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Understanding the Surgical Margin: A Molecular Assessment 245
David J. Clark and Li Mao

The inclusion of molecular characteristics into surgical margin analysis may not only yield a more sensitive and accurate assessment of the cells in these margins, but it may also provide insight into their impacts on patients’ postoperative prognosis. This concept of the “molecular surgical margin” is advantageous, as it integrates recent advances in our understanding of head and neck carcinogenesis, while also retaining the established methodology of histopathology. This multidisciplinary approach may facilitate the development of a uniform criterion for defining the surgical margin, which will likely result in a reduced recurrence rate and improved overall patient survival.

Margin Analysis: Squamous Cell Carcinoma of the Oral Cavity 259
Michael Shapiro and Andrew Salama

This article primarily focuses on defining terms including negative margin, close margin, and positive margin. Furthermore, this review delineates the current role of frozen section analysis and adjuvant therapy in treating oral squamous cell carcinoma with respect to surgical margin status.

Margin Analysis: Squamous Cell Carcinoma of the Oropharynx 269
Felix W. Sim, Hong D. Xiao, and R. Bryan Bell

Because of the common shared risk factors of smoking and heavy alcohol consumption, literature involving oropharyngeal squamous cell carcinoma (OPSCC) is often combined with oral squamous cell carcinoma. Human papilloma virus is now confirmed to be a major risk factor of OPSCC with its distinct epidemiology and favorable treatment outcome. The impact of adjuvant chemoradiation in the setting of positive surgical margins remains unclear but is likely influenced by tumor biology. This article reviews the tumor biology of OPSCC and summarizes recent findings on outcomes following surgical treatment of OPSCC.

Evaluation of the Bone Margin in Oral Squamous Cell Carcinoma 281
Joshua E. Lubek and Kelly R. Magliocca

Squamous cell carcinoma is the most common cancer within the oral cavity. Bone invasion involving the maxilla or mandible is reported in up to 50% of tumors on initial presentation. Although conflicting data exist, true bone invasion is thought to negatively affect risk of recurrence and long-term prognosis. The ultimate goal is to accurately identify bone invasion preoperatively and intraoperatively, because it affects...
the treatment plan. This article focuses on methods of evaluation of the bone margin in the preoperative and intraoperative setting, discussing the implications for prognostic, staging, and reconstructive methods.

Bone Margin Analysis for Benign Odontogenic Tumors 293
Eric Ringer and Antonia Kolokythas

With the potential exception of the case of ameloblastoma, information relevant to the exact tumor–bone interface and extent of bone invasion by the commonly encountered odontogenic tumors is lacking. These tumors are rare. Treatment rendered varies significantly. Although commonly accepted practices are recommended, scientific evidence is relatively lacking. Prospective multicenter studies from tertiary treatment centers are required for evidence-based guidelines. Until studies are available, the proposed linear bone resection margin for odontogenic tumors and the evaluation of its adequacy in tumor eradication will be based on the limited data available.

Bone Margin Analysis for Osteonecrosis and Osteomyelitis of the Jaws 301
Mohammed Qaisi and Lindsay Montague

Bone margin analysis in cases of osteomyelitis, osteoradionecrosis, and medication-related osteonecrosis of the jaw is a controversial topic. There is little evidence to guide treatment and the interpretation of bone margin results. This article examines the significance of margin status and any possible effect on progression of the disease process. A review of various treatment adjuncts used for intraoperative margin analysis during removal of affected tissue is provided. Literature on the role of imaging is also discussed with regards to treatment planning for surgical resection. The histology of the three separate entities including the approach to surgical and pathologic evaluation of margins is also discussed.

Margin Analysis: Malignant Salivary Gland Neoplasms of the Head and Neck 315
Robert A. Ord and Naseem Ghazali

There are no established protocols for the optimum surgical margin required for salivary gland malignancies. Factors including histologic diagnosis and TNM stage have been shown to be important in prognosis and survival outcome and mandate special consideration of margin size. Salivary cancers are treated differently at different anatomic sites, and different histologic types show a propensity for major or minor glands. Low-grade malignancies are treated with soft tissue margins of 1 cm or less. The facial nerve is preserved unless infiltrated and encased. Adenoid cystic carcinoma and carcinoma ex pleomorphic adenoma require more complex planning to obtain negative margins.

Margins for Benign Salivary Gland Neoplasms of the Head and Neck 325
Eric R. Carlson and James Michael McCoy

The proper ablation of any neoplasm of the head and neck requires the inclusion of linear and anatomic barrier margins surrounding the neoplasm. Exirpative surgery of the major and minor salivary glands is certainly no exception to this surgical principle. To this end, the selection and execution of the most appropriate ablative surgical procedure for a major or minor benign salivary gland neoplasm is an essential exercise in oral and maxillofacial surgery. Of equal importance is the intraoperative identification and preservation of the pseudocapsule surrounding the benign neoplasm. This article reviews these important elements
specifically related to ablative surgery of benign neoplasms of the parotid, submandibular and minor salivary glands with strict attention to observed nomenclature.

Margin Analysis: Cutaneous Malignancy of the Head and Neck 341
Donita Dyalram, Steve Caldroney, and Jonathon Heath

This article focuses only on margin analysis of the cutaneous malignancy of the skin. It discusses basal cell carcinoma, squamous cell carcinoma, and cutaneous melanoma. The management of the neck and distant disease are beyond the scope of this article, but it answers what is the appropriate surgical margin when excising these skin tumors, whether frozen sections are accurate for the analysis of these tumors, and treatment algorithm and rationale for a positive resection margin.

Margin Analysis: Sarcoma of the Head and Neck 355
Raafat F. Makary, Arun Gopinath, Michael R. Markiewicz, and Rui Fernandes

Head and neck sarcomas are rare but are associated with significant morbidity/mortality and management difficulties. These tumors are best managed in a multidisciplinary setting. Open or core biopsy is essential for histologic diagnosis and grading. Complete surgical tumor resection with negative margins at the first attempt is the best chance for potential cure. In most patients, except those with small resectable low-grade lesions, adjuvant radiotherapy and chemotherapy are added to maximize local control with variable results. Resection margins effect on recurrence rate and treatment modalities in selective types of head and neck sarcomas are discussed in this article.

Surgical Margins: The Perspective of Pathology 367
Kelly R. Magliocca

Neoplasms of the head and neck constitute a broad spectrum of benign and malignant entities. When treatment involves resection, assessment of the surgical margins represents an important component of the pathologic examination. Margin status is an important indicator of a complete surgical resection. The ability to generalize conclusions such as ‘safe distance’ measurements from work performed on SCCa or cutaneous malignancy to other types of neoplasms in the head and neck region seems limited. This article reviews conditions and considerations for reliable margin assessment and interpretation.

Margin Analysis—Has Free Tissue Transfer Improved Oncologic Outcomes for Oral Squamous Cell Carcinoma? 377
Sean P. Edwards

Microvascular reconstruction of ablative defects has become a mainstay of contemporary management of head and neck cancer patients. These techniques offer myriad tissue options that vary in character, volume, and components and have vastly improved the esthetic and functional outcomes achieved in this patient population. Although consensus exists regarding the reliability and functional and esthetic benefits of free tissue transfer, the same cannot be said for oncologic outcomes. The increase in resources required for the routine use of free tissue transfer has led to asking this question—Do vascularized free flaps allow for increased surgical margins and improvements in oncologic outcomes?