



# The first uniportal video-assisted thoracoscopic surgery masterclass in New Zealand

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**Abstract:** Although thoracotomy is still a standard approach to lung resection for some New Zealand (NZ) surgeons, there is an increasing penetration of video-assisted thoracoscopic surgery (VATS) approaches to complex lung resection, but only a few surgeons have applied uniportal techniques. This paper describes the first uniportal VATS (uVATS) Masterclass held in NZ that includes an animal wetlab, and a 2-day live surgery with proctorship from Professor Diego Gonzalez-Rivas. In our wetlab experience, we have used single lumen endotracheal intubation and bronchial blocker to facilitate excellent lung isolation. Prof Gonzalez-Rivas proctored 6 live surgical cases of successful uVATS for lung resection without compromising the optimal oncological principles. Following this Masterclass, our unit has adopted uniportal VATS as the default approach for all lung resection and pleural based operations.

**Keywords:** Uniportal video-assisted thoracoscopic surgery (uVATS); minimally invasive; wetlab; masterclass; New Zealand (NZ)

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## Background

New Zealand (NZ), a small country with a population of approximately 4.8 million people at the bottom of the South Pacific Ocean, has five main centres offering cardiothoracic surgical services.

Multiportal video-assisted thoracoscopic surgery (VATS) approach for lung resection has been performed by some cardiothoracic surgeons in NZ for several years. This approach has even been reported in complex and synchronous lung resection operations in NZ (1,2). However, only a small number of surgeons have applied uniportal techniques. In order to increase the exposure and penetration of uVATS in NZ, a 3-day Masterclass for uVATS was undertaken by Prof Diego Gonzalez-Rivas at AgResearch Ruakura and Waikato Hospital from 21 to 23 February 2018.

## NZ masterclass

Dr. David McCormack, a cardiothoracic surgeon at Waikato

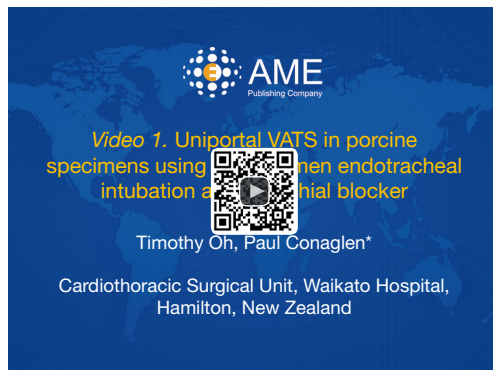
Hospital, initially approached Prof Gonzalez-Rivas, who agreed to provide the Masterclass for NZ surgeons. Surgeons from throughout the country were invited to participate. The Masterclass consisted of a full day animal wetlab at AgResearch Ruakura, utilizing live porcine models. Following this, live surgery was performed over 2 days with 6 uVATS lung resection cases at Waikato Hospital in Hamilton.

## Wetlab and equipment at AgResearch Ruakura

Many animal wetlabs worldwide have utilized live porcine or ovine models, most commonly with a tracheostomy to facilitate placement of a single lumen endotracheal tube into the contralateral main bronchus. Due to intubating resources that were no longer suitable for patient care (expired but still sterile), we had a number of options in order to avoid the creation of a tracheostomy. Initially, we utilized oral intubation with a 39 mm left-sided double-lumen endotracheal tube (VivaSight DL, ETVision Ltd., Israel—we did not utilize the built-in scope). We employed

a disposable flexible bronchoscope (aScope, Ambu, UK) to manipulate the tip towards the left main bronchus. We found, however, the length was inadequate to satisfactorily isolate the left lung in the porcine bronchial tree. We therefore utilized 2 separate solutions; the first was a standard single-lumen endotracheal tube (8.5 mm Flex-

tip, Parker Medical, Germany), with a bronchial blocker (Arndt endobronchial blocker set, Cook Medical, USA) placed in the left main bronchus; the second was an integrated solution (Univent, Fuji Systems Corporation, Japan), which incorporates a bronchial blocker in the single lumen endotracheal tube. Both these strategies resulted in excellent lung isolation (*Figure 1*).



