Defining ‘upper mediastinal irradiation’ in secondary subglottic laryngeal cancer

The reported incidence of secondary subglottic laryngeal cancer (SSLC) is 11–22% [1–3]. Vocal cord fixation has been observed in 25–56% of SSLC cases [1–3]. Surgery and radiotherapy are the cornerstones for the therapeutic management of locally advanced SSLC, and chemotherapy combined with radiotherapy is now also an accepted treatment option.

‘Upper mediastinal irradiation’ (UMI) is often considered after laryngectomy for advanced stage SSLC. We reviewed the literature in an attempt to clarify the appropriate location for adjuvant UMI in cases of SSLC. To our knowledge, there is no consensus opinion on the target area.

The boundaries of the mediastinum are the thoracic inlet, superiorly; the diaphragm, inferiorly; the sternum, anteriorly; the vertebral column, posteriorly and the parietal pleura, laterally. The trachea begins immediately below the lower border of the cricoid cartilage and ends at the carina bifurcating into the right and left main-stem bronchi. The subglottic region of the larynx, embryologically derived from the tracheobronchial anlage, has three draining lymphatic pedicles; the anterior chain which terminates into the lower deep cervical or pre-laryngeal, Delphian node (level 6 node) which in turn drains into the pre-tracheal and supraclavicular lymph nodes and the two posterolateral pedicles which drain into the paratracheal and superior mediastinal lymph nodes.

SSLC is known to metastasize to the thyroid gland bed, paratracheal and upper mediastinal nodes. However, since block resection of these structures is difficult, the region is best treated with elective post-laryngectomy radiotherapy which should encompass both the neck and upper mediastinum [4]. In our view, UMI could mean irradiation of the paratracheal lymph nodes in the area beginning from below the lower part of the cricoid cartilage in the neck down to the tracheal carina level within the thorax. In the American Joint Committee on Cancer staging of bronchogenic carcinoma, the location of the bilateral upper and lower paratracheal nodes are depicted as 2R, 2L, 4R and 4L respectively. All of these lymph nodes are essentially within the upper half of the mediastinum in the thoracic cage.

In SSLC, the administration of UMI is not unreasonable because of the reported >20% risk of nodal metastases associated with the disease [5,6]. However, several aspects of this particular neoplastic condition deserve consideration. First, from the surgeon’s perspective, the important paratracheal nodes are also located behind the sternal manubrium at the inominate artery site of origin relative to the aortic arch [7]. Second, a review of the patterns of failure after surgical treatment of SSLC revealed that the site of recurrences was often local (with or without regional relapse) and in the neck [8]. Third, in the radioactive tracer study of the lymphatic drainage of the subglottic larynx, Welsh [9] found that only 0.2% of the tracer ended up in the superior mediastinum, and over 99% localized in the paratracheal nodes in the neck. Fourth, with respect to the scope of UMI, there is some discord in radiation oncology literature [10–12]. Such inconsistency could perhaps be partly explained by the fact that, in many reports about SSLC, no clear mention has been made of the correlation between the degrees of subglottic tumor downward extension and the frequency including location of relapse in the superior mediastinal region of the thorax.

The impact of preventive UMI (the stoma included) in reducing the risk of peristomal recurrence after surgery for SSLC is known [1]. From the reviewed literature, we can say that, at a minimum, UMI should mean irradiation of the lower neck, stoma and the upper half of the superior mediastinum where the 2R and 2L paratracheal nodes reside. Efforts to fully define UMI are needed. It is important to ascertain the correct area to irradiate in patients with SSLC because recurrent disease can be associated with significant morbidity and mortality.

References
