Clinical Scenarios in Thoracic Surgery

CLINICAL SCENARIOS IN SURGERY SERIES

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To my lovely wife Lisa, who in our first year of marriage managed to make most of my dreams come true; and to my parents, Victoria and Mansour Kalimi, for giving me the opportunity to be a part of this wonderful profession.

R.K.

To Dr. Robert J. Jensik, a master surgeon, who taught us all the science and the art of thoracic surgery.

L.P.F.

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foreword

The editors, Dr. Kalimi and Dr. Faber, have employed a unique approach to their presentation of the subject matter in their new text, *Clinical Scenarios in Thoracic Surgery*. The format of the text is that of a teaching conference based on the concept we all are familiar with—surgical grand rounds. These weekly conferences are both a highlight of the educational program as well as a bane to the uninformed or disinterested members of either the "house" or attending staffs. This text promotes the former (education) and diminishes the latter (the attendant chagrin of exposing one's ignorance of a given subject). In using this text, one can keep the latter to his or her self.

The text is set up quite simply. The subjects covered pertain to the pathologic involvement of the chest wall, diaphragm, pleura, tracheobronchial tree, congenital diseases and structural diseases of the lung, inflammatory disease of the lung, tumors and cysts of the mediastinum, malignant lung tumors, lesions of the esophagus, and the description of the pertinent surgical procedures for the management of the aforementioned disease processes. The text itself consists of the 58 scenarios, with each case presented initially as an unknown clinical problem. The history is presented and discussed as to what the possible diagnosis might be. To establish the diagnosis the appropriate diagnostic studies are presented (incidentally, the illustrations are excellent). Discussion of the entity and its ramifications follows, additional diagnostic procedures as indicated are outlined, and the therapeutic approach is selected. All these processes are described in appropriate detail. Additional cogent information is presented either relative to the disease entity or to the operative procedure, or both. Finally, the disposition of the case is given.

Overall, the amount of information presented, although in a concise manner, is more than satisfactory for the reader's understanding of the disease process and its present day treatment.

Lastly, the Index of Cases is presented. This contains the diagnostic topics discussed in the text. With this the reader, if so inclined, may explore a particular subject that is of immediate interest at a given time.

Thus, this volume may be used in one of two ways: as a testing tool to sharpen one's knowledge of an "unknown" clinical problem, or as an informational resource of an encapsulated but complete review of a given thoracic surgical subject. Surgeons in training or even throughout their careers will find this text a valuable addition to one's library.

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preface

Clinical Scenarios in Thoracic Surgery is the first book of the Clinical Scenarios in Surgery series. The concept of editing a case-based textbook in which the information is presented in an interactive format greatly appealed to me. This unique format of clinical case presentation enables the reader to more effectively synthesize and integrate the information. In *Clinical Scenarios of Thoracic Surgery*, the reader is presented with a case-based review of general thoracic surgery patients. The authors were requested to create a clinical scenario based on radiographic images and to then provide the reader a differential diagnosis, treatment plan, and discussion of the disease process. Cases were chosen to provide a global overview of the subject, such as the chest wall, diaphragm, pleura, trachea and bronchus, congenital diseases of the lung, structural diseases of the lung, inflammatory diseases of the lung and mediastinum, lung disease, and esophageal disease. Clinical scenarios involving new technology such as laser and stent treatment of tracheal obstruction and video-assisted thoracoscopic surgery (VATS) are also included.

For many years attending and resident surgeons of the Thoracic Surgical Department at the Rush University Medical Center have met each Saturday morning to discuss interesting cases. Other surgeons and physicians from the Chicago area were invited to participate and present cases from their respective institutions. Traditionally, radiographic images were presented to a thoracic resident and heated, but quite informative discussions soon emerged. The success of the Saturday morning conference was due to the fact that the cases were interesting, the radiographic images were classic for the disease pathology, and the audience who participated were knowledgeable and experienced in the field of thoracic surgery.

This book was put together with the intention of providing the reader with a stimulating and interactive case-based discussion of the disease processes. The reader can review case scenarios without prior knowledge of the disease pathology and then follow the radiographic interpretation, diagnostic tests, operative approach, and postoperative management. In turn, one can refer to the table of contents or the index of cases and review a particular case for a disease process that may be of interest.

I had the pleasure of editing this book with my mentor and colleague, Dr. L. Penfield Faber. During his career in thoracic surgery at the Rush University Medical Center, Dr. Faber has assisted in the training of approximately 80 thoracic surgeons who are now practicing in the United States and abroad. His suggestions and comments in editing this manuscript were invaluable, and I am indebted to him for his contribution.

