

## Prof. De-Min Li: what we expect from da Vinci robotic surgery

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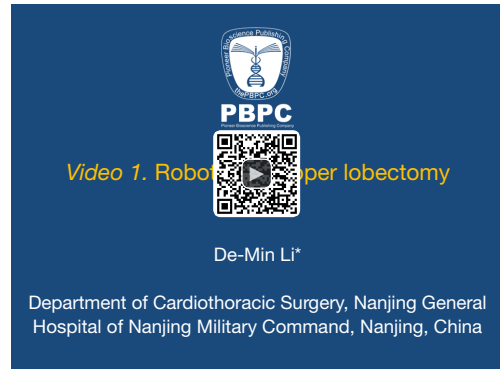
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*The Department of Cardiothoracic Surgery of Nanjing General Hospital of Nanjing Military Command has a distinguished reputation among Chinese patients for decades. In recent years, the introduction of the “da Vinci” robot in the hospital has allowed the Department of Cardiothoracic Surgery to carry out newer and more sophisticated surgeries and research projects. Under the leadership of its director Prof. De-Min Li and the tireless efforts of all the staff members, the Department of Cardiothoracic Surgery has gained many academic achievements, benefiting many patients and their families.*

*Recently, the JTD interviewed Prof. De-Min Li and invited him to share his insights on the application of the “da Vinci” robot in cardiothoracic surgeries and some other related issues (Figure 1).*

### Introduction

Prof. De-Min Li (Figure 2), Chief Physician, Professor, and director of the Department of Cardiothoracic Surgery, deputy Director of the lung cancer center of Nanjing General Hospital. In 2002, Prof. Li was trained on cardiovascular surgery at the heart unit at Monash Medical Centre in Melbourne, Australia for one year. Currently he is the director of the Department of Cardiothoracic Surgery of Nanjing General Hospital of Nanjing Military Command and professor and master's/doctoral supervisor of the School of Medicine of the Second Military Medical University, Nanjing University and Southern Medical University. He is also the Deputy Director of Lung Cancer Center of Nanjing General Hospital of Nanjing Military Command (Figure 3A,B). He performs various coronary artery bypass surgeries, major vascular surgeries and interventional treatment, and has rich experiences in the peri-operative management of elderly patients with severe coronary artery disease. He is skillful in the surgical treatment of severe valvular diseases and complex congenital heart diseases. He also performs surgeries including tracheal surgery, surgeries for esophageal cancer invading the descending aorta and/or left main bronchus, bronchial sleeve resection/reconstruction, bronchial and pulmonary arterial sleeve resection, and resection and reconstruction of carina. He has accumulated rich experiences in the intensive care and

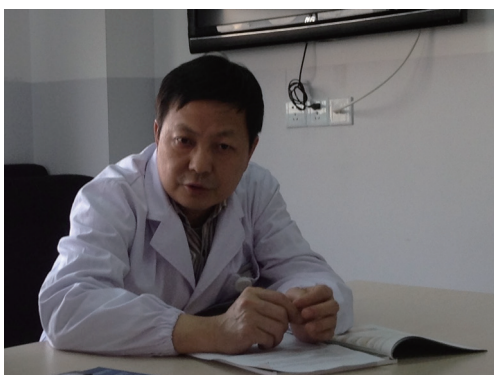


**Figure 1** Robotic left upper lobectomy (1). Available online: <http://www.asvide.com/articles/279>

treatment after cardiothoracic surgery.

**JTD:** *As we know, you were trained in coronary surgery at Monash Medical Centre in Melbourne, Victoria, Australia from 2002 to 2003. What was the domestic level of cardiac surgery at that time? What's your feeling about staying abroad then?*

**Prof. Li:** Generally speaking, the performance of cardiovascular surgery was quite good at that time in China. While the cardiovascular surgeries were well performed in some large general hospitals (e.g., third-grade class-A hospitals), they were not so successful in many other hospitals. In 2002, I began to receive training in the Monash Medical Centre in Melbourne, where they had academic capacity parallel to those in Europe and North America. The Australian centers had excellent concepts and modes in medical sciences; meanwhile, they paid particular attention to training, especially trainees from other countries. As I know, many well-known Chinese cardiovascular surgeons had been trained or did their internships in Australia. During the training period, the trainees not only could observe but also be involved in the clinical practice. The study in Australia was a fruitful trip for me. After I returned to China, I was able to perform coronary surgeries independently.



