Notes on the first uniportal video-assisted thoracic surgery lobectomy on June 25, 2009

John K. C. Tam

Division of Thoracic Surgery, Department of Surgery, National University of Singapore, Singapore 119228, Singapore

Correspondence to: John K. C. Tam, MD, MSc, MEd, FRCSC. Head and Senior Consultant, Division of Thoracic Surgery, Associate Professor of Surgery, Department of Surgery, National University of Singapore, Singapore 119228, Singapore. Email: john_tam@nuhs.edu.sg.

Received: 25 May 2018; Accepted: 19 July 2018; Published: 22 August 2018.

doi: 10.21037/jovs.2018.07.24

View this article at: http://dx.doi.org/10.21037/jovs.2018.07.24

My journey to uniportal video-assisted thoracic surgery (VATS)

20 years ago open thoracotomy was considered the standard approach for thoracic surgery. My journey in thoracic surgery started in 1999 at the University of Manitoba in Canada, where I learned to perform the full range of thoracic surgery using the open thoracotomy technique. At that time we performed multiportal VATS for pleural conditions only.

In 2005 I did a minimally invasive thoracic surgery fellowship at the University of Pittsburgh Medical Centre where I learned to perform multiportal VATS for the full range of thoracic surgery conditions, including VATS lobectomy. At the time, the standard was using 4 to 5 ports, including an accessory incision (*Figure 1A*,*B*). This technique was a major improvement from open thoracotomy, where trauma to the rib was avoided. Nevertheless, multiple skin incisions were still involved, multiple areas of the chest wall muscles were still traumatized by the ports, and multiple levels of intercostal nerves can still be affected.

In 2006 I started my practice as a Consultant in Thoracic Surgery at the National University of Singapore. I started with the 4 to 5 ports technique which I learned before. Having become a minimally invasive thoracic surgeon, the lingering question in my mind is whether VATS can become less invasive? Why do we need 4 to 5 ports? Is each of the ports indispensable?

This line of thinking and questioning led me to reduce the number of ports from 5 to 4 to 3, and by 2007 I started performing VATS lobectomy using a 2-port technique (*Figure 2*). I presented this technique in an international

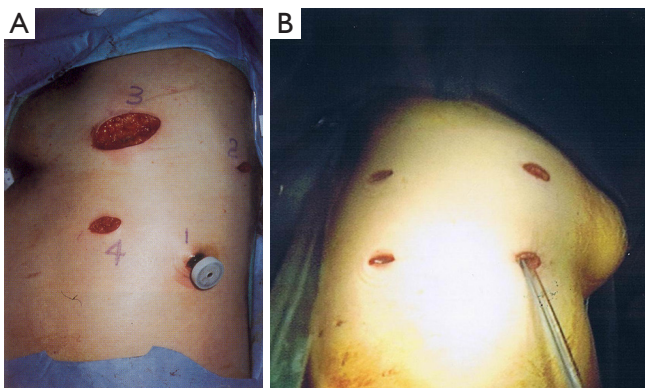


Figure 1 (A,B) 4 to 5 incisions were standard for multiportal VATS in 2006. VATS, video-assisted thoracic surgery.

VATS conference held in Xiamen, China in 2007, in which Professor Robert McKenna and Professor Anthony Yim were fellow invited faculties.

Patients were benefiting from this evolution, as it was clearly evident that each port reduction resulted in incremental reduction in their postoperative discomfort and pain medication usage, which translated into smoother recovery and reduced length of hospitalization. During that time, surgical advances were happening and single incision laparoscopic surgery (SILS) was introduced. The quest for less invasiveness in thoracic surgery continued, and by 2008 I was performing uniportal VATS (UVATS) using a 2–3 cm incision for a variety of thoracic surgery conditions such as bullectomies, pleurectomies, decortications, and mediastinal surgeries (*Figure 3*).

Major lung resections using UVATS posed a challenge,

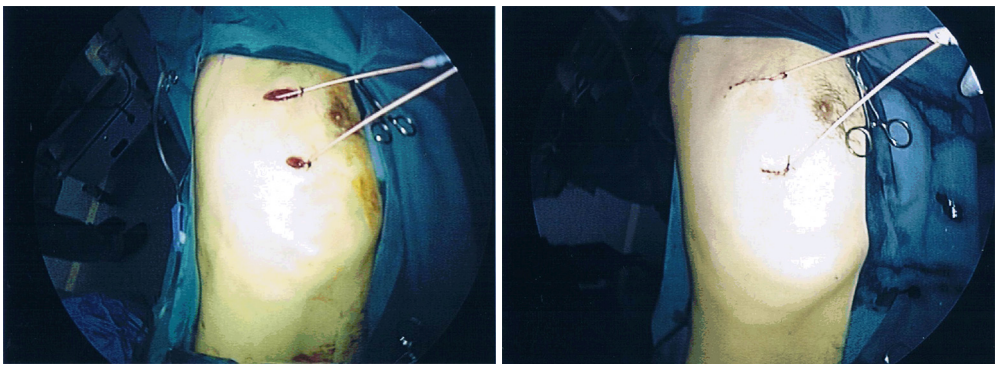


Figure 2 I presented VATS lobectomy using 2-port technique in an international VATS conference held in Xiamen, China in 2007. VATS, video-assisted thoracic surgery.

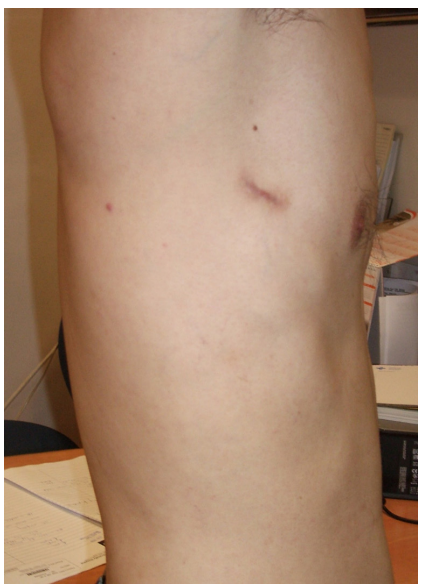


Figure 3 Uniportal VATS for a variety of thoracic surgeries were performed with one small incision at the National University Hospital in Singapore since 2008. VATS, video-assisted thoracic surgery.

Figure 4 Standard uniportal VATS lobectomy incision performed in the National University Hospital in Singapore since 2009. VATS, video-assisted thoracic surgery.

and I contemplated for 1 year on how this can be done. Having reduced form 5 down to 2 ports, it may appear that it was a small leap to go down to a single port, but in actuality it was a big step. The approach of multiportal VATS and UVATS was actually quite different. The most important differences were the direct angle and shorter distance of visualization through the thoracoscope, and the lesser acuity of the angle of surgical staplers towards the vital hilar structures. In a real sense, the visualization and approach to hilar dissection using UVATS has more similarities to open surgery than to multiportal VATS, except everything was performed through one small 2–3 cm cut without rib spreading while looking through a thoracoscope. This required a mindset shift (*Figure 4*).

