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| **3D Reconstruction and dynamic shape analysis of the large airways from bronchoscopy** |
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| **Introduction/Aim:**  Structural disorders of the large airways are increasingly recognised as a clinical entity and cause of morbidity in both adult and paediatric patients, due to the widespread use of computed tomography (CT) imaging and advanced post-processing techniques in clinical practice. The natural history, pathophysiological impact, optimal treatment and outcomes are largely unknown for many of these conditions, and there remains limited ability to understand the dynamic impact of these conditions on the airway and respiratory function. We seek to develop a system that allows to quantify dynamic large airway changes through bronchoscopy alone, without modification or changes to existing bronchoscopes.  **Methods:**  A computer application has been developed which allows for real-time generation of 3D representations of the visible segment of airways from bronchoscopy images, using unmodified bronchoscopes and image acquisition systems. From these segments, cross sections can be taken to perform shape classification using artificial intelligence, and sequential analysis over the respiratory cycle to determine the changes in cross-sectional area. A validation system is integrated into the system for both synthetic data, and real patient data in comparison to CT imaging.  **Results:**  Initial validation work, using synthetic computer-generated airway models, shows a close concordance with resulting segments generated through the application, with both static and dynamic airway measurements. A further extension to real patient data shows similar accuracy when reconstructed from a series of patients with normal and abnormal large airways.  **Conclusion:**  This application provides a unique tool to allow for the dynamic assessment of structural large airways disorders. The ability to measure, categorise, track and monitor progress of large airway conditions will allow for the further study of these large airway structural disorders.  **Grant Support:** Royal Children's Hospital Foundation scholarship(2005-2008) |