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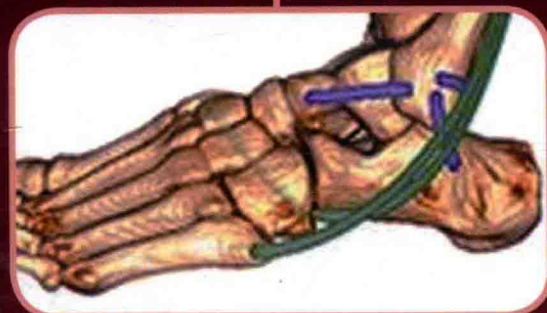
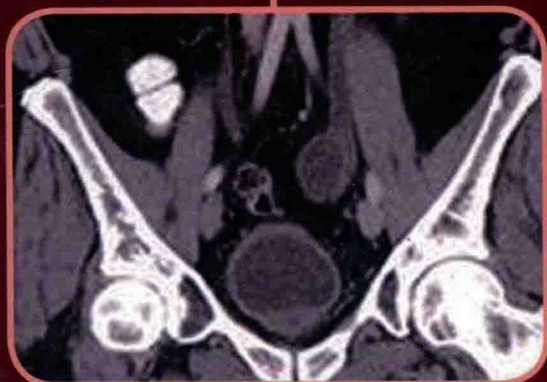
中国医师协会住院医师规范化培训参考教材

供放射科住院医师、专业学位研究生使用

核心放射学：影像诊断图解教程

Core Radiology

A Visual Approach to Diagnostic Imaging



主编 Jacob Mandell

主译 王维平

CAMBRIDGE

人民卫生出版社

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Core Radiology

A Visual Approach to Diagnostic Imaging

主 编 Jacob Mandell

主 译 王维平 美国 Mayo Clinic

副主译 (按姓氏笔画排序)

丁铁钢 美国麻省 Saint Anne 医院

卢 漫 四川省肿瘤医院/研究所

余建群 四川大学华西医院

吴汉平 美国 Case Western Reserve 大学医学院

杨运俊 温州医科大学附属第一医院

陈绍亮 复旦大学中山医院

居胜红 东南大学附属中大医院

南海燕 第四军医大学唐都医院

胡红杰 浙江大学医学院附属邵逸夫医院



人民卫生出版社

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地 址：北京市朝阳区潘家园南里 19 号

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译者名单

中国专家顾问（按姓氏笔画排序）

于经瀛 北京医院
王 武 中日友好医院
王绍武 大连医科大学附属第二医院
卢光明 中国人民解放军南京军区总医院
朱文珍 华中科技大学同济医学院附属同济医院
许乙凯 南方医科大学南方医院
吴春根 上海第六人民医院
宋 彬 四川大学华西医院
张敏鸣 浙江大学医学院附属第二医院
李亚明 中国医科大学附属第一医院
李路平 国家卫生和计划生育委员会

杨建勇 中山大学附属第一医院
杨 健 西安交通大学第一附属医院
陈 敏 北京医院
周 石 贵州医科大学附属医院
姜卫剑 中国人民解放军火箭军总医院
赵 鑫 郑州大学第三附属医院
徐 凯 徐州医科大学附属医院
崔光彬 第四军医大学唐都医院
彭志毅 浙江大学医学院附属第一医院
程敬亮 郑州大学第一附属医院
韩 萍 华中科技大学同济医学院附属协和医院

美国华人放射医生顾问

董 方 美国 Cleveland Clinic
郭文君 美国特拉华州 Nemours/Alfred I. duPont 儿童医院
赵庆华 美国纽约市 Crystal Run Healthcare
范文林 美国费城 Hahnemann 大学
赵炎乐 美国加州 Pomona Valley 医院
张岱伟 美国威斯康星州 Marshfield Clinic
王胜夫 美国艾荷华州立大学

汤 毅 美国纽约州 VA Western New York Healthcare System at Buffalo
卢 洋 美国伊利诺伊州大学芝加哥分校
俞金星 美国 Virginia Commonwealth 大学
闫增民 美国纽约州立大学 Stony Brook 分校
殷玉明 美国德州 Corpus Christi 医学中心
周大华 美国纽约州立大学 Nassau 大学医院
周以华 美国密苏里州 Saint Louis 大学

翻译（按姓氏笔画排序）

万 仞	于 静	于 瀛	马宏星	毛志群	王 玉	王亚玲	王草叶	王 殊	王 超	王 瑞
卢陈英	卢 瞳	史凤霞	史踊跃	田 菊	全杰蓉	刘会茹	刘 欢	刘 丽	刘 芳	刘建滨
刘 鹏	阳静宁	孙明涵	孙 欣	孙颖志	安天志	江 静	祁 丽	许长德	许 倩	严成功
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詹 麒	谭显政	潘春树	颜丽芬	颜林枫	颜 彬	鞠 斌				

审校（按姓氏笔画排序）

丁铁钢	于 瀛	毛志群	王 玉	王草叶	王斯妮	邓 军	邓 雯	卢 洋	卢 瞳	龙 茜
刘 芳	刘德全	吕霞飞	孙 欣	孙颖志	闫增民	张 军	杨 帆	杨国威	汪 晶	肖 刚
陈 平	陈志霞	周大华	周以华	居胜红	郑丽丽	郑杨杨	俞金星	南海燕	胡立斌	荆丽娜
赵庆华	赵 振	赵 添	赵 赫	赵 鑫	唐 静	殷玉明	袁 放	郭文君	彭礼清	谢双双
韩 宇	解 卓	颜林枫								

章节负责人

1. 胸部影像

总负责 第四军医大学唐都医院团队
总审校 南海燕 王维平

2. 胃肠道影像

总负责 东南大学附属中大医院团队
总审校 周大华 谢双双 王维平

3. 泌尿生殖影像

总负责 四川大学华西医院团队
总审校 卢瞳 唐静 南海燕 王维平

4. 神经影像

中方负责人 杨运俊 李亚军
美方负责人 闫增民
总审校 闫增民 居胜红 王维平

5. 骨骼与肌肉影像

总负责 四川大学华西医院团队
总审校 殷玉明 余建群 毛志群 南海燕
王维平

6. 超声影像

中方负责人 卢漫 刘德全
美方负责人 赵庆华
总审校 吴汉平 王维平

7. 核医学影像

中方负责人 陈绍亮
美方负责人 王维平
总审校 陈绍亮 马宏星 王维平

8. 乳腺影像

总负责 四川肿瘤医院研究所团队
中方负责人 杨帆
美方负责人 丁铁钢
总审校 杨帆 丁铁钢 吴汉平 王维平

9. 心脏血管影像

总负责 浙江丽水市中心医院团队
总审校 汪晶 王维平

10. 介入放射学

总负责 介入放射俱乐部(CirClub)团队
总审校 吴汉平 王维平

11. 儿科影像

总负责 贵州医科大学团队
中方负责人 彭芸 毛志群
美方负责人 郭文君 王维平
总审校 吴汉平 郭文君 毛志群

12. 影像物理

总负责 董方 王维平
总审校 董方 王维平

前 言

尽管这是中国医学影像史上第一本中英文双语对照教科书,但这并非是我们当初决定要翻译这本书的本意。

随着中国住院医师规范化培训进入制度化,同质化培训是解决当前医疗资源短缺与分配不均的重要手段之一。在过去的三年里,多中心医学影像教育平台(Multiple Institutional Medical Imaging Education, www.mimie.net)为我国影像学标准化培训做出了积极的尝试,这本中英文双语对照影像学教科书就是在这样的背景下诞生的。

