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Comparison of gating around end-expiration and end-inspiration in radiotherapy for lung cancer.

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PURPOSE:

To evaluate the advantages and disadvantages of gating around end-expiration and end-inspiration.

MATERIALS AND METHODS:

We created five irradiation protocols to treat 15 patients with lung cancer. They were non-gated irradiation (protocol 1, P1), amplitude-based gating around end-expiration (P2) and end-inspiration (P3), and phase-based gating around end-expiration (P4) and end-inspiration (P5). We compared the lung dosimetric parameters and the treatment time.

RESULTS:

Compared to P2, in P3 the mean lung dose was reduced by 0.5 ± 0.4 Gy, V20 by $1.2 \pm 0.9\%$, V10 by $1.4 \pm 0.8\%$, and V5 by $1.5 \pm 0.9\%$ ($p < 0.01$). There was no statistically significant difference in these parameters between P4 and P5. At a dose rate of 600 monitor units/min (MUs/min), the average treatment time required for 100MUs was 10, 26, 64, 33, and 33 s, respectively, for P1, P2, P3, P4, and P5.

CONCLUSIONS:

With amplitude-based gating, gating around end-inspiration (P3) produced a greater decrease in the lung dose, however, the treatment time was longest among the four gated protocols. There was no significant difference between the two phase-based gating protocols (P4 and P5) with respect to the radiation dose to the lungs and the treatment time.