

琉球大学学術リポジトリ

[症例報告] Minimally invasive cardiac surgery for aortic valve replacement

メタデータ	言語: 出版者: 琉球医学会 公開日: 2010-07-02 キーワード (Ja): キーワード (En): 作成者: Kudaka, Manabu, Koja, Kageharu, Kuniyoshi, Yukio, Miyagi, Kazufumi, Mitsuyoshi, Shimoji, Uezu, Toru, Arakaki, Katsuya, Ikemura, Ryo メールアドレス: 所属:
URL	http://hdl.handle.net/20.500.12000/0002016053

Minimally invasive cardiac surgery for aortic valve replacement

Manabu Kudaka, Kageharu Koja, Yukio Kuniyoshi, Kazufumi Miyagi,
Shimoji Mitsuyoshi, Toru Uezu, Katsuya Arakaki and Ryo Ikemura

Second Department of Surgery, Faculty of Medicine, University of the Ryukyus,
207 Uehara, Nishihara, Okinawa 903-0215, Japan

(Received on August 12, 1998, accepted on November 24, 1998)

ABSTRACT

Minimally invasive cardiac surgery (MICS) for valve repair or replacement has been reported in recent literature. The advantages of this method include less incisional pain and discomfort, a reduced length of hospital stay because of reduced surgical trauma. We report two cases of aortic valve replacement through a right parasternal incision using femoro-femoral bypass. Postoperative recovery was complete and uneventful in both; there was no severe wound pain, wound infection or other complication. A limited right parasternal incision reduces the impairment induced by a median sternotomy. We conclude that MICS is a promising new technique that can be considered as an alternative in most cases of aortic valve disease. *Ryukyu Med. J.*, 18(4)155~157, 1998

Key words: MICS, aortic valve replacement, femoro-femoral bypass, minimally invasive operation

INTRODUCTION

Recently, minimally invasive surgery has been an adjunct to the management of cardiovascular surgery^{1,2)}. Minimally invasive direct coronary artery bypass (MIDCAB), for example, has become a standard technique in myocardial revascularization of the left anterior descending coronary artery for single coronary disease³⁾. MIDCAB does not require a cardiopulmonary bypass, and the incision in the chest is small. These procedures tend to provide the definitive benefits of cardiac surgery, while minimizing surgical trauma. Cosgrove *et al.*⁴⁾ reported a minimally invasive approach for aortic valve surgery through a right parasternal incision. This technique does not require a median sternotomy and reduces surgical trauma. The smaller incision is cosmetically more acceptable to patients, especially women. Additionally, this procedure has been shown to improve quality of life in the postoperative period. Herein, we describe two patients with aortic stenosis who underwent minimally invasive cardiac surgery (MICS).

CASE REPORT

Case 1: A 49-year-old female presented with an abnormal heart murmur at a local hospital and was referred to us. While awaiting surgery, symptoms of cardiac failure appeared. She visited our emergency room because of difficulty in breathing. Thirty minutes after arrival, her

dyspnea is exacerbated, necessitating endotracheal intubation. She was admitted to the intensive care unit. Her hemodynamic condition recovered after administration of an inotropic agent and appropriate ventilation support. She had no history of rheumatic fever or rheumatoid arthritis. On cardiac examination, a grade II/VI systolic ejection heart murmur was heard along the left sternal border and auscultation of the lung revealed coarse crackles. A chest X-ray showed pulmonary artery congestion and an increase in the cardiac diameter. An ECG confirmed normal sinus rhythm but left ventricular hypertrophy. An echocardiography demonstrated heavy calcification of the aortic valve with mild regurgitation, and the presence of severe systolic pressure gradient (118 mmHg) between the left ventricle and the aorta. Computed tomography showed a deviation of the ascending aorta to the right side of the chest. The patient underwent MICS on March 2, 1998.

With the patient in the supine position, a 12 cm right parasternal incision, 4 cm lateral to the sternum was made and the third and fourth costal cartilages were totally excised. The right side of the pericardium was incised, exposing the aortic arch, right atrium and most part of the right ventricle (Fig.1). The femoral artery and vein were exposed and cannulated after heparinization for cardiopulmonary bypass. After cardiopulmonary bypass was established, the aorta was cross clamped. The ascending aorta was incised obliquely and then cold cardioplegia solution was administered into the coronary

