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7 | Immediate ex-vivo diagnosis of pituitary adenomas using confocal reflectance microscopy: a proof-of-principle study.

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ABSTRACT

OBJECTIVE The objective of this study was to evaluate the feasibility of using confocal reflectance microscopy (CRM) ex vivo to differentiate adenoma from normal pituitary gland in surgical biopsy specimens. CRM allows for rapid, label-free evaluation of biopsy specimens with cellular resolution while avoiding some limitations of frozen section analysis. METHODS Biopsy specimens from 11 patients with suspected pituitary adenomas were transported directly to the pathology department. Samples were immediately positioned and visualized with CRM using a confocal microscope located in the same area of the pathology department where frozen sections are prepared. An H & E-stained slide was subsequently prepared from imaged tissue. A neuropathologist compared the histopathological characteristics of the H & E-stained slide and the matched CRM images. A second neuropathologist reviewed images in a blinded fashion and assigned diagnoses of adenoma or normal gland. RESULTS For all specimens, CRM contrasted cellularity, tissue architecture, nuclear pleomorphism, vascularity, and stroma. Pituitary adenomas demonstrated sheets and large lobules of cells, similar to the matched H & E-stained slides. CRM images of normal tissue showed scattered small lobules of pituitary epithelial cells, consistent with matched H & E-stained images of normal gland. Blinded review by a neuropathologist confirmed the diagnosis in 15 (94%) of 16 images of adenoma versus normal gland. CONCLUSIONS CRM is a simple, reliable approach for rapidly evaluating pituitary adenoma specimens ex vivo. This technique can be used to accurately differentiate between pituitary adenoma and normal gland while preserving biopsy tissue for future permanent analysis, immunohistochemical studies, and molecular studies. KEYWORDS:CRM = confocal reflectance microscopy; NA = numerical aperture; adenohypophysis; confocal reflectance microscopy; frozen section analysis; pituitary adenoma; pituitary surgery; rapid diagnosis; tissue architecture
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