The placement of the uniport incision is closer to the hilar structures, and the use of long surgical cutters represented potential safety hazard. In my reflection it became clear that UVATS lobectomy was feasible in all lobes. The one step that required special care was bronchial division for UVATS left upper lobe (LUL) lobectomy. At

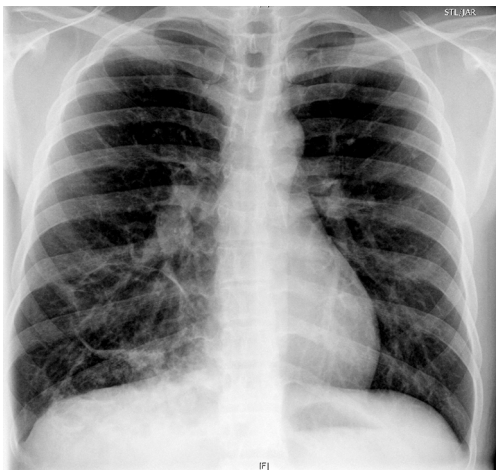


Figure 5 Chest radiograph of the first UVATS lobectomy patient with RLL sequestration. UVATS, uniportal video-assisted thoracic surgery; RLL, right lower lobe.

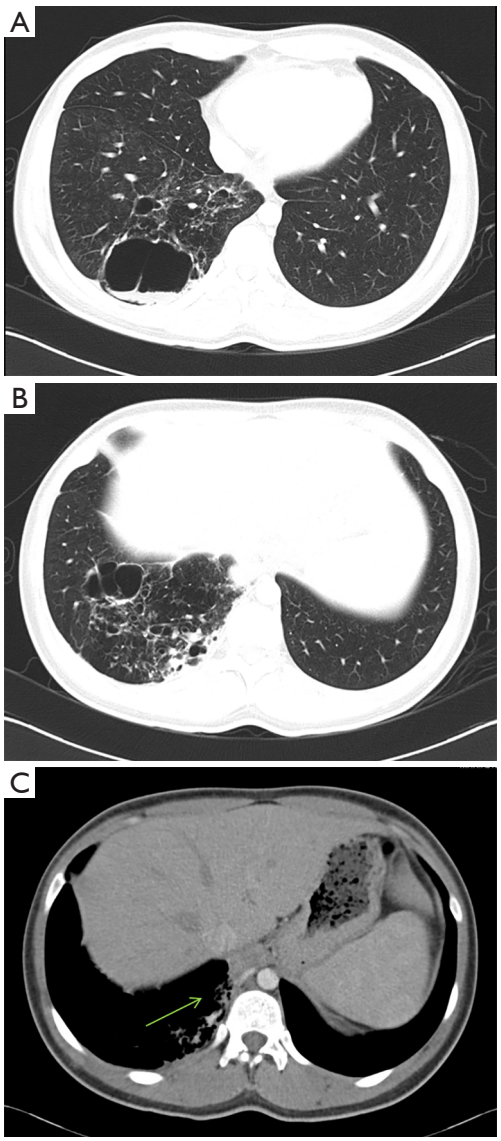
the time, angled tip staplers were yet to be available, and linear cutter posed a threat to the underlying pulmonary artery and aorta which is closely behind the LUL bronchus.

Surgical innovations are evolutions which progress through small incremental steps of improvements. Patient safety is paramount while each step is undertaken. "First do no harm" is a timeless adage that we will do well to bear foremost in mind during our pursuit for surgical advancement and betterment for our patients. In 2009, I had rehearsed all the steps necessary and was ready to perform UVATS lobectomy safely.

First UVATS lobectomy

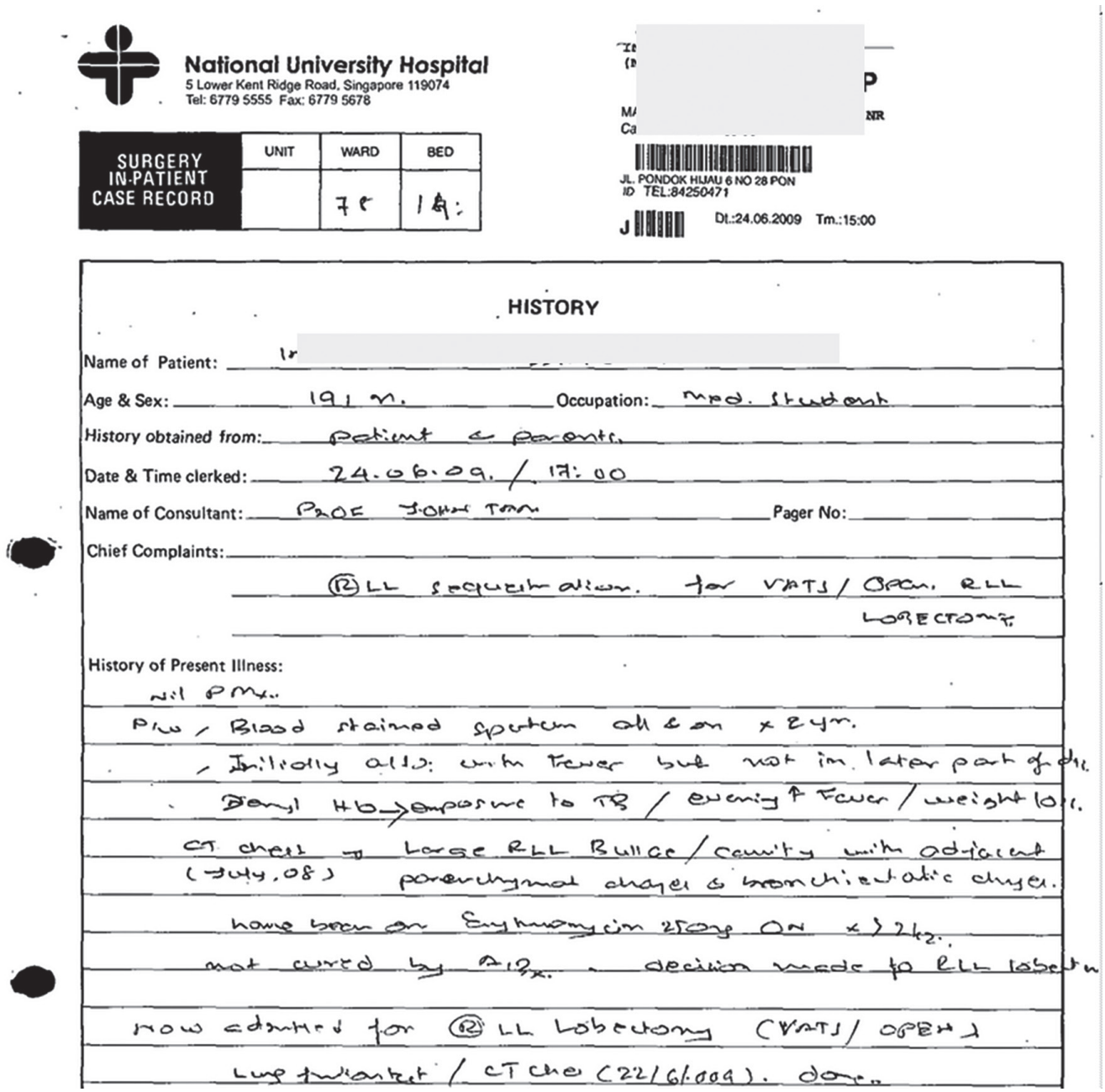
My first uniportal VATS lobectomy was performed on June 25, 2009 in the National University Hospital of Singapore. My patient was a 19-year-old medical student from Indonesia. He had right lower lobe sequestration and multiple infected bullaes (*Figures 5*,*6*). He suffered from frequent infections (fever, cough with minor hemoptysis) for many years despite maximal medical therapy, and required multiple hospitalizations each year resulting in significant interruptions in his studies. The patient was admitted to the hospital on June 24, 2009 (*Figure 7*).

