Giant Left Atrium Needed Negative Pressure Ventilation
Erez Kachel, Hartzell V. Schaff, Fuad Moussa, Sergey Preisman, Ehud Ranani and Leonid Sternik
Ann Thorac Surg 2010;89:269-271
DOI: 10.1016/j.athoracsur.2009.03.102

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://ats.ctsnetjournals.org/cgi/content/full/89/1/269
Giant Left Atrium Needed Negative Pressure Ventilation

Erez Kachel, MD, Hartzell V. Schaff, MD, Fuad Moussa, MD, Sergey Preisman, MD, Ehud Ranani, MD, and Leonid Sternik, MD

Department of Cardiac Surgery, Sheba Medical Center, Ramat Gan, Israel; Division of Thoracic and Cardiovascular Surgery, Mayo Clinic College of Medicine, Rochester, Minnesota; Division of Cardiovascular Surgery Sunnybrook Health Sciences Center, Toronto, Ontario, Canada; Department of Anesthesia, Sheba Medical Center, Ramat Gan, Israel

Giant left atrium (GLA) is seen in a variety of cardiac conditions. The GLA is diagnosed by combining the patient’s history, physical examination, and imaging techniques, along with a computed tomographic chest scan, echocardiogram, and barium swallow test. We recently operated on a severely symptomatic 71-year-old woman with GLA (135 mm × 192 mm). We were forced to anesthetize her with negative pressure ventilation before connecting to the cardiopulmonary bypass circuit. Her postoperative course and long-term follow-up were uneventful. The procedure for GLA reduction is safe, even in very high-risk patients. Negative pressure ventilation may be used successfully as a bridge to cardiopulmonary bypass in certain cases.

Accepted for publication March 18, 2009.

Address correspondence to Dr Kachel, Department of Cardiac Surgery, Sheba Medical Center, Ramat Gan, 52621, Israel; e-mail: erezk@bezeqint.net.

Giant left atrium (GLA) is seen in a variety of cardiac conditions. The GLA is diagnosed by combining the patient’s history, physical examination, and imaging techniques, along with a computed tomographic chest scan, echocardiogram, and barium swallow test. We recently operated on a severely symptomatic 71-year-old woman with GLA (135 mm × 192 mm). We were forced to anesthetize her with negative pressure ventilation before connecting to the cardiopulmonary bypass circuit. Her postoperative course and long-term follow-up were uneventful. The procedure for GLA reduction is safe, even in very high-risk patients. Negative pressure ventilation may be used successfully as a bridge to cardiopulmonary bypass in certain cases.


Left atrial (LA) enlargement is seen in a variety of cardiac conditions, including mitral valve diseases, left ventricular failure, chronic atrial fibrillation, and left-to-right shunts. The LA may be enlarged to giant proportions [1], which are defined as bigger than 60 to 75 mm. Patients usually present with complaints of shortness of breath or dysphagia, or both. Morbidity from a giant left atrium (GLA) comes from compression of intracardiac and adjacent extracardiac structures. In addition, the presence of a GLA increases the thromboembolic risk, despite anticoagulant therapy. A GLA is usually diagnosed by combining the patient’s history, physical examination, and chest roentgenogram, along with a computed tomographic chest scan, echocardiogram, and barium swallow test.

In the Sheba Medical Center in Israel we recently operated on a 71-year-old woman who had three previous heart operations with a huge, dilated left atrium that was severely symptomatic. We decided to report this case because the combination of a very high operative risk of a GLA forced us to use negative pressure ventilation for induction of anesthesia, severe respiratory symptoms, and the complexity of a fourth cardiac surgery for this patient.

A 71-year-old woman who was admitted because of severe progressive dyspnea (ie, she was oxygen-dependent at rest). The patient had conditions of palpitations, orthopnea, nausea, vomiting, dysphagia, and difficulty swallowing solid foods. These symptoms worsened during the last several weeks before surgery was undertaken.

Her past medical history includes mitral commissurotomy for rheumatic heart disease in 1959, a mitral valve replacement in 1979, and a redo mitral valve replacement plus aortic valve replacement plus tricuspid valve replacement for infective endocarditis in 1999. A physical examination revealed an alert, intelligent, cooperative, cachectic woman with a body mass index of 17 who was found to be in New York Heart Association functional class IV, with congestive heart failure. Her blood pressure was 130/75 and she had an atrial fibrillation at approximately 120 beats/min. Her neck veins were distended and she had hepatomegaly. There was minimal air entry to her right lung and reduced air entry to the left. She had pitting edema of the lower extremities.

Her oxygen saturation was 86% on room air at rest. Her chest roentgenogram showed massive cardiomegaly. The chambers that caused the enlargement could not be clearly ascertained (Fig 1).

Her echocardiographic scan demonstrated a GLA (135 mm × 192 mm). In spite of the GLA, there was no left atrial thrombus. The mitral valve was functioning well,
and the plan was to examine the valve again during the procedure. The aortic and tricuspid valves were functioning appropriately. According to these findings we planned to reduce the left atrial size, to examine the mitral valve, and to repair or replace, if necessary.

Her computed tomographic scan showed that the GLA, which compressed and almost completely blocked her right bronchus, had caused right middle and lower lobe atelectasis and had partially compressed her left bronchus (Fig 2).

