



# THE ANNALS OF THORACIC SURGERY



**Resection of a Chest Chondrosarcoma Invading the Spine and the Aorta**  
Philippe Noirhomme, Yves d'Udekem, Everard Munting, Gebrine El Khoury, Yves  
Humblet and Robert A. Dion  
*Ann Thorac Surg* 1998;65:534

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/65/2/534>

*The Annals of Thoracic Surgery* is the official journal of The Society of Thoracic Surgeons and the Southern Thoracic Surgical Association. Copyright © 1998 by The Society of Thoracic Surgeons. Print ISSN: 0003-4975; eISSN: 1552-6259.

2. McGoon DC, Mankin HT, Vlad P, Kirlin JW. The surgical treatment of supravalvar aortic stenosis. *J Thorac Cardiovasc Surg* 1961;41:125-33.
3. Doty DB, Polansky DB, Jenson CG. Supravalvar aortic stenosis: repair by extended aortoplasty. *J Thorac Cardiovasc Surg* 1977;74:362-71.
4. Brom AG. Obstruction to left ventricular outflow tract. In: Khansari S, ed. *Cardiac surgery: safeguards and pitfalls in operative technique*. Rockville, MD: Aspen, 1988;276-80.
5. Flaker G, Teske D, Kilman J, Hosier D, Wooley C. Supravalvar aortic stenosis: a 20-year clinical perspective and experience with patch aortoplasty. *Am J Cardiol* 1983;51:256-60.
6. Doty DB. Supravalvar aortic stenosis. *Ann Thorac Surg* 1991;51:886-7.
7. Myers JL, Waldhausen JA, Cyran SE, Gleason MM, Weber HS, Baylen BG. Results of surgical repair of congenital supravalvar aortic stenosis. *J Thorac Cardiovasc Surg* 1993;105:281-8.

## Resection of a Chest Chondrosarcoma Invading the Spine and the Aorta

Philippe Noirhomme, MD, Yves d'Udekem, MD, Everard Munting, MD, Gebrine El Khoury, MD, Yves Humblet, MD, and Robert A. Dion, MD

Department of Cardiovascular and Thoracic Surgery, Cliniques Universitaires Saint-Luc, Bruxelles, Belgium

A 34-year-old man presented with a large chondrosarcoma of the chest invading six ribs and the vertebral bodies of five adjacent thoracic vertebrae. En bloc resection of the tumor with six ribs, the anterior part of five vertebral bodies, and the thoracic aorta was performed through a thoracotomy and a paravertebral incision.

(*Ann Thorac Surg* 1998;65:534-5)

© 1998 by The Society of Thoracic Surgeons

A 34-year-old man with no past medical history presented with a left-sided chest pain. Computed tomographic scan showed a partly calcified mass measuring  $10 \times 14 \times 6$  cm in the posterior part of the left lower chest. On magnetic resonance imaging, because the mass was centered on the posterior part of the tenth rib, the suggestion was made that the tumor originated from this rib (Fig 1). There was evidence of invasion of the fifth to the ninth ribs and of the vertebral bodies of the sixth to the tenth thoracic vertebrae. The esophagus and the lung were not involved by the mass. The tumor surrounded the adjacent thoracic aorta in a horseshoe fashion. Microscopic examination of a needle biopsy specimen showed a well-differentiated chondrosarcoma. No other secondary locations were found.

Because of the size of the tumor and the invasion of the spine, the oncologists thought that the mass was unre-

sectable. Therefore, chemotherapy was started. After two administrations of a combination of doxorubicin and isophosphamide, the pain disappeared. A repeated computed tomographic scan showed no regression of the mass. Because of the young age of the patient, the possibility of an operation was discussed with the thoracic and the orthopedic surgeons. A curative resection was thought to be feasible.

