Oesophageal Toxicity and Hypofractionated Concurrent Chemoradiotherapy for Non-small Cell Lung Cancer

Sir — A hypofractionated schedule of 52.5–55 Gy in 20 fractions over 4 weeks (2.625–2.75 Gy/fraction) is favoured for radical non-small cell lung cancer treatment in the UK [1]. The addition of chemotherapy improves outcome, but optimal scheduling (sequential vs concurrent) has yet to be determined. Additionally, scheduling influences the severity of toxicity, including in-field oesophagitis. Predictive studies have attempted to model oesophagitis using calculated dosimetry [2,3], but data relevant to concurrent chemoradiotherapy, especially hypofractionation, are minimal [4].

In our centre, we analysed the relationship between dosimetry and oesophageal toxicity in 24 patients undergoing radical radiotherapy for non-small cell lung cancer, 55 Gy in 20 fractions over 4 weeks, from 2005 to 2006. Thirteen patients received concurrent chemotherapy with cisplatin 20 mg/m² during fractions 1–4 and 16–19 and vinorelbine 15 mg/m² during fractions 1, 6, 15 and 20. The remainder received between two and four cycles of sequential chemotherapy before commencing radiotherapy. All patients were computed tomography scanned (5 mm axial slices) on Eclipse and three-dimensional conformal 6 MV photon therapy was delivered using three or four fields. Patients were reviewed weekly during treatment and toxicity recorded using NCI-CTC grading. On Eclipse, the oesophagus was contoured from the lower border of cricoid cartilage to the gastroesophageal junction. Dosimetric data generated included: (1) dose-volume histogram (DVH) (%) — volume of oesophagus receiving a stated dose or more relative to volume of whole organ; (2) DVH (cm³) — absolute volume receiving a stated dose or more; (3) length of oesophagus with 100% circumference receiving more than 40, 45, 50 and 55 Gy — L₁₀₀/₄₀, L₁₀₀/₄₅, L₁₀₀/₅₀ and L₁₀₀/₅₅; and (4) mean oesophageal dose. DVH data were analysed at 5 Gy dose interval steps, i.e. V₅, V₁₀, etc. Dosimetric correlation with toxicity was carried out using Spearman’s testing.

Oesophageal toxicity breakdown in the sequential group was n = 5 (grade 1) and n = 6 (grade 2). In the concurrent group, n = 1 (grade 0), n = 4 (grade 1), n = 6 (grade 2), n = 1 (grade 3), n = 1 (grade 4). The sequential group showed marked correlation between incremental irradiated oesophageal volumes and worsening toxicity. Statistical significance was seen with DVH (%) for V₁₅–V₅₀ (P ≤ 0.012), DVH (cm³) for V₂₀–V₅₀ (P ≤ 0.008), L₁₀₀/₄₀, L₁₀₀/₄₅, L₁₀₀/₅₀ (P ≤ 0.025) and mean oesophageal dose (P = 0.001). In contrast, there was extremely poor correlation in the concurrent group. The only parameters that correlated significantly were DVH (%) V₅₀ (P = 0.041), V₅₀ (P = 0.032) and L₁₀₀/₅₀ (P = 0.044). There was no difference between the mean dose to the oesophagus in the sequential group 21.7 Gy vs the concurrent group 19.6 Gy (P = 0.309). In both groups, no correlation was seen between oesophagitis with gender, age, performance status and pre-treatment dysphagia.

A meta-analysis by Rowell and O’Rourke [5] reported a higher incidence of acute oesophagitis ≥ grade 3 with concurrent compared with sequential chemoradiotherapy. This was consistent with our results. Primarily, in this study we set out to determine if conventional dosimetry would be relevant in predicting toxicity of hypofractionated chemoradiotherapy based on an initial cohort of patients treated at our centre. We found a strong correlation between dosimetry and oesophagitis in the sequential group, but not in the concurrent group. This factor should be considered in future studies.

References
respondents (64%) were from regional centres and the remaining 36% were from academic institutions.

All but two respondents had been satisfied choosing radiotherapy as a specialty. However, some of them expressed criticism regarding the quality of some training details, and 36% of respondents were unsatisfied. The rate of satisfied respondents was higher in academic than in regional centres (79% vs 51%, \( P = 0.007 \)). The lower level of satisfaction in regional centres was probably caused by poorer access to the literature, fewer staff members involved in teaching and infrequent department meetings.

About 60% of programme directors did not fulfil trainees’ expectations. The number of completed patient care episodes, including treatment qualification, radiotherapy planning and delivery, during the training period ranged from 10 (one case) to 3000, with a mean of 450. The average number of brachytherapy procedures carried out per trainee was 73 (range 0–1000). There were 15 trainees who had not done any applications and 39 trainees (39%) who had done fewer than 10. Sixty-nine per cent of respondents attended part of their training outside a home institution in other Polish centres for a median duration of 2 months. Twice as many respondents from academic than from regional centres participated in international training (30% vs 15%). The financial problems seemed to be a major obstacle for attending training outside a home institution. Less than 20% of training and teaching costs were covered by an institutional allowance, mainly academic. The most common choice of career plan was to continue radiotherapy practice in their home institution (72%); 17% would like to combine clinical practice with research, 13% wished to continue radiotherapy practice abroad. It is interesting that working abroad was planned by 40% of the respondents who were pleased with the quality of training, yet by only 16% who were not (\( P = 0.01 \)).

This first national survey has documented some improvements in Polish radiotherapy over the last 10 years [3]. Although the Polish training programme in radiotherapy has already reached the level of the European Society for Therapeutic Radiology and Oncology recommendations, the present survey has shown that, in some details, it does not meet the expectations of trainees, especially those from regional centres. The most important issues to be solved are to eliminate the differences in training between academic and regional centres and to convince programme directors to be more active in their duties. It is also important to develop a system of exchange training visits between centres. The Polish Society of Radiation Oncology alone cannot solve financial problems, because it needs fundamental legislative changes.

References