

Posterior Edge

*, †, ‡
‡? *? *? †

____: posterior edge

____: tangential field block
posterioredge

posterioredge

posterior edge

$$Co = 2\sin^{-1}\{\sin \theta \sin(C/2)\}$$

(Co: collimator angle, θ : angle between tangential beam and table, C: couch angle)

____: posterior edge가

posterior edge

posterioredge

posterior edge

posterioredge

가 가

____: posterioredge가

가

: , Posterior edge,

1,2) , 가

가

2003 1 15 2003 4 4

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, half - beam block
3-6) hanging block, 7) custom made beam alignment
protector, 8) metal rod - chain tangential

3 :
 corner block⁹⁾ 가
 terior edge
 posterior edge
 8) 가
 posterior edge
 8)

Posterior Edge
 1.
 tilted
 board
 10 ~ 15°
 pos -
 Siddon
 가 2 cm

(Fig. 1).
 posterior edge
 1 ~ 2 cm
 가
 1 ~ 2 cm
 가
 S
 posterior edge
 가

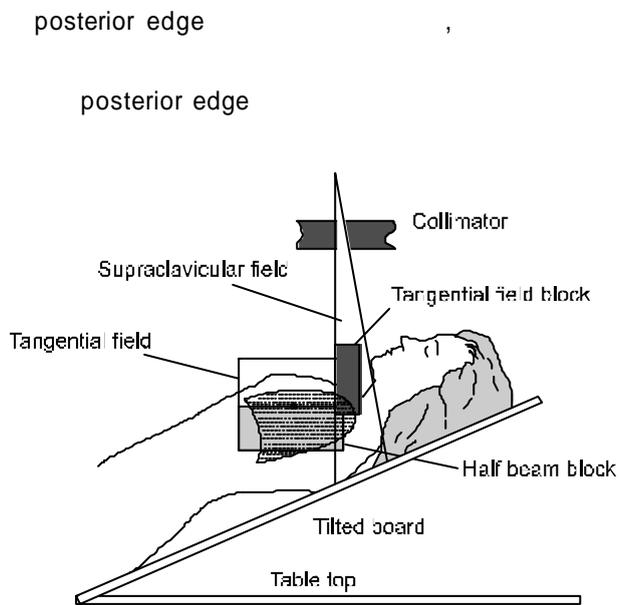


Fig. 1. Sagittal view illustrating the alignment of the tangential breast (chest wall) and supraclavicular field.

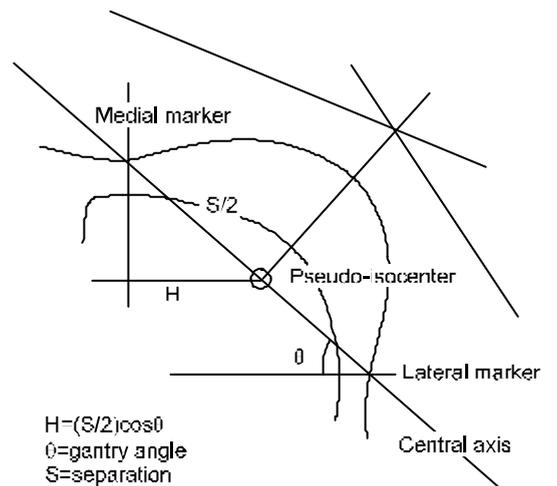
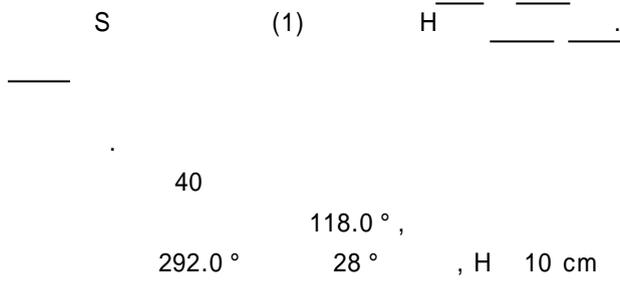


Fig. 2. Vertical cross-section of the fields arrangement in the mid-breast width isocenter at half separation. It is seen how S, H, and θ are defined.