I would like to thank the authors, many of whom have had the opportunity to participate in the Saturday morning conferences, for providing numerous radiographic images, meticulously researching the information, and promptly submitting the scenarios for editorial revisions. I would also like to thank my colleague, Dr. Robert Bojar, also a graduate of the Rush University Medical Center's Thoracic Surgical Residency Training Program, for providing me with the necessary guidance and for encouraging me in this endeavor.

Finally, I would like to thank Lisa McAllister, Acquisitions Editor at Lippincott Williams & Wilkins, for her diligence and effort in getting this book to publication and Dr. Thomas Shields for providing useful suggestions and for writing the foreword for this book.

Robert Kalimi, M.D.

case 1

Presentation

A 27-year-old student is admitted to the hospital complaining of dyspnea and cough occurring over the past 6 weeks. The patient has no significant medical problems and does not smoke. He has no family history of malignancy. He has not traveled outside the United States in 20 years. On physical examination, vital signs are stable, heart sounds are normal, and there are decreased breath sounds over the right chest.

Chest X-rays

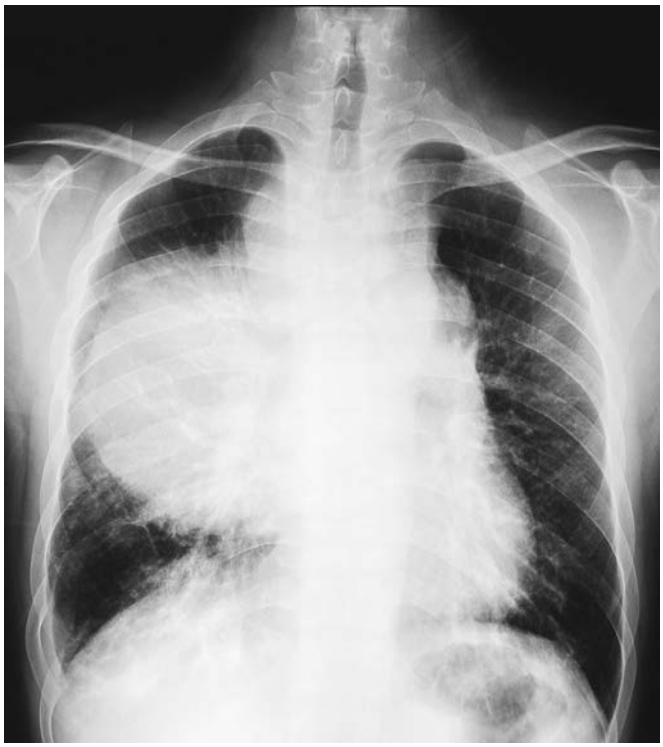

Figure 1-1

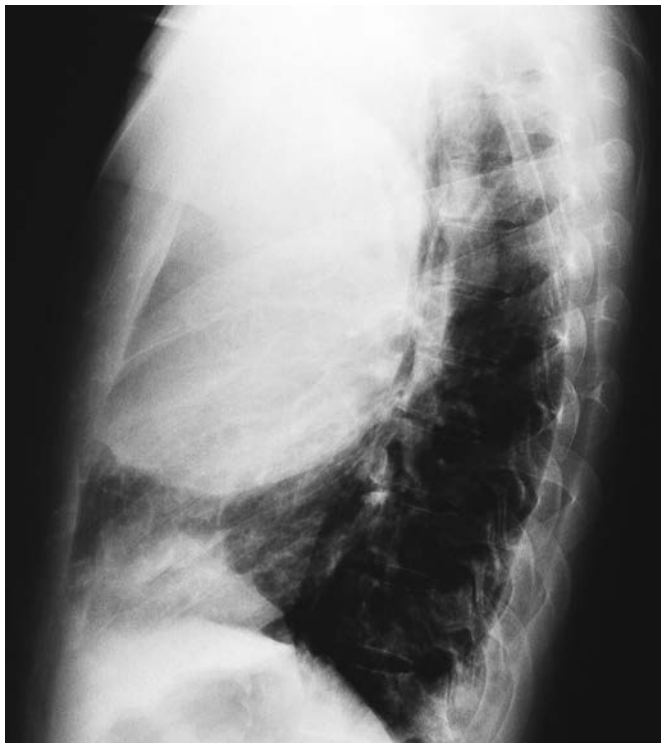

Figure 1-2

Chest X-ray Report

The chest x-rays demonstrate a large anterior mass located in the mediastinum and the right chest. The heart is not enlarged. There are no pleural effusions. There are no masses in the left lung field.

