

Oral presentation

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The clinical application of optical coherence tomography in the head and neck

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Optical coherence tomography is an imaging modality that uses light to determine cross-sectional anatomy in turbid media such as living tissues. The axial resolution of conventional OCT exceeds 10 μm and allows identification of specific structural features of the tissue such as the epithelium, basement membrane, lamina propria, and various specialized structures such as glands and ducts. This presentation will review the University of California Irvine experience with OCT imaging in the head and neck (2002–2009) encompassing over 400 subjects in the operating room, ICU, and clinic. Imaging in adults, paediatric cases, and neonates will be discussed as well as instrumentation for use in surgery and the office.

The major clinical applications of OCT in otolaryngology-head and neck surgery that we have explored are: 1) examination of the true vocal folds with the aim of identifying and characterizing pre-cancerous and early stage malignancy and 2) examination of the paediatric/neonatal subglottis. Early stage laryngeal cancer is very difficult to differentiate from many disorders that mimic it, including chronic laryngitis. Biopsy can permanently destroy vocal quality and requires general anaesthesia; thus surgeon is reluctant to obtain diagnostic tissue specimens. OCT imaging has the potential to provide surgeons with a means to better establish indications for microsurgical biopsy, monitor progression of disease, and guide therapy. The subglottic larynx is the "choke" for the neonatal airway and oedema or scar in this region is a major cause of failed extubation. Differentiating oedema from scar is impossible without surgical microendoscopy. OCT imaging can discern subtle differences in the subglottic mucosa and hopefully provide a means to identify patients at risk for extubation failure, and ideally in the future be used in

the neonatal ICU to optimize endotracheal tube management.