(Fig. 2).

$$H = (S/2) \cos \theta \quad \dots\dots\dots(1)$$



40
118.0°,
292.0° 28°, H 10 cm

James⁷⁾
(Fig. 3).

posterior edge Siddon⁸⁾

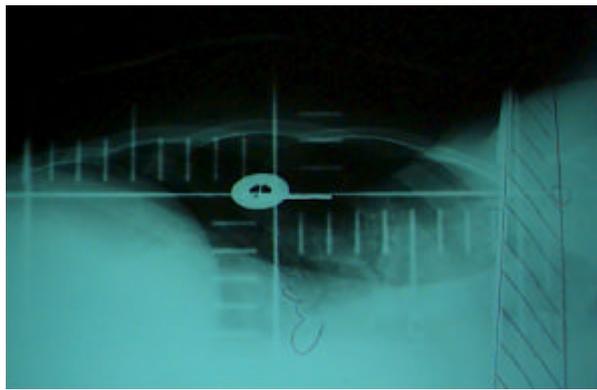


Fig.3. Radiograph showing overlapped images of the metal line, indicating a correct couch angle setting and tangential field block.

posterior edge

posterior edge
posterior edge
(Fig. 4).

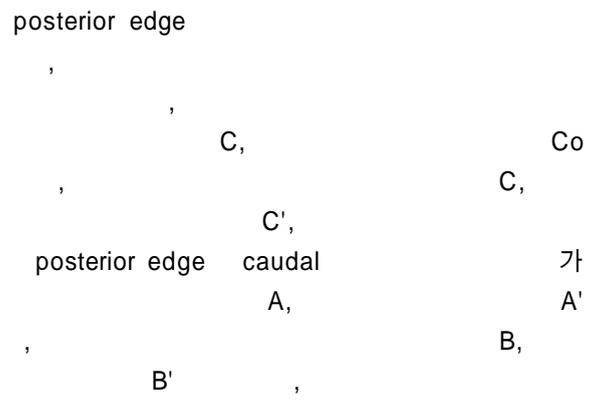


Fig. 5A

A A', B B' A'' B''

Fig. 5B

A''B'' 가 BB' 가

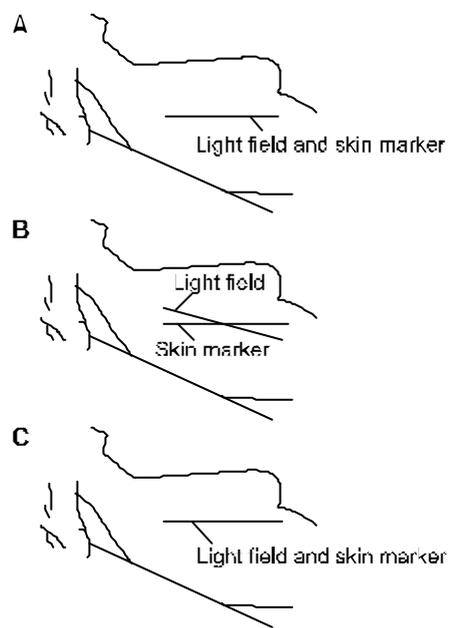


Fig. 4. Procedure for determining the lateral tangential collimator angles. (A) The gantry is rotated by lateral tangential angle. A line is drawn on the patient's skin to indicate the exit border. (B) The couch is rotated to overlap the image of the metal-line in lower margin of supraclavicular field. (C) The collimator is rotated so that the light field is aligned to the skin mark.

A''C' BC'' B'C''

Fig. 5B

$Co = 2\sin^{-1}\{\sin \theta \sin (C/2)\} \dots(2)$
 (Co: collimator angle, θ : angle between tangential beam and table, C: couch angle)

