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ACCESS ALL AREAS – electromagnetic navigation & the pulmonologist

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Investigation of peripheral pulmonary lesions remains a common clinical problem in Respiratory medicine. Minimally invasive biopsy is frequently required and clinical decision-making generally requires consideration of a number of clinical & radiologic characteristics. Is the lesion more centrally positioned, with an air-bronchus sign, in a patients with significant emphysema? Bronchoscopic sampling would be associated with a high yield and favourable safety profile. Or is the lesion pleurally-based, with no bronchus sign visible on computed tomography (CT)? In which case CT-guided percutaneous biopsy will be associated with a significantly higher diagnostic yield with a low rate of complications.(1)

Complication rates following percutaneous lung biopsy are significantly higher than for bronchoscopic sampling and so bronchoscopic biopsy may be favoured as the initial diagnostic step.(2) Systematic reviews report diagnostic yield for endobronchial ultrasound (EBUS)-guided bronchoscopy to be 73%, and higher when combined with other guidance techniques such as Electromagnetic Navigation (EMN) (3-5) or virtual bronchoscopy.(2) This remains lower than diagnostic rates for CT-guided lung biopsy.(2) Regardless of which approach is chosen, non-diagnostic procedures frequently require consideration of performance of the alternate approach, necessitating an extra procedure at a later date by a different specialist.

Developments in Interventional Pulmonology continue to incrementally improve diagnostic performance of bronchoscopy in assessment of pulmonary nodules. Of currently available technologies, EMN bronchoscopy has the highest reported diagnostic sensitivity for assessment of pulmonary nodules,(2-4) Yields exceeding 90% appear possible with the most recent advances, though BTPNA and robotic bronchoscopy but remain in development.(6, 7)

Pulmonologists need not be confined to bronchoscopic sampling to achieve tissue diagnosis of intra-thoracic lesions. The chest wall has long been recognized to be within the working field of the pulmonologist, with pleural diagnostic procedures, including pleuroscopy,(7) predominantly performed by pulmonologists. Image guidance with ultrasound for centesis or intercostal chest tube insertion has reduced complications and increased diagnostic performance, and is now recommended by expert guidelines.(8)

Following establishment of US-guidance of pleural procedures, pulmonologist-performed ultrasound-guided biopsy of parenchymal lung lesions is now routine at many centres, with excellent diagnostic and safety profiles.(9) There are now few areas, or approaches, the pulmonologist cannot take.

The best of both worlds might be imagined where patients would be able to benefit from an approach that affords patients the safety of bronchoscopic investigation whilst retaining the added diagnostic value percutaneous sampling can achieve. This no longer appears to be wishful thinking – recent advances in Electromagnetic (EM) technology now permit pulmonologists to perform EM-guided percutaneous lung biopsy. In this issue, Mallow & colleagues present exciting findings regarding diagnostic outcomes and safety of the technique.(10)

Importantly, EM guidance is planned from the same CT, and is performed using the same software. Equally of significant value is the fact that the procedure can be performed in the same procedural suite, and under the same anaesthetic. As the authors note, “If a diagnosis is unachievable with a bronchoscopic approach, the proceduralist can pivot again to perform an EM guided percutaneous lung biopsy during the same procedural setting.” Earlier feasibility studies indicated proceeding to EM-guided percutaneous added only approximately 20 minutes to the total procedure time.(11)

In this retrospective multi-centre cohort, the authors report a diagnostic yield of 74%; comparable to studies of Radial EBUS/EMN.(2, 5) While the diagnostic rate is consistent

with published bronchoscopic studies, adverse events, particularly pneumothorax, appear consistent with studies of radiologist-performed percutaneous biopsy. Importantly, the authors note the impact of institutional experience on complication rates, with one centre contributing 51% of cases to this retrospective cohort and noting an 18% adverse event rate compared with 27% at sites where less than 10 procedures had been completed.(10)

As with all new technologies, it remains to be determined how this modality may be incorporated into routine clinical practice, though the currently underway study (NCT03338049) is likely to address some unanswered questions. Patient selection in this retrospective study is not described, and it is unclear why some patients (number unspecified) underwent both EMN-directed bronchoscopic and percutaneous sampling. Interestingly, diagnostic yield appeared slightly higher (81%) in patients where both approaches were used.