Discussion

The differential diagnosis of anterior mediastinal masses includes thymoma, lymphoma, thyroid goiter, and germ cell tumor. In a patient who presents with an anterior mediastinal mass, a complete history and physical examination is important. A history of ptosis, dysarthria, and muscle weakness, particularly if the weakness increases with increased activity, suggests the diagnosis of mediastinal thymoma associated with myasthenia gravis. Patients with enlarged axillary, supraclavicular, and cervical lymph nodes may have lymphoma. About 60% of patients with mediastinal germ cell tumors are asymptomatic, and 40% have dyspnea and chest pain.

In a young man with a mediastinal tumor, a computed tomography (CT) scan of the chest, as well as tumor markers, should be obtained. Tumor markers include α-fetoprotein, β-human chorionic gonadotropin, and lactate dehydrogenase.

CT Scans

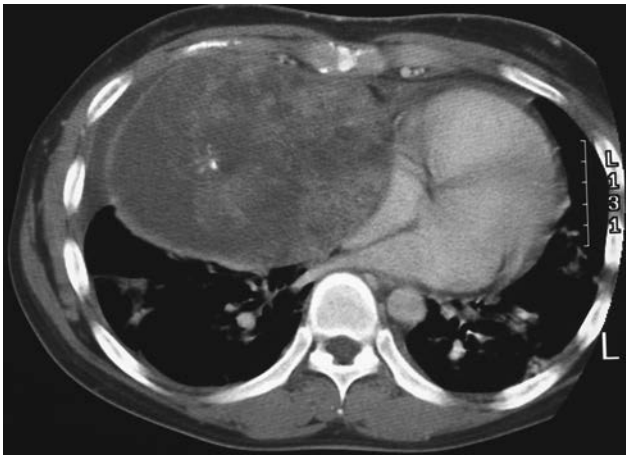

Figure 1-3

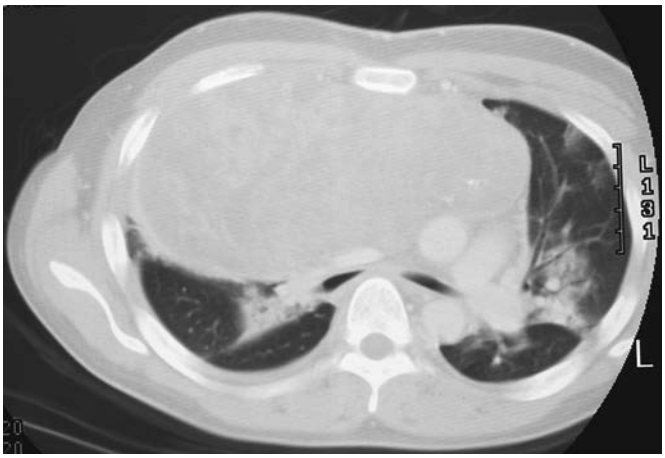

Figure 1-4

CT Scan Report

The chest CT demonstrates a heterogeneous 18-cm × 8-cm × 9.8-cm mass with calcifications and multiple areas of necrosis and hemorrhage. The mass extends into the neck and right pleural space. There is compression of the trachea and both main-stem bronchi.

Case Continued

Tumor markers are submitted, and the α-fetoprotein is 437 ng/mL; the β-human chorionic gonadotropin level is slightly elevated.

Discussion

Elevated α-fetoprotein and β-human chorionic gonadotropin levels in a young man are highly suggestive of the diagnosis of germ cell tumor. About 10% of germ cell tumors are extragonadal; they can be benign (such as teratomas or epidermoid cysts) or malignant. The mediastinum is the most common extragonadal site of germ cell tumors. Malignant germ cell tumors are further categorized into seminomas and nonseminomatous germ cell tumors. Malignant germ cell tumor is a possible diagnosis when either the α-fetoprotein or β-human chorionic gonadotropin tumor marker is elevated. In most pure mediastinal seminomas, α-fetoprotein and β-human chorionic gonadotropin levels are normal. Serum α-fetoprotein is never elevated, and β-human chorionic gonadotropin is mildly elevated in about 10% of patients with mediastinal seminomas. Germ cell tumors are believed to arise from totipotential cells in the thymus. In the past, some believed that these tumors represented metastases from occult gonadal tumors. However, pathologic examination of scrotal contents of patients with mediastinal tumors has not substantiated this theory. Thus, in patients with mediastinal germ cell tumor and a normal testicular examination, ultrasonography of the testis is not necessary. Because the treatments of benign and malignant germ cell tumors differ, tissue diagnosis is necessary for determining therapeutic plans. Tumor marker (e.g., α-fetoprotein or β-human chorionic gonadotropin) levels higher than 500 ng/mL are diagnostic of nonseminomatous germ cell tumors, and the chemotherapy regimen should commence without awaiting histologic diagnosis.

