



Surgical margins for the extirpation of oral cancer

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The surgical margin, called the surgical safety margin, is an important consideration when resecting primary oral cancers. However, what is an adequate surgical margin is unclear. Moreover, many resection margins are deemed negative or “free” if the frozen section is negative, regardless of the proximity of the margin to the tumor mass. In a review of surgical margins in head and neck cancer, 90% of surgeons considered the final resection margin to be negative if further supplemental margins were negative, even if the initial frozen section margins were positive¹.

1. Clinical margins vs pathological margins

There are two types of surgical margins: clinical and pathological. Clinical margins are generally about 1 to 1.5 cm. Although close surgical margins can contribute to local recurrence after resection in oral cancer², the prognostic value of surgical margins is still controversial³. In a large retrospective cohort study of oral squamous cell carcinoma, Buchakjian et al.³ found that intraoperative frozen margins were not ideal predictors of outcome, being less accurate than specimen margins for final biopsy. Pathological margins more meaningfully predict local recurrence than do clinical margins. Liao et al.⁴ reported that pathological margins of more than 7 mm decreased the local relapse rate significantly. In general, many authors recommend pathological margins greater than 5 mm^{1,5}.

2. Mucosal margins vs deep margins

For three-dimensional tissues, surgical margins can be divided into mucosal margins and deep margins. Mucosal margins are clearer than deep margins because we cannot directly see the deeper boundary of the tumor mass. Deep margins consist of mesenchymal tissue (e.g., muscle and connective tissue) and neurovascular channels and are difficult to delineate, whereas surgical margins can be precisely cut on the mucosa.

3. Margins according to proximity

Margins are currently classified as positive, close, or clear, according to their proximity to the tumor mass in the pathological specimen. However, there is no clear distinction among the three. Depending on the definition, positive margins may include the carcinoma *in situ* but not dysplasia¹, involve the microscopic tumor⁶, or be less than 1 mm⁷. Close margins have been defined as 3 mm or less⁶, 4 mm or less⁸, and 1 mm to 4.9 mm⁷. An adequate clear margin is thought to be more than 3 mm⁶, more than 5 mm^{1,7,9}, or 7 mm⁴. According to most authors, an adequate pathological margin is at least 5 mm. In my opinion, a positive margin can include the carcinoma *in situ* or dysplasia, and a close margin may fall between a positive margin and an adequate clear margin.

4. Tissue contracture

Tissue will contract after excision. Cutting with a scalpel blade will not distort or damage tissue, whereas cutting with an electrosurgical scalpel can ablate or injure the tissue along the incision line. Hence, the size of a measurable pathological margin can be underestimated when an electrosurgical scalpel rather than a scalpel blade is used. There are few studies about shrinkage of a tissue after its removal from the body^{10,11}. Previously reported post-resection shrinkage values

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were 24.8% and 20.9% for the mucosa and tongue, respectively, in the canine study by Johnson et al.¹¹, 20% to 25% for mucosal margins in a human study¹⁰, and 41% to 47.5% for a lip specimen in the study by Egemen et al.¹². Another human study showed that the amount of shrinkage differed according to the site: buccal mucosa (66.7%), tongue (35%), floor of the buccal cavity (33.3%), retromolar trigone (16.7%), and gingiva (15.4%)¹³. Therefore, we recommend that the surgical margins be increased by more than 25% to ensure adequacy and that the contracture percentage according to the tumor site be considered.

5. Locoregional control with surgical margin

The safety margin is considered the main indicator of oncological radicality¹⁴. Although more important than the clinical margin, the histopathological margin does not predict tumor aggressiveness. The aggressiveness of a tumor reflects the depth of tumor invasion or perineural invasion rather than the size of the surgical margin¹⁴. Nevertheless, surgical excision with an adequate surgical margin is the best means of achieving local control in oral cancer¹. Jang et al.² showed that the local recurrence rate increased significantly when the surgical margin was less than 5 mm. However, because microscopic tumor extension from the tumor margin in a T1 mass does not exceed 3 mm², they suggest that the surgical safety margin be redefined according to tumor size². Yamada et al.⁹ found that the risk of local recurrence did not differ significantly between surgical margins of 5 mm vs those more than 5 mm, whereas a significant difference between a clear margin and a close or tumor-involved margin was evident. They suggest that a surgical margin of about 5 mm is sufficient and thus that a surgical margin of more than 5 mm is not necessary for local control⁹.

6. Summary

In summary, a surgical margin of about 5 mm will be generally acceptable in a pathologic specimen. We should take care when delineating deep margins and consider tissue contraction after removal of a surgical specimen from the body. The tumor contraction percentage may differ in accordance with the primary site of the tumor, although definitive information is lacking. Therefore, we should carefully examine the pathologic specimen in terms of the proximity of the resection margin to the front of tumor, as well as perineural

invasion, tumor aggressiveness, tumor invasion depth, and other factors.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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