculated on the 80-90% isodose of isocenter dose and given consecutive 3 fractions for total dose of 30 Gy (10 Gy/fraction).

Results : Median follow-up was 12 months. One patient (9%) showed complete response and four patients (36%) showed partial response and others showed stable disease. Planning target volumes (PTV) ranged from 3 to 111 cc (mean 18.4 cc). Set-up error was within 5 mm in all directions (X, Y, Z axis). There was no complication in all patients.

Conclusion : In primary and metastatic tumors, stereotactic radiosurgery using stereotactic body frame is very safe, accurate and effective treatment modality.

Key Words : Stereotactic body frame, Radiosurgery