UVATS right lower lobectomy was performed on June 25, 2009 (*Figures 8*,*9*). One 2.5cm incision was made on the right 5th intercostal space at the anterior axillary line using the muscle sparing technique. No additional ports or access



Figures 6 (A,B,C) Computed tomography scan of the thorax of the first UVATS lobectomy patient showing right lower lobe sequestration with multiple infected bullae. Arrow showed anomalous aortic supply. UVATS, uniportal video-assisted thoracic surgery.

incisions were made. Dense adhesions were present due to multiple prior episodes of infection. The right lower lobe was found to be inflamed and enlarged, with multiple large infected bullaes within the lung parenchyma. Multiple very large and adherent lymph nodes were found in the inferior pulmonary ligament, hilum, peribronchial, and interlobar areas. The nodes were carefully dissected and



National University Hospital
5 Lower Kent Ridge Road, Singapore 119074
Tel: 6779 5555 Fax: 6779 5678

SURGERY IN-PATIENT CASE RECORD

UNIT	WARD	BED
	7C	14

JL. PONDOK HIJAU 6 NO 28 PON
ID TEL:84250471
Dt.:24.06.2009 Tm.:15:00

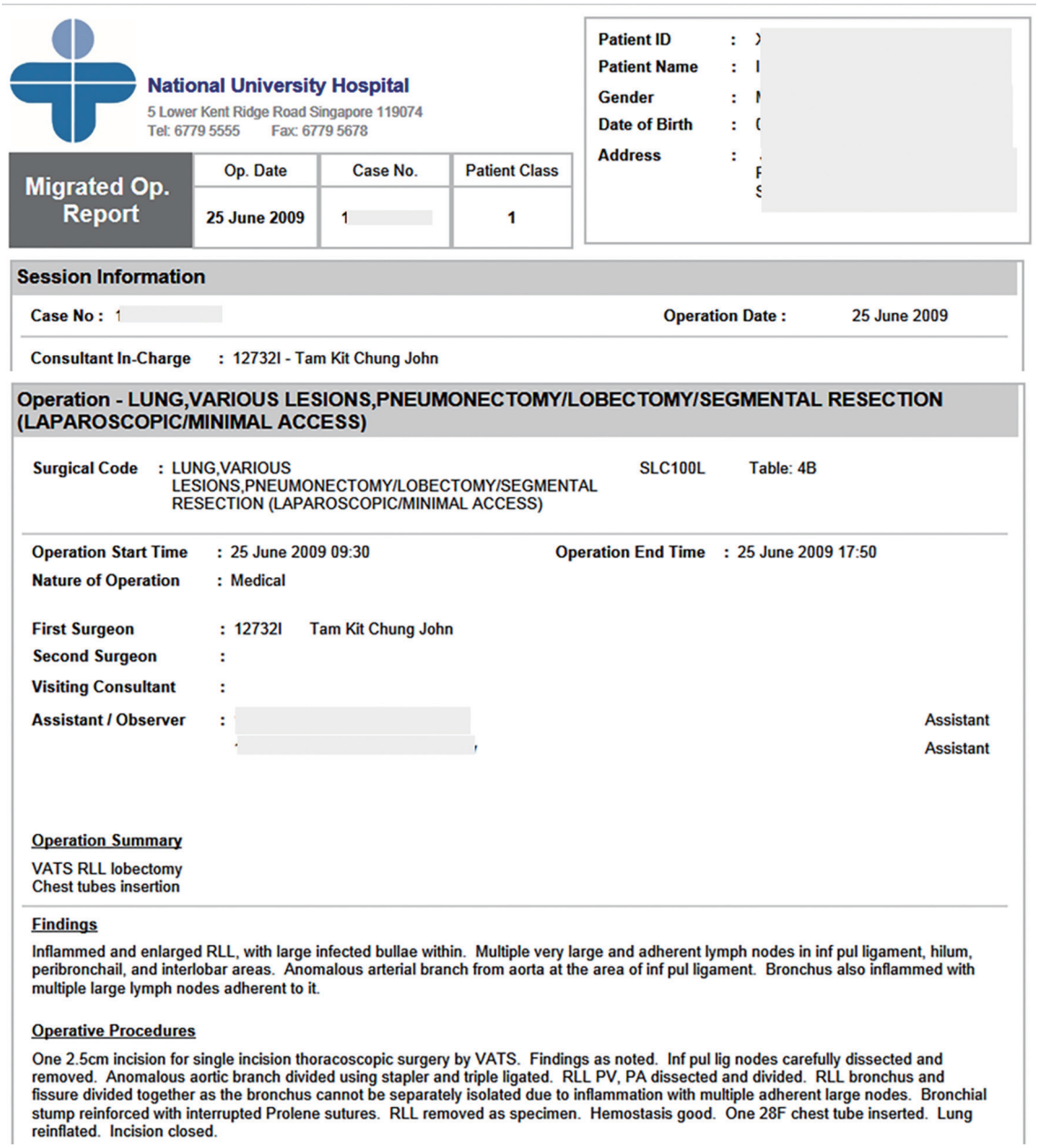
HISTORY

Name of Patient:
Age & Sex: 19 M. Occupation: Med. Student
History obtained from: Patient & Parents.
Date & Time clerked: 24.06.09. / 17:00
Name of Consultant: Prof John Tan Pager No:
Chief Complaints:
(R) LL consolidation. for VATS / Open. RLL Lobectomy.
History of Present Illness:
Nil PMx.
PTW / Blood stained sputum all s/o x 2 yr.
/ Initially alb: with fever but not in later part of dx.
Dengue Hb/o exposure to TB / evening ↑ Fever / weight loss.
CT chest (July, 08) Large RLL Bullae / cavity with adjacent parenchymal changes & bronchiectatic changes.
home taken on Erythromycin 250mg OM x 2 wks.
not cured by Abx. - decision made to RLL lobectomy
now admitted for (R) LL Lobectomy (VATS / OPEN)
Lung transplant / CT chest (22/6/09). done.

Figure 7 Hospital admission record dated June 24, 2009 of the first UVATS right lower lobectomy. UVATS, uniportal video-assisted thoracic surgery.

removed. Anomalous arterial branch from the descending aorta was found near the inferior pulmonary ligament and it was ligated and divided. Standard anatomical dissection was performed. The right lower lobe pulmonary vein, pulmonary artery, bronchus and fissure were divided using surgical stapler through the same uniport. One chest drain was placed through the same uniport.

The patient's postoperative CXR was satisfactory



National University Hospital
5 Lower Kent Ridge Road Singapore 119074
Tel: 6779 5555 Fax: 6779 5678

Patient ID :
Patient Name :
Gender :
Date of Birth :
Address :

Migrated Op. Report

Op. Date	Case No.	Patient Class
25 June 2009	1	1

Session Information

Case No : 1 Operation Date : 25 June 2009

Consultant In-Charge : 12732I - Tam Kit Chung John

Operation - LUNG,VARIOUS LESIONS,PNEUMONECTOMY/LOBECTOMY/SEGMENTAL RESECTION (LAPAROSCOPIC/MINIMAL ACCESS)

Surgical Code : LUNG,VARIOUS LESIONS,PNEUMONECTOMY/LOBECTOMY/SEGMENTAL RESECTION (LAPAROSCOPIC/MINIMAL ACCESS) SLC100L Table: 4B

Operation Start Time : 25 June 2009 09:30 Operation End Time : 25 June 2009 17:50

Nature of Operation : Medical

First Surgeon : 12732I Tam Kit Chung John

Second Surgeon :

Visiting Consultant :

Assistant / Observer : Assistant

Assistant

Operation Summary

VATS RLL lobectomy
Chest tubes insertion

Findings

Inflammed and enlarged RLL, with large infected bullae within. Multiple very large and adherent lymph nodes in inf pul ligament, hilum, peribronchail, and interlobar areas. Anomalous arterial branch from aorta at the area of inf pul ligament. Bronchus also inflammed with multiple large lymph nodes adherent to it.