我们希望这本书能够为大家学习和掌握医学影像基本概念提供帮助,同时也希望能够在帮助大家理解英文医学影像专业知识、相关术语以及表达方式中起到积极作用。翻译是一门艺术,我们力求在准确表达英文原意的时候,尽量使中文流畅并保持英文一致的顺序结构。在过去两年多时间里,我们所有参与翻译和校对的学生和专家们都做出了最大的努力,进行了无数次讨论和修改。但是,我们仍有很多遗憾,译文中还不时发现一些不妥甚至错误的地方。我们恳请大家在阅读此书的时候,持有一种批评和帮助的态度,如果有不同的意见或发现了问题,希望大家到我们的网络专栏里面进行讨论并提出您宝贵的修改意见,我们会在再版的时候不断完善。

我要感谢我们来自全国数十家医院的学员,因为你们的激情使得这一艰巨的任务得以启动;我要感谢各多中心医学影像教育参与单位和专家们,因为你们的支持使得翻译和校对工作得以顺利展开;我要特别感谢美国的华人放射影像学的医师们,因为你们的把关使得这本书翻译的准确性得到保证。最后,我要感谢我的家人,我的太太和两个儿子,在这过去多少个日子里,你们给了我大量的时间,让我专心完成这一最具挑战性的工作。

让我们一起学习,共同提高,为我国的医学影像教育事业做出一份自己的努力。

王维平
2017年5月

CONTRIBUTORS

Juan Carlos Baez, MD

Resident in Radiology,
Brigham and Women's Hospital

Beryl R. Benacerraf, MD

Clinical Professor of Radiology and
Obstetrics and Gynecology,
Harvard Medical School

Scott Britz-Cunningham, MD, PhD

Staff Radiologist, Department of Nuclear Medicine,
Brigham and Women's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Paul M. Bunch, MD

Resident in Radiology,
Brigham and Women's Hospital

Michael J. Callahan, MD

Director, Computed Tomography
Division Chief, Abdominal Imaging
Department of Radiology,
Boston Children's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Jeffrey Forris Beecham Chick, MD

Resident in Radiology,
Brigham and Women's Hospital

Sona A. Chikarmane, MD

Resident in Radiology,
Brigham and Women's Hospital

Mary Elizabeth Cunnane, MD

Staff Radiologist,
Massachusetts Eye and Ear Infirmary
Instructor of Radiology,
Harvard Medical School

Pamela Deaver Ketwaroo, MD

Resident in Radiology,
Brigham and Women's Hospital

原著名单

Christine M. Denison, MD

Staff Radiologist, Division of Breast Imaging,
Brigham and Women's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Naman S. Desai, MD

Resident in Radiology,
Brigham and Women's Hospital

Alexandra Fairchild, MD

Resident in Radiology,
Brigham and Women's Hospital

Ritu R. Gill, MD, MPH

Staff Radiologist, Division of Thoracic Imaging,
Brigham and Women's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Alisa Suzuki Han, MD

Staff Radiologist, Division of Angiography and
Interventional Radiology,
Brigham and Women's Hospital
Instructor of Radiology,
Harvard Medical School

Michael Hanley, MD

Staff Radiologist,
Division of Thoraco-Abdominal Imaging,
University of Virginia Health System
Assistant Professor of Radiology,
University of Virginia School of Medicine

Timothy P. Killoran, MD

Staff Radiologist, Division of Angiography and
Interventional Radiology,
Brigham and Women's Hospital
Instructor of Radiology,
Harvard Medical School

Meaghan M. Mackesy, MD

Resident in Radiology,
Brigham and Women's Hospital

Jonathan Opraseuth, MD

Resident in Radiology,
Brigham and Women's Hospital

Sanjay Prabhu, MBBS, DCH, MRCPCH, FRCR

Director, Radiology Advanced Image Analysis Lab,
Staff Radiologist, Boston Children's Hospital
Instructor in Radiology,
Harvard Medical School

Sughra Raza, MD

Associate Director of Breast Imaging,
Brigham and Women's Hospital
Associate Professor of Radiology,
Harvard Medical School

Julie A. Ritner, MD

Staff Radiologist, Divisions of Ultrasound and Breast
Imaging, Brigham and Women's Hospital
Instructor in Radiology,
Harvard Medical School

Justin R. Routhier, MD

Resident in Radiology,
Brigham and Women's Hospital

Ari Sacks, MD

Resident in Radiology,
Brigham and Women's Hospital

Cheryl A. Sadow, MD

Staff Radiologist, Division of Abdominal Imaging
and Intervention, Brigham and Women's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Asha Sarma, MD

Resident in Radiology,
Brigham and Women's Hospital

Nehal Shah, MD

Staff Radiologist, Division of Musculoskeletal
Imaging and Intervention,
Brigham and Women's Hospital
Instructor in Radiology,
Harvard Medical School

Jeffrey Y. Shyu, MD

Resident in Radiology,
Brigham and Women's Hospital

Kirstin M. Small, MD

Staff Radiologist, Division of Musculoskeletal
Imaging and Intervention,
Brigham and Women's Hospital
Instructor in Radiology,
Harvard Medical School

Stacy E. Smith, MD

Section Head and Barbara N. Weissman
Distinguished Chair of Musculoskeletal Imaging
and Intervention
Associate Director, Radiology Residency Program,
Brigham and Women's Hospital
Assistant Professor of Radiology,
Harvard Medical School

Darryl B. Sneag, MD

Resident in Radiology,
Brigham and Women's Hospital

Shreya Sood, MD

Resident in Radiology,
Brigham and Women's Hospital

Michael Steigner, MD

Staff Radiologist, Division of Non-invasive
Cardiovascular Imaging,
Brigham and Women's Hospital
Instructor in Radiology,
Harvard Medical School

