Diagnosis of Hydatid Pulmonary Cyst

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Radiologic Diagnosis of Hydatid Pulmonary Cyst

When x-rays were discovered in 1895 specialists started to describe the radiologic aspects of the pulmonary diseases. Levy-Dorn and Zadek affirmed that the characteristic picture of an entire simple cyst in the lungs is a round shadow with neat borders. As every symbol in biology, this affirmation proved to be false and so Lanari was able to say that the most perfect image of an hydatic cyst he had seen corresponded to a sarcoma.

The studies continued and Claessen gave an important step in his treatise of hydatidosis. Later the works of Sergent, Beclere, Tuffier, Nemenow, Escudero, Deve, Belot, Lozano, Morquio, Petzetakis, Peuteuil, Stephani, Guarini, Liemann, Lagos Garcia, Queirolo and others made the problem of the diagnosis of hydatid cyst reach its full maturity. For a better study we shall make an anatomoradiologic division and thus find:

A). Unbroken cysts: The density of the shadows on the roentgen picture is proportioned to the specific weight of the bodies that appear in it—since the specific weight of the whole cyst—its mother-bag, its two walls and the liquid it contains is greater than that of the surrounding air, hydatic cyst can be easily seen in the lungs. Tuffier asserted that x-rays can pass through the hydatic cyst without producing a shadow. Recently, Escardo and Anaya stated that an hydatic cyst smaller than an egg cannot be seen on the x-ray screen. We find both affirmations false, for reasons explained above and because we have seen simple, not calcified cysts as small as a cherry produce a picture and the vomica or the operation proved they were hydatic cysts.

The difficulty of diagnosis consists in differentiating hydatic cysts from other bland parts of the same density, like tumors, inflammations, parasites etc. The resemblance of their shadows with those of hydatic cysts is the reason there are no pathognomonic images in hydatidosis of the lungs but only characteristic ones.

The roentgenologic image of an unbroken simple cyst depends greatly upon its localization. Central cysts generally develop according to the law of Belot and Peuteuil which reads: Every neoformation in the lungs tends to adopt a spherical form because the density of the lung tissues is small and homogenous. There is no axis of expansion, for the forces of peripheral attraction of the lungs are equally distributed and influenced only by the changes of intrathoracic pressure due to respiration. In consequence, Beclere asserts that every hydatic cyst produces a round, dark, frequently spheric, homogenous shadow with neat borders, as if drawn with a compass, easily seen against the clarity of the surrounding parenchyma. This concept is widely accepted and supported by Holsknecht, Didie, Picort, Auspensky, Morquio etc., while others criticize it, particularly Escudero
who affirms that the most exactly round pictures are produced by pulmonary sarcoma.

There are many authors between these two criteria, including ourselves; we find that the radiologic image of an entire simple cyst can vary from a perfectly round shadow (Fig. 1) to the most strange shapes like the one represented by the Fig. 2. We consider that the factor of utmost importance in the form of the cyst is its localization, because all the cysts situated near the thoracic wall, diaphragm or mediastinum are deformed by the rigid parts that limit their growth. The entire cyst presents a dense shadow with rather well determined borders. One of the most characteristic signs of an entire hydatid cyst is that of separation: in the upper part of the cyst, between the adventitia and the germinative capes, there is a clear space in form of a half moon with the concavity downwards. This clear space is the pneumoperivesicle, the so called “calotte aerienne” of Deve. Another rather frequent sign is that of the buoy—it is a shadow in the interior of the parenchyma, seemingly floating. It is easily influenced by respiration (sign of Escudero-Nemenow). During inspiration it adopts a vertical form, during expiration the contrary occurs. In our investigation we have seen this sign in 45 per cent of the cases; the Valsalva maneuver makes this sign even more accentuated. The further from the hilus are the cysts, the more they move with the respiration, except when they have strong adherences or are caught between two bronchial tubes. When a cyst gets caught between two bronchial tubes it also gets deformed while growing and so a cyst which was completely circular when small, may become polygonal after a certain time. This is very rare, it is much more frequent to find such polygonal forms in the emptied hydatid cysts because of the loss of the intracystic tension.