Operative Procedures

One 2.5cm incision for single incision thoracoscopic surgery by VATS. Findings as noted. Inf pul lig nodes carefully dissected and removed. Anomalous aortic branch divided using stapler and triple ligated. RLL PV, PA dissected and divided. RLL bronchus and fissure divided together as the bronchus cannot be separately isolated due to inflammation with multiple adherent large nodes. Bronchial stump reinforced with interrupted Prolene sutures. RLL removed as specimen. Hemostasis good. One 28F chest tube inserted. Lung reinflated. Incision closed.

Figure 8 Operation record of the first UVATS lobectomy at the National University Hospital, Singapore on June 25, 2009. UVATS, uniportal video-assisted thoracic surgery.

(*Figure 10*), and he was observed overnight in the cardiothoracic high dependency unit (*Figure 11*). Patient had an uneventful recovery. His chest drain was removed on postoperative day (POD) 5, and he was discharged from the hospital on POD 6 (*Figure 12*).

His follow up chest radiograph in the clinic showed expected volume loss of the right lung post-lobectomy (*Figure 13*). Histology report showed right lower lobe bullae with organization, congestion, mixed inflammation, and bronchiectasis. All dissected lymph nodes showed reactive hyperplasia (*Figure 14*). This patient has no further lung infections after surgery, and remains well

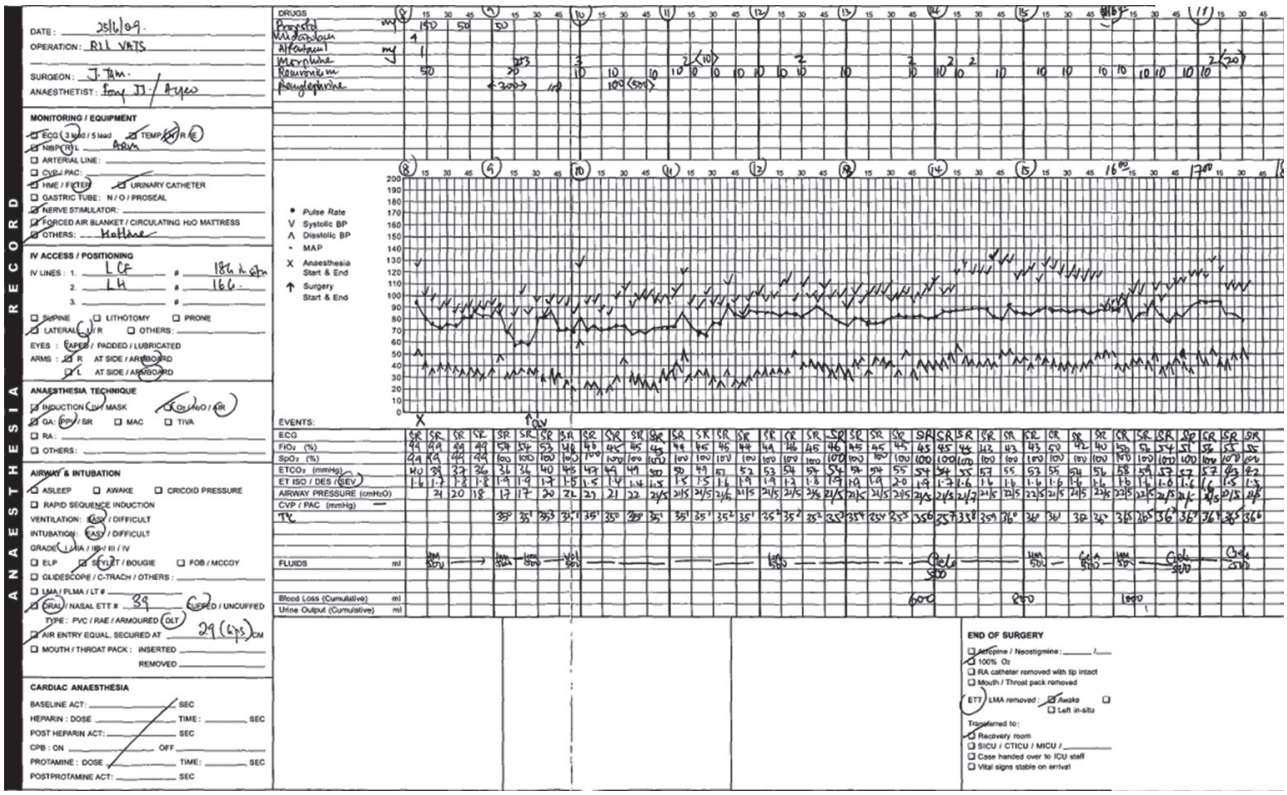
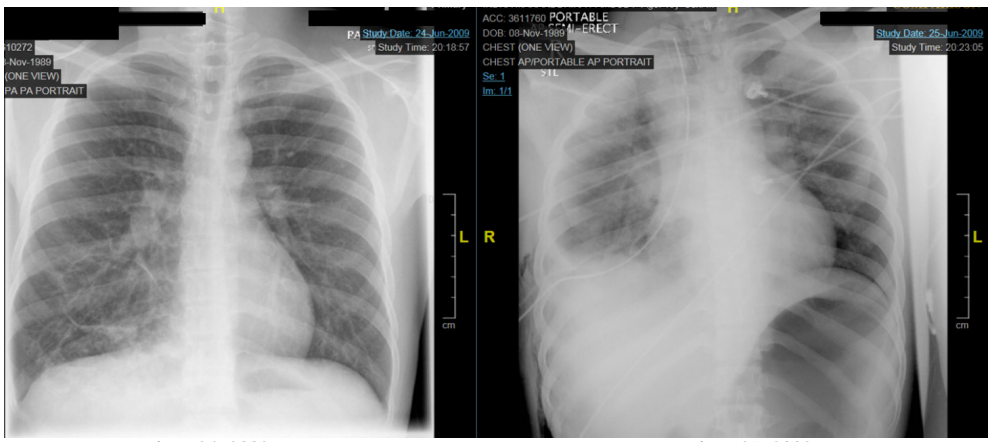


