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22 | Confocal Reflectance Imaging of Head and Neck Surgical Specimens: A Comparison to Histology

ABSTRACT

BACKGROUND: Confocal reflectance microscopy (CRM) is an optical method of imaging tissue noninvasively without the need for fixation, sectioning, and staining as in standard histopathologic analysis. Image contrast is determined by natural differences in refractive indices of organelles and other subcellular structures within the tissues. Gray-scale images are displayed in real time on a video monitor and represent horizontal (en face) optical sections through the tissue. We hypothesized that CRM is capable of discerning histologic characteristics of different tissues in the head and neck.

OBJECTIVES: To examine the microscopic anatomy of freshly excised head and neck surgical specimens en bloc using CRM and to compare the findings with those generated by conventional histologic analysis.

DESIGN: This was a pilot observational cohort study. Bone, muscle, nerve, thyroid, parotid, and ethmoid mucosa from human surgical specimens were imaged immediately after excision. Confocal images were compared with corresponding routine paraffin-embedded, hematoxylin-eosin-stained sections obtained from the same tissue.

RESULTS: Characteristic histologic features of various tissues and cell types were readily discernible by CRM and correlated well with permanent sections. However, in all tissues examined, there was less microscopic detail visible in the CRM images than was appreciated in paraffin-embedded histologic sections.

CONCLUSIONS: The CRM images revealed cytologic features without the artifacts of histologic processing and thus may have the potential for use as an adjunct to frozen-section analysis in intraoperative consultation.