In unbroken cysts the Queirolo-Walsch statement is of a great diagnostic value. It says: while pulmonary cysts reject the bronchial tubes, tumors, on the contrary attract and deform the aerial ways and later even the thoracic walls and the mediastinum. Mansoury thinks that hydatid cyst permits the outline of the lung to be seen in its shadow, but that
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Tumors do not. Spender, Viallet and other authors do not give this proposition any value because the contour of the lungs can be seen in almost all the dense shadows of the thorax; it depends on the technic employed and the volume and situation of the shadow. The visibility or invisibility of the lungs serves us only to determine if the process affects the whole lung. It is in the saclike aneurysm that we see least of the pulmonary tissues.

Hydatid pulmonary cysts frequently present shadows with marked protuberances; the borders in these cases may still be neat and precise, or, they may have an irregular, dentiform and oily outline that Escudero and other Argentine authors have often found. Some authors (Broc, Jaubert de Beaujeau, Remy-Roux and Aubry) assert the reason for these oily limits is that in certain cases the bags of the new generation grow through the cuticle toward the outside instead of growing inside. This is especially common among animals, but Kilvington found it rather frequently in the human liver, too which makes that localization of the disease so much more serious. Other authors confirmed recently this phenomenon which sometimes originates a radiographic image in form of a potato (Fig. 3) or of a halteridium.

Another serious difficulty encountered in the diagnosis of hydatid cysts consists in determining whether a cyst is located in the lower part of the lungs or in the liver. There are different means of investigating such a case. Lateral radiography will clear doubts in many cases. Blefari recognizes a great value of the liberation of the costophrenic sinus (Fig. 4) which is frequently occupied by the cysts and other subphrenic tumors and usually remains free in case of pulmonary hydatid disease. We find that affirmation correct but would add that another important sign is the liberation of the cardiophrenic sinus in pulmonary hydatid cysts, while subphrenic cysts and tumors tend to occupy it; (particularly diaphragmatic hernia). We can also use to great advantage the diagnostical pneumoperitoneum; the diagnostical pneumothorax advised by Abadie, on the contrary, seems to us of less value and is most of the times impossible to realize because of the strong adherences. To determine whether a cyst

FIGURE 3

FIGURE 4
is located in the liver or in the lower part of the lungs we can also use tomography and radiography with contrast.

Even more difficult to diagnose are cases in which the disease is located in the lung and in the liver at the same time. Frequently it is necessary to proceed to a thoracotomy or a thoracolaparotomy in order to be able to make a diagnosis. Keeping in mind what we have previously said we can distinguish the following anatomoclinical forms of an unbroken cyst:

1) **Isolated cyst, without generative capacity.** Frequently in the lungs there is just one cyst, without vesicles. Sometimes it is quite big and produces few symptoms. The germinal membrane of the cyst can be separated easily, it is smooth and gets thinner as the cyst grows. The external membrane is united with the viscera itself. Spontaneous opening of this cyst is fairly frequent, sometimes giving way to vomica. A real degeneration of the tissues surrounding the cyst caused by the external membrane was observed from time to time. Escudero has studied this condition and has given it the name of cuticular degeneration. Clinically we call these patients silent. The discovery of the disease is very often fortuitous.

2) **Secondary bronchogenic echinococcosis of Deve and Herbert.** This form is developed by a cyst with germinative capacity. After invading the bronchial tree it can, by aspiration, provoke multiple infiltrations in parts far from the primitive cyst. It is often accompanied by acute manifestations in the respiratory ways such as pleuritis, atelectasis and infections of the residual cavity, so that the general symptomatology is usually accentuated.

3) **Primitive and hematogenous multiple pulmonary hydatidosis.** These infiltrations are originated from the intestinal chyliferous reached by the eggs by way of ingestion. The eggs pass by the vena portae to the liver, from there by the suprahepatic veins to the inferior cava, right part of the heart and to pulmonary artery which takes them to the lungs.

4) **Secondary pulmonary hydatidosis, single or multiple.** This form is characteristic of old carrier patients who have had hydatid cysts outside of the thorax. The symptomatology varies greatly. It is extremely frequent that the primitive localization is in the liver. These cysts have a
tendency to open spontaneously in bronchi or other organs.