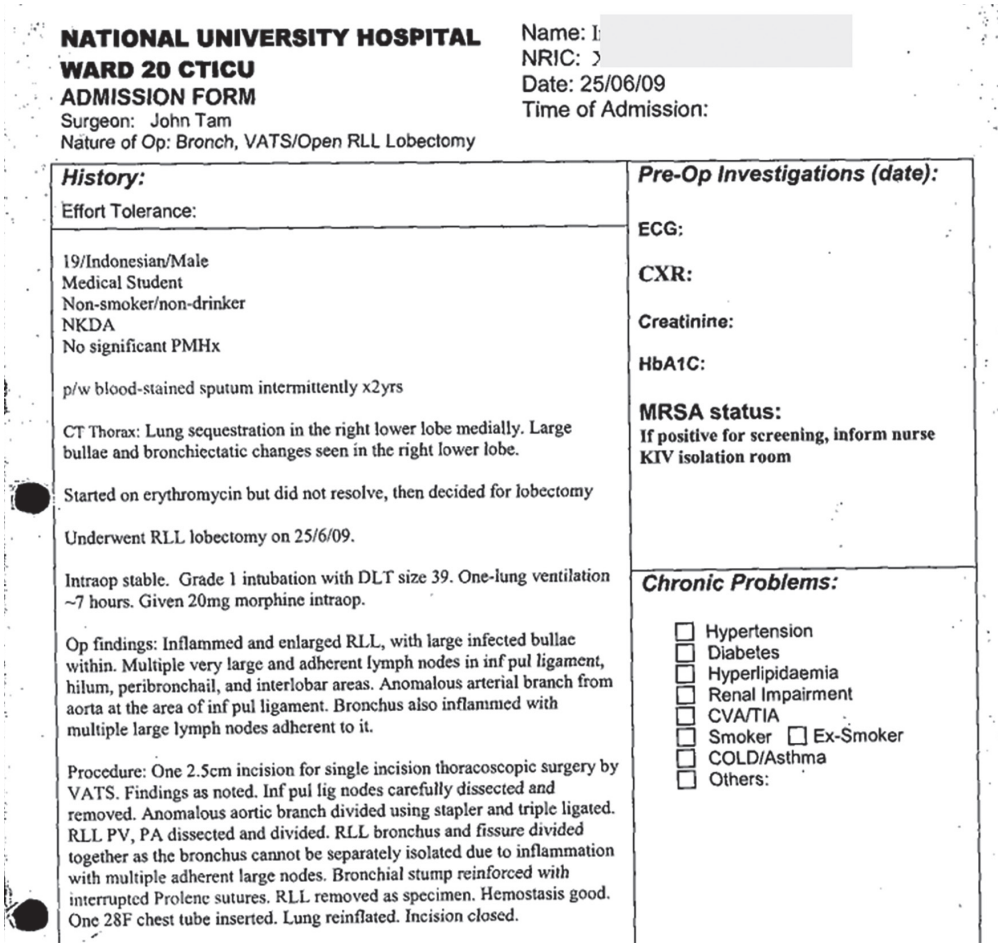
Figure 9 Anesthesia record of the first UVATS lobectomy at the National University Hospital, Singapore on June 25, 2009. UVATS, uniportal video-assisted thoracic surgery.



June 24, 2009
Day before surgery

June 25, 2009
Day of surgery

Figure 10 Chest radiograph before (June 24, 2009) and after the first UVATS lobectomy (June 25, 2009). UVATS, uniportal video-assisted thoracic surgery.



NATIONAL UNIVERSITY HOSPITAL
WARD 20 CTICU
ADMISSION FORM
Surgeon: John Tam
Nature of Op: Bronch, VATS/Open RLL Lobectomy

Name: I
NRIC:)
Date: 25/06/09
Time of Admission:

History:

Effort Tolerance:

19/Indonesian/Male
Medical Student
Non-smoker/non-drinker
NKDA
No significant PMHx

p/w blood-stained sputum intermittently x2yrs

CT Thorax: Lung sequestration in the right lower lobe medially. Large bullae and bronchiectatic changes seen in the right lower lobe.

Started on erythromycin but did not resolve, then decided for lobectomy

Underwent RLL lobectomy on 25/6/09.

Intraop stable. Grade 1 intubation with DLT size 39. One-lung ventilation ~7 hours. Given 20mg morphine intraop.

Op findings: Inflammed and enlarged RLL, with large infected bullae within. Multiple very large and adherent lymph nodes in inf pul ligament, hilum, peribronchail, and interlobar areas. Anomalous arterial branch from aorta at the area of inf pul ligament. Bronchus also inflammed with multiple large lymph nodes adherent to it.

Procedure: One 2.5cm incision for single incision thoracoscopic surgery by VATS. Findings as noted. Inf pul lig nodes carefully dissected and removed. Anomalous aortic branch divided using stapler and triple ligated. RLL PV, PA dissected and divided. RLL bronchus and fissure divided together as the bronchus cannot be separately isolated due to inflammation with multiple adherent large nodes. Bronchial stump reinforced with interrupted Prolene sutures. RLL removed as specimen. Hemostasis good. One 28F chest tube inserted. Lung reinflated. Incision closed.

Pre-Op Investigations (date):

ECG:

CXR:

Creatinine:

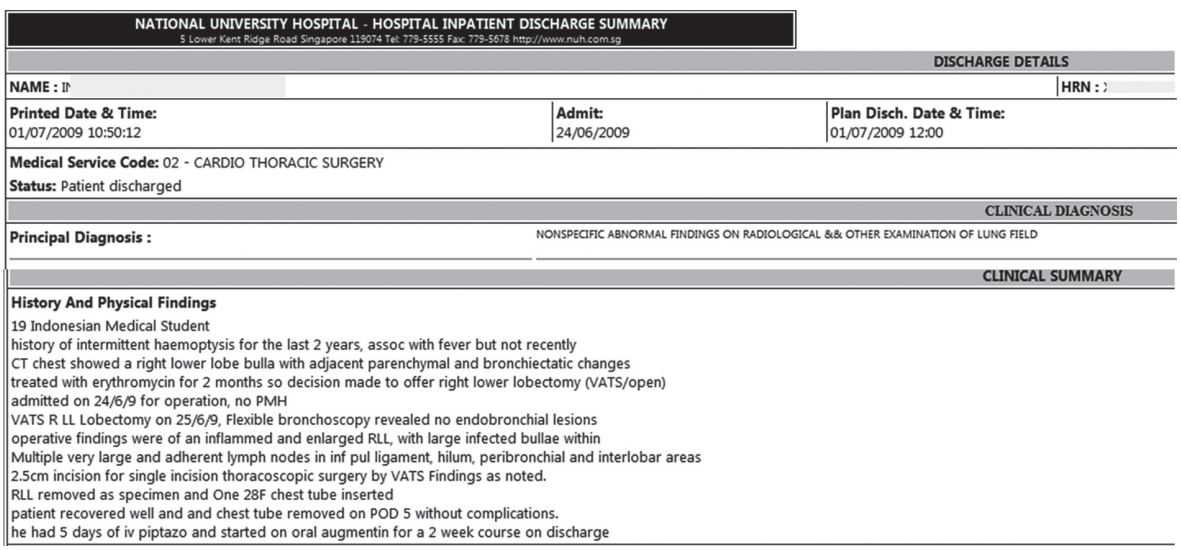
HbA1C:

MRSA status:
If positive for screening, inform nurse KIV isolation room

Chronic Problems:

- ☐ Hypertension
- ☐ Diabetes
- ☐ Hyperlipidaemia
- ☐ Renal Impairment
- ☐ CVA/TIA
- ☐ Smoker ☐ Ex-Smoker
- ☐ COLD/Asthma
- ☐ Others:

Figure 11 Admission record to the cardiothoracic high dependence unit in the National University Hospital, Singapore on June 25, 2009.



