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An effective and safe surgical approach for a superior sulcus tumor: A case report



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ABSTRACT

INTRODUCTION: Superior sulcus tumors, frequently referred to as Pancoast tumors, are a wide range of tumors invading a section of the apical chest wall called the thoracic inlet. For this reason, a surgical approach and complete resection may be difficult to accomplish. We experienced a locally advanced superior sulcus tumor (SST) located from the anterior to posterior apex thoracic inlet and performed complete resection after definitive chemoradiation.

PRESENTATION OF CASE: A 71-year-old Japanese male presented at our hospital due to left back pain and an abnormal chest computed tomography (CT) scan showing 80 × 70 × 60-mm tumor located in the left middle apex thoracic inlet. This tumor was located near the subclavian artery, and the subclavian lymph nodes were swollen. The tumor was found to be an adenocarcinoma (clinical-T3N3M0 stage IIIB). Therefore, we performed definitive chemoradiation therapy. Slight reduction in the tumor size was noted after the treatment, and the subclavian lymph nodes were not swollen. We next performed surgical resection for this SST. Regarding the surgical approaches, the anterior approach was a transmanubrial approach, and the posterior approach was a Paulson's thoracotomy. In this manner, we were able to perform complete en-bloc resection of this tumor.

DISCUSSION: This surgical approach was effective and safe for treating a SST located from the anterior to posterior apex of the thoracic inlet. The patient remains healthy and recurrence-free at 2.5 years after the operation.

CONCLUSION: Surgical approach for SST is difficult. Therefore, this approach is effective and safety.

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1. Introduction

Superior sulcus tumor, more commonly referred to as Pancoast tumors, are a wide range of tumors invading an area of the apical chest wall called the thoracic inlet. The unique characteristics of Pancoast tumors lie in the anatomy of region where these tumors occur. For this reason, a surgical approach to treating these tumors is technically demanding, and complete resection may be difficult to accomplish [1]. The treatment of superior sulcus tumor has evolved greatly over the years; initially thought to be inoperable, the first case of surgical removal was reported in 1956 by Chardack

and MacCallum [2]. In the 1990s, induction chemoradiotherapy followed by radical surgical resection was introduced as a new standard treatment for superior sulcus tumors. This treatment brought in improved outcomes and remains the gold standard today [1].

We experienced a case of locally advanced superior sulcus tumor located from the anterior to posterior apex of the thoracic inlet and performed complete resection after definitive chemoradiation. This patient remains healthy and alive 2.5 years after this aggressive operation. Given these outcomes, we feel that our trimodality therapy is worthy of consideration. The work has been reported in line with the SCARE criteria [3].

2. Presentation of case

A 71-year-old Japanese male presented at our hospital due to left back pain and an abnormal chest computed tomography (CT) scan showing a 80 × 70 × 60-mm tumor located in the left middle apex

Abbreviations: SST, superior sulcus tumor; CT, computed tomography; VATS, video-assisted thoracic surgery.

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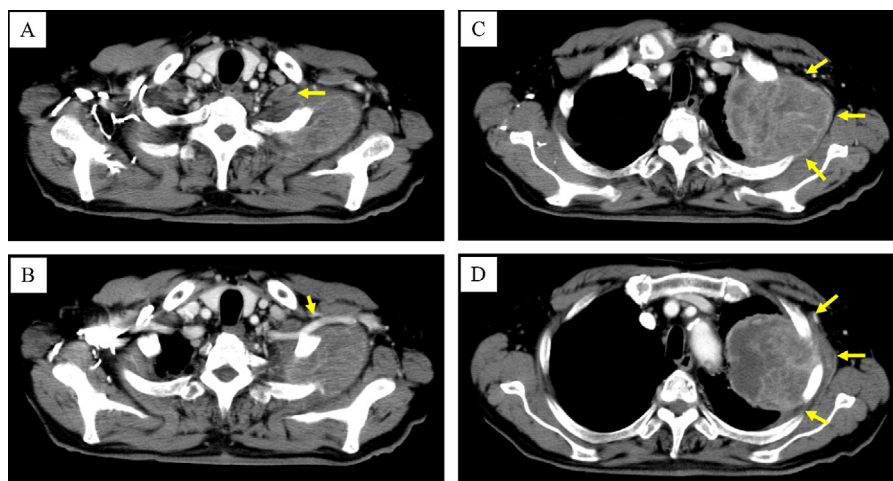


