The evolution of uniportal video assisted thoracic surgery in Costa Rica

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Abstract: Video-assisted thoracic surgery (VATS) has become one of the most important advances in thoracic surgery in this generation. It has evolved continuously into a less invasive approach, being uniportal VATS the last step in this evolution. Since the first uniportal VATS lobectomy was performed in La Coruña in 2010, the procedure has suffered and exponential growth that has allowed it to widespread around the world, expanding the indications from initially early stage lung cancer cases to complex advance cases nowadays. In Costa Rica, uniportal VATS started to be use for major pulmonary resection in June 2014, thanks to the tutoring from Dr. Gonzalez-Rivas. In our center, uniportal VATS is the standard approach for minimally invasive procedures, and major pulmonary resections had only been done through the single port approach. In order to evolve and progress in the experience of the procedure, and to expand the indications in which it was being performed, a "uniportal VATS master class" was held in Rafael Angel Calderón Guardia Hospital in San José, Costa Rica, from September 16 to September 18 2015. The master class was led by Dr. Diego Gonzalez-Rivas and it counted with the contribution of Dr. Li Wentao and Dr. Yang Yang, from Shanghai Pulmonary Hospital. The course attracted almost every thoracic surgeon in our country and participants also included anesthesiologists, pulmonologists, nurses and medical students. Three uniportal VATS were performed during the course, a left lower and a right upper lobectomy and a wedge resection that was the first non-intubated VATS procedure ever performed in our country.

Keywords: Uniportal VATS; lobectomy; single port; minimally invasive; non-intubated thoracic surgery; Costa Rica

Received: 06 April 2016; Accepted: 06 April 2016; Published: 27 April 2016.
doi: 10.21037/jovs.2016.04.05
View this article at: http://dx.doi.org/10.21037/jovs.2016.04.05

One of the most important advances in thoracic surgery of our generation has been video-assisted thoracic surgery (VATS) (1), it has evolved from the initial multiport approach to a less invasive approach using only a single incision or uniportal VATS.

As in multiport VATS, the first cases reported using the single port approach were procedures such as biopsies, wedge resections and pneumothorax surgery by the team lead by Gaetano Rocco (2). It was until 2010, that major pulmonary resections were completed successfully by uniportal VATS in La Coruña (3), starting and exponential growth that has allowed to perform even complex oncological cases through this approach (4).

Since Gonzalez-Rivas *et al.* performed the first uniportal VATS lobectomy, the approach has proven to be safe, feasible and reproducible, leading to a widespread of the procedure around multiple centers in the world. The growth of the technique cannot only be explained by its own advantages, a big part is due to the great effort by Dr. Diego Gonzalez-Rivas to teach it to any surgical team interested in learning it. It was in this process where he made another major contribution, he decided to travel around the world and teach the technique to thoracic surgeons in their hospitals, letting all the surgical team (nurses, assistants,

Figure 1 The master class was held with the collaboration of Dr. Diego Gonzalez-Rivas, Dr. Wentao Li and Dr. Yang Yang.

Figure 2 Live surgery performed by Dr. Gonzalez-Rivas in Rafael Angel Calderón Guardia Hospital.

anesthesiologist) to familiarize with the procedure, showing them that it could be done in their center and making the technique available to any thoracic surgical unit with a VATS program around the world.

In Costa Rica, VATS surgery started since the late 90s and uniportal VATS was used seldom for diagnostic procedures.

In May 2013, after attending a lecture from Dr. Gonzalez-Rivas in the ESTS conference in Birmingham, about his experience in major pulmonary resections, that included even sleeve resections, the author was convinced this was the present and future of thoracic surgery.

Our group started to use only the single port approach for every VATS surgery, including pleural biopsies, effusion drainage, wedges resections, drainage and decortication for empyemas and resection of mediastinal tumors. This was a step-by-step process, in which we gained confidence and skills with each procedure before progressing to another. Before we started using this approach for empyemas, many coagulated hemothorax were completed successfully. A lot of the skills of dissection in a uniportal approach were acquired during the decortication of phase 2 and 3 empyemas. Being able to completely decorticate this difficult cases gave us a push in our learning curve that prepare us for more difficult surgeries. Complex VATS surgery started in June 2014 with the first lobectomy being performed successfully. This process was only possible through the tutoring of Dr. Gonzalez-Rivas. The first case perform was a left lower lobectomy in a male patient with bronchiectasis.

