



The benefits of combining the latest technology in thoracic surgery

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There is increasing attention on the benefits brought about by the latest numerous developments in thoracic surgery (1,2). There has been drastic evolution covering the major aspects of pulmonary intervention including diagnosis with electromagnetic bronchoscopy, robotic-assisted bronchoscopy and the move to minimally invasive surgery including robotic assisted thoracic surgery. With the implementation of lung health screening programs there is earlier and more frequent detection of lung nodules. We have seen the benefit of navigational bronchoscopy adding a further option to diagnose these lesions in the multi-disciplinary meeting. There is a trend, related to screening, of increased practice of lung preserving surgery with the role of segmentectomy subject to renewed discussion and increased uptake. It had traditionally been viewed as a more technically demanding operation when compared with lobectomy. It is our experience from our robotic program of undertaking a greater number of segmentectomies including those classified as complex which create several intersegmental planes. This is aided by the highly magnified vision that robotic surgery affords with easier and accurate identification the relevant structures and tissue planes— aspects critical in undertaking a successful segmentectomy. Of course, the surgeon can also optimise their pre-operative planning by utilising computed tomography (CT) based 3 dimensional imaging which allows both review of broncho-vascular anatomy but also assessment of the tumour to ensure the operation remains oncologically sound with clear margins attained.

Whilst techniques such as robotic assistance and navigational and robotic assisted bronchoscopy are being utilised separately to progress patient care, there is also

surely further benefit gained from combining these techniques—specifically under the same anaesthetic. Consider fairly common scenarios where these new techniques can and have been used in combination. The patient with emphysema and a ground glass opacity that has been detected incidentally. The patient has even undergone artificial intelligence assessment of the CT scan as part of the assessment and work up of their emphysema. They are strongly in favour for surgical resection of the lesion having been appraised of the options available. This operation can be smoothly conducted utilising a range of the new technology available. Navigational bronchoscopy is used to accurately locate and identify the lesion with a fiducial marker. A robotic assisted operation then allows for resection of this lesion whilst firefly fluorescence imaging is used with indocyanine green to incorporate removal of the emphysematous lung. As such the lesion can be successfully resected with an effective lung volume reduction providing symptomatic improvement. There is also the scenario of a patient with multiple lesions in the same lung that are marked using navigational bronchoscopy with methylene blue before being resected with safe margins but avoiding unnecessary parenchymal removal. There are other scenarios we can describe in combining the newest technology that have benefitted our patients.

We continue as thoracic surgeons to gain further experience of undertaking the latest techniques and utilising the latest technology. There is also the consideration that further developments are constantly occurring with molecular imaging gaining momentum. Similarly, we continue to successfully employ those techniques such as video-assisted thoracic surgery (VATS) that have

transformed thoracic surgical practice and are tried and tested. Therefore, the armamentarium continues to grow and we can recommend not only using them and benefitting from them individually but looking as to how they can be combined with the aim of optimising the treatment and care of the thoracic surgical patient.

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