Fig 1. Computed tomography of the chest showing the localization of this tumor. This tumor located in the left apex thoracic inlet. Subclavian lymph node was swelling (A). This tumor touched subclavian artery (B). This tumor involved 1st, 2nd, 3rd ribs (C, D).

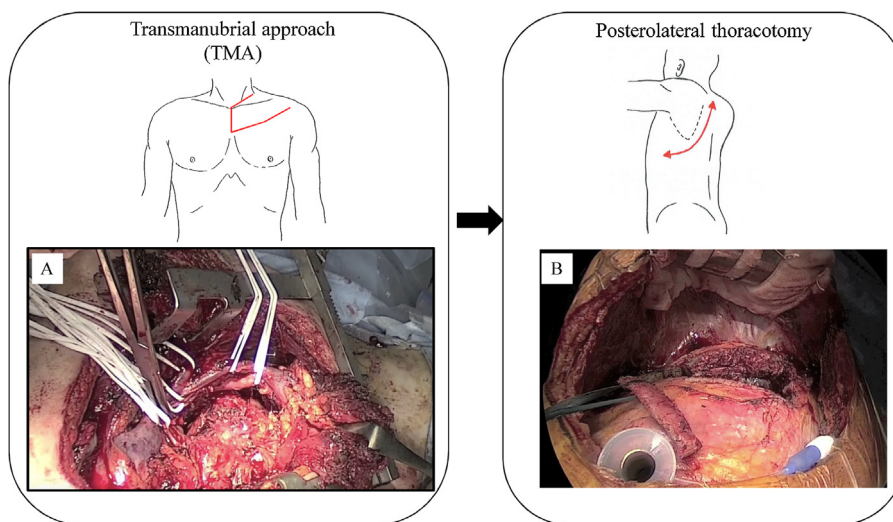


Fig. 2. The diagram of the surgery and surgical view. Peel off and secure left subclavian artery and vein (A). Classic posterolateral thoracotomy allowed us to obtain tumor-free margins in the section of the chest wall (B).

of the thoracic inlet. This tumor was located near the subclavian artery, and the subclavian lymph nodes were swollen (Fig. 1).

We performed endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA). The tumor was found to be an adenocarcinoma (clinical-T3N3M0 stage IIIB), so we performed definitive chemoradiation therapy (radiation total: 61.4Gy, weekly CBDCA and paclitaxel, 6 courses). After this treatment, slight reduction in the tumor size was noted, and the subclavian lymph nodes were no longer swollen. At this point, we diagnosed the tumor as cy-T3M0M0 stage IIB adenocarcinoma. We then performed surgical resection for this superior sulcus tumor located from the anterior to posterior apex of the thoracic inlet.

The surgical procedure included four steps. The diagram of the surgery and surgical view are shown in Fig. 2. First, we performed VATS via the left thoracic cavity. We then confirmed the resectability and lack of dissemination. Second, via the transmanubrial approach, we obtained tumor-free margins of the anterior cervical structures. The tumor was located near the subclavian artery, and we were able to remove the tumor from these major vessels safely. We then disconnected the anterior first and second ribs using a wire saw and performed subclavian lymph node dissection before closing the anterior wound. Third, through classic

posterolateral thoracotomy (Paulson's thoracotomy), we obtained tumor-free margins in a section of the chest wall (ribs 1, 2, and 3). We then performed left upper lobectomy and mediastinal lymph node dissection. Finally, we reconstructed the chest wall using a double layer of polypropylene mesh (Bard Mesh, C.R. Bard Inc., Karlsruhe, Germany) with the patient in the neutral lateral position after the placement of a chest tube. The mesh was sutured to the ribs, and the thoracotomy was closed. The operative time was 10 h, and the intraoperative bleeding was 1200 ml.