NATIONAL UNIVERSITY HOSPITAL - HOSPITAL INPATIENT DISCHARGE SUMMARY
5 Lower Kent Ridge Road Singapore 119074 Tel: 779-5555 Fax: 779-5678 http://www.nuh.com.sg

DISCHARGE DETAILS

NAME : I | **HRN :**)

Printed Date & Time:	**Admit:**	**Plan Disch. Date & Time:**
01/07/2009 10:50:12	24/06/2009	01/07/2009 12:00

Medical Service Code: 02 - CARDIO THORACIC SURGERY
Status: Patient discharged

CLINICAL DIAGNOSIS

Principal Diagnosis : NONSPECIFIC ABNORMAL FINDINGS ON RADIOLOGICAL && OTHER EXAMINATION OF LUNG FIELD

CLINICAL SUMMARY

History And Physical Findings
19 Indonesian Medical Student
history of intermittent haemoptysis for the last 2 years, assoc with fever but not recently
CT chest showed a right lower lobe bulla with adjacent parenchymal and bronchiectatic changes
treated with erythromycin for 2 months so decision made to offer right lower lobectomy (VATS/open)
admitted on 24/6/9 for operation, no PMH
VATS R LL Lobectomy on 25/6/9, Flexible bronchoscopy revealed no endobronchial lesions
operative findings were of an inflammed and enlarged RLL, with large infected bullae within
Multiple very large and adherent lymph nodes in inf pul ligament, hilum, peribronchial and interlobar areas
2.5cm incision for single incision thoracoscopic surgery by VATS Findings as noted.
RLL removed as specimen and One 28F chest tube inserted
patient recovered well and and chest tube removed on POD 5 without complications.
he had 5 days of iv piptazo and started on oral augmentin for a 2 week course on discharge

Figure 12 Discharge summary for the first UVATS lobectomy patient from the National University Hospital, Singapore on July 1, 2009. UVATS, uniportal video-assisted thoracic surgery.

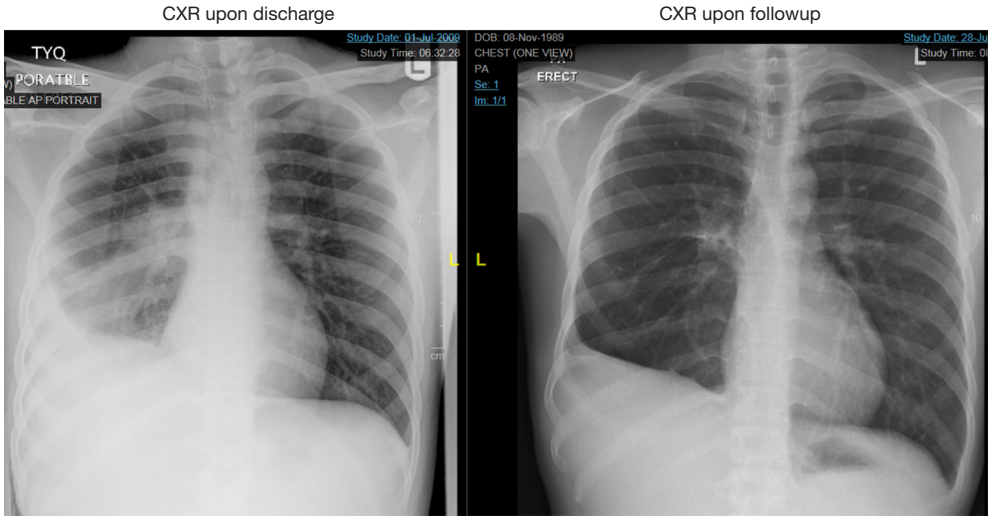


Figure 13 Chest radiograph upon discharge and on follow-up, showing expected volume loss post lobectomy.

General Lab Result(Details)

Name	
HRN No.	
Location	OPERATING THEATRE(M)
Order Date	26-06-2009 00:00:00
Receipt Date	26-06-2009 00:00:00
Comment	

HISTOLOGY

Results	Unit	Ref Ranges

SPECIMEN TYPE NB09-11044 03/07/2009 VICTOR LEE KWAN MIN (DR)

A: RIGHT LOWER LOBE LUNG SPECIMEN; B: PERIOESOPHAGEAL LYMPH NODE; C: INFERIOR PULMONARY LIGAMENT; D: INTER LOBAR LYMPH NODE

CLINICAL HISTORY

Right lower lobe sequestration. CT chest 2008 July. Large right lower lobe bullae adjacent parencyhmal changes and bronchiectatic changes.

GROSS DESCRIPTION

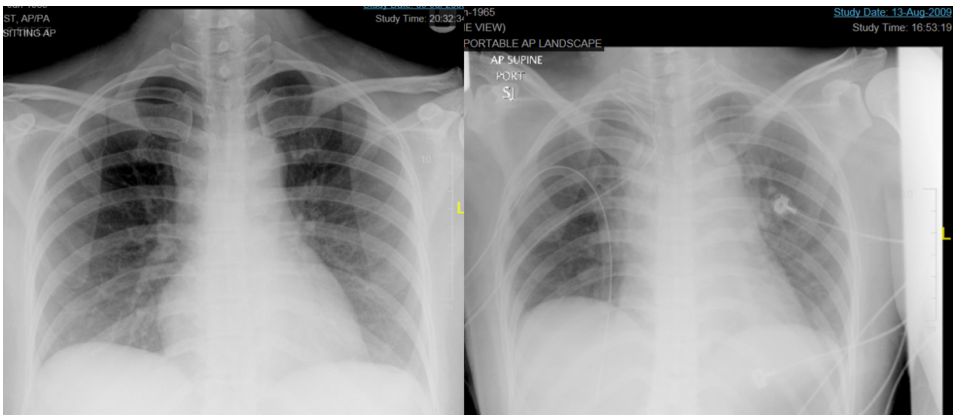
(A) The specimen is received in formalin in a container labelled with patient's data and designated as "right lower lobe lung specimen". Received lobe of lung measuring 17.0 x 12.0 x 4.0cm. There are two stapled margin measuring 9.0 and 0.4cm. The 9.0cm stapled margin is present over an area of lung parenchyma containing several large airways and blood vessels. Cut surface show a large 4.0cm bullae containing haemorrhage fluid. The adjacent lung parenchyma appears fibrotic. There are also multiple smaller bullae ranging in size from 0.3 to 0.5cm. No mass identified grossly.

DIAGNOSIS

A. Right lower lobe lung specimen:
- Clinical history of right lower lobe lung sequestration.
- Bullae with organization, congestion and mixed inflammation.
- Changes of bronchiectasis.

B. Perioesophageal, C. Inferior pulmonary ligament and D. Interlobar lymph nodes:
- Lymph nodes with reactive hyperplasia.

Figure 14 Histology report of UVATS RLL lobectomy. UVATS, uniportal video-assisted thoracic surgery; RLL, right lower lobe.



Preop Postop

Figure 15 Chest radiograph of patient who underwent first UVATS lobectomy for lung cancer on August 13, 2009. UVATS, uniportal video-assisted thoracic surgery.

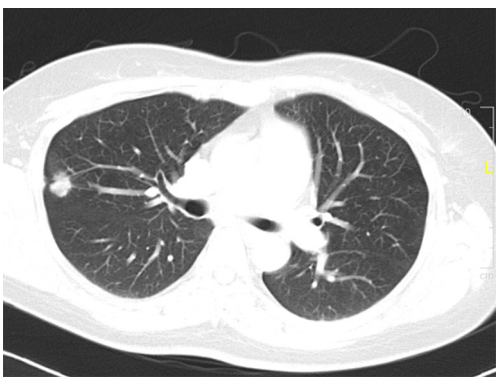


Figure 16 CT scan of patient who underwent first UVATS lobectomy for lung cancer. UVATS, uniportal video-assisted thoracic surgery.

until this day.

