

# Air-vacuum Cushion

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\_\_\_\_\_ : air-vacuum cushion

\_\_\_\_\_ : 1998 8 1999 8  
20 EPID x (right-left), y (cranio-caudal)  
z (anterior-posterior), y (cranio-caudal) matching

t-  
\_\_\_\_\_ : 10 x, y 0.02 mm, 0.78 mm  
2.13 mm, 2.40 mm 1.46 mm, 1.51 mm z,  
y 2.96 mm, 0.47 mm 3.69 mm, 1.96  
mm 2.79 mm, 1.48 mm 10 x, y -0.33  
mm, 0.81 mm 1.71 mm, 3.08 mm 1.40 mm, 1.88 mm  
z, y 2.98 mm, 0.74 mm  
4.75 mm, 2.65 mm 2.69 mm, 1.86 mm

air-vacuum cushion  
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air-vacuum cushion (Vac-lock, Med-Tec, USA) EPID x (left-right) y (cranio-caudal) z (anterior-posterior) EPID EPID  
 “+” 198 187  
 1998 8 1999 8 20  
 CL2100C/D (Varian, USA) 3 10 air-vacuum cushion (random error) 6 8) EPID  
 10 1 Varian 256 × 256 matrix Portal-vision MK1 (Varian, U.S.A)  
 (source surface distance)

Table 1  
 moris), (acetabulum), (sacrum), (caput ossis femoris), (pelvic inlet) 10 x, y

Table 1. Systematic and Random Error of Control Group

Port direction	Coordinates	Mean displacement (mm)	Systematic 1 SD* (mm)	Random 1SD* (mm)	Range (mm)
Posterior	x	0.02	2.13	1.46	-8.9 4.9
	y	0.78	2.40	1.51	-5.7 7.7
Lateral	z	2.96	3.69	2.79	-9.9 12.5
	y	0.47	1.96	1.48	-5.5 6.1

\*SD : standard deviation

Table 2. Systematic and Random Error of Test Group

Port direction	Coordinates	Mean displacement (mm)	Systematic 1 SD* (mm)	Random 1 SD* (mm)	Range (mm)
Posterior	x	-0.33	1.71	1.40	-4.1 4.8
	y	0.81	3.08	1.88	-7.3 8.4
Lateral	z	2.98	4.75	2.69	-8.2 13.2
	y	0.74	2.65	1.86	-8.9 10.0

\*SD : standard deviation

0.02 mm, 0.78 mm  
 2.13 mm, 2.40 mm  
 mm, 1.51 mm  
 2.96 mm, 0.47 mm  
 3.69 mm, 1.96 mm  
 2.79 mm, 1.48 mm  
 Fig. 1

Fig. 4  
 $p$   
 0.47, 0.95  
 $p$  0.90, 0.71

Fig. 2

Table 2  
 10  
 -0.33 mm, 0.81 mm  
 1.71 mm, 3.08 mm  
 1.40 mm, 1.88 mm  
 2.98 mm, 0.74 mm  
 4.75 mm, 2.65mm  
 mm, 1.86 mm

varian EPID

EPID

Fig. 3

EPID 1

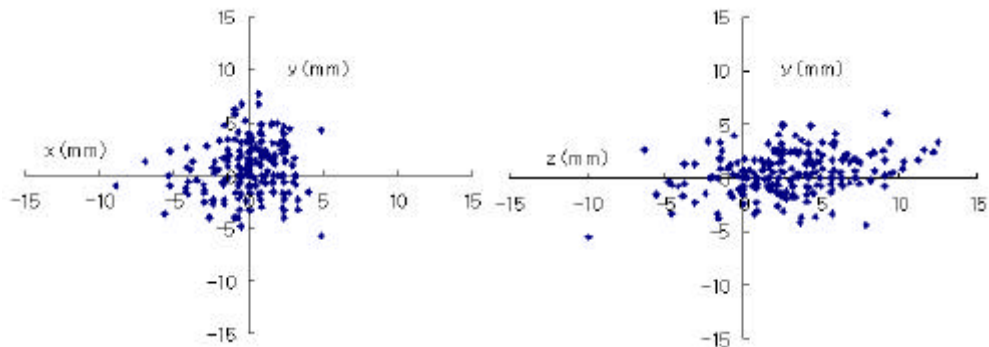


Fig. 1. Scatter plot of overall displacement along the lateral (x), the cranio-caudal (y) and the anterior-posterior (z) direction for 10 patients with rectal cancer (control group).

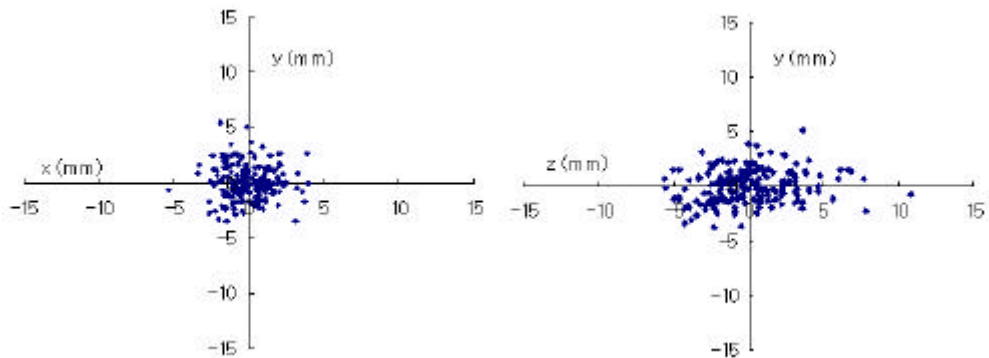


Fig. 2. Scatter plot of random displacement along the lateral (x), the cranio-caudal (y) and the anterior-posterior (z) direction for 10 patients with rectal cancer (control group).

