

Surgical Resection of a Huge Mediastinal Schwannoma after Preoperative Embolization

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Abstract : We present a case who underwent a surgical resection of a huge mediastinal schwannoma after arterial embolization of the tumor-feeding artery to minimize the risk of hemorrhagic complications during the surgical procedure. The difficulty of surgically exposing the tumor was presupposed; hence, uncontrollable bleeding during the surgical procedure was anticipated. A total en-block resection of the tumor was successfully performed without any massive bleeding. The use of preoperative embolization in the management of mediastinal tumors may help surgeons to safely perform a surgical resection when a poor surgical exposure and extensive surgical bleeding are anticipated.

Key words : Mediastinal tumor, Surgical resection, Embolization, Schwannoma

Introduction

A schwannoma is the most common type of posterior mediastinal tumor, and a surgical resection is considered to be the primary treatment for this type of benign tumor. We herein present a huge mediastinal schwannoma that was successfully resected after the embolization of the feeding arteries to control any possible haemorrhagic complications during surgery.

Materials and Methods

Patient

A 73-year-old female had been suffering from progressive dyspnea and had an elevated body temperature of up to 39°C. A chest radiograph demonstrated a huge round mass, measuring 15 cm×18 cm in diameter, located in the right upper thorax (Fig. 1). Horner's syndrome (ptosis, miosis, and anhidrosis of the face) on the right side was ob-

served which was supposed to have been caused by compression of the Th1-3 thoracic sympathetic

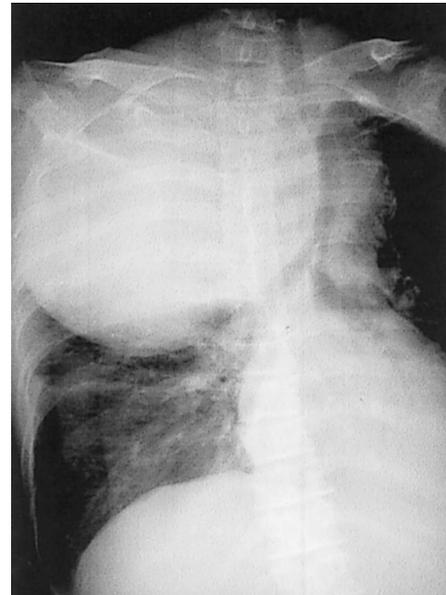


Fig. 1. A chest radiograph shows a huge mass in the right upper thoracic cavity. A severe mediastinal shift (right to left) is observed.

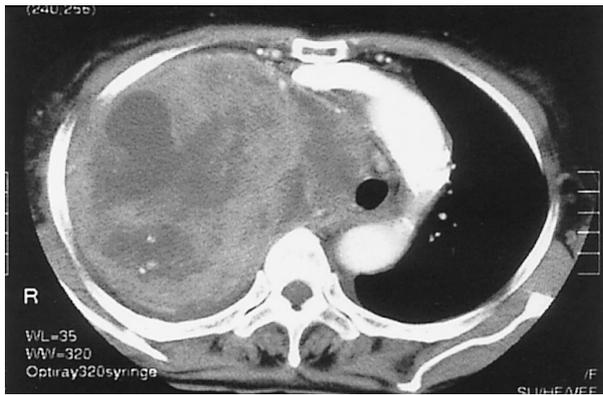


Fig. 2. A CT scan of the mass at the level of the aortic arch. The tumor compresses the mediastinal structure including the trachea and the major vessels. Unhomogeneously enhanced CT findings regarding the inside of the tumor suggested the tumor's well-vascularized features, and possible presence of internal hemorrhaging and necrosis was inferred.

nerve by the tumor. The right lung, especially the upper lobe, was severely compressed by the mass. Computed tomography showed a smooth and fairly capsulated round mass that compressed the mediastinal structure without any invasive capacity (Fig. 2). The trachea was also severely compressed over almost its entire length. Because of the tumor's radiographically benign features, the lesion was diagnosed to be a possible benign neurogenic tumor. Unhomogeneously enhanced CT findings regarding the inside of the tumor suggested the tumor to have well-vascularized features, and possible internal hemorrhaging and necrosis was inferred (Fig. 2). A high fever, elevated serum C-reactive protein concentration and white blood cell count seemed to suggest the necrotic condition of the tumor.

Surgical procedure

The embolization of the feeding arteries was performed 3 days before performing a surgical resection. Angiography revealed three abnormal arterial branches from the right subclavian artery that were supplying the tumor, and they were completely embolized by use of a Vortex Platinum Coil (Boston scientific co., France) (Fig. 3a, b). A median sternotomy with a right antero-lateral thoracotomy at the 4th intercostal space was made for adequate surgical exposure at the entire mediasti-

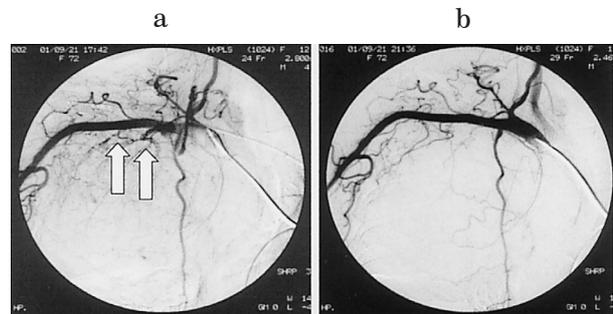


Fig. 3. Angiogram of the feeding arteries
a ; An angiogram showing abnormal feeding arteries branching from the subclavian artery (arrow).
b ; An angiogram after embolization of abnormal arteries supplying the tumor.

