A biatrial inverted T-shaped incision has been described[5] and provided an excellent exposure and unobstructed view to resect and reconstruct the roof of the CS.

CONCLUSIONS

Resection and reconstruction of the roof of the CS can be efficiently accomplished to ensure complete resection of the myxoma.

References

1. Symbas PN, Hatcher Jr CR, Gravanis M. Myxoma of the heart: clinical and experimental observations. *Ann Surg*. 1976;183:470.
2. Nkere UU, Pugsley WB. Time relationships in the diagnosis and treatment of left-atrial myxoma. *Thorac Cardiovasc Surg*. 1993;41:301-3.
3. McCarthy PM, Piehler JM, Schaff HV, et al. The significance of multiple, recurrent, and ''complex'' cardiac myxomas. *J Thorac Cardiovasc Surg*. 1986;91:389-96.
4. Waller DA, Ettles DF, Saunders NR, Williams G. Recurrent cardiac myxoma: the surgical implications of two distinct group of patients. *Thorac Cardiovasc Surg*. 1989;37:226-30.
5. Morishita K, Fukada J, Abe T. Inverted T-shaped biatrial incision for large left atrial myxoma. *J Card Surg*. 1997;12:112-5.

Retrosternal adhesiolysis through an anterior minithoracotomy: A novel approach facilitating complete median redo sternotomy with a patent internal thoracic artery graft

Issam Ismail, MD,[a] Ruoyu Zhang, MD,[a] Kristina Ringe, MD,[b] Stefan Fischer, MD, MSc, PhD,[a] and Axel Haverich, MD, PhD,[a] Hannover, Germany

In most redo coronary artery bypass grafting (CABG) procedures, complete median resternotomy is inevitable to fully expose the heart. This primarily blind procedure places patients at increased risk of catastrophic hemorrhage and mortality, especially in the presence of a patent internal thoracic artery (ITA) or vein graft.[1] Various strategies have been developed to reduce this risk.[1-4] Here we report a novel approach that facilitates complete median redo sternotomy in the presence of a patent ITA graft crossing the midline.

CLINICAL SUMMARY

A 66-year-old man was admitted because of progressive multivessel coronary artery disease. He underwent CABG with left ITA to left anterior descending coronary artery (LAD) bypass and a saphenous vein aortocoronary graft to the ramus intermedius 11 years ago. In addition to the known stenosis, the current coronary angiogram revealed 75% stenosis of the crux cordis, 90% proximal stenosis of the posterior interventricular artery, and 90% stenosis at the left ITA to LAD bypass, as well as excellent long-term patency of the vein graft. Because of these findings, the decision was made for redo myocardial revascularization of the LAD and right coronary artery.

Preoperative 64-slice thoracic computed tomographic (CT) analysis, which is required before every elective resternotomy in our unit, demonstrated the left ITA graft crossing the sternal midline and adherence to the posterior wall of the sternum, as depicted in Figure 1, *A*. To avoid injury to the patent left ITA graft and cardiac structures, retrosternal tissue adhesiolysis through a right anterior minithoracotomy was performed to then facilitate median resternotomy. First, a 3-cm right anterior thoracotomy through the third intercostal space from the parasternal line to the midclavicular line was performed (Figure 2). The pleural space was opened. After the costal retractor was inserted, the tissues were separated in the median direction. The right ITA was identified and left untouched. By using the third sternal wire as a landmark, the left ITA graft was located and dissected from the posterior wall of the sternum, followed by extended retrosternal tissue adhesiolysis in the cranial and caudal direction. As the next step, complete and safe sternotomy was performed with an oscillating saw, followed by mediastinal dissection.

After establishment of cardiopulmonary bypass with hypothermia (35°C) and administration of blood cardioplegia in an antegrade fashion, myocardial revascularization was performed with a saphenous vein aortocoronary graft to the distal LAD and a sequential saphenous graft to the right coronary artery and posterior interventricular artery. No injury of the left ITA graft or cardiac structures was observed during the procedure.

From the Division of Cardiac, Thoracic, Transplantation and Vascular Surgery,[a] and the Department of Radiology,[b] Hannover Medical School, Hannover, Germany.

Received for publication March 11, 2008; accepted for publication March 21, 2008.

Address for reprints: Issam Ismail, MD, Division of Cardiac, Thoracic, Transplantation and Vascular Surgery, Hannover Medical School, Carl-Neuberg Str. 1 30625, Hannover, Germany (E-mail: Ismail.Issam@mh-hannover.de).