Hydatid cysts can also be situated in the pleura. The primitive echinococcosis of the pleura was first described by Gary and Lion in 1900 and confirmed by Deve's experiences in animals. The hexagon-shaped embryo can reach the periphery of the lung by way of blood vessels from where it passes to the pleura and remains there. Dew does not admit this primitive localization, and we have not seen it. We rather think that in the majority of cases pleural cysts have origin in a pulmonary cyst that had enucleated itself and passed to the pleura. When the parasite grows in the pleura it compresses the lung, makes the thoracic wall bulge and displaces the mediastinum. In some cases it is eliminated by vomica, as described by Perazzi. Usually this vomica is preceded by the formation of a pyopneumothorax. Puncture is dangerous in cases of pleural cysts; it is better to do thoracotomy, having previously prepared for an operation in case the diagnosis is confirmed. Pleural hydatid cysts give a predominantly thoracic symptomatology, thus completely different from that of the pulmonary cyst.

The diagnosis of unbroken hydatid pulmonary cyst should be made by way of anteroposterior radioscopy, lateral and oblique radiography, in some cases.

B). Aseptic complications of unbroken hydatid cysts: The unbroken cyst can provoke pneumonitis around it or produce a zone of atelectasis. This can obscure the cyst. The unbroken cyst can also be accompanied by pleural reaction caused by osmosis of the hydatid liquid. Depending on the intensity of this reaction we can or cannot see through the cyst.

Calcification of hydatid cyst is a relatively rare process and the only part of it that calcifies is the fibrous capsule. Hydatid cyst in calcified form is often found during autopsy or in a series of radiologic examinations. It is frequently confused by the radiologists with tuberculous processes in which calcifications are more common.

C). Septic complications of hydatid pulmonary cyst: The most frequent complication of hydatid pulmonary cyst is perforation of a bronchus. When this occurs many radiologic signs corresponding to the anatomo-pathological modifications that this cyst undergoes may be observed; only exceptionally the cyst opens without producing radiologic signs. When the liquid is completely expelled, together with the membrane (the curative vomica) the image is exactly the same as after an intervention with actual methods; we observe on the x-ray screen a residual cavity without much perifocal reaction; the cavity is sometimes filled with blood. When the spontaneous opening of the cyst is recent we observe in some cases a zone of condensation in almost all the affected lobes. This zone of condensation may develop into carnification which sometimes, as we have noted ourselves, is almost impossible to see by the x-ray film. When this reaction is minimal and if the expulsion of the membrane and the liquid is partial, a horizontal superior limit above the aerial camara is observed—that means an hydatid pneumocyst was formed. Lagos Garcia found a picture that he described as the sign of “camalote.” A picture of this type
The cases quoted are from Spain. The hydatidosis does not exist in Costa Rica.
served as a filter for the germs, always present in the bronchi. Generally
the perifocal reaction is not as great as in abscesses and even though
the general symptomatology is that of pulmonary infection, the presence
of hydatid material in sputum clears any doubts that may arise. In in-
fected cysts one also finds the Escudero sign, not observed in abscesses.
The gangliar reaction is also often present in these cases. There is a
great group of infected cysts in which the membrane gets loose and sepa-
rates itself. Tillier observes an irregularity of the superior level of the
liquid, the movements of this level being very slow; this sign was de-
scribed by Cumbo in 1921. It corresponds to the image described by
Lozano for the liver and what this author thought was due to the contrac-
tion of the young bags. This form may be considered pathognomonic of
the infected hydatid pulmonary cyst. Sometimes, says Arce, we find a
space full of air between the capsule and the membrane, a sign frequently
observed in the beginning of the process of emptying. The superior limit
of the cyst can be seen convexed, the air remaining above and visible as
a dense shadow in form of an arch. This image, too, is very characteristic
of the infected cyst.

Although pulmonary cyst can perforate the pleura, this spontaneous
rupture is not frequent particularly because when the cysts grow much
they produce fuses of the pleuras. In cases where the pleura has been
perforated by hydatid cyst often an hydropneumothorax with its air
camara and the liquid level is seen or, even more typical, a hydatid hyd-
ropneumothorax that rapidly becomes a pyopneumothorax. Perforation of
the pleura by a hydatid cyst gives many symptoms like the asphyxiant
valvular pneumothorax, the syndrome of an "acute thorax," abundant
vomicas, violent pains, cutting or producing a sensation of an interior
tearing. In one of our cases the rupture was produced in a larval way,
with no symptomatology.

Cases of secondary pleural echinococcosis are rare: in 1925 Deve quotes
as the only ones those of Leonard, Renon and London; later a few others
were described by Bernou, Fruchard, Gain and Ugon.