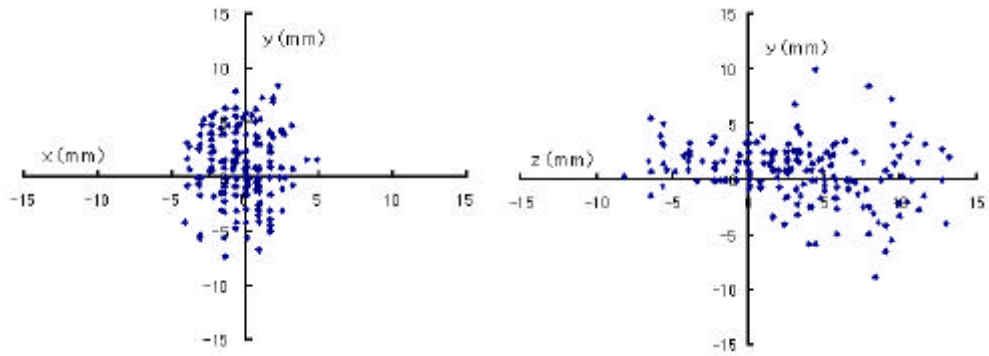


Fig. 3. Scatter plot of overall displacement along the lateral (x), the cranio-caudal (y) and the anterior-posterior (z) direction for 10 patients with rectal cancer (test group).

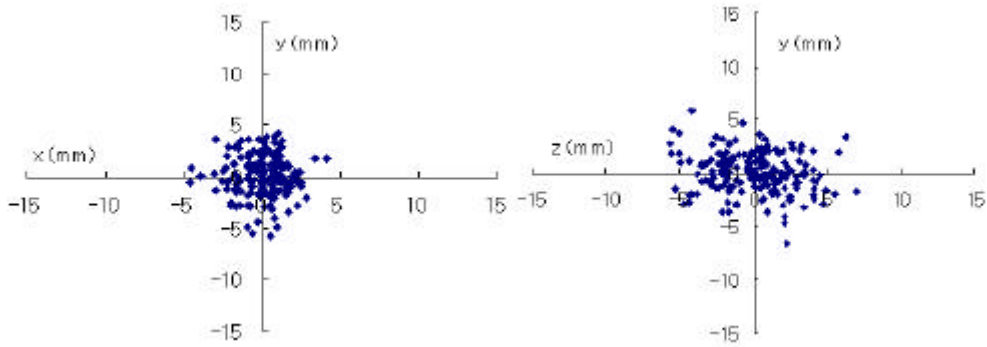


Fig. 4. Scatter plot of random displacement along the lateral (x), the cranio-caudal (y) and the anterior-posterior (z) direction for 10 patients with rectal cancer (test group).

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 가 James<sup>11)</sup> air-

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**Abstract**

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The Role of Air-Vacuum Cushion Device in Patients with  
Rectal Cancer in Radiation Therapy

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**Purpose** : We analyzed setup errors induced by using air-vacuum cushion as immobilization device in patients with rectal cancer.

**Materials and methods** : We had treated the twenty patients with rectal cancer by 6 MV, 10 MV X-ray from Aug. 1998 to Aug. 1999 at Chungnam National University Hospital. All patients were treated at prone position. They were separated to two groups, control group, 10 patients using styrofoam, and test group, 10 patients using styrofoam and air-vacuum cushion. We measured errors of posterior field for x, y axis and lateral field for z, y axis with simulation film and EPID image using a matching technique.

**Results** : In control group, the mean displacement values of pelvic bone landmark for x axis and y axis were 0.02 mm, 0.78 mm, respectively and the standard deviations of systematic error were 2.13 mm, 2.40 mm, respectively and the standard deviation of random error were 1.46 mm, 1.51 mm, respectively. In test group, the mean displacement values of x axis and y axis were -0.33 mm, 0.81 mm, respectively and the standard deviations of systematic error were 1.71 mm, 3.08 mm, respectively and the standard deviations of random errors were 1.40 mm, 1.88 mm, respectively. The mean displacement values of z axis and y axis were 2.98 mm, 0.74 mm, respectively and the standard deviations of systematic error were 4.75 mm, 2.65 mm, respectively and standard deviations of random error were 2.69 mm, 1.86 mm, respectively. The statistical difference of field size by using air vacuum cushion between two groups in posterior direction and lateral direction was not shown.

**Conclusion** : We think that use of air-vacuum cushion may not be an advantage for improving setup accuracy in rectal cancer patients.

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**Key Words** : Immobilization, Radiation therapy, Rectal neoplasms