Barbara N. Weissman, MD

Vice Chair, Department of Radiology,
Section Head Emeritus, Musculoskeletal Imaging
Director, Radiology Residency Program
Brigham and Women's Hospital
Professor of Radiology,
Harvard Medical School

Ged Wieschhoff, MD

Resident in Radiology,
Brigham and Women's Hospital

Jeremy R. Wortman, MD

Resident in Radiology,
Brigham and Women's Hospital

Gregory L. Wrubel, MD

Clinical Fellow in Diagnostic Neuroradiology,
Brigham and Women's Hospital

CONTENTS

1	Thoracic Imaging	1
2	Gastrointestinal imaging	96
3	Genitourinary imaging	175
4	Neuroimaging	225
5	Musculoskeletal imaging	382
6	Ultrasound	514
7	Nuclear imaging	612
8	Breast imaging	657
9	Cardiovascular imaging	729
10	Interventional radiology	768
11	Pediatric imaging	821
12	Physics of imaging	933
	Index	961

目录

1	胸部影像	1
2	胃肠道影像	96
3	泌尿生殖影像	175
4	神经影像	225
5	骨骼与肌肉影像	382
6	超声影像	514
7	核医学影像	612
8	乳腺影像	657
9	心脏血管影像	729
10	介入放射学	768
11	儿科影像	821
12	影像物理	933
	索引	961

1 Thoracic Imaging

Contents

Introductory concepts	2
Patterns of lung disease	9
Pulmonary infection	22
Infections in the immunocompromised	29
Pulmonary edema and ICU imaging	34
Lung cancer	37
Pulmonary vascular disease	47
Diffuse lung disease	52
Mediastinum	71
Airways	82
Pleura	91

1 胸部影像

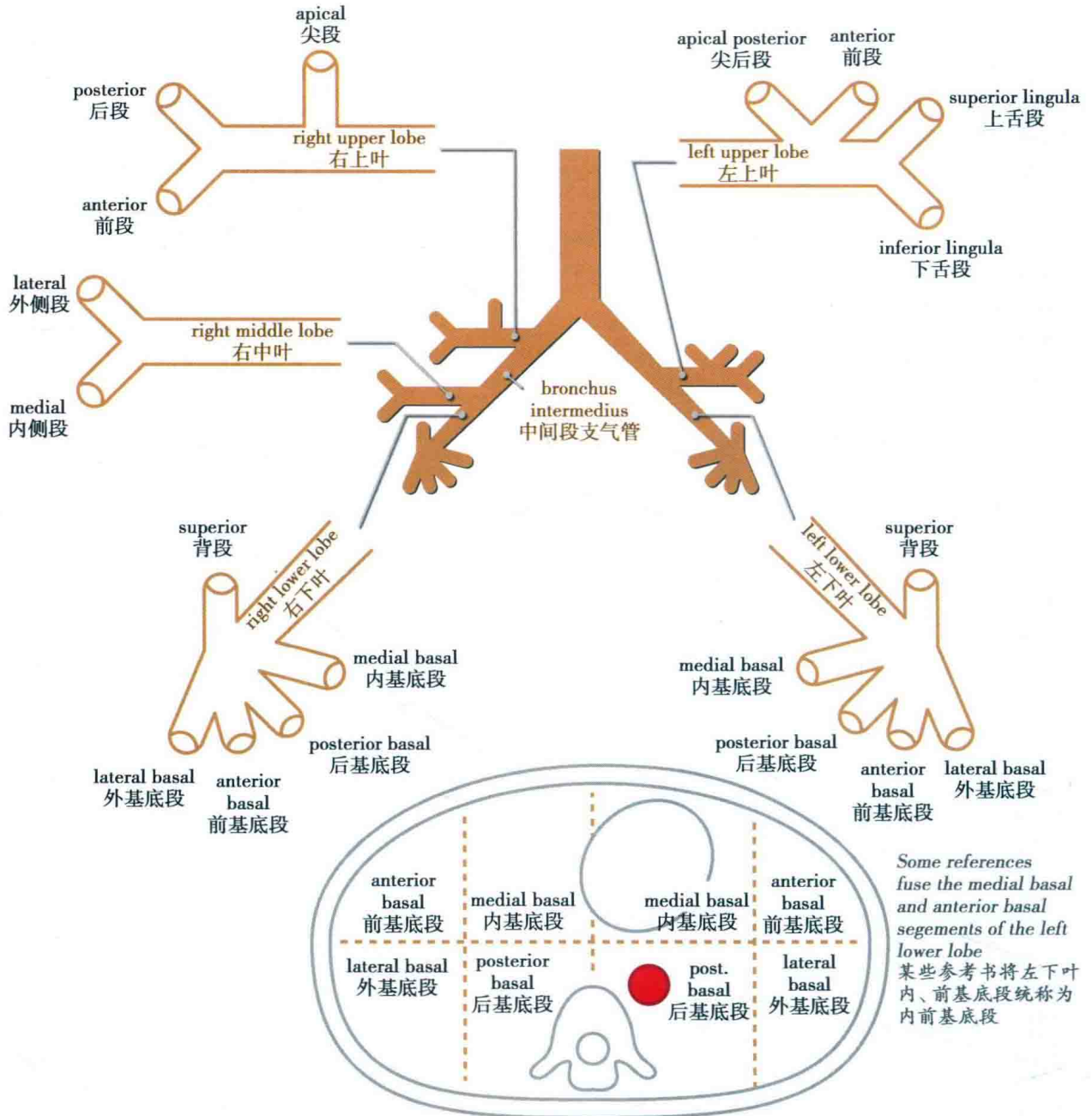
目录

概念介绍	2
肺部疾病的表现形式	9
肺部感染	22
免疫功能低下时的感染	29
肺水肿和 ICU 影像	34
肺癌	37
肺血管疾病	47
弥漫性肺疾病	52
纵隔	71
气道	82
胸膜	91

INTRODUCTORY CONCEPTS

ANATOMY

Lobar and segmental anatomy



Interlobar fissures

- The minor fissure separates the right upper lobe (RUL) from the right middle lobe (RML) and is seen on both the frontal and lateral views as a fine horizontal line.
- The major (oblique) fissures are seen only on the lateral radiograph as oblique lines.

On the right, the major fissure separates the RUL and RML from the right lower lobe.

On the left, the major fissure separates the left upper lobe from the left lower lobe.

- The azygos fissure is an accessory fissure present in less than 1% of patients, seen in the presence of an azygos lobe. An azygos lobe is an anatomic variant

概念介绍

解剖

肺叶和肺段解剖

叶间裂

- 水平裂将右肺上叶(RUL)与右肺中叶(RML)分开,在正、侧位胸片上均显示为一条水平的细线。
- 斜裂仅在侧位胸片上可见,显示为一条斜线。

在右肺,斜裂将右肺上叶、中叶与右肺下叶分开。

在左肺,斜裂将左肺上叶与左肺下叶分开。

- 奇裂是一个副裂,发生率小于1%,见于有奇叶的病人。奇叶是一种解剖变异,由右肺上

where the right upper lobe apical or posterior segments are encased in their own parietal and visceral pleura.

