Lung cysts: A tip of the iceberg?

Poster No.: C-0852
Congress: ECR 2010
Type: Educational Exhibit
Topic: Chest - Lung
Authors: A. Oikonomou, A. Chatzistefanou, E. Astrinakis, E. Vranou, K. Dimitrova, P. Prassopoulos; Alexandroupolis/GR
Keywords: lung, cyst, HRCT
Keywords: Lung, Respiratory system, Thorax
DOI: 10.1594/ecr2010/C-0852

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method ist strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slide shows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Learning objectives

To analyze imaging findings for an effective differential diagnosis in diseases with a predominant cystic pattern on HRCT.
**Background**

Lung cysts are easily detected by HRCT. They may be a primary manifestation of rare interstitial lung diseases or an associated finding in common entities. When a cystic or cyst-like pattern is encountered in HRCT, the evaluation of certain characteristics of cysts is necessary in order to narrow the differential diagnosis. These characteristics refer to the morphology, size and shape of the cysts, the wall thickness, number and zonal distribution. The differential diagnosis may be further narrowed when the previously mentioned characteristics of the cysts are associated with other coexisting pulmonary imaging findings such as ground glass opacities, consolidation, nodules, air-trapping at expiration, pneumothorax, fibrosis, or even extrapulmonary imaging manifestations. Furthermore, epidemiologic factors including gender, age, smoking history, occupation, allergies and immunologic status may be valuable in certain cases.
Characteristics of the lung cysts

Round thin-walled lung cysts are typically encountered in lymphangioleiomyomatosis (LAM) (figure 1, 2), Lymphocytic Interstitial Pneumonia (LIP) (figure 3), Desquamative Interstitial Pneumonia (DIP) (figure 4), neurofibromatosis type I (NF1) (figure 5), Extrinsic Allergic Alveolitis (EAA) (figure 6) and Birt-Hogg-Dubbe (BHD) syndrome (figure 7). In pulmonary Langerhans cell histiocytosis (PLCH) the cysts may be round or oval or have bizarre shapes with bilobed, cloverleaf and branching configuration (figure 8). The cysts in PLCH are usually numerous, with a mean diameter of few millimetres to several centimetres, upper and mid lung zones predominance and typical sparing of the costophrenic angles and tips of the lingula and right middle lobe (figure 9). In LAM, the cysts are also numerous, measuring 2mm-20mm, while characteristically no zonal predominance is noted (figure 10). Few cysts, up to 25mm, are usually found in LIP and EAA, with perivascular, subpleural distribution and lower lobe predominance favouring LIP, as opposed to the diffuse distribution seen in EAA. In NF1 and BHD, HRCT may reveal multiple cysts (figure 11), though in NF1 a solitary cyst may also be encountered (figure 12). In BHD the cysts measure up to 20mm, may be irregular-shaped with a typical lower - median zone predominance and subpleural distribution (figure 7). DIP may also be characterized by the presence of microcysts, which are occasionally reversible (figure 4). Centrilobular emphysema, although not a true cystic lesion, may resemble a cyst-like configuration usually lacking a discernible wall, or occasionally having thin borders (figure 13).