Pathologically, complete resection was achieved. The pathological diagnosis was yp-T3N0M0 adenocarcinoma, and the histologic response for evaluating the tumor response to induction therapy was two (E2). The patient was discharged from our hospital 18 days after surgery. This surgery was successful, with no major postoperative complications. The patient remains healthy and recurrence-free at 2.5 years after the operation.

3. Discussion

Two points should be noted in association with this case. First, this surgical approach (anterior: transmanubrial approach, posterior: Paulson's thoracotomy) was effective and safe for treat-

ing a superior sulcus tumor located from the anterior to posterior apex of the thoracic inlet. This patient was suspected of having subclavian lymph node metastasis and a tumor touching the subclavian artery. Therefore, the transmanubrial approach was useful to remove the tumor from major vessels and dissect the subclavian lymph nodes. We were fortunate to be able to remove the tumor from the subclavian artery without issue; however, if we had not been able to remove it, we could alternatively have resected and reconstructed the subclavian artery via the transmanubrial approach. Indeed, we previously reported several aggressive surgeries in which we used the transmanubrial approach and resected/reconstructed major vessels [4,5].

Second, the patient remains healthy and recurrence-free at 2.5 years after this aggressive operation. We therefore feel that our trimodality therapy is worthy of consideration. Regarding the treatment for superior sulcus tumor, the advantages of performing preoperative radiotherapy were first described by Shaw et al. in 1961 [6]. The potential benefits include a decrease in the tumor size to improve the resectability by shrinking the tumor, a reduction in the number of viable cells to limit the risk of seeding cells during resection, and the blockage of lymphatics to limit the risk of seeding further. Despite the lack of randomized studies, this treatment was generalized because many series have reported better local control and survival rates with it than with other approaches (30% at 5 years), especially in patients who underwent complete resection and whose specimens revealed rare viable cells after irradiation [7].

Trimodality therapy has become a “standard of care” in patients with superior sulcus tumors. The rationale for adding concurrent chemotherapy to preoperative radiotherapy was to improve the resection rates and to treat occult systemic disease in order to limit the risk of distant relapse [8]. The present patient first received definitive chemoradiation because of subclavian lymph nodes metastasis (N3). After this therapy, a slight reduction in the tumor size was noted, and the subclavian lymph nodes were no longer swollen. In general, surgery after definitive chemoradiation therapy is called “salvage surgery”. As a result, we performed salvage surgery for this patient and achieved a good prognosis. These findings underscore the importance of considering the possibility of surgical resection for cases of advanced non-small cell lung cancer. “Never give up” is therefore considered to be an important mantra for thoracic surgeons.

4. Conclusion

We experienced a case of locally advanced SST located from the anterior to posterior apex of the thoracic inlet. Our surgical approach was effective and safe for treating a SST.

Conflict of interest

There were no conflicts of interest or financial interests for any of the authors.

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Ethical approval

We got ethical approval from ethical committee of University of Occupational and Environmental health, Japan.

Consent

Written and signed consent from the patient to publish a case report has been obtained.

Author contributions

Soichi Oka; Study design, writing•Kenichi Kobayashi; Ohter•Hiroki Matsumiya; Ohter•Masatoshi Kanayama; Other•Shuichi Shinohara; Other•Shinji Shinohara; Other•Akihiro Taira; Other•Taiji Kuwata; Other•Masaru Takenaka; Other•Yasuhiro Chikaishi; Other•Ayako Hirai; Other•Yuko Tashima; Other•Naoko Imanishi; Other•Koji Kuroda; Other•Yoshinobu Ichiki; Other•Fumihiko Tanaka; Study design.

Guarantor

Fumihiko Tanaka, M.D., Ph.D.

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