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Respiratory gating techniques for optimization of lung cancer radiotherapy.

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PURPOSE:

The primary objective of the STIC 2003 project was to compare the clinical and economic aspects of respiratory-gated conformal radiotherapy (RGRT), an innovative technique proposed to limit the impact of respiratory movements during irradiation, versus conventional conformal radiotherapy, the reference radiation therapy for lung cancer.

METHODS AND MATERIALS:

A comparative, nonrandomized, multicenter, and prospective cost toxicity analysis was performed in the context of this project between April 2004 and June 2008 in 20 French centers. Only the results of the clinical study are presented here, as the results of the economic assessment have been published previously.

RESULTS:

The final results based on 401 evaluable patients confirm the feasibility and good reproducibility of the various RGRT systems. The results of this study demonstrated a marked reduction of dosimetric parameters predictive of pulmonary, cardiac and esophageal toxicity as a result of the various respiratory gating techniques. These dosimetric benefits were mainly observed with deep inspiration breath-hold (DIBH) techniques (ABC and SDX systems), which markedly increased the total lung volume compared with the inspiration-synchronized system based on tidal volume (Real-time Position Management). These theoretical dosimetric benefits were correlated clinically with a significant reduction of pulmonary acute toxicity, and the pulmonary, cardiac, and esophageal late toxicities, especially with DIBH techniques. Pulmonary function parameters, although more heterogeneous, especially DLCO, showed a tendency to reduction of pulmonary toxicity in the RGRT group.

CONCLUSIONS:

RGRT seems to be essential to reduce toxicities, especially the pulmonary, cardiac, and esophageal late toxicities with the DIBH methods.