In Pneumocystis jiroveci pneumonia (PJP), cysts present variably with thin or thick walls and exhibit a central, perihilar distribution with upper lobe predominance (figure 14, 15). Predominantly thick walled cysts or cyst-like lesions are found in Hydatid disease, Coccidioidomycosis, metastatic disease and cystic bronchiectasis. In Hydatid disease, an air-crescent sign or an air-fluid level is produced when there is communication between the airways and the pericyst or the endocyst respectively. The characteristic “water-lilly sign” is produced when the collapsed inner layer of a ruptured cyst is contrasted with surrounding air (figure 16). When there is complete collapse of the remnants of the ruptured cyst in the dependant part of the pericyst the radiologic sign is called "mass within a cyst" (figure 17). Coccidioidomycosis is caused by the dimorphic fungus C. Immitis and although in the acute setting solitary nodules or consolidation associated with satellite nodules may be seen, in the chronic stage, solitary - or less frequently multiple - nodules may cavitate resulting in thick-walled cysts, mainly in the peripheral region of an upper lobe (figure 18). The wall of a cavitated metastatic mass is generally thick and irregular, although thin-walled cavities may also be found (figure 19). Cavitation occurs either primarily or secondary to chemotherapy and the residual cavitated metastases are called pulmonary lacunae (figure 20, 21). Cystic bronchiectasis mimick cysts when imaged axially and the clue is the presence of an
accompanying artery branch producing the characteristic "signet ring sign" (figure 22). When imaged longitudinally, occasionally cystic bronchiectasis resemble a "bunch of grapes" (figure 23). Occasionally a bulla can reach a very large size in the lung and it can be infected presenting as a thin-walled large cyst with an air-fluid level (figure 24). Rarely lung cancer can manifest with a cystic pattern - especially squamous cell carcinoma - characterized by thin wall and multiple internal septations (figure 25). Finally in the elderly individuals - never smokers - lung cysts can be a completely innocent finding with no clinical significance. Lung cysts in the elderly are thin walled and may be solitary and occasionally they are accompanied by a mild subpleural reticular pattern (figure 26).

**Associated pulmonary imaging findings**

The differential diagnosis can further be enhanced by evaluating associated pulmonary imaging findings such as ground glass opacities (GGO), consolidation, nodules, air-trapping at expiration, pneumothorax, fibrosis. Centrilobular nodules ranging from 1-10 mm in diameter are characteristically found in PLCH, with cyst formation actually representing gradual cavitation of these nodules (figure 9b). Presence of GGO may be encountered in the intervening lung parenchyma, while pneumothorax occurs in 10-16% of the cases and occasionally may be the cause of initial presentation (figure 8, 9). On the other hand, nodules are invariably absent in LAM, while patchy GGO may rarely be present probably representing foci of pulmonary hemorrhage. Pneumothorax is found in 40-50% of the cases and very often is the cause of initial presentation (figure 1). Pleural effusions are also common in LAM that prove to be chylothorax in the majority of times. In LIP poorly defined centrilobular nodules (figure 27a) as well as bilateral ground glass opacities are found, often associated with patchy or diffuse thickening of the bronchovascular bundles (figure 27b). Diffuse or geographic areas of ground-glass opacities and presence of hazy centrilobular micronodules combined with air trapping on expiratory images supports a diagnosis of subacute EAA (figure 6). Diffuse or patchy areas of GGO with central and perihilar distribution and with upper lobe predominance, occasionally associated with pneumothorax favour the diagnosis of PJP (figure 14, 15). Diffuse or patchy areas of GGO with lower lobe predominance associated with mild subpleural reticular pattern and traction bronchiectasis and lack of honeycombing favours a diagnosis of DIP (figure 4). NF1 may be occasionally associated with GGO and centrilobular hazy micronodules and bibasilar reticular opacities (figure 11). In BHD, cysts may characteristically abut or include the proximal portion of the lower pulmonary veins or arteries (figure 28).

**Extrapulmonary manifestations**

Some of the above described cystic lung diseases are characterized by the presence of extrapulmonary manifestations. In particular, LAM is often associated with systemic lymphatic abnormalities (lymphangiomas) (figure 29) and abdominal tumors, while multiple nerve sheath tumors (mostly neurofibromas), associated with multiple café-au-lait skin spots (figure 12) and involvement of the sympathetic chains, vagus and phrenic nerves are typically found in NF1. Osteosarcoma, endometrial carcinoma, squamous
cell carcinoma and gastrointestinal adenocarcinoma comprise the mostly described primaries that may be associated with cyst-like pulmonary metastatic disease. Finally, in BHD syndrome, skin hamartomas and renal tumors are often present, while in hydatid disease hepatic involvement is almost always present.