OVERVIEW OF ATELECTASIS

- Atelectasis is loss of lung volume due to decreased aeration. Atelectasis is synonymous with collapse
- Direct signs of atelectasis are from lobar volume loss and include:

Displacement of the fissures.
Vascular crowding.

- Indirect signs of atelectasis are due to the effect of volume loss on adjacent structures and include:

Elevation of the diaphragm.
Rib crowding on the side with volume loss.
Mediastinal shift to the side with volume loss.
Overinflation of adjacent or contralateral lobes.
Hilar displacement.

- Air bronchograms are *not* seen in atelectasis when the cause of the atelectasis is central bronchial obstruction, but air bronchograms can be seen in subsegmental atelectasis. Subsegmental atelectasis is caused by obstruction of small peripheral bronchi, usually by secretions.
- Subsegmental atelectasis and mild fever are both commonly encountered in postsurgical patients, although it has been proposed that there is no causative relationship between atelectasis and postoperative fever.

Mechanisms of atelectasis

- **Obstructive** atelectasis occurs when alveolar gas is absorbed by blood circulating through alveolar capillaries but is not replaced by inspired air due to bronchial obstruction.

Obstructive atelectasis can cause lobar atelectasis, which is complete collapse of a lobe, discussed on the following page.

Obstructive atelectasis occurs more quickly when the patient is breathing supplemental oxygen since oxygen is absorbed from the alveoli more rapidly than nitrogen.

In general, obstructive atelectasis is associated with volume loss. In critically ill ICU patients, however, there may be rapid transudation of fluid into the obstructed alveoli, causing superimposed consolidation.

In children, airway obstruction is most often due to an aspirated foreign object. In contrast to adults, the affected side becomes hyperexpanded in children due to a ball-valve effect.

Subsegmental atelectasis is a subtype of obstructive atelectasis commonly seen after surgery or general illness, due to mucus obstruction of the small airways.

- **Relaxation** (passive) atelectasis is caused by relaxation of lung adjacent to an intrathoracic lesion causing mass effect, such as a pleural effusion, pneumothorax, or pulmonary mass.
- **Adhesive** atelectasis is due to surfactant deficiency.

Adhesive atelectasis is seen most commonly in neonatal respiratory distress syndrome, but can also be seen in acute respiratory distress syndrome (ARDS).

- **Cicatricial** atelectasis is volume loss from architectural distortion of lung parenchyma by fibrosis.

叶尖段或后段被自身的脏、壁层胸膜包绕形成。

肺不张概述

- 肺不张是指由于通气下降引起的肺容积减少。不张与萎陷是 synonym 词。
- 肺不张的直接征象来自于肺叶容积减少,包括:

叶间裂移位。
血管聚集。

- 肺不张的间接征象来自于肺容积减少对邻近结构的影像包括:

横膈上抬。
患侧肋骨聚拢与容积减少。
纵隔向患侧偏移与容积减少。
邻近或对侧肺叶过度膨胀。
肺门移位。

- 空气支气管征在中央支气管阻塞引起的肺不张中是看不到的,但可见于亚段肺不张。亚段肺不张由小的外周支气管阻塞引起,常为分泌物阻塞。
- 亚段肺不张和轻度发热常见于手术后患者,尽管有研究指出肺不张与术后发热之间并无因果关系。

肺不张的机制

- **阻塞性**肺不张发生于肺泡内的气体经肺泡毛细血管的血液循环吸收,但由于支气管阻塞不能从吸入的气体中进行补充。

阻塞性肺不张可导致肺叶不张,为一个肺叶的完全萎陷,将在后文讨论。

阻塞性肺不张在辅助供氧的患者中更快发生,因为肺泡内的氧气比氮气吸收要快。

通常,阻塞性肺不张均伴有肺容积的减少。但在 ICU 重症的患者,可能会有体液快速漏出到阻塞的肺泡内,在肺不张的基础上发生肺实变。

在儿童,气道梗阻常常因为吸入异物。与成人相比,患侧肺由于球阀效应形成过度膨胀。

亚段不张是阻塞性肺不张的一个亚型,常见于术后患者或全身性疾病,它由小气道黏液阻塞引起。

- **弛豫性(被动性)**肺不张是由胸内具有占位效应的病变对邻近肺组织压迫导致的不张,如胸腔积液、气胸或肺部肿块引起的肺不张。
- **粘连性**肺不张由肺泡表面活性物质缺乏导致。