C 5.5°
 Co 2.57°

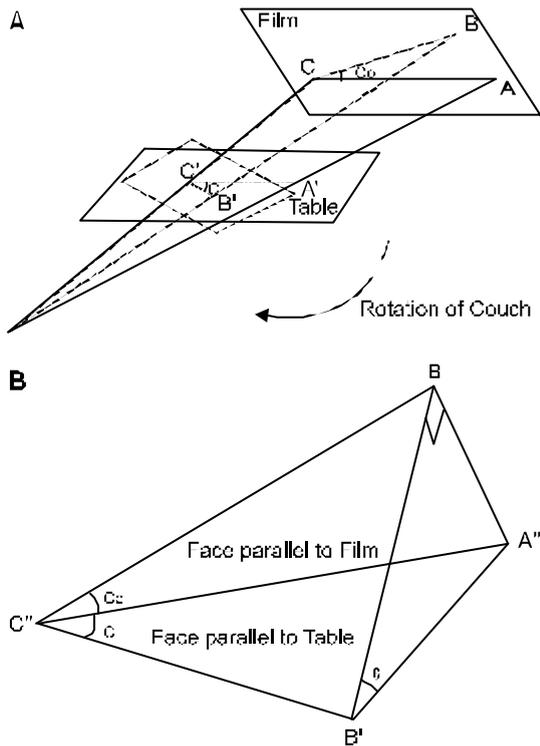


Fig. 5. (A) Set-up geometry of treatment lateral tangential field before and after rotation of couch. The broken line represents the geometry after rotation of couch. (B) The diagram presents the relationship the couch angle, collimator angle and gantry angle from the A. If \overline{AC} , \overline{BC} , $\overline{A'C'}$, the equation could be abstracted as: $Co = 2\sin^{-1}\{\sin \theta \sin (C/2)\}$ (Co: collimator angle, θ : angle between tangential beam and table, C: couch angle)

2.

가 posterior edge 가 posterior edge

Fig. 6

100 MU
 posterior edge

Fig. 6

4 MV

100 MU

posterior edge
 posterior edge가

cranial caudal 7 cm

3.

1 cm
 10 cm
 10 cm

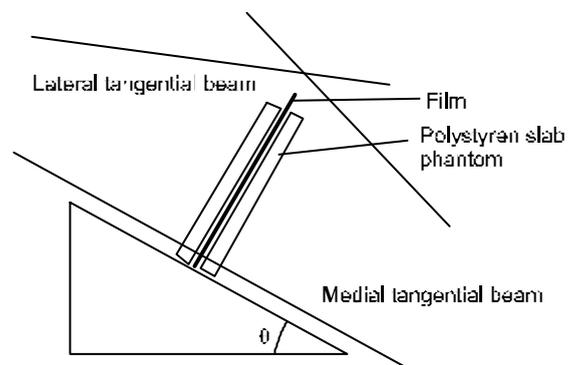


Fig. 6. Lateral and medial tangential beam set-up on film/phantom for the purpose of certification of posterior edges of both tangential beam.

CT three dimensional computer planning system (PLATO, Netherlands)

5 , 180 cGy 5040 cGy

edge posterior
 edge posterior edge
 (2)
 edge posterior edge
 Normal tissue complication probability (NTCP)

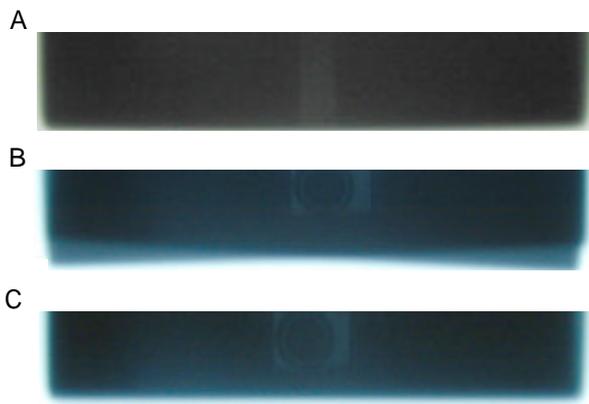


Fig. 7. The verification film. (A) Before the rotation of collimator, it shows the posterior edges of medial and lateral tangential field do not match each other. (B) After the rotation of collimator by matching the line on patient's skin and posterior edge of light field, posterior edges match each other. (C) After the rotation of collimator according to the formula above, posterior edges match well. Collimator angle of B and that of C were same each other.