**Epidemiologic characteristics - Clinical history**

Knowledge of gender, age, smoking history, occupational history and history of allergies, immunologic status and area of living (in the case of infectious diseases) can play a definitive role in reaching a certain diagnosis. This is the case for LAM, which is only encountered in women of reproductive age, lacking a smoking history. Smoking habit is characteristically absent in EAA, where the pathologic mechanism includes inhalation of various antigens or may be associated with drug toxicity. Therefore, it is often encountered as an occupational disease (e.g. farmer’s lung, bird fancier’s lung). On the other hand a smoking history is almost mandatory for the diagnosis of PLCH that is mostly seen in young adult heavy smokers. A history of smoking is also a prerequisite in patients with DIP - almost in 90% of them - the remaining being secondary to dust inhalation or drug reaction. A history of smoking is also present in centrilobular emphysema. LIP and PJP affects middle-aged patients with underlying autoimmune disease or immunodeficiency, most commonly Sjogren’s syndrome, autoimmune disorders, dysproteinemia in LIP and AIDS in PJP. Endemic and geographical distribution is seen in infective diseases, with Coccidioidomycosis mainly occurring in southwestern United States and Northern Mexico and Hydatid disease occurring in the Mediterranean region, Africa, South America, the Middle East, Australia and New Zealand. Above the age of 75 years old cystic lung airspaces should be in most of the cases considered "innocent".

In summary, cysts that coalesce to form bizarre shapes sparing lung bases and occasionally coexisting with nodules are seen in pulmonary Langerhans cell histiocytosis. Rounded cysts with no zonal distribution, not accompanied by nodules are hallmark of lymphangioleiomyomatosis. Few cysts associated with ground glass opacity (GGO), are seen in Lymphocytic Interstitial Pneumonia (LIP) and in Extrinsic Allergic Alveolitis (EAA). However in LIP cysts are larger and there is history of immunodeficiency, while in EAA there is history of antigen exposure and absence of smoking history. Upper lobe predominant cysts associated with GGO - especially in HIV patients - characterize Pneumocystis pneumonia. Small cysts in smokers associated with GGO and coexistent emphysema or traction broncholectasis favour Desquamative Interstitial Pneumonia. Cysts of variable size are seen in both neurofibromatosis and Birt-Hogg-Dubbe (BHD) syndrome but are more paraseptal in the latter, mimicking paraseptal emphysema. Single cysts may be seen in coccidiomycosis and hydatid disease. Cystic metastases are rarely seen - mainly post treatment. Centrilobular emphysema and cystic bronchiectasis may mimic, but are not actually characterized by presence of true lung cysts.
Fig. 0: Figure 1: Lymphangioleiomyomatosis. Magnified HRCT scan of the right lung at the level of the upper lobes shows scattered round, thin-walled lung cysts with normal intervening lung parenchyma. There is residual right pneumothorax and a small right pleural effusion that proved to be chylothorax. Draining catheter is seen in the right pleural cavity.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 2a, b: Lymphangioleiomyomatosis. HRCT sans at the level of the upper lobes and the confluence of the pulmonary veins show multiple round, thin-walled lung cysts with normal intervening lung parenchyma with no sparing the anterior tips of the middle lobe and lingula.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 2a, b: Lymphangioleiomyomatosis. HRCT sans at the level of the upper lobes and the confluence of the pulmonary veins show multiple round, thin-walled lung cysts with normal intervening lung parenchyma with no sparing the anterior tips of the middle lobe and lingula.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 3a, b: Lymphocytic interstitial pneumonia. HRCT scans at the level of the upper lobes and the lower lobes show big rounded, thin-walled lung cysts with a characteristic subpleural location. Note that the intervening lung parenchyma in this case is normal.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 3 a, b: Lymphocytic interstitial pneumonia. HRCT scans at the level of the upper lobes and the lower lobes show big rounded, thin-walled lung cysts with a characteristic subpleural location. Note that the intervening lung parenchyma in this case is normal.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 4: Desquamative interstitial pneumonia (courtesy by Prof DM Hansell). HRCT scan shows scattered small cystic airspaces with barely perceptible wall that are associated with areas of ground glass opacity and a mild reticular pattern. It is believed that most of cystic airspaces in DIP represent bronchiolectasis and emphysematous changes and only a small percent may be true cysts.