粘连性肺不张最常见于新生儿呼吸窘迫综合征,但也可见于急性呼吸窘迫综合征(ARDS)。

- **瘢痕性**肺不张是纤维化导致的肺实质结构扭曲所造成的肺容积减少。

LOBAR ATELECTASIS

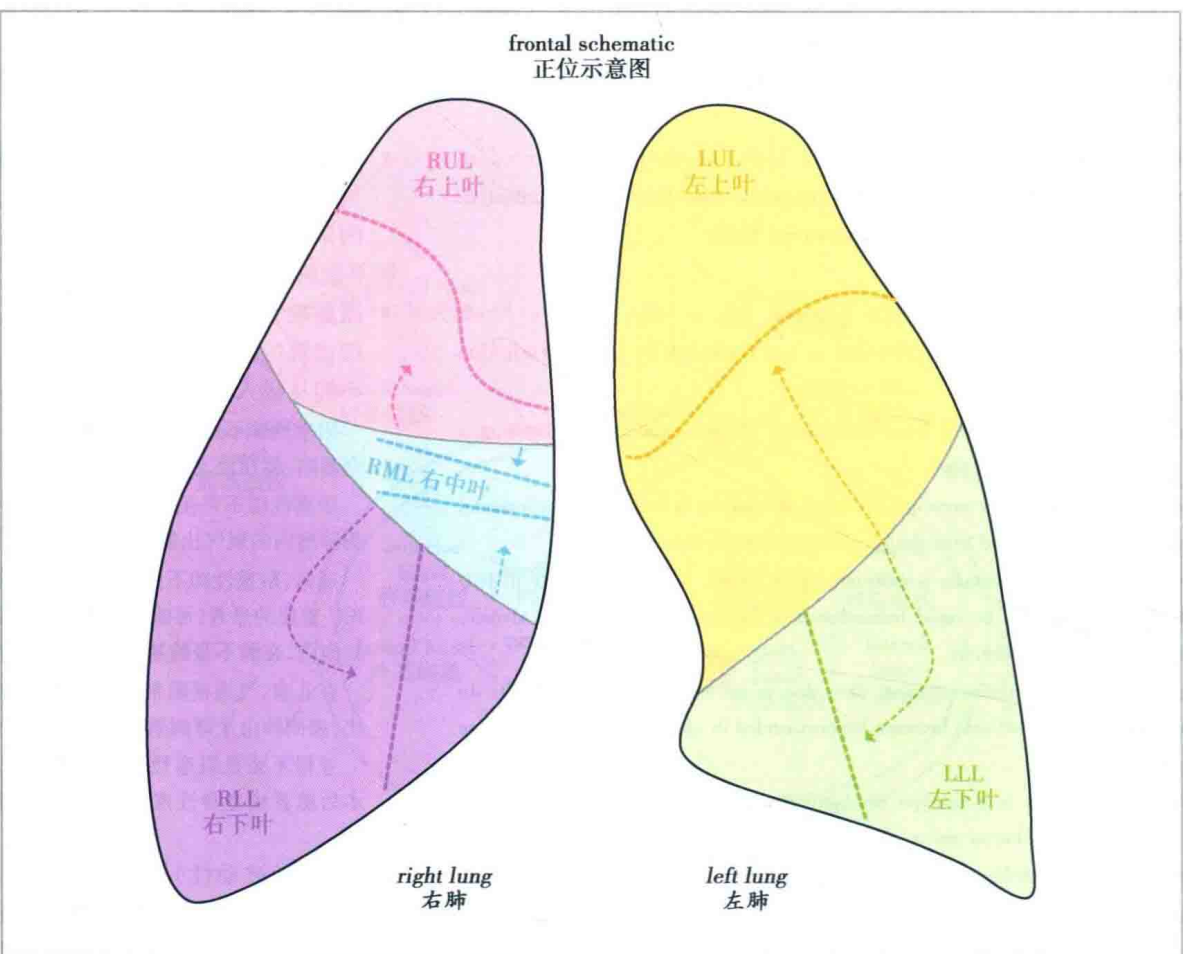
- Lobar atelectasis is usually caused by central bronchial obstruction (obstructive atelectasis), which may be secondary to mucus plugging or an obstructing neoplasm.
If the lobar atelectasis occurs acutely, mucus plugging is the most likely cause.
If lobar atelectasis is seen in an outpatient, an obstructing central tumor must be ruled out.
- Lobar atelectasis, or collapse of an entire lobe, has characteristic appearances depending on which of the five lobes is collapsed.

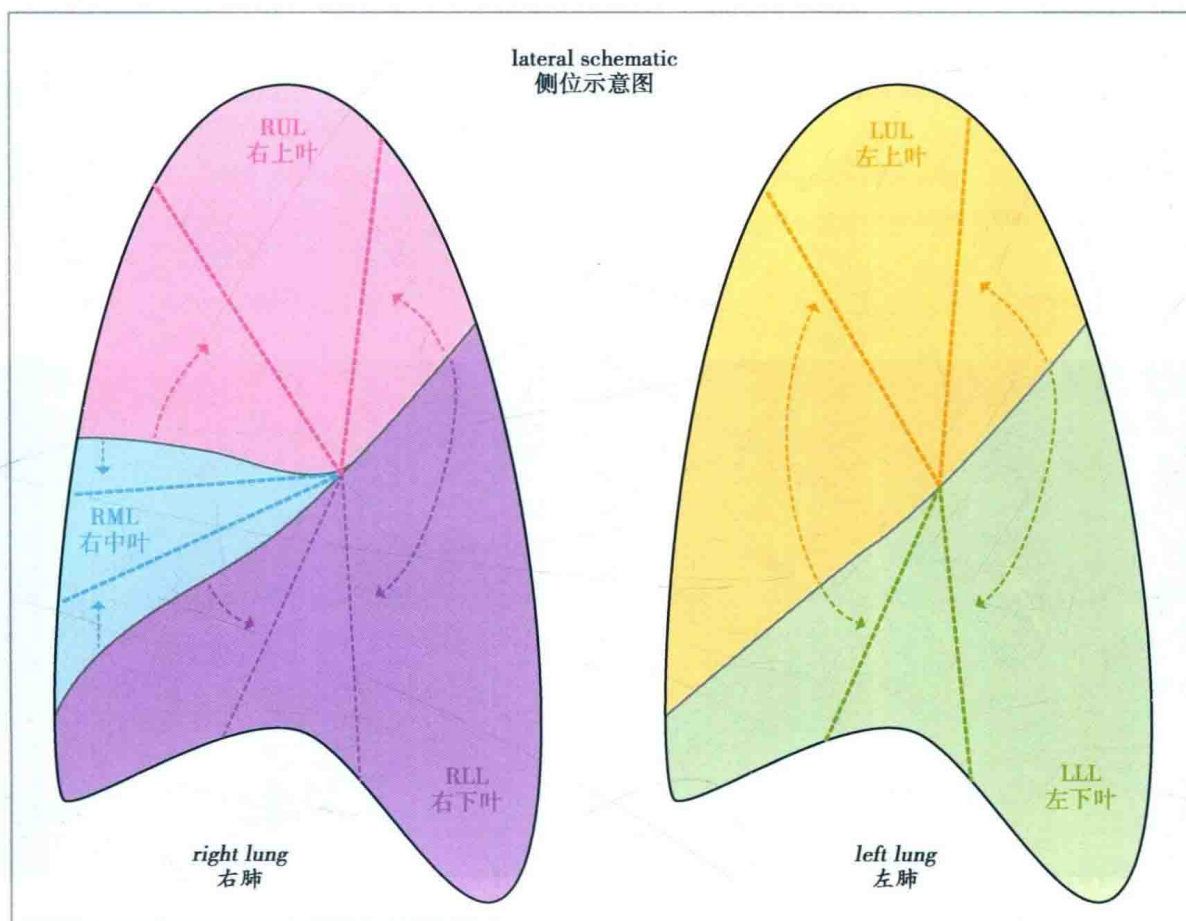
Patterns of lobar atelectasis

肺叶不张

- 肺叶不张通常是由于中央支气管梗阻(阻塞性肺不张),可继发于黏液栓塞或阻塞性肿瘤。
如果发生急性肺叶不张,黏液栓塞最为可能的原因。
如果肺叶不张见于门诊患者,需排除阻塞性中央型肿瘤。
- 肺叶不张或一叶的完全萎陷,其表现的特征性取决于五叶中哪一个叶发生了萎陷。