It is much more frequent that the pleura is infiltrated from hepatic
cyst which produces what is called colepyopneumothorax. The frequency
of this complication seems to be due to the facility with which hydatid
cyst of the liver grows upward because of negative intrathoracic pressure;
atrophy of the diaphragm by compression (Deve); infection that fuses
the diaphragm with the pleura and the necrosis of the adventitia. As far
as diagnosis is concerned the presence of bile in the pleural exudate is
meaningful. Other signs which help to establish the primitive hepatic
localization of the disease are: the sign of the "volcano in eruption" (Fig.
6) described by Harris in which the curved point of the diaphragm indi-
cates the localization of the primitive cyst; the sign of camalote and that of
the arcade described by Deve and Levertisseur. This last sign consists in
the appearance of a lineal shadow similar to a descending arch which is
submerged in the liquid cape; this arch is the dead adventitial bag that
remains suspended in the cavity after the separation from the hepatic
tissue. The discovery of calcifications in the liver is helpful, for they are
pathognomonic. Perforation of a hepatic cyst in the pleura can also occur in a dissimulated way and without the formation of pneumothorax (the case quoted by Reboul). Spontaneous rupture of a pulmonary hydatid cyst into the abdomen is not known in the medical literature.

Subphrenic hydatid cyst, as Rendu and Deve observe, can break directly in the bronchia through a short trajectory without cavity in the lungs. In this case typical vomica containing membranes and small vesicles takes place; the radiologic image is characteristic. There may or may not be an intermediate pulmonary cavity, but the formation of a basal cyst-like empyema is constant. This empyema can begin by a simple trajectory and due to the continuous passing of the infected material the pulmonary parenchyma gets destroyed; this is followed by a formation of a focus of suppuration. Claessen admits the perforation in the incisura interlobaris; from there it can reach the hilus producing only few disturbances in the lung. It occurs very seldom, due, Deve believes, to the fact that the pleural leaves of the incisura become fused, thus making the penetration impossible. Piaggio Blanco and Garcia Capurro were able to quote 20 cases proving the contrary and they affirm that “the best radiologic images of the liquid interlobar process correspond to pathologic processes originated by subphrenic hydatidosis. Sometimes we find an interlobar pleural reaction in form of incisuritis.”

Less frequent, or rather exceptional complications are rupture of the cyst in the pericardium causing pericarditis which begins more or less abruptly. The cyst can also open in the rachial conduct, skin or the digestive apparatus. Tuberculosis associated with pulmonary hydatidosis gives no characteristic radiologic image. The diagnosis must rely on examination of sputum.

Operated cysts can present other complications one of them being the formation of residual fistulas. These are now rare. Diagnosis of fistulas is made primarily by way of radiographies with a contrast, tomography and the test of methylene blue.

Diagnosis of pulmonary sclerosis is difficult, in fact it sometimes cannot be made except during surgical intervention. Other times radiography is useful; if the sclerosis is accompanied by bronchiectasis the injection of lipiodol in the bronchi is necessary in order to make a diagnosis.

The diagnostic value of tomography in pulmonary hydatidosis is not great, but it is useful in the differential diagnosis, to localize the cyst and in some special cases like the one in Figure 7. Bronchoscopy is helpful in some cases, especially when atelectasis is present.

SUMMARY

The order of the radiologic exploration of pulmonary hydatid disease should be as follows: 1) simple radiography; 2) posteroanterior or antero-posterior radiography; 3) lateral radiography; 4) tomography, and 5) oblique radiography, radiographies with contrast or other methods if required.
RESUMEN

El orden de la exploración radiológica de la hidatidosis pulmonar debe ser como sigue: 1) radioscopía simple; 2) radiografía postero-anterior o antero-posterior; 3) radiografía lateral; 4) tomografía, y 5) radiografía oblicua, radiografías con contraste u otros métodos cuando se requieran.

RESUME

L'ordre de l'exploration radiologique dans le cas de kystes hydatiques du poumon est le suivant: 1) radiographie standard; 2) radiographies postéro-antérieure ou antéro-postérieure; 3) radiographie latérale; 4) tomographies, y 5) radiographies obliques. Si c'est nécessaire, radiographies avec substance de contraste ou autres méthodes.