Radial/Circumferential Surgical Margin in Laryngectomy Specimens

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Larynx and rectum are two organs that are structurally and functionally distinct from each other, but being tubular organs they share a similar morphological aspect. Although the musculature and cartilaginous structure of the larynx do not have similarity with rectum, both organs have a lumen and are surrounded by fascias named as the investing fascia for the former and mesorectal fascia for the latter. The neoplasm of these two organs may grow as a vegetative mass into the lumen or to the opposite direction invading the wall of the luminal organ, as well as longitudinally proximal and distal to the origin of the tumor.

The location and extent of the tumor is important for determining the type of treatment for laryngeal carcinomas. If surgery is the preferred treatment of choice, appropriate type of partial laryngectomy and excision margins of total laryngectomy must be planned according to the extent of laryngeal carcinoma. Although we intend to primarily focus on total laryngectomy specimens, the same facts which apply for partial laryngectomies will also be addressed briefly.

The above mentioned directions of tumor growth results in three dimensional surgical margins for both organs; proximal, distal, and circumferential or radial. The concept of “radial surgical margin” has been introduced as an important prognostic factor for rectal carcinomas for more than three decades [1–3]. The radial surgical margin is a

parameter that should be evaluated and reported in rectal carcinomas, which is coined with assessment of the completeness of mesorectal excision [3]. Mesorectal excision is the method of rectal surgery with the outer surface of the mesorectal fascia. The completeness of surgery; for radial margins of mesorectal fascia defects are evaluated by the pathologists, which are also reported to be predictive factors for local recurrence. Mesorectal excision, either primarily or after neoadjuvant chemo/radiotherapy, has improved rectal carcinoma prognosis considerably, especially in terms of local recurrence [4–6]. In a series of 16,619 rectal carcinomas, radial/circumferential margin positivity was found in 17.2% of patients operated by different methods [7]. In 2002 the importance of radial surgical margin positivity was shown in rectal carcinomas with a 3.5 fold increase of local recurrence in multivariate analysis [8].

Considering larynx as a tubular organ with a circumferential/radial surgical margin like rectum, we should expect finding such data in the literature, including the incidence and associated risk factors for radial surgical margin positivity as well as its prognostic implications. However, there is no clear data about radial or circumferential margin in laryngectomy specimens in the literature. At the latest College of American Pathologists Cancer Templates for Laryngectomy Specimens, although it is stated that closest or positive surgical margin should be reported, radial or circumferential margin terms are not mentioned [9]. This may result in neglecting the evaluation and/or reporting of radial margin and wrong reporting of the closest tumor distance to the surgical margin. On the other hand, if only a group of pathologists would report radial margins, this might lead to controversial results in the literature. For example, at the figure from a laryngectomy specimen with supraglottic squamous cell carcinoma, the tumor free distance to the

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Fig. 1 **a** Supraglottic squamous cell carcinoma with safe mucosal margins. **b** The tumor was close to the radial margin at the posterior radial surgical margin, especially adjacent to the base of greater cornu of the thyroid cartilage

Fig. 2 **a** Glottic and subglottic squamous cell carcinoma with safe mucosal margins. **b** Tumor positivity at the radial surgical margin, confirmed by microscopy at the posterior subglottic region

Table 1 The surgical margin evaluation results in laryngectomy and/or laryngopharyngectomy specimens

Surgical procedure	Positive surgical margin at a mucosal site	Positive circumferential margin	Mucosa as the closest surgical margin	Circumferential margin as the closest surgical margin
Total laryngectomy	3	4 ^a	30	18
Partial laryngectomy	0	0	14	2
Laryngopharyngectomy	0	0	1	3
Total	3 (4%)	4 (5.33%)	45 (60.00%)	23 (30.66%)

^aThree of the positive radial margins were at the supraglottic region and one was at the postcricoid region

mucosal surgical margin was 1.5 cm (Fig. 1a). However, the vertical section to the lumen of the specimen presents very close surgical margin at the posterior radial surgical margin, especially adjacent to the base of greater cornu of the thyroid cartilage (Fig. 1b). If this case is evaluated neglecting radial surgical margins, the reported closest surgical margins would be incorrect. Furthermore, although mucosal surgical margin is negative, radial surgical margins may be positive at vertical sections of laryngectomy specimens in some patients as seen in Fig. 2a, b.

The radial surgical margin concept also applies to partial laryngectomy specimens as well as to pharyngeal and hypopharyngeal carcinoma cases.

Negligence in reporting the third dimension of radial surgical margin may negatively impact correct targeted volume planning for radiotherapy and even omitting required adjuvant chemo and/or radiotherapy with its negative consequences. Considering the planning of postoperative radiotherapy, the location of is important. The circumferential margins of laryngectomy specimens are rather large and irregular and specifying the anatomical location of positive or close margins is particularly important for accurate adjuvant radiotherapy planning.

To highlight the extent of the problem, we looked through a group of our available cases. More than one-fourth of 75 cases had the circumferential margin as the closest or positive surgical margin (Table 1).

Considering the completeness of the pathology report and optimal patient care, we suggest standard reporting of the radial surgical margin as a separate parameter. This will also allow us to have complete data to determine its prognostic value in a large series of patients in the future.

Compliance with Ethical Standards

Conflict of interest The authors declares that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical

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