First UVATS lobectomy for lung cancer

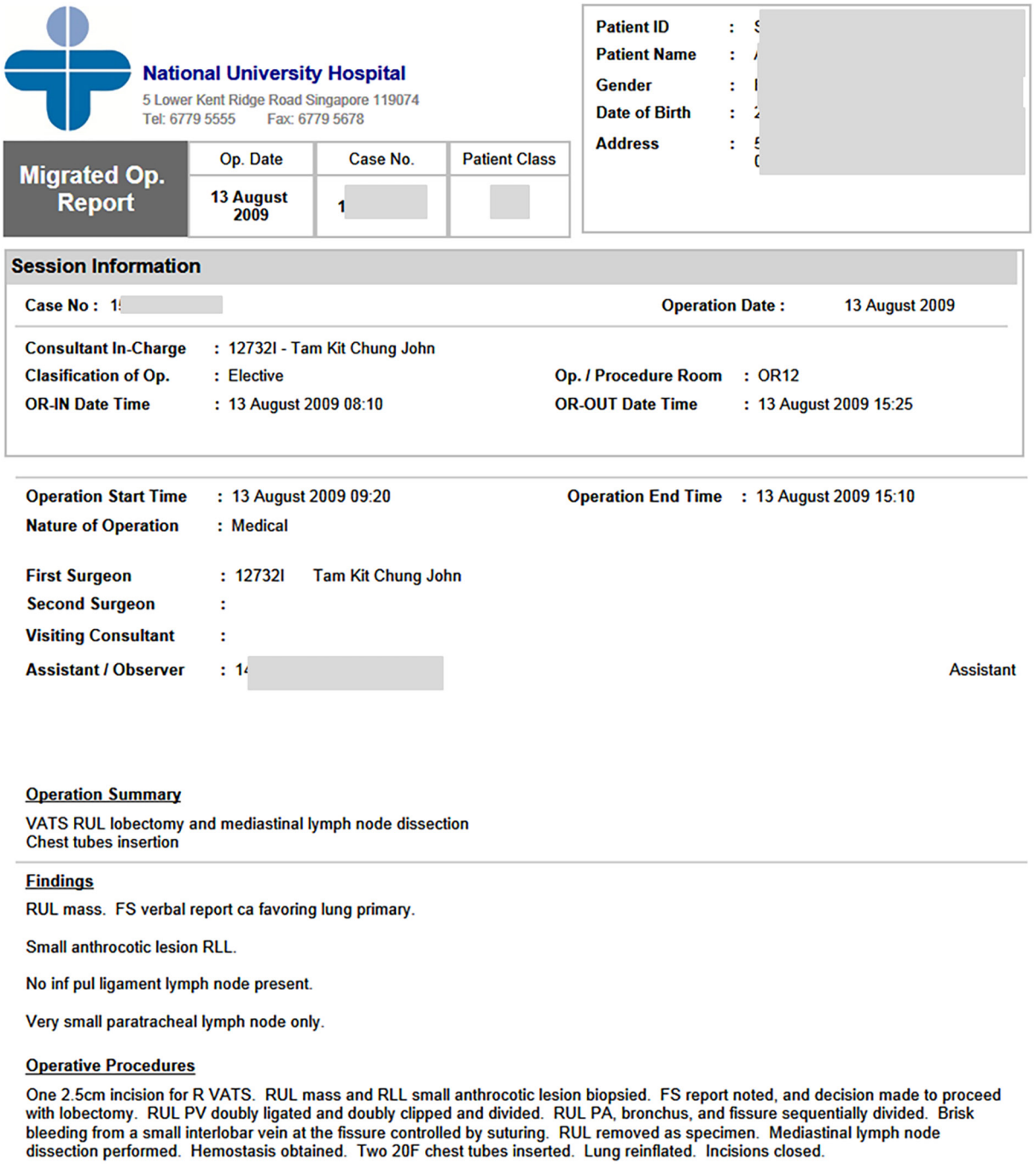
My first UVATS lobectomy for lung cancer was performed in the National University Hospital in Singapore on August 13, 2009. The patient was a 44 year old lady with a 2-cm nodule in the right upper lobe (*Figures 15,16*). Surgery was performed through a 2.5-cm uniport at the 4th intercostal space in the anterior axillary line on the right chest. Standard anatomical dissection was performed for the bronchovascular structures and mediastinal nodal dissection was performed (*Figure 17*). Postoperative chest radiograph was normal (*Figure 18*). Histology report showed a 1.5-cm moderately differentiated adenocarcinoma resected from the right upper lobe. All resected lymph nodes were negative for malignancy (*Figure 19*).

Subsequently, UVATS lobectomies were performed on the other lobes in the following months (*Figure 20*). A case series of our early experiences with UVATS lobectomy was submitted to an international thoracic surgery journal on February 9, 2012. This was however rejected by the journal editor on the basis that our case series was not randomized and a comparison group was absent. With this delay, the article was eventually submitted to The Annals of Thoracic Surgery and was accepted as on July 1, 2013 for publication in the December 2013 edition of the Annals (1) (*Figure 21*).

Epilogue

Since the first UVATS lobectomy was performed in 2009, a routine UVATS program was offered in the National University Hospital in Singapore. A new generation of thoracic surgeons in Singapore and in Asia was trained in this technique. Thousands of patients in Singapore have since benefited from the UVATS approach.

In the words of Professor Gaetano Rocco, "it doesn't actually matter today who devised uniportal VATS—



National University Hospital
5 Lower Kent Ridge Road Singapore 119074
Tel: 6779 5555 Fax: 6779 5678

Patient ID : S
Patient Name : A
Gender : F
Date of Birth : 2
Address : 5 C

Migrated Op. Report

Op. Date	Case No.	Patient Class
13 August 2009	1	

Session Information

Case No : 1
Operation Date : 13 August 2009

Consultant In-Charge : 12732I - Tam Kit Chung John
Clasification of Op. : Elective
Op. / Procedure Room : OR12
OR-IN Date Time : 13 August 2009 08:10
OR-OUT Date Time : 13 August 2009 15:25

Operation Start Time : 13 August 2009 09:20
Operation End Time : 13 August 2009 15:10
Nature of Operation : Medical

First Surgeon : 12732I Tam Kit Chung John
Second Surgeon :
Visiting Consultant :
Assistant / Observer : 1 Assistant

Operation Summary

VATS RUL lobectomy and mediastinal lymph node dissection
Chest tubes insertion

Findings

RUL mass. FS verbal report ca favoring lung primary.

Small anthrocotic lesion RLL.

No inf pul ligament lymph node present.

Very small paratracheal lymph node only.

Operative Procedures

One 2.5cm incision for R VATS. RUL mass and RLL small anthrocotic lesion biopsied. FS report noted, and decision made to proceed with lobectomy. RUL PV doubly ligated and doubly clipped and divided. RUL PA, bronchus, and fissure sequentially divided. Brisk bleeding from a small interlobar vein at the fissure controlled by suturing. RUL removed as specimen. Mediastinal lymph node dissection performed. Hemostasis obtained. Two 20F chest tubes inserted. Lung reinflated. Incisions closed.

Figure 17 Operation record of first UVATS lobectomy for lung cancer at National University Hospital, Singapore on August 13, 2009. UVATS, uniportal video-assisted thoracic surgery.