Endotracheal intubation was performed under topical anesthesia and light sedation in the sitting position after draping the patient. Mechanical ventilation, as well as manual ventilation, became very difficult due to high inspiratory pressure. The patient remained on spontaneous ventilation. Endotracheal tube was exchanged to the left double lumen tube with the intention to bypass the left main bronchus obstruction. However, artificial ventilation remained impossible. Attempts to pass catheters for jet ventilation through the bronchial obstruction were unsuccessful. We decided to proceed with cannulation for cardiopulmonary bypass under local anesthesia and light sedation; however, the patient was not able to assume the supine position without signs of severe respiratory distress. Therefore, cannulation proceeded with spontaneous ventilation, assisted by negative ventilation (Hayek RTX Respirator; Medivent Ltd, London, United Kingdom) in a respiratory synchronized mode as a temporary bridge to cardiopulmonary bypass. First, percutaneous cannulation of the superior vena cava (20-French Fem Flex femoral arterial cannula; Edwards Lifesciences, Irvine, CA) was performed using the right internal jugular vein and ultrasonic guidance. Then cannulation of the femoral artery and vein was performed in the right groin, and full cardiopulmonary bypass was connected. After placing the patient on cardiopulmonary bypass, the negative pressure ventilation device was switched back to endotracheal ventilation.

The patient’s chest was then prepped and draped and a mid-sternotomy was performed. After division of adhesions, the aorta was clamped. Cold blood antegrade cardioplegia was given. The left atrium was opened along the interatrial groove. The prosthetic mitral valve was examined and was found to be normal. A strip of 2-cm wide left atrial wall between the right pulmonary veins and interatrial septum was excised along the left atriotomy incision (Fig 3, Strip A). Another strip of 3-cm to 4-cm wide section between the left and right pulmonary veins was excised (Fig 3, Strip B). That strip began from the left atrial roof and extended to the left atriotomy between the posterior mitral valve annulus and the right inferior pulmonary vein. All incisions of the left atrial wall were sutured together with running 4-0 Prolene...
The patient was uneventfully weaned from cardiopulmonary bypass. After hemostasis, the chest was closed. The size of the left atrium was reduced significantly, according to the echocardiography at the end of surgery.

The patient was successfully weaned from mechanical ventilation on the first postoperative day. Her further postoperative course was uneventful. At the 10-month postoperative follow-up, the patient felt good and was asymptomatic.

The chest roentgenogram showed a significant reduction in the LA size (Fig 4). The computed tomographic chest scan showed a much smaller LA (dimension, 71 mm) (Fig 5).

Comment
This case was unusual because the GLA distorted the cardiac and intrathoracic structures and caused severe respiratory disorders. Furthermore, this was a very high-risk reoperation with adhesions of the heart and great vessels to the sternum, mainly because of the LA compression.

We believe that the left atrial diameter (135 mm × 192 mm) that we found here is the largest reported to date, and the only published one with extreme findings (both clinical and imaging), which forced using negative pressure ventilation for respiratory support.

Although many surgical procedures have been proposed to reduce the atrial size, their effectiveness is not well established [2, 3]. We present herein a patient with GLA and describe an effective and simple procedure.

In the surgical treatment of mitral valve problems, GLA increases perioperative mortality from 7% to 20%. In the case of cardiac cachexia, mortality is increased to more than 39% [4, 5].

Despite the extremely high risk, we decided to operate the patient because of her relatively young age, no comorbidities, her severe symptomatic condition, her good rehabilitation potential, and the fact that LA reduction volume will reduce the patient’s mortality and morbidity.

The GLA reduction operation presented here is a safe procedure even in very high-risk patients. Negative pressure ventilation may be used successfully as a bridge to cardiopulmonary bypass in certain cases. Accurate preoperative assessment regarding anesthetic and surgical methods is a key point for satisfactory operative results.

References

Compartment Syndrome After Endoscopic Harvest of the Great Saphenous Vein During Coronary Artery Bypass Grafting

Aparna Kolli, MD, Joyce T. Au, MD, Daniel C. Lee, MD, Natalie Klinoff, PA, and Wilson Ko, MD

Compartment syndrome is a limb-threatening condition often associated with traumatic, crush, burn, and reperfusion injuries. It is characterized by the development of disproportionately severe pain, paresthesias, decreased range of motion, loss of pulse, and a tense, edematous limb. In addition, measured compartment pressures and creatine phosphokinase values are often elevated. The definitive treatment is a decompressive fasciotomy. Compartment syndrome after coronary artery bypass grafting, however, is rare. The few reported cases all occurred in the vein donor leg after open harvest. We present a patient with compartment syndrome after endoscopic harvest of the saphenous vein for coronary artery bypass grafting.

© 2010 by The Society of Thoracic Surgeons

Accepted for publication June 16, 2009.

Address correspondence to Dr Kolli, SUNY Downstate Medical Center, 450 Clarkson Ave, Box 51, Brooklyn, NY 11203; e-mail: ahkolli@hotmail.com.
Giant Left Atrium Needed Negative Pressure Ventilation
Erez Kachel, Hartzell V. Schaff, Fuad Moussa, Sergey Preisman, Ehud Ranani and Leonid Sternik

Ann Thorac Surg 2010;89:269-271
DOI: 10.1016/j.athoracsur.2009.03.102

Updated Information & Services
including high-resolution figures, can be found at:
http://ats.ctsnetjournals.org/cgi/content/full/89/1/269

References
This article cites 5 articles, 3 of which you can access for free at:
http://ats.ctsnetjournals.org/cgi/content/full/89/1/269#BIBL

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
Cardiac - other
http://ats.ctsnetjournals.org/cgi/collection/cardiac-other

Permissions & Licensing
Requests about reproducing this article in parts (figures, tables) or in its entirety should be submitted to:
http://www.us.elsevierhealth.com/Licensing/permissions.jsp or email: healthpermissions@elsevier.com

Reprints
For information about ordering reprints, please email: reprints@elsevier.com