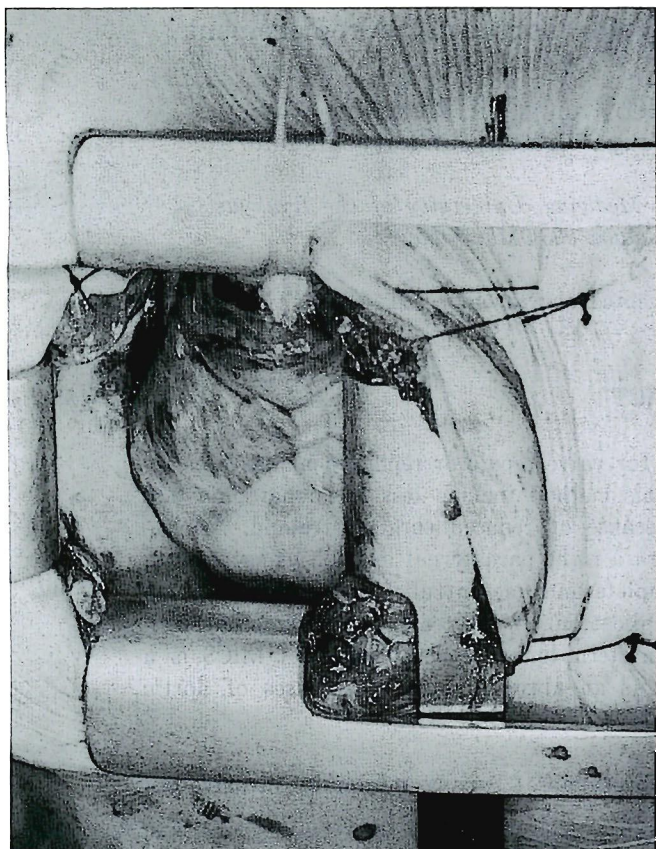


Fig. 1 Operative picture: good operative field is obtained through parasternal incision.

ostia. The aortic valve showed a congenital bicuspid valve with heavy calcification. The calcified valve was resected, and was replaced with a No.19 Carbomedics (Sulzer medica, U.S.A.) prosthetic valve. Postoperative course was uneventful and the patient was discharged on postoperative day 34.

Case 2: A 59-year-old male with a past history of percutaneous transluminal angioplasty for single coronary artery disease was transferred for treatment of aortic stenosis. Upon admission, physical examination revealed a grade III/VI systolic heart murmur at the right second intercostal space. An ECG revealed normal sinus rhythm but left ventricular hypertrophy, and a chest X-ray showed moderate cardiomegaly. An echocardiography revealed a severe calcified lesion of the aortic valve. Cardiac catheterization revealed a PAWP of 13 mmHg, and an aortic valve systolic gradient of 55 mmHg with a cardiac index of 3.16 l/min/m².

Surgery was performed on March 16, 1998. A right parasternal incision was made. The approach to the aorta was the same as described in case 1. In this case, we could not obtain a satisfactory operative field because the aortic root was medially deviated. The dilated ascending aorta was incised obliquely and cold cardioplegia solution was given directly into the coronary ostia. The



Fig. 2 Picture taken at the end of the operation.

calcified valve was excised and was replaced with a No.21 Carbomedics prosthetic valve with a little difficulty due to the inadequate operation field. Postoperative course was uneventful and the patient was discharged on postoperative day 26 with no wound pain.

DISCUSSION

Minimally invasive surgery is widely applied in general surgery, thoracic surgery, orthopedics and gynecologic surgery. Cholecystectomy or inguinal hernia repair with laparoscopy has now become a standard technique in general surgery. In thoracic surgery, video-assisted thoracic surgery are performed in most institutions. As compared with conventional surgery, minimally invasive surgery reduces surgical trauma, blood loss, subsequent postoperative pain, shortens the hospital stay, reduces cost and improves cosmesis⁶⁾ (Fig.2). This procedure does not lead to respiratory insufficiency in the elderly. Currently, there has been a proliferation of reports detailing minimally invasive techniques for cardiac surgery, such as MIDCAB, video-assisted valve replacement and the thoracoscopic approach^{3,6)}.

We performed aortic valve replacement through a right parasternal incision, as reported by Cosgrove⁴⁾, for two patients. This procedure provided satisfactory