In patients with elevated tumor markers, histologic and cytologic methods have been used to determine the histologic subtype. CT-guided core needle biopsies may provide adequate sampling. If core needle biopsy does not yield a diagnosis, open biopsy by anterior mediastinotomy (Chamberlain's procedure) is performed to provide sufficient tissue for diagnosis.

Case Continued

The patient undergoes Chamberlain's procedure through an incision over the second costal cartilage, and histologic evaluation reveals endodermal sinus (yolk sac) tumor.

Discussion

Only about 10% of germ cell tumors are extragonadal, and the mediastinum is the most common extragonadal site. Other extragonadal sites include the retroperitoneum and pineal gland. Germ cell tumors account for about 10% of mediastinal tumors. About 10% of mediastinal germ cell tumors are benign (teratomas); the rest are malignant tumors, which are categorized into seminomatous and nonseminomatous tumors and which respectively account for 30% and 70% of the malignant mediastinal germ cell tumors. The histologic subtypes of nonseminomatous germ cell tumors include (a) teratocarcinoma, (b) endodermal sinus (yolk sac) tumor, (c) choriocarcinoma, and (d) embryonal carcinoma. The incidence of malignant germ cell tumors of the mediastinum appears to be increased in patients with Klinefelter's syndrome (hypogonadism, XXY, azoospermia). These patients develop germ cell tumors about 10 years earlier than patients without Klinefelter's syndrome. Malignant germ cell tumors of the mediastinum are unusual in women.

The clinical presentation is dependent on the histology. Benign tumors (teratomas) are usually incidental radiologic findings. Malignant tumors usually cause symptoms, often owing to compression or invasion of mediastinal structures such as the airway, the esophagus, or the superior vena cava. Compared with seminomatous tumors, nonseminomatous tumors have a propensity to grow

rapidly; thus, prompt diagnosis and initiation of therapy are important. Up to 85% of patients may present with metastatic disease to the lung, pleura, retroperitoneal lymph nodes, liver, bone, brain, and kidneys. Hematologic malignancy may also be associated with nonseminomatous mediastinal germ cell tumor and is usually diagnosed within 1 year of the diagnosis of nonseminomatous germ cell tumor. Treatment of nonseminomatous germ cell tumors includes cisplatin-based chemotherapy regimen.

Case Continued

Abdominal and brain CT scans demonstrate no evidence of metastatic disease. The patient undergoes four cycles of cisplatin, etoposide, vinblastine, and bleomycin in various combinations.

Although the patient's serum α-fetoprotein markers decrease to normal levels, the tumor does not shrink and continues to cause progressive dyspnea and chest pain. The patient undergoes surgical resection through a median sternotomy. Surgical dissection permits total removal of the mass with its capsule intact. Care is taken to avoid injury to the recurrent laryngeal nerves and the phrenic nerves. Because the mass is adherent to the right upper lobe, a small rim of lung is stapled and resected with the mass. Pathologic examination reveals mature teratoma with no evidence of malignancy.

Intraoperative Photograph

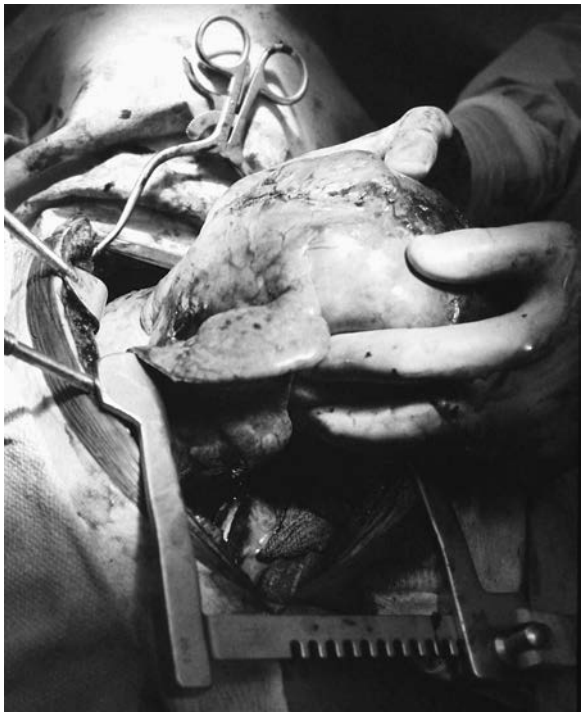

Figure 1-5 See Color Plate 1 following page 114.