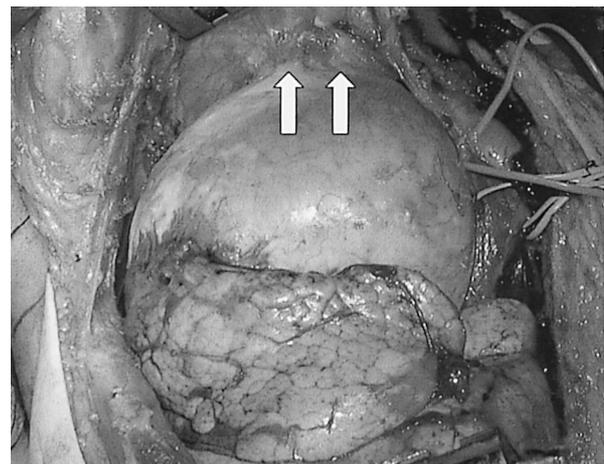


Fig. 4. Macroscopic surgical view ; Abnormal feeding arteries are observed from the right subclavian artery (arrow).

num including the origin of tumor-feeding artery from the subclavian artery. No direct invasion into the thoracic wall was observed. Mild inflammatory adhesion existed between the tumor and the mediastinal structure which was carefully divided. The major feeding arteries were found in the fibrous adhesion between the upper top of the tumor and the subclavian artery which was carefully ligated and cut (Fig. 4). Several small feeding vessels branching from the intercostals artery were present. After ligating those feeding arteries, the tumor was then completely removed from the thoracic cavity. A minimal amount of inflam-

matory adhesion was present between the right upper lobe lung and the tumor as they were carefully separated. The total blood loss during the entire procedure was 490 ml. The postoperative course was uneventful.

Pathology

The resected tumor measured 14×12×10 cm in size, and weighed 800 gr. Microscopically, the specimen shows a focal proliferation of spindle cells which had a delicate wavy cytoplasm with an interlacing pattern. These findings were compatible with schwannoma.

Discussion

Benign neurogenic tumors are the most common type of mediastinal tumor in the posterior mediastinum. A surgical resection is considered the primary treatment for this benign disease. Since benign mediastinal tumors are usually found in their early stages during medical checkups, such huge tumors are rarely encountered in cases undergoing a surgical resection. Other than the size problem, the CT findings of this case showed a non-homogenous enhancement thus suggesting a hyper-vascular capacity that could possibly lead to hemorrhagic complications during surgery.

The effectiveness of preoperative embolization for mediastinal tumors to reduce the risk of hemorrhagic complications has been described in the treatment of highly vascular tumors such as, for example, paraganglioma.¹⁾²⁾ Regarding benign neurogenic mediastinal tumors, the necessity of preoperative embolization has been only rarely reported. A case was reported which suggested the effectiveness of preoperative embolization for vascularly rich dumbbell schwannoma which required a two-term approach (the tumor was amputated in two parts, thoracic and neurosurgical, for total

removal).³⁾ Other reports have also demonstrated the necessity of preoperative embolization for the removal of huge sacral schwannoma in a situation of poor surgical exposure.⁴⁾⁵⁾

Of course, in most cases, schwannomas are not vascularly rich tumors. However, when the tumor is huge and is found to receive a large blood supply, and a poor surgical exposure is presupposed then, massive surgical bleeding is anticipated. In addition, in cases where piecemeal removal is the only choice because an en-block resection is impossible, the risk of bleeding may greatly increase. In such situations, the risk of critical bleeding increases when the tumor receives a large blood supply. Our findings suggest that this procedure is highly useful in order to perform a safe surgical resection of mediastinal tumors in which difficult surgical exposure and/or substantial surgical bleeding is anticipated.

References

- 1) Rakovich, G., Ferraro, P., Therasse, E., Duranceau, A. : Preoperative embolization in the management of a mediastinal paraganglioma. *Ann. Thorac. Surg.* 72 : 601-3, 2001.
- 2) Ward, P. H., Liu, C., Vinuela, F., Benton, J. R. : Embolization, an adjunctive measure for removal of carotid body tumors. *Laryngoscope* 98 : 1287-91, 1988.
- 3) Fiumara, E., D'Angelo, V., Florio, F. P., Nardella, M., Bisceglia, M. : Preoperative embolization in surgical treatment of spinal thoracic dumbbell schwannoma. A case report. *J. Neurosurg. Sci.* 40(2) : 153-6, 1996.
- 4) Yoshihara, T., Nagai, K. : Infantile schwannoma of the maxillary sinus. *Int. J. Pediatr. Otorhinolaryngol.* 40(2-3) : 181-7, 1997.
- 5) Stecken, J., Bardaxoglou, E., Touquet, S., Manzo, N., Cherki, E., Dorwling-Carter, D., Muckensturm B. : Giant sacral schwannoma with pelvic extension. *Neurochirurgie* 42(6) : 294-9, 1996.

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