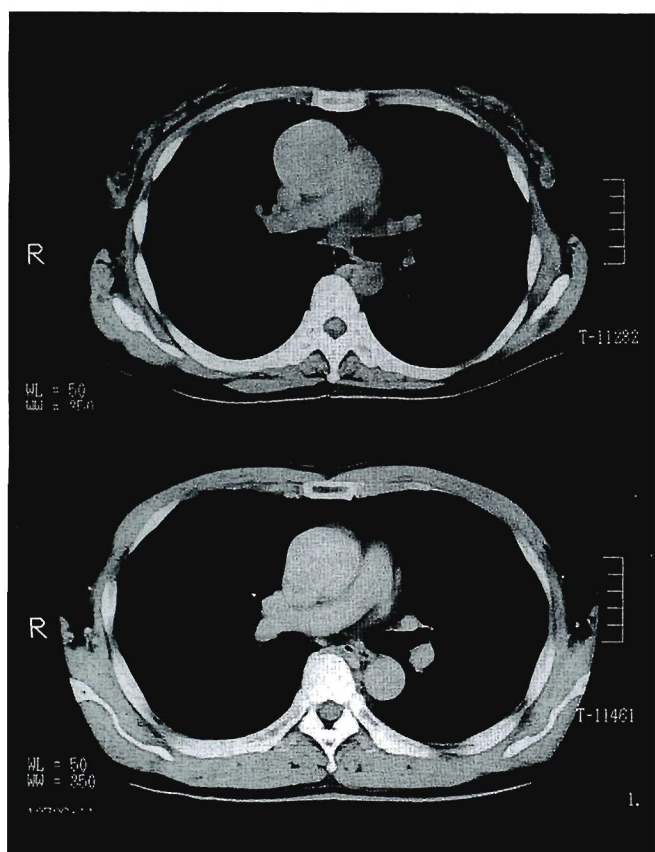


Fig. 3 Case 1 computed tomogram showing the deviation of the ascending aorta to the right side (upper); in contrast in case 2, the aortic root is medially deviated (lower).

results for both surgeons and patients. The advantages of this procedure without conventional sternotomy and manipulation in the mediastinum can be the reduced postoperative incisional pain and lower incidence of mediastinitis. However, some problems remain. Since the aorta was exposed without median sternotomy, the operating field was limited in comparison with the traditional approach. In our experience, direct visualization of the aortic valve was best achieved using two rib spreaders placed vertically and transversely. In this manner, aortic valve replacements can be performed without difficulty. When the aorta deviated to the right side of the thorax as in case 1, the ascending aorta was exposed directly under the wound, and a good field was obtained. In case 2, the ascending aorta was directly under the sternum, and the operative field was not satisfactory. To obtain a good operative field in such case, it is desirable to surgically remove the third and fourth costal cartilages from the sternum. Therefore, the correlation of the ascending aorta and sternum should be detected by preoperative thoracic computed tomogram (Fig.3). Other problems with this technique are difficulties in defibrillation and cardiac massage at the time of weaning from cardiopulmonary bypass. Cosgrove *et al.*⁴⁾

recommended that defibrillator pads be placed routinely on the chest wall and back throughout this procedure. If a cardiac massage become necessary, the right parasternal incision may have to be converted to a standard median sternotomy for effective cardiac massage.

The surgery was accomplished using femoro-femoral bypass. Adequate venous drainage was obtained by placing a long cannula into the IVC through the femoral vein and an L-shaped cannula into the SVC directly. The long cannula⁷⁾ with a soft and tapered tip passed through the IVC and it lied easily. The L-shaped cannula placed into the SVC did not disturb the operative procedures. The occurrence of thromboembolism is feared during femoro-femoral bypass, therefore aorto-iliac artery should be screened by computed tomography or angiography.

MICS can be performed safely and can result in low morbidity and a high degree of patient satisfaction. MICS could become the preferred operative approach for the repair or replacement of the aortic valve.

REFERENCE

- 1) Lytle B.W.: Minimally invasive cardiac surgery. *J. Thorac. Cardiovasc. Surg.* 111: 554-555, 1996.
- 2) Schwartz D.S., Ribakove G.H., Grossi E.A., Stevens J.H., Siegel L.C., Goar F.G., Peters W.S., McLoughlin D., Baumann F.G., Colvin S.B. and Galloway A.C.: Minimally invasive cardiopulmonary bypass with cardioplegic arrest: a closed chest technique with equivalent myocardial protection. *J. Thorac. Cardiovasc. Surg.* 111: 556-566, 1996.
- 3) Calafiore A.M., Angelini G.D., Bergsland J. and Salerno T.A. Minimally invasive coronary artery bypass grafting. *Ann. Thorac. Surg.* 62: 1545-1548, 1996.
- 4) Cosgrove D.M. and Sabik J.F.: Minimally invasive approach for aortic valve operations. *Ann. Thorac. Surg.* 62: 596-597, 1996.
- 5) Cohn L.H., Adams D.H., Couper G.S., Bichell D.P., Rosborough D.M., Sears S.P. and Aranki S.F.: Minimally invasive cardiac valve surgery improves patient satisfaction while reducing costs of cardiac valve replacement and repair. *Ann. Surg.* 226: 421-428, 1997.
- 6) Chitwood W.R., Elbeery J.R., Chapmann W.H.H., Moran J.M., Lust R.L., Wooden W.A. and Deaton D.H.: Video-assisted minimally invasive mitral valve surgery: the micro-mitral operation. *J. Thorac. Cardiovasc. Surg.* 113: 413-414, 1997.
- 7) Kuniyoshi Y., Kojima K., Iha K., Akasaki M., Miyagi K., Shimoji M., Kugai T., Kusaba A., Shimabukuro M. and Kamisato T.: Clinical experiences of a newly developed long venous cannula for femoro-femoral bypass. *Jpn. J. Artif. Organs.* 23: 964-967, 1994.