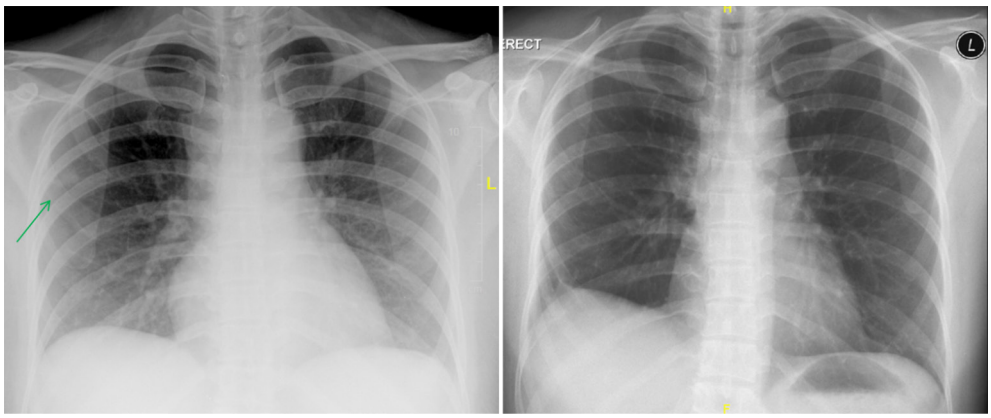


Figure 18 Chest radiograph of first UVATS lobectomy for lung cancer. UVATS, uniportal video-assisted thoracic surgery.

NAME : MRN :
DATE / TIME : 13-AUG-2009 00:00 ACCESSION NO : 9
LOCATION : Operating Theatre(M) ORDERED BY : TAM JOHN KIT CHUNG
HISTOLOGY F
SPECIMEN TYPE NB09-13647-1 09/09/2009 BENGT FREDRIK PETERSSON (DR)

A: FROZEN SECTION FOR WEDGE BIOPSY RIGHT UPPER LOBE LESION; B: RIGHT UPPER LOBE (LUNG); C: RIGHT UPPER LOBE BIOPSY 2; D: RIGHT LOWER LOBE BIOPSY; E: RIGHT PERIBRONCHIAL LYMPH NODE; F: RIGHT PARATRACHEAL LYMPH NODE; G: RIGHT INTERLOBAR LYMPH NODE

DIAGNOSIS

(A) Lung, right upper lobe, wedge biopsy:
- 1.5 cm moderately differentiated adenocarcinoma, mixed type (acinar-, papillary- and BAC-patterns). pT1

(B) Lung, right upper lobe, lobectomy:
- No evidence of malignancy. Six lymph nodes without metastasis (0/6)

(C) Lung, right upper lobe, biopsy 2:
- No evidence of malignancy
- Mild pleural fibrosis

(D) Lung, right lower lobe, biopsy:
- One intrapulmonary lymph node without metastasis (0/1)

(E) Right peribronchial lymph node:
- One lymph node without metastasis (0/1)

(F) Right paratracheal lymph node:
- Two lymph nodes without metastasis (0/2)

(G) Right interlobar lymph node:
- One lymph node without metastasis (0/1)

Figure 19 Histology record of first UVATS lobectomy for lung cancer on August 13, 2009. UVATS, uniportal video-assisted thoracic surgery.

- UVATS RLL lobectomy June 25, 2009
- UVATS RUL lobectomy August 13, 2009
- UVATS LUL lobectomy December 10, 2009
- UVATS RML lobectomy February 22, 2010
- UVATS LLL lobectomy March 11, 2010

Figure 20 Chronology of UVATS lobectomy at the National University Hospital, Singapore. UVATS, uniportal video-assisted thoracic surgery.

GENERAL THORACIC

Total Muscle-Sparing Uniportal Video-Assisted Thoracoscopic Surgery Lobectomy

John K. C. Tam, MD, and Kee Siang Lim, BS

Division of Thoracic Surgery, National University of Singapore, National University Health System, Singapore

Background. Conventional video-assisted thoracoscopic lobectomy uses multiple incisions, including an access incision and several port incisions. This series aims to evaluate the technical feasibility and early results of uniportal video-assisted thoracoscopic surgery (UVATS) lobectomy using a small, total muscle-sparing incision.

Methods. We performed the first UVATS lobectomy in June 2009, and 38 major resections were attempted using this approach until September 2011. A single, small, muscle-sparing incision was made without rib spreading. True anatomic hilar dissection, individual vascular and bronchial ligation, and mediastinal lymph node dissection were performed under thoracoscopic visualization on a monitor.

Results. Thirty-two patients (84%) had malignant diseases, and 6 patients (16%) had benign diseases. Of the primary lung cancers, 85% were in stage I. Of the 38 attempted major resections, 32 UVATS lobectomies were successfully completed and 6 were converted to open thoracotomy. The early outcomes of successful UVATS lobectomy were analyzed (32 patients); 97% had no postoperative complications. There were no deaths. Mean pain score was 0.4 on postoperative day 1 and decreased to 0 by 1 week. Ninety-seven percent of patients received only oral analgesia postoperatively. Eight percent of patients experienced mild intercostal neuralgia not requiring treatment. No patients complained of shoulder dysfunction. The median duration of returning to full normal activities was 7 postoperative days.

Conclusions. Total muscle-sparing UVATS lobectomy is technically feasible with low morbidity and mortality rates. Patients had minimal postoperative pain and narcotic use; and good functional outcomes with no shoulder dysfunction and early return to full normal activities.

(Ann Thorac Surg 2013;96:1982–7)

Conventional video-assisted thoracoscopic surgery (VATS) uses multiple incisions, which may still create significant postoperative pain [1, 2]. The concept of single port access (SPA) is the latest advance in minimally invasive surgery. Uniportal VATS (UVATS) is a single-incision thoracoscopic approach. Some evidence suggests that UVATS may improve postoperative pain

2011, and 32 cases were successfully completed. Inclusion criteria for UVATS lobectomy were clinical stage I or II lung cancer, tumor less than 7 cm, benign lung disease with failure of medical therapy, and physiologic operability. Exclusion criteria were tumor greater than 8 cm, chest wall or mediastinal involvement, endobronchial tumor requiring sleeve resection, known N2 or N3 dis-

Figure 21 Publication of UVATS case series in the *Annals of Thoracic Surgery* in 2013. UVATS, uniportal video-assisted thoracic surgery.

what really matters today is for the technique to stand the test of time". This is true indeed and the wish is for all UVATS surgeons to work together in friendship and cooperation to propagate this excellent technique to all corners of the earth.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editor (Jose Luis Danguilan) for the series "Dedicated to the 6th Asian Single-port VATS Symposium 2018" published in *Journal of Visualized Surgery*. The article has undergone external peer review.

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jovs.2018.07.24). The series "Dedicated to the 6th Asian Single-port VATS Symposium 2018" was commissioned by the editorial office without any funding or sponsorship. The author has no other conflicts of interest to declare.

Ethical Statement: The author is 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.

doi: 10.21037/jovs.2018.07.24
Cite this article as: Tam JK. Notes on the first uniportal video-assisted thoracic surgery lobectomy on June 25, 2009. J Vis Surg 2018;4:173.

References

1. Tam JK, Lim KS. Total muscle-sparing uniportal video-assisted thoracoscopic surgery lobectomy. Ann Thorac Surg 2013;96:1982-6.