© Hansell DM. Department of Radiology, Royal Brompton Hospital, UK
Fig. 0: Figure 5: Neurofibromatosis type 1. HRCT scan at the level of the lower lobes shows a solitary round, thin-walled lung cyst in the periphery of the right lower lobe showing a small internal septa. There are no other abnormalities in the remaining lung parenchyma.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 9 a, b: Pulmonary Langerhans cell histiocytosis. There are lung cysts of variable size with round or oval shapes that coalesce to form bizarre shapes and that have either thin or thick walls. Lung cysts have an upper lobe predominance sparing completely the lung bases and the anterior tips of the middle lobe and lingula. Note the characteristic cavitating nodules in figure 2b that will gradually transform to lung cysts. Note also patchy areas of ground glass surrounding the right upper lobe lung cysts (9a) and the centrilobular areas of ground glass opacity in the left upper lobe (9 a, b).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 8a, b, c: Pulmonary Langerhans cell histiocytosis. There are numerous lung cysts with round, oval shapes or that coalesce to form bizarre shapes (clover-leaf) and that have either thin or thick walls. Lung cysts have an upper lobe predominance sparing the lung bases and the anterior tips of the middle lobe and lingula. Note the residual right pneumothorax that is being drained by a chest tube and the subcutaneous emphysema of the right anterior thoracic wall.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 8a, b, c: Pulmonary Langerhans cell histiocytosis. There are numerous lung cysts with round, oval shapes or that coalesce to form bizarre shapes (clover-leaf) and that have either thin or thick walls. Lung cysts have an upper lobe predominance sparing the lung bases and the anterior tips of the middle lobe and lingula. Note the residual right pneumothorax that is being drained by a chest tube and the subcutaneous emphysema of the right anteriothoracic wall.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 8a, b, c: Pulmonary Langerhans cell histiocytosis. There are numerous lung cysts with round, oval shapes or that coalesce to form bizarre shapes (clover-leaf) and that have either thin or thick walls. Lung cysts have an upper lobe predominance sparing the lung bases and the anterior tips of the middle lobe and lingula. Note the residual right pneumothorax that is being drained by a chest tube and the subcutaneous emphysema of the right anterithoracic wall.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 7: Birt-Hogg-Dubbe syndrome (from reference 20, Tobino K et al. Eur J Radiol 2009; [Epub ahead of print]). Magnified HRCT scans of the left lung shows few round, thin-walled lung cysts with a subpleural location. Lung cysts in Birt-Hogg-Dubbe syndrome may also be oval-shaped and irregular-shaped and have lower lobe predominance.

© Tobino K et al. Eur J Radiol 2009
**Fig. 0:** Figure 9 a, b: Pulmonary Langerhans cell histiocytosis. There are lung cysts of variable size with round or oval shapes that coalesce to form bizarre shapes and that have either thin or thick walls. Lung cysts have an upper lobe predominance sparing completely the lung bases and the anterior tips of the middle lobe and lingula. Note the characteristic cavitating nodules in figure 2b that will gradually transform to lung cysts. Note also patchy areas of ground glass surrounding the right upper lobe lung cysts (9a) and the centrilobular areas of ground glass opacity in the left upper lobe (9 a, b).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 6: Extrinsic allergic alveolitis (from reference 16, Franquet T et al. J Comput Assist Tomogr 2003;27:475-478). HRCT scan shows few scattered rounded lung cysts in the right upper lobe and the left lower lobe. Note patchy areas of ground-glass opacity in the right upper lobe and the left lower lobe.