肺叶不张的表现



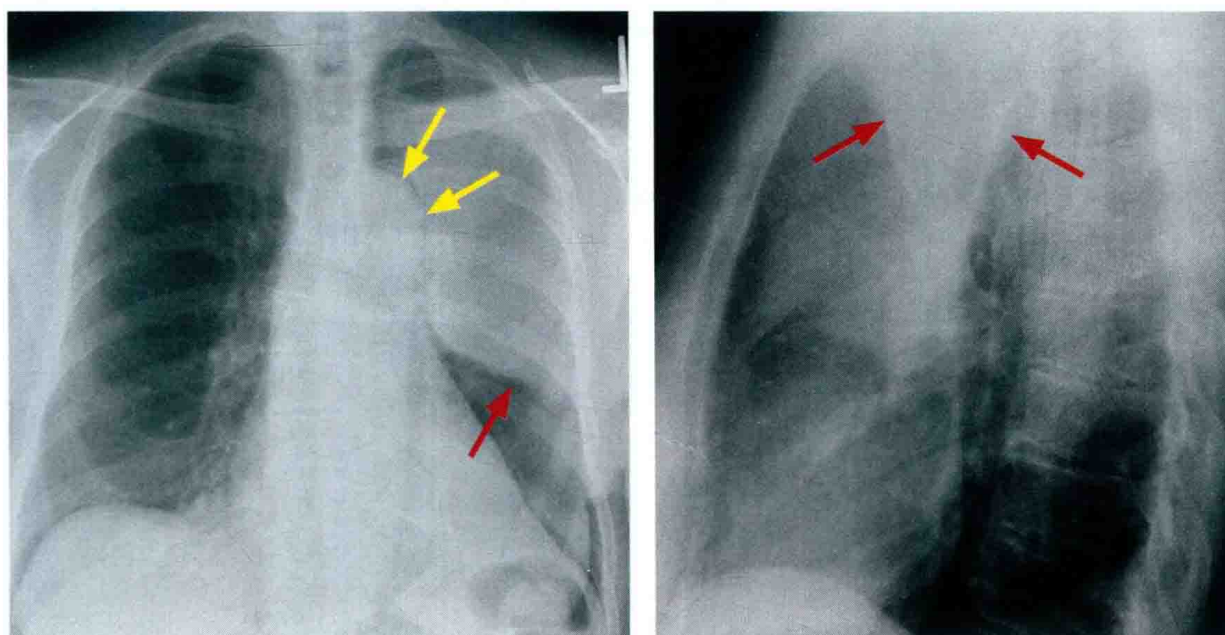


- Each of the five lobes tends to collapse in a predictable direction, as shown above.

Left upper lobe atelectasis

- 五个肺叶中的每一叶都有各自特定的塌陷方向,如上图所示。

左肺上叶不张



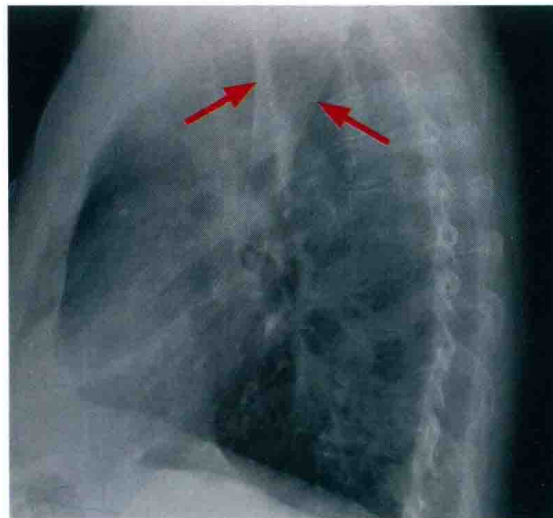
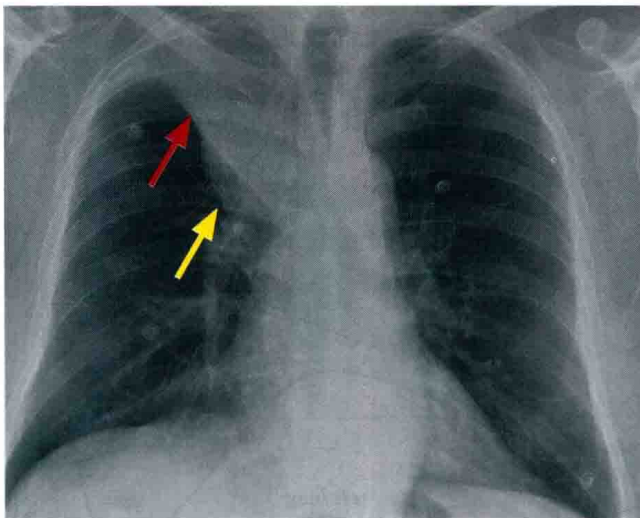
Left upper lobe collapse and *luftsichel* sign: Frontal radiograph (left image) shows a veil-like left upper lung opacity representing the collapsed left upper lobe (red arrow). A crescent of air lateral to the aortic arch is the *luftsichel* (yellow arrows). The lateral view (right image) shows the anterior wedge-shaped collapsed left upper lobe (red arrows).

Case courtesy Ritu R. Gill, MD, MPH, Brigham and Women's Hospital.

左肺上叶萎陷和 Luftsichel(气镰)征:正位胸片(左图)显示左上肺幕状致密影代表不张的左肺上叶(红箭头)。主动脉弓外侧的新月形气体影为气镰征(黄箭头)。侧位胸片(右图)显示前部呈楔形不张的左肺上叶(红箭头)。

- The *luftsichel* (*air-sickle* in German) sign of left upper lobe collapse is a crescent of air seen on the frontal radiograph, which represents the interface between the aorta and the hyperexpanded superior segment of the left lower lobe.
- It is important to recognize left upper lobe collapse and not mistake the left lung opacity for pneumonia, since a mass obstructing the airway may be the cause of the lobar atelectasis.

Right upper lobe atelectasis



Right upper lobe collapse and *Golden's S* sign: Frontal radiograph (left image) shows a right upper lobe opacity with superior displacement of the minor fissure (red arrow) and a convex mass (yellow arrow). Lateral radiograph (right image) shows the wedge-shaped collapsed RUL projecting superiorly (red arrows).

右肺上叶萎陷和 *Golden S* 征: 正位胸片(左图)显示右肺上叶致密影伴水平裂(红箭头)上移和一个隆凸的肿块(黄箭头)。侧位片(右图)显示楔形不张的右肺上叶在上方投影(红箭头)。

- The *reverse S* sign of *Golden* is seen in right upper lobe collapse caused by an obstructing mass. The central convex margins of the mass form a reverse S. Although the sign describes a *reverse S*, it is also commonly known as *Golden's S* sign. Similar to left upper lobe collapse, a right upper lobe collapse should raise concern for an underlying malignancy, especially with a *Golden's S* sign present.
- The *juxtaphrenic peak* sign is a peridiaphragmatic triangular opacity caused by diaphragmatic traction from an inferior accessory fissure or an inferior pulmonary ligament.