Fig. 7 Fig. 8 Fig. 7
 3가
 posterior edge가
 Fig. 7B Fig. 7C
 Fig. 8
 cranial 7 cm
 , caudal 7 cm
 posterior edge

Posterior edge

Fig. 9

posterior edge가

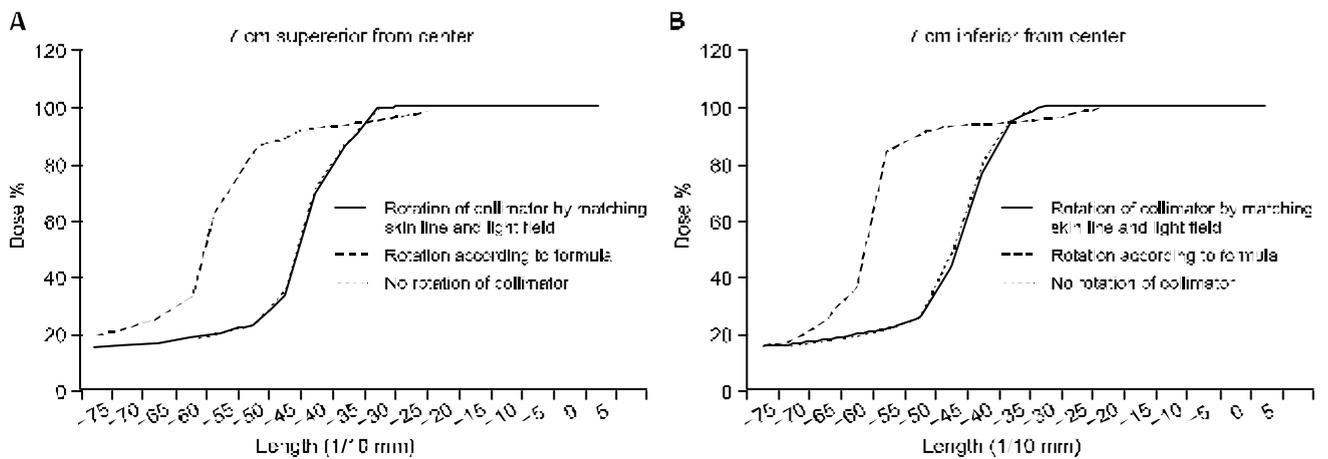


Fig. 8. Densitometric demonstration of posterior tangential beam. (A) 7 cm cranial from the center. (B) 7 cm caudal from the center. If the collimator angle is not adjusted, the posterior edges of medial and lateral tangential beam do not match each other.

posterior edge가

 Abstract

Correction Method on Mismatched Posterior Edge of Medial and Lateral Tangential Fields for Three Fields Techniques in Breast Cancer

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Purpose: The target volume for the three field technique in breast cancer include the breast tangential and supraclavicular areas. The techniques rotating the gantry and couch angles, to match these two areas, will geometrically produce mismatching of the posterior edge between the medial and lateral tangential beams. This mismatch was confirmed by film dosimetry and three - dimensional computer planning. The correction methods of this mismatching were studied in this article.

Materials and Methods: After the supraclavicular field was simulated using a half beam block and the medial and lateral tangential fields, by the rotation of the couch and gantry, we compared the following two methods to correct the mismatch. The first method was the rotation of collimator until a line drawn on the posterior edge of tangential beams before the rotation of couch aligned the line drawn on the posterior edge after the rotation. The second method was the rotation of collimator according to the formula developed by the author as follows;

$$C_o = 2 \sin^{-1} \{ \sin \theta \sin (C/2) \}$$

(C_o: collimator angle, θ : angle between tangential beam & table, C: couch angle)

Results: The film dosimetry showed the mismatching of posterior edges of the medial and lateral tangential fields prior to the rotation of collimator, while the posterior edges matched well after the rotation of collimator according to the formula. The three - dimensional computer plan also showed that the posterior edges matched well after the rotation of collimator accordingly. The DVH of the ipsilateral lung with the proper rotation of collimator angle was better than that without the rotation of collimator angle.

Conclusion: The mismatching of the posterior edges of the medial and lateral tangential fields can be recognized on the three field technique in breast irradiation when the gantry and couch are simultaneously rotated and can be corrected with the proper rotation of the collimator angle. The radiation dose to the ipsilateral lung could be lowered with this technique.

Key Words: Breast cancer, Posterior edge, Three field technique