Video-assisted thoracoscopic surgery in device closure of atrial septal defect

Sir,

Atrial septal defect (ASD) is a common congenital heart disease. Compared with surgical and percutaneous closure method[1,2] recently along with the development of thoracoscopic technique in cardiac surgery, we have combined the thoracoscopic technique and the transthoracic minimally invasive closure technique and in order to achieve a more esthetically acceptable outcome. In this study, we reported totally thoracoscopic surgical closure of ASD, to treat ten cases of ASDs from January 2012 to September 2012.

Ten patients were included in the study, six males and four females, with a mean age of 27.2 ± 10.6 years (age range 16-42 years). All patients were diagnosed with an ostium secundum ASD without any other intracardiac deformities. The diameter of the defect ranged from 16 mm to 24 mm. The present study was approved by the Ethics Committee of our university and was conducted according to the tenets of the Declaration of Helsinki. The ASD occluder was made from Lifetech Scientific (Shenzhen) Co., Ltd., China.

In our method, the patient was placed supine with the right side of the chest elevated about 45°. A parasternal incision 1 cm in length was made in the right anterior chest wall. The thoracic cavity was reached through the 4th intercostal space. One-lung ventilation was employed during surgery. Another incision 1 cm in length was made at the intersection of the midaxillary line and the 4th intercostal space for the thoracoscope [Figure 1]. The pericardium was opened with an electric hook and a traction suture was placed on the pericardium. The suture line was pulled out through the incision on the midaxillary line to expose the right atrium. A purse-string suture was applied in the anterolateral wall of the right atrium. Systemic heparin (1 mg/kg) was used. A fine needle was aspirated from the center of the purse. The guidewire and delivery sheath were placed in succession [Figure 2]. Under ultrasound guidance, the delivery sheath was extended to the left atrium through the ASD. An occluder was slowly advanced via the sheath. The left atrial umbrella was open within the left atrium and pulled back tightly and then the right atrial umbrella was open. Ultrasound examination was carried out to confirm that the umbrella closure was tight, there was no residual shunt and the structures and functions of the superior vena cava, inferior vena cava, pulmonary vein, coronary sinus opening, mitral valve and tricuspid valve were intact. Finally, the occluder and the delivery sheath were removed in turn and the purse-string suture in the right atrium was ligated.

The closure procedure was performed successfully in all 10 patients. The operative time ranged from 60 min to 90 min (mean 70.5 ± 10.6 min). The time for intracardiac closure ranged from 5 min to 10 min (mean 7.1 ± 1.5 min). The size of the occluder for the ASD ranged from 20 mm to 28 mm (mean 24.4 ± 3.2 mm). Perioperative arrhythmia, including supraventricular tachycardia and atrial flutter, occurred in two patients. Cardiac rhythm returned to normal in a relatively short period of time after medication was administered. In those who had a successful attempt, the overall immediate complete closure rate was 100%.

Similar to some reports on transcatheter or surgical ASD closure,[1,2] we also achieved high technical success and good therapeutic outcomes. Our method has several advantages. It was easy to learn and cost-acceptable in the Third World nations. It can completely avoid the application of cardiopulmonary bypass and its small incision (1 cm) is cosmetically preferable to patients. It can be used for patients with relatively large defects and thus, extends the indication of defect closure. It can completely avoid X-ray exposure. It is most important to note that in case of failed closure, our method

Figure 1: The surgical field

Figure 2: The sheath positioned from the right atrial free wall by thoracoscope
can be quickly converted to cardiopulmonary bypass surgery in the same operating room without transporting the patient from the interventional suite to the operating room.

We believe that transthoracic minimally invasive ASD closure is safe and effective, as is demonstrated by the experience we have documented.[3,4] On this basis, we have introduced the thoracoscopic technique and obtained a perfect view inside the right chest cavity by left-sided one-lung ventilation.[5,6] Through the 1-cm incision in the anterior chest wall, we can incise the pericardium, carry out purse-string suture and place the closure sheath. In addition, the approach used for thoracoscopy also can be applied to insert the drainage tube, further reducing the extent of the incision. The most difficult aspects of this technique are the manipulation of instruments under thoracoscopy and the technique of atrial septal closure using the occluder. The operative time in the current study was relatively long compared with that of conventional transthoracic minimally invasive closure. The long operative time results mainly from the inexperience of those performing the manipulation under thoracoscopy during surgery. With increased experience in the surgical procedure, the operative time is expected to be shortened. The magnification effect of thoracoscopy allows us to observe bleeding in the surgical field more clearly and assists with hemostasis during surgery. In the current study, no large pleural or pericardial effusion was observed. We suggest that the operator should have sufficient experience in heart surgery and should be familiar with intraoperative ultrasound imaging. Compared with percutaneous closure of an ASD, our procedure can be converted to open surgery immediately, if necessary, which makes the surgeon more confident.

In our opinion, we believe that this procedure cannot replace traditional surgery and percutaneous interventional procedures; however, it could be an option for the treatment of ASD. Currently, various surgical procedures are available to most patients. Therefore, the selection of surgical procedure should be based on individual considerations such as the condition and the needs of the patient, the size of ASD, the experience of the physician and the availability of equipment in the hospital.

In summary, we believe that totally thoracoscopic surgical closure of ASD is a safe and effective procedure, that it is minimally invasive and that it can achieve an esthetically acceptable outcome.

Hua Cao, Qiang Chen, Gui-Can Zhang, Yun-Nan Hu, Fan Xu
Department of Cardiovascular Surgery, Union Hospital, Fujian Medical University, Fuzhou, 350001, P. R. China
E-mail: caohua69@hotmail.com

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