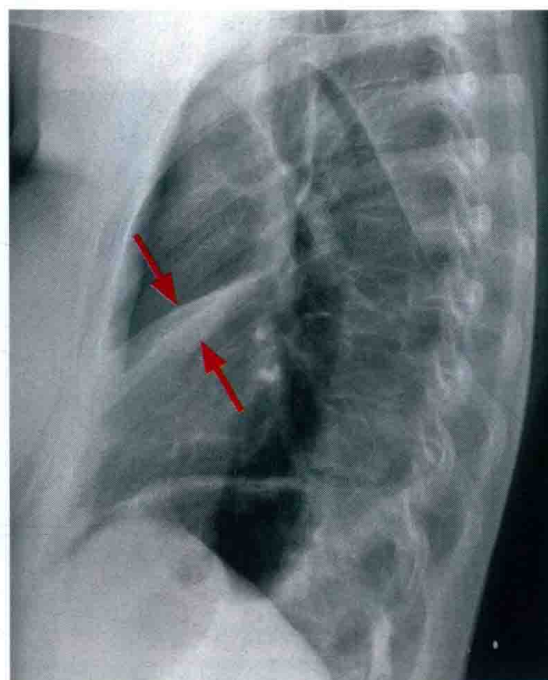
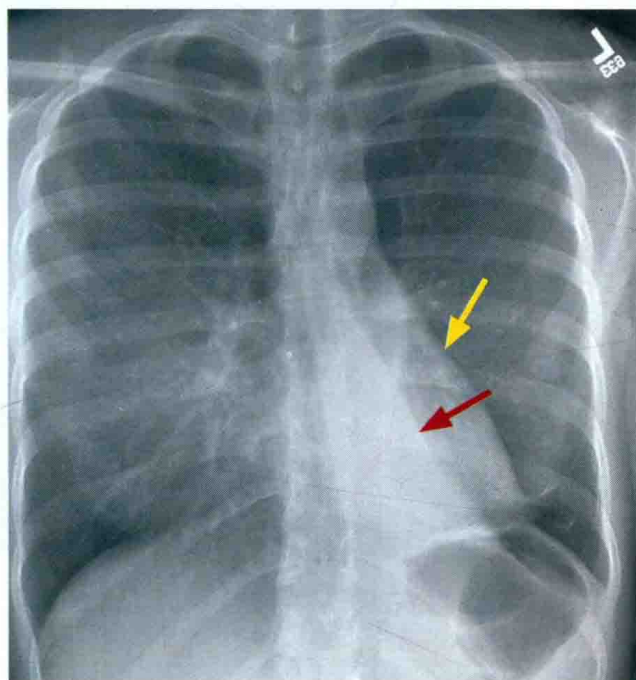
- 左肺上叶不张的 *luftsichel* 征(即气镰征, *luftsichel* 为德语,是空气和镰刀的意思)指正位胸片所示的新月形气体影,代表的是主动脉与过度充气的左肺下叶背段所形成的交界面。
- 识别左肺上叶不张非常重要,且不要与肺炎出现的左肺致密影所混淆,因为肿块阻塞气道可能是叶性肺不张的原因。

右肺上叶不张

- *Golden* 反 *S* 征见于肿块阻塞引起的右肺上叶不张。中央隆凸的肿块边缘形成反 *S*。尽管此征象描述反 *S*,它也称为 *Golden S* 征。与左肺上叶不张类似,右肺上叶不张时应考虑有恶性肿瘤的可能,特别是出现 *Golden S* 征时。
- 膈上尖峰征是膈旁三角形致密影,为横膈被下副裂或下肺韧带牵拉所致。

Left lower lobe atelectasis

左肺下叶不张



Left lower lobe collapse: Frontal and lateral radiographs demonstrate a triangular retrocardiac opacity representing the collapsed left lower lobe (red arrows). There is loss of concavity of the left heart border (the *flat waist* sign; yellow arrow).

Case courtesy Ritu R. Gill, MD, MPH, Brigham and Women's Hospital.

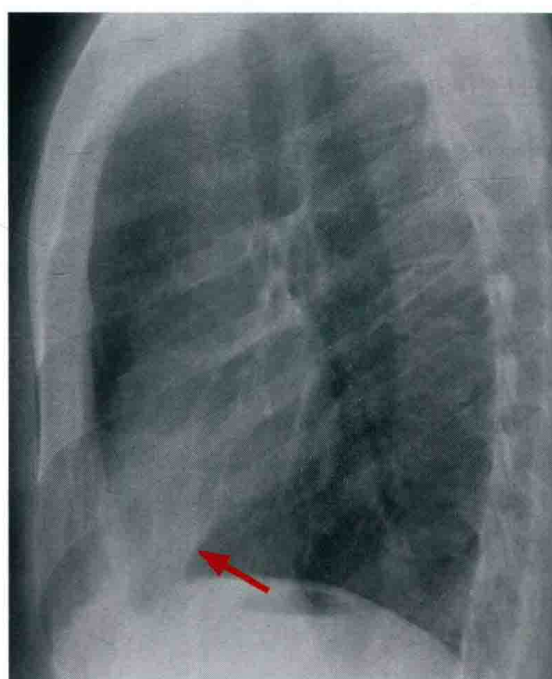
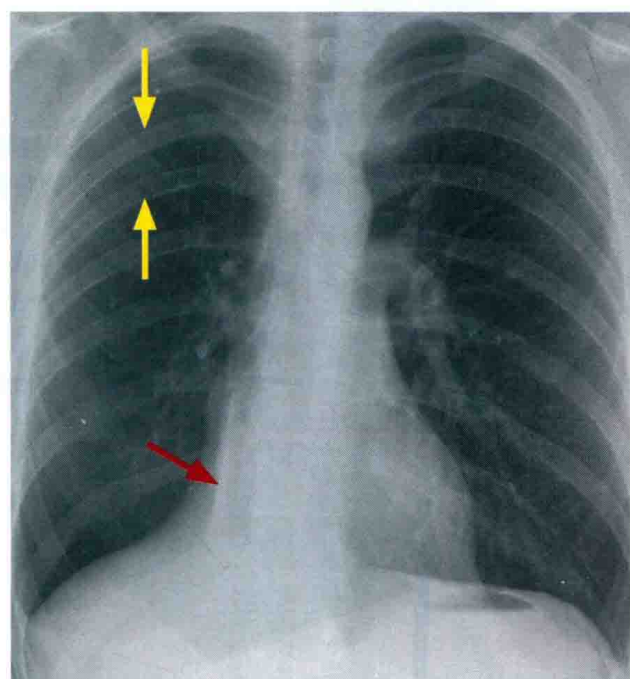
左肺下叶不张:正、侧位胸片显示一三角形心后致密影,代表塌陷的左下叶(红箭头)。左心缘凹度变浅(平腰征;黄箭头)。

- In left lower lobe collapse, the heart slightly rotates and the left hilum is pulled down.
- The *flat waist* sign describes the flattening of the left heart border as a result of downward shift of hilar structures and resultant cardiac rotation.

