Dynamic Cell Imaging as an Alternative to Rapid Onsite Evaluation in Robotic Bronchoscopy: A Comparative Study

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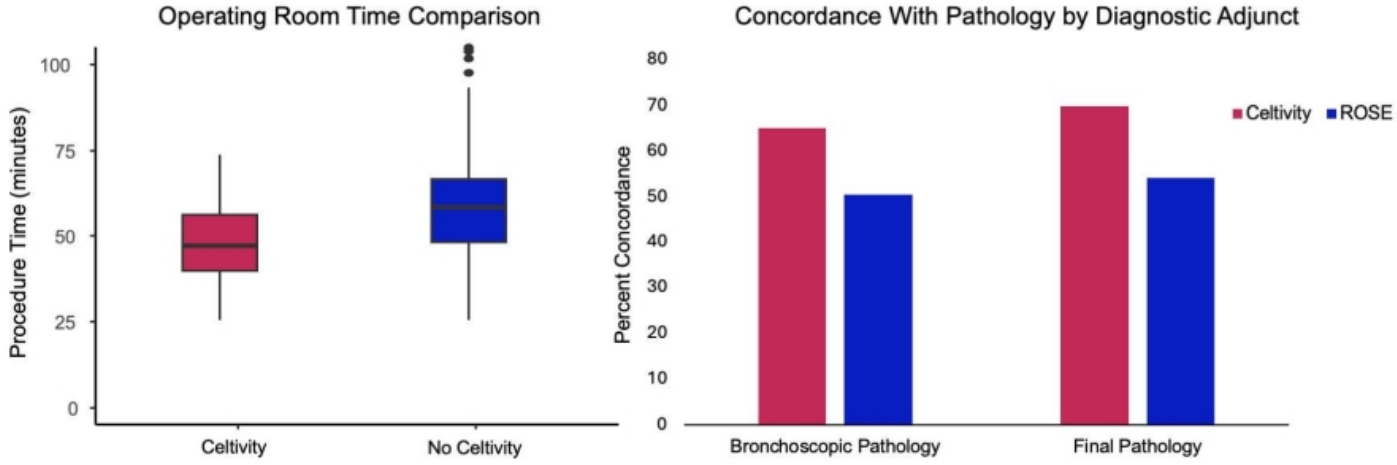
Rationale: Robotic bronchoscopy has become the preferred method for sampling suspicious pulmonary lesions. Rapid onsite evaluation (ROSE) is commonly coupled with robotic bronchoscopy to confirm that the lesion of interest has been sampled and to provide a preliminary diagnosis. However, ROSE increases procedure time and has variable concordance with final pathology. The Celtivity biopsy system (Acquyre Biosciences) uses Dynamic Cell Imaging (DCI) with full-field optical coherence tomography (FFOCT) to enable proceduralists to rapidly evaluate biopsy samples without staining or fixing. We present the results of our experience using this platform as an adjunct to robotic bronchoscopic biopsy at a single institution.**Methods:** All cases performed by a single surgeon using robotic bronchoscopy (Monarch, J&J) were included in this analysis. Data were prospectively collected, and patients were followed post-procedure for a minimum of one year. Final lesion pathology was confirmed via surgical resection, repeat biopsy, or stability on CT scan for over one year. Cases using Celtivity were matched to non-Celtivity cases in a 1:2 ratio based on lesion size, region (central vs. peripheral), lobe, body mass index, and concomitant use of endobronchial ultrasound. Categorical variables were analyzed using chi-squared or Fisher's exact test, while continuous variables were analyzed using the Wilcoxon rank sum test. Success probabilities with Celtivity versus ROSE were compared using a two-sample test for equality of proportions with a continuity correction.**Results:** Celtivity was used in 94 cases, yielding diagnostic interpretation (suspicious/not suspicious) in 98% (92/94) compared to 64% (233/364) of cases with ROSE. Diagnostic interpretation using Celtivity was concordant with robotic bronchoscopic pathology 65.2% of the time, which was significantly higher than ROSE (50.5%, p=0.019). Celtivity additionally showed greater concordance than ROSE when compared to final pathology on long-term follow-up (69.9% vs. 54.1%, p=0.008). In 12 cases that resulted in benign robotic bronchoscopic pathology, interpretation with Celtivity of suspicious cellular activity led to additional biopsy/resection confirming malignancy. Compared to cases with ROSE, the addition of Celtivity significantly lowered indeterminate bronchoscopic biopsy rates (4.3% vs. 11%, p=0.04) and reduced procedure time (42 [35-51] vs. 53 [43-61] minutes, p < 0.001).**Conclusions:** Celtivity was non-inferior to ROSE as a diagnostic tool for sample accuracy and preliminary diagnosis in robotic bronchoscopic biopsy specimens. Operating room time and indeterminate biopsy rates were significantly reduced. Celtivity may be a valuable adjunct for proceduralists to more efficiently and accurately perform robotic bronchoscopy compared to traditional methods.



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