The operation was performed with intraoperative monitoring of somatosensory evoked potentials because of the clear invasion of the spine and because of the potential involvement of the aorta. The patient was placed in the lateral decubitus position. The procedures were concomitantly performed by the thoracic and orthopedic surgeons. Intrathoracic exploration was performed through a left thoracotomy in the eighth intercostal space, whereas the partial resection of the invaded vertebral bodies necessitated a left paravertebral incision. The aorta was dissected above and below the mass. At the lower side of the tumor, a cuff of diaphragm had to be resected to gain control of the aorta. The esophagus was mobilized. Resection of the mass necessitated the section of the fifth to the tenth ribs in their midportion. Thereafter, the anterolateral part of the sixth to the tenth thoracic vertebral bodies were osteotomized through the posterior incision. Partial corpectomy of the sixth to the tenth thoracic vertebrae was obtained by an osteotomy carried out from the posterior to the anterior aspect of the vertebrae, starting in the posterolateral part of the pedicles. The spinal canal was not entered, whereas the corresponding intercostal nerves were sacrificed.

At this stage, the mass was separated from all surrounding structures, except the aorta. The midportion of the thoracic aorta was pinched by the tumor as tightly as if secured by a pair of pliers. It was impossible to dissect the aorta free from the mass, so the only way to extirpate the tumor was either to cut through it or to resect the aorta. Aortic replacement was undertaken because we



Fig 1. Chest magnetic resonance image.

Accepted for publication Sep 9, 1997.

Address reprint requests to Dr Noirhomme, Department of Cardiovascular and Thoracic Surgery, Cliniques Universitaires Saint-Luc, Ave Hippocrate 10, B-1200 Bruxelles, Belgium.

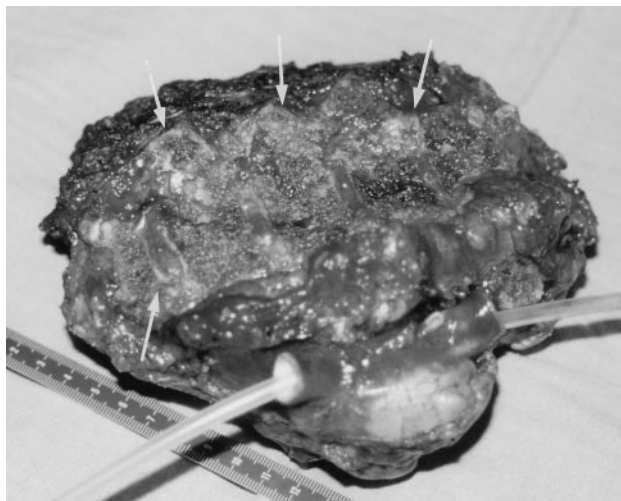


Fig 2. Operative specimen. Thoracic vertebrae are indicated by arrows. A catheter is passed through the thoracic aorta.

feared that section of the tumor might be responsible for the spread of neoplasia. The patient was placed under partial bypass with a Biomedicus (Eden Prairie, MN) pump placed between the left atrium and the diaphragmatic thoracic aorta. Under control of the somatosensory evoked potentials, the aorta was clamped above and below the mass and the resection was completed (Fig 2). A Dacron graft was then interposed between the two segments of the aorta. The large defect in the chest wall was reconstructed with the suture of an allograft of fascia lata. The postoperative period was totally uneventful, and the patient was discharged on the 9th postoperative day. A few days later, he was asymptomatic.

Microscopic examination of the mass confirmed the diagnosis of a well-differentiated chondrosarcoma. Although the ribs and the vertebral bodies were clearly invaded, the aorta was found to be free from invasion. The bony margins of resection were free of tumor.

One year later, the patient is free from recurrence.

### Comment

In recent years, aggressive surgical behavior has been advocated for large chest wall tumors invading adjacent structures [1-4]. Today the prognosis of patients with chondrosarcoma in whom complete resection of the tumor has been achieved is relatively good. With curative resection, the 5-year survival can reach 70% [5, 6]. Burt and associates [6], in a series of 88 patients with chondrosarcoma, demonstrated that the significant adverse prognostic factors were the presence of metastases, age greater than 50 years, incompleteness of resection, and the advent of local recurrence. Sex, grade, and tumor size were not prognostic factors. Therefore, we thought that extensive resection of all invaded structures, even vertebrae, had to be attempted. Nowadays, with the monitoring of the somatosensory evoked potentials, vertebrectomy and replacement of the thoracic aorta might become safer procedures [7].