After attending a uniportal VATS course in Shanghai Pulmonary Hospital directed by Dr. Gonzalez-Rivas, from October to November 2014 we started to carry out upper lobectomies also.

Thanks to the experience gained and in order to maximized our learning curve and teach the approach to other thoracic surgeons in our country, we decided to hold a course in our hospital with the help of Dr. Gonzalez-Rivas.

The course was divided into three days, the first day took place in the Medical and Surgeons College of Costa Rica (*Figure 1*), consisted in a lecture by Dr. Gonzalez-Rivas, directed to the medical community in general, this taught numerous general practitioners, pulmonologists and medical students the benefits and applications of uniportal VATS surgery. The second day consisted in a theory course directed to thoracic surgeons and the third day was reserved for three uniportal VATS surgeries performed by Dr. Gonzalez-Rivas, two lobectomies and one non-intubated wedge resection.

The first part of the course consisted in multiple lectures that explained the process and evolution of uniportal VATS, the steps to perform major lung resections and how to deal with complications that may arrive during surgery.

The second part consisted in live surgery (*Figure 2*), with three cases performed by Dr. Gonzalez-Rivas. All patients were placed in a lateral decubitus position, the incision was made in the fifth intercostal space, and no wound retractor was placed. All of the operations were completed without any complications.

The first case consisted in a 77-year-old woman with a 1.5 cm spiculated nodule located centrally in the left lower lobe (*Figure 3*). A left lower lobectomy with a radical lymph node dissection was performed (*Figure 4*). The pathological staging and diagnosis was stage IA adenocarcinoma

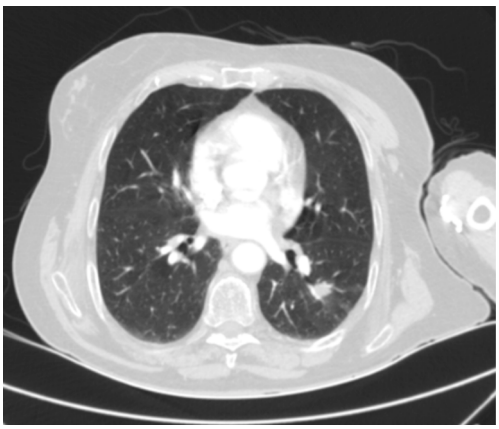

Figure 3 Chest CT shows a 1.5 cm central spiculated nodule in the left lower lobe.

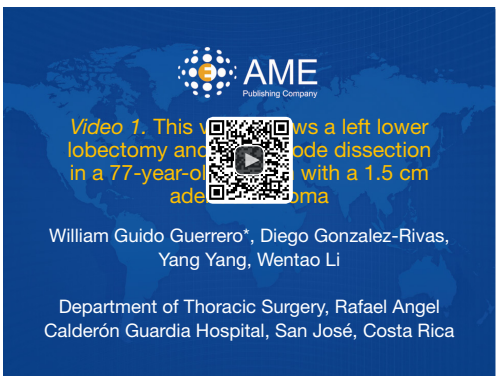

Figure 4 This video shows a left lower lobectomy and lymph node dissection in a 77-year-old women with a 1.5 cm adenocarcinoma (5). Available online: http://www.asvide.com/articles/964

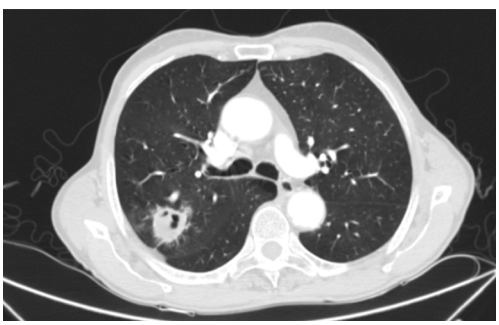

Figure 5 Chest CT shows a 4 cm mass with cavitation, located in the right upper lobe.