**Figure 2** Prof. De-Min Li introducing the da Vinci surgery in his department.

**JTD:** *As we know, your team has performed well in both clinical practice and scientific research. Would you please briefly introduce your department and your team to us?*

**Prof. Li:** The Department of Cardiothoracic Surgery of Nanjing General Hospital currently is divided in two sections: the Cardiovascular Surgery and the General Thoracic Surgery. The latter is focused on pulmonary and esophageal diseases as well as some general chest diseases and mediastinal tumors. The minimally invasive surgery in the General Thoracic Surgery is currently one of our priorities. Thoracoscopic lung resection is the preferred surgical procedure for lung cancer, and video-assisted thoracoscopic surgery (VATS) is also the mainstream treatment for mediastinal tumors. In recent years, the rapid development of completely endoscopic radical resection of esophageal cancer has achieved good results. The Cardiovascular Surgery is mainly focused on heart valve diseases, coronary heart disease, and macrovascular disease, with the minimally invasive treatment of heart valve disease and coronary heart disease and the hybrid cardiac surgery for macrovascular disease as the priorities.

**JTD:** *Coronary artery bypass grafting (CABG) has become a relatively mature procedure. Would you like to introduce the use of CABG in China?*

**Prof. Li:** Coronary surgery has been widely performed in China, and its levels in the majority of Chinese third-grade class-A hospitals are comparable to their international counterparts. Now our goal is to do it better, though CABG is the gold-standard treatment for multiple-vessel lesions, most eligible patients prefer coronary intervention, which is less invasive. Only patients with poor vascular conditions



**Figure 3** (A,B) Nanjing General Hospital of Nanjing Military Command.

and therefore not feasible for intervention undergo surgical treatment, which make the surgery more difficult and risky. Therefore, cardiac surgeons must try their best to maintain good quality control and expected long-term outcomes. The long-term role of internal mammary artery in anterior descending coronary artery reconstruction is irreplaceable and therefore the internal mammary artery should be routinely used. CABG should be actively applied in young patients with coronary heart disease to achieve good long-term patency rate and maintain good quality of life. The concept of “minimally invasive” should be rationally applied in the surgical treatment of coronary heart disease. Off-pump CABG can lower the impact of extracorporeal circulation on human body and thus reduce the peri-operative risks. By cooperating with the Department of Cardiology, we are using the Hybrid Operation Room and da Vinci robot for hybrid coronary surgery. More specifically, the left internal mammary artery (LIMA) reconstruction or the anterior descending artery reconstruction is performed under the assistance of the robot or completed by the robot, whereas the international intervention except for the anterior descending artery is performed by the Department of Cardiology. The joint efforts of these two departments enable us to apply the most

advanced treatment concepts to our patients, thus reducing the trauma and achieving the optimal efficacies.

**JTD:** *How about the treatment of aortic dissection in your department?*

**Prof. Li:** More patients with aortic dissection have been identified along with the advances in diagnostic technology and the increased awareness of this condition, particularly when the climate changes. The routine use of ECG and CT for patients with acute chest pain has increased the detection rate of acute aortic dissection. Aortic dissection is a very dangerous disease, and therefore must be appropriately managed according to patients' conditions. The type A aortic dissection is easy to become ruptured at its early stage and is associated with high mortality; thus, active surgical treatment is warranted. The improvements in the surgical procedures, anesthesia, and other techniques for the type A aortic dissection have made the surgical treatment more effective. In addition to the routine techniques including deep hypothermic circulatory arrest for aorta/aortic arch replacement and the "elephant trunk" technique, we also apply hybrid procedures without deep hypothermic circulatory arrest in carefully selected cases, which avoids the impact of deep hypothermic circulatory arrest on human body and reduces the post-operative complications. For type B aortic dissection, minimally invasive interventions are preferred, which are featured by good effectiveness, small trauma, and quick recovery.