This case brought up a lot of discussions between the

oncologists and the surgeons. Because of the size of the tumor and its spreading to the spine, the oncologists initially doubted that a curative resection could be achieved, and therefore chemotherapy was started. For today's surgeons working in a multidisciplinary team approach, resection of large chest wall masses can be performed with a low operative risk and minimal morbidity, and should be attempted in all patients who can benefit from a curative resection.

### References

1. Grunenwald D, Mazel C, Girard P, Berthiot G, Dromer C, Baldeyrou P. Total vertebrectomy for en bloc resection of lung cancer invading the spine. *Ann Thorac Surg* 1996;61:723-6.
2. Savant DN, Patel SG, Bokil KP, Bhatena HM, Karavana NM, Vyas JJ. Reconstruction of chest wall defects following extirpative surgery. *J Surg Oncol* 1994;55:186-9.
3. Chapelier A, Macchiarini P, Rietjens M, et al. Chest wall reconstruction following resection of large primary malignant tumors. *Eur J Cardiothorac Surg* 1994;8:351-7.
4. Hasse J. Reconstruction of chest wall defects. *Thorac Cardiovasc Surg* 1991;39(Suppl):241-7.
5. Martini N, Huvos AG, Burt ME, et al. Predictors of survival in malignant tumors of the sternum. *J Thorac Cardiovasc Surg* 1996;111:96-106.
6. Burt M, Fulton M, Wessner-Dunlap S, et al. Primary bony and cartilaginous sarcomas of chest wall: results of therapy. *Ann Thorac Surg* 1992;54:226-32.
7. Guerit JM, Verhelst R, Rubay J, Khoury G, Matta A, Dion R. Multilevel somatosensory evoked potentials (SEPs) for spinal cord monitoring in descending thoracic and thoraco-abdominal aortic surgery. *Eur J Cardiothorac Surg* 1996;10:93-104.

## Aneurysm of the Left Sinus of Valsalva Producing Aortic Valve Regurgitation and Myocardial Ischemia

Yoshiharu Takahara, MD, Yoshio Sudo, MD, Tooru Sunazawa, MD, and Nobuyuki Nakajima, MD

Division of Cardiovascular Surgery, Funabashi Municipal Medical Center, Funabashi, Japan

An aneurysm of the left sinus of Valsalva producing aortic valve regurgitation was treated by excising the aortic root including the aneurysm but leaving the aortic valve leaflets. The aortic valve was reimplemented inside a graft. Postoperative examinations revealed normal aortic valve function. In this case, the cause of aortic valve regurgitation was due to deformity of the aortic annulus. An aortic valve-sparing operation is an appropriate method for such a case.

(Ann Thorac Surg 1998;65:535-7)

© 1998 by The Society of Thoracic Surgeons

Accepted for publication Sep 10, 1997.

Address reprint requests to Dr Takahara, 1-21-1, Kanasugi, Funabashi, Chiba 273, Japan.

**Resection of a Chest Chondrosarcoma Invading the Spine and the Aorta**  
Philippe Noirhomme, Yves d'Udekem, Everard Munting, Gebrine El Khoury, Yves  
Humblet and Robert A. Dion  
*Ann Thorac Surg* 1998;65:534

**Updated Information  
& Services**

including high-resolution figures, can be found at:  
<http://ats.ctsnetjournals.org/cgi/content/full/65/2/534>

**References**

This article cites 6 articles, 5 of which you can access for free at:  
<http://ats.ctsnetjournals.org/cgi/content/full/65/2/534#BIBL>

**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](mailto:healthpermissions@elsevier.com).

**Reprints**

For information about ordering reprints, please email:  
[reprints@elsevier.com](mailto:reprints@elsevier.com)



**THE ANNALS OF  
THORACIC SURGERY**