Discussion

In contrast to pure mediastinal seminomas that are sensitive to radiation and cisplatin-based chemotherapy, nonseminomatous mediastinal tumors are treated by a variety of cisplatin-based chemotherapy regimens without radiation. After a 3-month cycle of chemotherapy, the patient is restaged by CT scan of the chest and abdomen and by reevaluation of serum markers. If tumor markers normalize and there is no radiographic evidence of tumor, no further intervention is necessary, and the patient is evaluated monthly with physical examination and a chest x-ray for the first 2 years. If tumor markers remain elevated after a chemotherapy regimen, higher-dose chemotherapy or other chemotherapy regimens are used. If tumor markers normalize but the tumor is present radiographically (as in the scenario described), surgical resection should be performed if tumor fails to regress on serial CT scans. Usually, the residual tumors are benign teratomas and necrotic tumors. Benign teratomas after successful chemotherapy treatment should be resected because of the possibility of increased size of the teratoma, with subsequent compressive effects. Furthermore, teratomas may undergo malignant degeneration. Finally, if the resected specimen includes viable germ cell tumor, additional cycles of chemotherapy should be administered.

case 2

Presentation

An 85-year-old woman with a 50-pack-per-year history of smoking has been treated with antibiotics for the past 2 weeks for symptoms of bronchitis. After a 2-week course of antibiotics, the patient's cough persists, and a chest x-ray is obtained. The chest x-ray demonstrates a nodule in the right lung, and computed tomography (CT) scans are obtained for further evaluation.

CT Scans

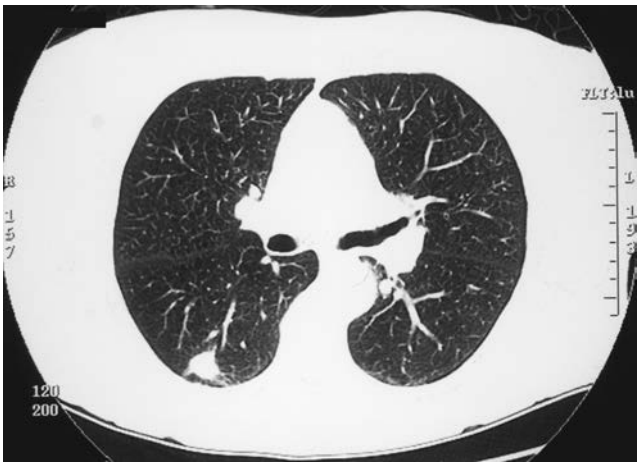

Figure 2-1

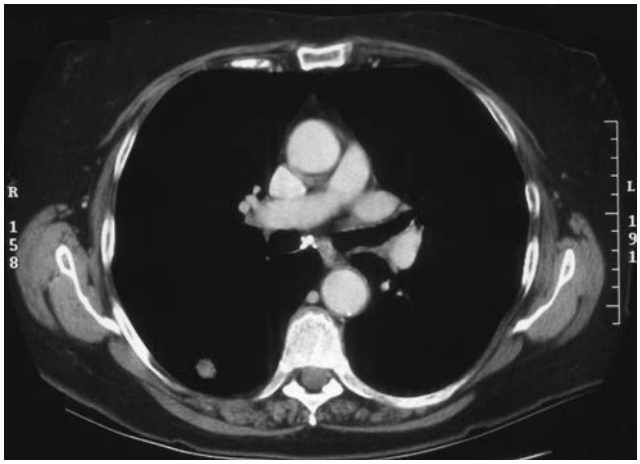

Figure 2-2

CT Scan Report

The CT scans demonstrate a 2-cm solitary nodule in the superior segment of the right lower lobe. The mass is spiculated and extends to the pleura. There is no mediastinal adenopathy. Mild emphysematous changes are present. There are no pleural effusions.