- 左肺下叶不张时,心脏轻度旋转且左肺门受牵拉下移。
- 平腰征指左心缘变平,由肺门结构下移和由此引起的心脏旋转造成。

Right lower lobe atelectasis

右肺下叶不张

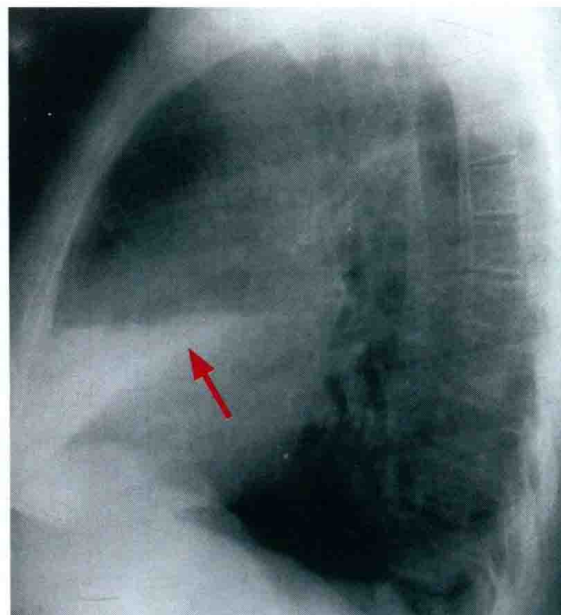
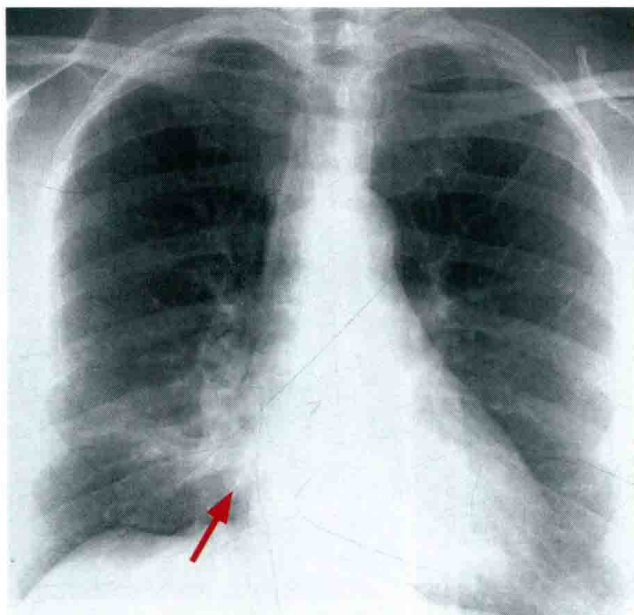


Right lower lobe collapse: Frontal radiograph shows an abnormal vertically oriented interface medial to the right heart border (red arrow), which corresponds to a wedge-shaped opacity projecting over the heart on the lateral view (red arrow) and represents the collapsed right lower lobe. On the frontal radiograph, there is subtle crowding of the ribs (yellow arrows) in the right hemithorax due to volume loss.

右肺下叶不张:正位胸片显示右心缘内侧一异常的垂直方向的界面(红箭头),与侧位胸片上投射在心影的楔形致密影一致(红箭头),代表了塌陷的右肺下叶。在正位片上,可见右半胸廓肋骨因肺容积减少而轻度靠拢(黄箭头)。

- Right lower lobe atelectasis is the mirror-image of left lower lobe atelectasis.
- The collapsed lower lobe appears as a wedge-shaped retrocardiac opacity.

Right middle lobe atelectasis



Right middle lobe atelectasis: Frontal chest radiograph shows an indistinct opacity in the right lung with focal silhouetting of the right heart border (arrow). There is elevation of the right hemidiaphragm due to volume loss. The lateral radiograph shows a wedge-shaped opacity (arrow) projecting over the mid-heart representing the collapsed right middle lobe.

Case courtesy Ritu R. Gill, MD, MPH, Brigham and Women's Hospital.

右肺中叶不张:正位胸片显示右肺模糊的密度增高影与右心缘局部分界不清(箭头)。右膈因右肺容积减少而抬高。侧位片显示楔形致密影投射在心影中部,代表不张的右肺中叶(箭头)。

- The findings of right middle lobe atelectasis can be subtle on the frontal radiograph. Silhouetting of the right heart border by the collapsed medial segment of the middle lobe may be the only clue. The lateral radiograph shows a wedge-shaped opacity anteriorly.

ROUND ATELECTASIS

- Round atelectasis is focal atelectasis with a round morphology that is *always* associated with an adjacent pleural abnormality (e. g., pleural effusion, pleural thickening or plaque, pleural neoplasm, etc.).
- Round atelectasis is most common in the posterior lower lobes.
- All five of the following findings must be present to diagnose round atelectasis:
 - 1) Adjacent pleura must be abnormal.
 - 2) Opacity must be peripheral and in contact with the pleura.
 - 3) Opacity must be round or elliptical.
 - 4) Volume loss must be present in the affected lobe.
 - 5) Pulmonary vessels and bronchi leading into the opacity must be curved—this is the *comet tail sign*.

- 右肺下叶不张是左肺下叶不张的镜像表现。
- 不张的下叶表现为一个楔形的心后致密影。

右肺中叶不张

- 右肺中叶不张在正位胸片上可表现不明显。右肺中叶内侧段萎陷引起的右心缘轮廓改变可能是唯一的线索。侧位片上显示为前部的楔形致密影。

盘状肺不张

- 盘状肺不张是一个圆形的局限性肺不张,几乎均伴有邻近胸膜的异常(如胸腔积液、胸膜增厚或斑块、胸膜肿瘤等)。
- 盘状肺不张最常见于肺下叶的后部。
- 诊断盘状肺不张必须满足以下五个影像学表现:
 - 1) 邻近胸膜必须有异常。
 - 2) 致密影必须位于外周并与胸膜相接触。
 - 3) 致密影必须呈圆形或椭圆形。
 - 4) 受累肺叶必须有容积减少。
 - 5) 指向致密影的肺血管和支气管必须是弯曲的——即彗尾征。