In addition to patient selection, future studies will be required to determine the incremental gain achieved by EM-guided percutaneous sampling following negative ENB. Rapid on-site cytology was not used, but may be an important element in intra-procedural decision-making regarding whether to proceed to percutaneous sampling or not.(12) Optimal utility of this approach will likely be achieved when the proportion of patients requiring percutaneous sampling can be minimized.

Finally, while median lesion-pleura distance is presented, the proportion of patients where the lesion was in contact with the pleura is not presented. The authors do note that diagnostic yield was higher (85%) and pneumothorax rate lower (10%) in this group – these figures are slightly inferior to US-guided pulmonologist-performed lung biopsy.(9) The real-time confirmation of lesion position possible with US-guidance is likely to be responsible for this, and a blue-sky scenario might see EM-bronchosocpic and percutaneous navigation being combined with US-guided sampling to minimize complication rates.

The field of Interventional Pulmonology continues to be driven by both technologic developments and by clinician-researchers who can envision how these developments might be deployed in clinical practice, and who then undertake studies such as presented by Mallow & colleagues. They have clearly established that pulmonologist-performed percutaneous biopsy using EM guidance is feasible and safe. It is another significant & welcome advance to the ever-widening field of Interventional Pulmonology.

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REFERENCES

1. Steinfort DP, Vincent J, Heinze S, Antippa P, Irving LB. Comparative effectiveness of radial probe endobronchial ultrasound versus CT-guided needle biopsy for evaluation of peripheral pulmonary lesions: a randomized pragmatic trial. Respiratory medicine. 2011 ;105(11):1704-11.

2. Gould MK, Donington J, Lynch WR, Mazzone PJ, Midthun DE, Naidich DP, et al. Evaluation of individuals with pulmonary nodules: when is it lung cancer? Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2013;143(5 Suppl):e93S-120S.

3. Steinfort DP, Bonney A, See K, Irving LB. Sequential multimodality bronchoscopic investigation of peripheral pulmonary lesions. The European respiratory journal. 2016;47(2):607-14.

4. Anantham D, Feller-Kopman D, Shanmugham LN, Berman SM, DeCamp MM, Gangadharan SP, et al. Electromagnetic navigation bronchoscopy-guided fiducial placement for robotic stereotactic radiosurgery of lung tumors: a feasibility study. Chest. 2007;132(3):930-5.

5. Steinfort DP, Khor YH, Manser RL, Irving LB. Radial probe endobronchial ultrasound for the diagnosis of peripheral lung cancer: systematic review and meta-analysis. The European respiratory journal. 2011;37(4):902-10.

6. Herth FJ, Eberhardt R, Sterman D, Silvestri GA, Hoffmann H, Shah PL. Bronchoscopic transparenchymal nodule access (BTPNA): first in human trial of a novel procedure for sampling solitary pulmonary nodules. Thorax. 2015;70(4):326-32.

7. Vakil E, Ost D, Vial MR, Stewart J, Sarkiss MG, Morice RC, et al. Non-specific pleuritis in patients with active malignancy. Respirology. 2018;23(2):213-9.

8. Williamson JP, Twaddell SH, Lee YC, Salamonsen M, Hew M, Fielding D, et al. Thoracic ultrasound recognition of competence: A position paper of the Thoracic Society of Australia and New Zealand. Respirology. 2017;22(2):405-8.

9. Diacon AH, Schuurmans MM, Theron J, Schubert PT, Wright CA, Bolliger CT. Safety and yield of ultrasound-assisted transthoracic biopsy performed by pulmonologists. Respiration; international review of thoracic diseases. 2004;71(5):519-22.

10. Mallow, C, Lee, H, Oberg, C, Thiboutot J, Akulian J, Burks AC, Luna B, Banzaquen S, Batra H, Cardenas-Garcia J, et al. Safety and diagnostic performance of pulmonologists performing electromagnetic guided percutaneous lung biopsy (SPiNperc). Respirology. 2019; https://doi.org/10.1111/resp.13471.

11. Yarmus LB, Arias S, Feller-Kopman D, Semaan R, Wang KP, Frimpong B, et al. Electromagnetic navigation transthoracic needle aspiration for the diagnosis of pulmonary nodules: a safety and feasibility pilot study. Journal of thoracic disease. 2016;8(1):186-94.

12. Steinfort DP, Leong TL, Laska IF, Beaty A, Tsui A, Irving LB. Diagnostic utility and accuracy of rapid on-site evaluation of bronchoscopic brushings. The European respiratory journal. 2015;45(6):1653-60.