**Enter the era of minimally invasive surgery with the help of the da Vinci robot**

**JTD:** *The Nanjing General Hospital was one of the hospitals that introduced the da Vinci Surgical System at an early stage. In 2012, the first case of robotic assisted heart repair surgery in Jiangsu Province was completed in the hospital. What are the indications for the robotic surgeries?*

**Prof. Li:** The da Vinci robotic surgery is a specific example of the application of modern high technology in surgery and also represents one of the future directions of minimally invasive cardiothoracic surgery. However, a wider application of da Vinci robot in the cardiothoracic surgery still has a long way to go, since it may involve many issues such as the costs of the system, the cost of treatment, the training of medical staff, and the acceptance of the relevant concepts. Generally, the applications of

robotics in cardiothoracic surgery have many advantages. For instance, the robotic hand, when replacing the human hand, can reduce surgical trauma; also, the 3-dimensional vision of the robot is more accurate when compared with the 2-dimensional vision of the conventional endoscope and therefore allows the operator to directly transfer his/her ideas to the robot hand. The robot can perform reconstruction accurately, which is also superior to the endoscope. Currently, the applications of the robot in the cardiothoracic surgery include CABG assisted by or fully by the robot, mitral valve repair or replacement, repair of atrial septal defect, and resection of cardiac tumors. In the General Thoracic Surgery section, it is mainly applied in the treatment of thymic tumor, lung tumor, and esophageal surgeries. In 2014, the application of robot to cardiothoracic surgery has been listed as a key academic project in our department. It is planned that about 150 robotic operations will be performed this year. Before the robotic surgery, the doctors must carefully evaluate patients' conditions. Only those who are expected to achieve therapeutic effectiveness comparable to the routine surgeries and meanwhile will benefit from the "minimally invasive" and "aesthetic" features will be considered appropriate for the robotic surgery.

**JTD:** *After the use of robotic assisted treatment, will the priority of a specific surgical procedure be changed?*

**Prof. Li:** The role of doctors remains critical during the robotic cardiothoracic surgeries. The operators must have rich experiences in the conventional surgeries. In other words, only surgeons who are good at the conventional surgeries are possible to carry out the robotic operations. Robot is just a tool used by doctors. With the robot, the surgeons just operate in the console instead of the operative field. Therefore, the use of robot does not cause changes in the key surgical procedures.

**JTD:** *As the deputy director of Lung Cancer Center of Nanjing General Hospital, what's your opinion on the role of surgery in the multidisciplinary treatment of lung cancer?*

**Prof. Li:** The treatment for lung cancer differs based on the disease stage. Multidisciplinary management currently is the main treatment for lung cancer. Surgery plays an important role in the treatment of lung cancer, particularly those at an early stage (stages I and II). For resectable tumors (stage III), tailored multidisciplinary management is needed. In our department, the treatment for lung cancer focuses on

surgical treatment (e.g., bronchial sleeve resection and reconstruction, bronchial/pulmonary arterial double-sleeve resection and reconstruction, and carina resection and reconstruction) for complicated lung cancer; and, minimally invasive radical resection of lung cancer (totally thoracoscopic lung resection and robotic lung resection). The Hybrid Operation Room in our hospital allows us to carry out accurate thoracoscopic resection of the small lung lesions under digital subtraction angiography (DSA).

*JTD: In fact, in addition to surgery itself, post-operative care is also very important for the recovery and treatment of a patient. What kind of work is expected in post-operative care? Is there any experience you would like to share with our readers?*

**Prof. Li:** Post-operative care is important to ensure the effectiveness of surgical treatment. An increasing number of our patients are elderly people, and they often have concomitant conditions such as diabetes, hypertension, chronic obstructive pulmonary disease, and organ dysfunction. For these patients, in addition to minimally invasive surgery, post-operative care including peri-operative

airway management, fluid management, maintenance of water and electrolyte balance, blood sugar regulation, anti-infection treatment, nutritional support, and supportive therapy of vital organs are also very important. Treatment and care should be conducted in a more proactive manner. We must carefully observe and analyze the disease conditions and take effective preventive measures before the occurrence of any complication. All in all, modern surgery has placed higher demand on surgeons.

*JTD: Thank you very much!*

### Acknowledgements

*Disclosure:* The author declares no conflict of interest.

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