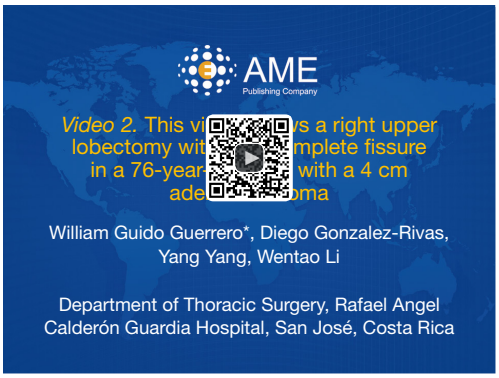

Figure 6 This video shows a right upper lobectomy with an incomplete fissure in a 76-year-old male with a 4 cm adenocarcinoma (6). Available online: http://www.asvide.com/articles/965

(T1aN0M0).

Secondly a right upper lobectomy was performed in a 76-year-old male with a 4 cm mass in the right upper lobe (*Figure 5*). Complete lymph node dissection was also performed (*Figure 5*) and the definitive pathological diagnosis was stage IB adenocarcinoma (T2aN0M0).

The last patient of the course had a previous history of right breast cancer, and had a 1.4 cm nodule located in the right upper lobe (*Figure 6*). This case was performed without intubation (the first case performed like this in our country), vagus blockage with lidocaine was done in order to avoid coughing and the patient was sedated through the procedure. After location of the lesion a wedge resection was carried out and the procedure was completed successfully. The frozen section was not able to differentiate between a primary and a metastatic lesion. The definitive diagnosis was atipic carcinoid tumor with vascular and lymphatic invasion. A reVATS right upper lobectomy was performed two weeks later, also by uniportal approach, without complications.

Comments

VATS lobectomies are now the standard approach for early stage lung cancer and uniportal VATS has proven to be safe and feasible not only for early stage lung cancer but for advance cases also (3,7). The team from La Coruña has the biggest series of lobectomies perform by a single port approach and their experience includes already complex bronchial and vascular reconstructions (7-9). Other thoracic

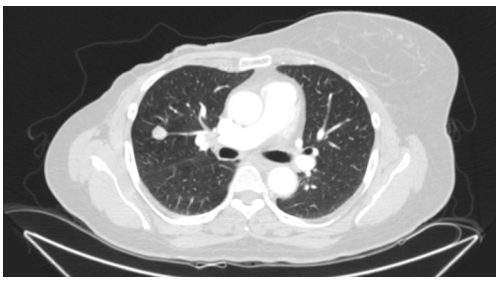

Figure 7 Chest CT shows a 1.4 cm nodule located in the right upper lobe. This patient had a prior right mastectomy.

units, especially in Asia had also reported their experience with the approach (10), were a lot of centers had adopted the technique and even started training programs.

In our hospital, uniportal VATS is now the standard approach in minimally invasive surgery, and the majority of our procedures are carried out this way. Currently more than 170 cases, 15 of the major lung resections had been achieve successfully with a uniportal approach. The success of the program is in a big way thanks to the guidance and continuous cooperation of Dr. Diego Gonzalez-Rivas. Being able to learn from his experience and incredible surgical technique has allowed our team to grow as surgeons and improve our results.

Uniportal VATS is a very innovating procedure in our country, and we are one of the few centers that are doing it as a standard approach for all the VATS cases. Because of this, a lot of press and media coverage was done to the visit of the pioneer of the approach and the master class taking place in our hospital. Most of the national newspapers and television news reported on the event (*Figure 7*).

After the course we have been able to emulate his surgical process and follow his recommendations, which has facilitated the procedure considerably and also improve our surgical time. We gained confidence and experience, letting us progress to more difficult cases including advance stage lung cancer.

Acknowledgements

None.

doi: 10.21037/jovs.2016.04.05
Cite this article as: Guido Guerrero W, Gonzalez-Rivas D, Yang Y, Li W. The evolution of uniportal video assisted thoracic surgery in Costa Rica. J Vis Surg 2016;2:91.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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