**Fig. 0:** Figure 12: Neurofibromatosis type 1: HRCT scan shows a solitary small rounded lung cyst in the right upper lobe with barely perceptible wall. There were no other abnormalities in the patient's lung parenchyma. Note the small spot in the left anterior thoracic wall representing cafe-au-lait dermal spot.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0: Figure 10 a, b, c: Lymphangioleiomyomatosis.** HRCT scans at the level of the upper lobes, middle lobe and lingula show multiple scattered rounded, thin-walled lung cysts that have no zonal predominance and are also located in the lung bases. The intervening lung parenchyma is normal.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 10 a, b, c: Lymphangioleiomyomatosis. HRCT scans at the level of the upper lobes, middle lobe and lingula show multiple scattered rounded, thin-walled lung cysts that have no zonal predominance and are also located in the lung bases. The intervening lung parenchyma is normal.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 15: Pneumocystis jeroveci pneumonia. HRCT scan of the upper lobes shows thick-walled lung cysts in the upper lobes surrounded by diffuse areas of ground glass opacity.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 14: *Pneumocystis jeroveci* pneumonia. HRCT scan of the upper lobes shows thin-walled lung cysts in the right upper lobe surrounded by patchy areas of ground glass opacity.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 13 a, b: Centrilobular emphysema. Two sequential HRCT scans at the level of the upper lobes show numerous cystic airspaces that have no discernible walls - or occasionally extremely thin - and contain "a central white dot" representing the centrilobural artery.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 10 a, b, c: Lymphangioleiomyomatosis. HRCT scans at the level of the upper lobes, middle lobe and lingula show multiple scattered rounded, thin-walled lung cysts that have no zonal predominance and are also located in the lung bases. The intervening lung parenchyma is normal.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR

Fig. 0: Figure 11a, b: Neurofibromatosis type 1: Two sequential HRCT scans of the upper lobes show numerous thin-walled, mainly small lung cysts with a subpleural and central location. Hazy centrilobular micronodules of ground-glass opacity are also noted in the upper lobes.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 11a, b: Neurofibromatosis type 1: Two sequential HRCT scans of the upper lobes show numerous thin-walled, mainly small lung cysts with a subpleural and central location. Hazy centrilobular micronodules of ground-glass opacity are also noted in the upper lobes.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 13 a, b: Centrilobular emphysema. Two sequential HRCT scans at the level of the upper lobes show numerous cystic airspaces that have no discernible walls - or occasionally extremely thin - and contain "a central white dot" representing the centrilobural artery.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 22 a, b, c: Cystic bronchiectasis in cystic fibrosis. HRCT scans of two patients (1st: fig 22 a, b) and (2nd: fig 22 c) with cystic fibrosis show large thin and thick-walled cystic bronchiectasis imaged axially and therefore mimicking lung cysts. However scrolling up and down the images of the study readily reveals the continuation of the dilated bronchi. Note the "signet-ring" sign characterized by the presence of an axially imaged dilated bronchus that is accompanied by the adjacent pulmonary artery. Cicatriziation atelectasis is also seen around the cystic bronchiectasis especially in the left upper lobe (fig 22 a, b) and right - sided pneumothorax (fig 22 c), that are common associated findings in cystic fibrosis.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 22 a, b, c: Cystic bronchiectasis in cystic fibrosis. HRCT scans of two patients (1st: fig 22 a, b) and (2nd: fig 22 c) with cystic fibrosis show large thin and thick-walled cystic bronchiectasis imaged axially and therefore mimicking lung cysts. However scrolling up and down the images of the study readily reveals the continuation of the dilated bronchi. Note the "signet-ring" sign characterized by the presence of an axially imaged dilated bronchus that is accompanied by the adjacent pulmonary artery. Cicatrization atelectasis is also seen around the cystic bronchiectasis especially in the left upper lobe (fig 22 a, b) and right - sided pneumothorax (fig 22 c), that are common associated findings in cystic fibrosis.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 21 a, b: Cystic metastasis. Two magnified views of the right lower lobe pre (a) and post (b) chemotherapy treatment for endometrial cancer show completely cystic transformation of the initially cavitating metastases with almost no discernible wall (pulmonary lacunae).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 21 a, b: Cystic metastasis. Two magnified views of the right lower lobe pre (a) and post (b) chemotherapy treatment for endometrial cancer show completely cystic transformation of the initially cavitating metastases with almost no discernible wall (pulmonary lacunae).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 20 a, b: Cystic metastasis. Two magnified views of the left upper lobe pre (a) and post (b) chemotherapy treatment for endometrial cancer show completely cystic transformation of the initially cavitating metastasis with almost no discernible wall (pulmonary lacuna).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 20 a, b: Cystic metastasis. Two magnified views of the left upper lobe pre (a) and post (b) chemotherapy treatment for endometrial cancer show completely cystic transformation of the initially cavitating metastasis with almost no discernible wall (pulmonary lacuna).