**Figure 1** Uniportal VATS in porcine specimens using single lumen endotracheal intubation and bronchial blocker (3). VATS, video-assisted thoracoscopic surgery.

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## Live surgery

The live cases are described in *Table 1*. These were conducted over 2 days, with 3 cases each day to facilitate proctoring uVATS technique. All patients gave explicit consent to participate in the Masterclass, and optimal oncological principles were adhered to for each case, i.e., no compromise of resection due to the uVATS approach. The format of the Masterclass facilitated translation of the technical skills developed in the animal wetlab immediately to the operating room. There was very little alteration of our current patient anaesthetic and positioning that was required. Most of the live surgical cases were performed by our own surgeons, with Prof Gonzalez-Rivas assisting or demonstrating certain key techniques (*Figure 2*).

**Table 1** Live cases in NZ uniportal VATS masterclass

Case	Clinical details
1	A 61-year-old female with incidental finding right upper lobe lesion on chest X-ray following a fall: (I) PET CT demonstrated avid right upper lobe (RUL) lesion, with avid superior hilar lymph node; (II) transbronchial biopsy showed adenocarcinoma. Operation: right uniportal VATS upper lobectomy and mediastinal lymph node sampling
2	A 56-year-old female with chronic non-productive cough and an active smoker of 20 pack-year history: (I) PET CT demonstrated non-avid 10 mm RUL apical ground-glass nodule; (II) not amenable to percutaneous biopsy. Operation: right uniportal VATS apical wedge resection. Frozen section revealed adenocarcinoma, therefore proceeded to right upper lobe apical segmentectomy and mediastinal lymph node sampling
3	A 77-year-old male with chronic cough and haemoptysis: (I) PET avid 34 mm left lower lobe spiculated lesion, and avid but not enlarged inferior hilar lymph node; (II) percutaneous biopsy showed lepidic adenocarcinoma. Operation: left uniportal VATS lower lobectomy and mediastinal lymph node sampling
4	A 68-year-old female with chronic non-productive cough: (I) CT chest demonstrated a central left lower lobe 29 mm solid lesion with smooth margins and peripheral coarse calcification causing extrinsic compression of the left lower lobe basilar bronchus; (II) transbronchial biopsy was non-diagnostic. Operation: left uniportal VATS lower lobectomy and mediastinal lymph node sampling. Formal histology proven to be typical carcinoid tumour
5	A 67-year-old male with chronic non-productive cough with background of chronic lymphocytic leukaemia: (I) PET CT chest demonstrate an avid 85mm RUL mass along with multiple avid and enlarged lymph nodes; (II) percutaneous biopsy showed lepidic adenocarcinoma. Operation: right uniportal VATS upper lobectomy and mediastinal lymph node sampling
6	A 60-year-old female with weight loss and family history of lung cancer: (I) PET CT chest demonstrated an avid 20mm spiculated lesion; (II) percutaneous biopsy showed poorly differentiated adenocarcinoma. Operation: right uniportal VATS upper lobectomy and mediastinal lymph node sampling

NZ, New Zealand; VATS, video-assisted thoracoscopic surgery.



**Figure 2** Uniportal VATS in live surgical cases (4). VATS, video-assisted thoracoscopic surgery.

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## Discussion

The clinical outcomes for the patients were superior to the existing multiportal VATS approach, particular in terms of improvement in length of hospital stay and noticeably less pain in uVATS patients. Although the case number was too small to statistically demonstrate a difference, it has been the authors' ongoing experience that patients have less pain utilizing an uVATS approach compared to multiportal VATS. Other groups have also reported similar outcomes (5-7).

Since the Masterclass, the routine approach at Waikato Hospital has been uVATS for lung resection, and pleural-based procedures. Once the learning curve is completely overcome, more complex lung resection operation can also be safely performed via uVATS (8).

A key element to the Masterclass that ensured its success was the enthusiasm and specific tutorage from Prof. Gonzalez-Rivas. Along with the clinical benefits over multiport VATS and thoracotomy, has enabled uVATS to rapidly penetrate the thoracic surgical world. It is a model that, if emulated, could facilitate the uptake of other novel techniques in other areas of cardiothoracic surgery.

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

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