J Thorac Cardiovasc Surg 2009;137:1034-5
0022-5223/$36.00

doi:10.1016/j.jtcvs.2008.03.028

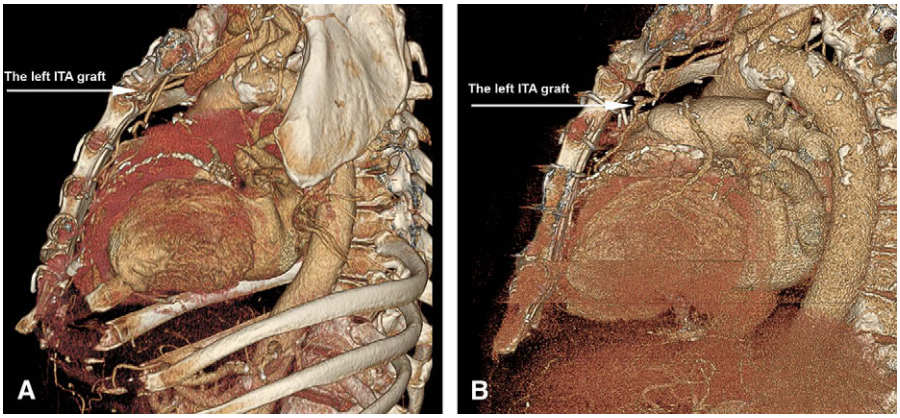

FIGURE 1. A, Preoperative 64-slice thoracic computed tomographic analysis demonstrated the left internal thoracic artery *(ITA)* graft crossing the sternal midline and adherence to the posterior wall of the sternum. B, Postoperative 64-slice computed tomographic scans confirmed the patency of the new bypass grafts and ruled out injury or occlusion of the previous left ITA and vein graft.

The postoperative course was uneventful. The postoperative 64-slice CT scans confirmed the patency of the new bypass grafts and ruled out injury or occlusion of the previous left ITA and vein grafts, as shown in Figure 1, *B*.

DISCUSSION

In most redo CABG procedures, complete median redo sternotomy is the preferred approach to fully expose the heart. However, this primarily blind procedure places the patient at high risk of injury to retrosternal cardiac structures and patent bypass grafts. According to a large survey on catastrophic hemorrhage during sternal re-entry, the most commonly injured structures were the right ventricle (39%), patent previous vein grafts (20%), aorta (15%), ITA (12%), and innominate vein (6%).[1] Redo sternotomy is more challenging if a patent conduit crosses the sternal midline and is adherent to the posterior sternal wall. A patent graft was reported as the only independent variable that increases the risk of catastrophic hemorrhage during redo sternotomy.[1]

FIGURE 2. Right anterior thoracotomy through the third intercostal space as access for the subsequent retrosternal adhesiolysis.

In this context appropriate preoperative imaging is of utmost importance. In our hands CT has remained the gold standard in elective cases.[5]

In addition to the sagittal oscillation saw, various strategies have been developed to reduce the risk associated with redo sternotomy, including establishment of peripheral cardiopulmonary bypass or controlled exsanguinations to decompress the heart and oblique sternotomy in the area of the jeopardized ITA graft with a micro-oscillating sagittal saw.[1-3] Nevertheless, redo sternotomy remains a blind and high-risk procedure. The reported thoracoscopic substernal dissection is safe and effective but would extend the duration of the procedure and requires special equipment.[4] In contrast, retrosternal adhesiolysis through an anterior minithoracotomy provides a simple and safe approach to dissect cardiac structures and extracardiac grafts from the posterior sternal wall before complete median resternotomy. It is not time consuming and does not require any special instruments.

In conclusion, retrosternal adhesiolysis through an anterior minithoracotomy is a simple and safe approach to facilitate median redo sternotomy and reduces the risk of associated complications, such as injury of grafts and cardiac structures.

References

1. Follis FM, Pett Jr SB, Miller KB, Wong RS, Temes RT, Wernly JA. Catastrophic hemorrhage on sternal reentry: still a dreaded complication? *Ann Thorac Surg*. 1999;68:2215-9.
2. Cohn LH. Myocardial protection for reoperative cardiac surgery in acquired heart disease. *Semin Thorac Cardiovasc Surg*. 1993;5:162-7.
3. Aris A. Controlled exsanguination during sternal reentry. *J Thorac Cardiovasc Surg*. 2003;126:918-9.
4. Gazzaniga AB, Palafox BA. Substernal thoracoscopic guidance during sternal reentry. *Ann Thorac Surg*. 2001;72:289-90.
5. Cremer J, Teebken OE, Simon A, Hutzelmann A, Heller M, Haverich A. Thoracic computed tomography prior to redo coronary surgery. *Eur J Cardiothorac Surg*. 1998;13:650-4.