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 19: Cystic metastasis from endometrial cancer. Spiral CT of the chest at lung windowing shows three round, thin-walled, subpleural lung cysts in the lower lobes that proved to be metastases from the known primary of endometrial cancer.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 18: Coccidiomycosis. HRCT scan shows a cyst with thick and irregular wall in the periphery of the right upper lobe.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 17 a, b: Hydatid disease - "mass within a cyst" sign. HRCT scans of the lower lobes at lung (a) and mediastinal (b) windowing show a large thick-walled cyst in the right upper lobe containing remnants of the ruptured membrane (mass-like) in its dependant part.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 17 a, b: Hydatid disease - "mass within a cyst" sign. HRCT scans of the lower lobes at lung (a) and mediastinal (b) windowing show a large thick-walled cyst in the right upper lobe containing remnants of the ruptured membrane (mass-like) in its dependant part.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
**Fig. 0:** Figure 16a, b: Hydatid disease - "water-lilly" sign. HRCT scans of the lower lobes at lung (a) and mediastinal (b) windowing show a large cystic mass with an air-crescent sign in the nondependent part of the cyst characteristic of the water-lilly sign. This sign is produced when the collapsed inner layer of a ruptured cyst is contrasted with surrounding air.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 16a, b: Hydatid disease - "water-lilly" sign. HRCT scans of the lower lobes at lung (a) and mediastinal (b) windowing show a large cystic mass with an air-crescent sign in the nondependent part of the cyst characteristic of the water-lilly sign. This sign is produced when the collapsed inner layer of a ruptured cyst is contrasted with surrounding air.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 22 a, b, c: Cystic bronchiectasis in cystic fibrosis. HRCT scans of two patients (1st: fig 22 a, b) and (2nd: fig 22 c) with cystic fibrosis show large thin and thick-walled cystic bronchiectasis imaged axially and therefore mimicking lung cysts. However scrolling up and down the images of the study readily reveals the continuation of the dilated bronchi. Note the "signet-ring" sign characterized by the presence of an axially imaged dilated bronchus that is accompanied by the adjacent pulmonary artery. Cicatrization atelectasis is also seen around the cystic bronchiectasis especially in the left upper lobe (fig 22 a, b) and right - sided pneumothorax (fig 22 c), that are common associated findings in cystic fibrosis.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 27: Lymphocytic interstitial pneumonia. HRCT scan showing diffuse areas of ground glass opacity associated with numerous cysts.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Fig. 0: Figure 28: Birt-Hogg-Dubbe syndrome (from reference 20, Tobino K et al. Eur J Radiol 2009; [Epub ahead of print]). HRCT scan of the right lung shows numerous thin-walled lung cysts. One of the cysts located in the right lower lobe is seen characteristically including the proximal portion of the right lower pulmonary vein.

© Tobino K et al. Eur J Radiol 2009; [Epub ahead of print]
**Fig. 0:** Figure 29: Lymphangioleiomyomatosis. HRCT sans at the level of the lower lobes shows apart from the numerous lung cysts in the lung bases, a soft tissue mass in the posterior mediastinum- upper retroperitoneum that was proved to be retroperitoneal lymhangioma.

© Department of Radiology, University Hospital of Alexandroupolis - Alexandroupolis/GR
Conclusion

Lung cysts should be analyzed in relation to coexisting HRCT abnormalities, other extrapulmonary imaging findings and clinical history for differential diagnosis or identification of rare entities.
Personal Information

Corresponding author:

Anastasia Oikonomou
Department of Radiology
University Hospital of Alexandroupolis
Democritus University of Thrace
Dragana, 68100 Alexandroupolis, GR

email: aoikonom@med.duth.gr
tel: +30 2551076803, fax: +30 25510 30473
References

References:

15. Silva CI, Churg A, Müller NL. Hypersensitivity pneumonitis: spectrum of high-resolution CT and pathologic findings. AJR Am J Roentgenol 2007;188:334-44