Value and Pitfalls of the Lateral Lung Scan*

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Two hundred eighty-one of 443 lung scans composed of anterior, posterior, and lateral projections (done in our hospital) demonstrated defects. In 3.9 percent of them (11 cases), the defects were delineated in the lateral views only, while in 29.2 percent (82 cases), the lateral views either outlined additional defects not appreciated on the straight views, or showed more extensive lung involvement. In the majority of instances, 56.6 percent (159 cases), the lateral views showed comparable findings and also tended to segmentally localize the defects better. However, in 10.3 percent (29 cases), defects present on the straight projections were not detected on the lateral views. Various causes that could give rise to artefactual abnormalities in the lateral lung scan and therefore inhibit its proper interpretation, are reviewed and discussed. Despite these problems, the lateral may be the only view to demonstrate abnormalities and, in fact, frequently provides additional useful information.

Lung scanning is a widely accepted noninvasive modality in the diagnosis of pulmonary diseases.1-3 Anterior, posterior, and lateral scans are usually obtained. The usefulness of the lateral projection is recognized,4-5 but statistics supporting this are lacking in the literature. Similarly, pitfalls in the interpretation of the lateral scans are known,4,6,7 but evidence in print as to the extent of incidence of these pitfalls is also lacking. Analysis of 443 scans done at our hospital aimed at these two points, was therefore undertaken. Pitfalls in interpretation and the reasons behind these pitfalls, are reviewed and discussed.

MATERIALS AND METHOD

Five hundred eighteen lung scans were performed at the Brooklyn Hospital on 285 adult patients following the administration of either 300 uCi of 131I macroaggregated albumin or 2 mCi of 99mTc macroaggregated albumin from July 5, 1972 to June 7, 1974. Scans were obtained using a dual scanner.§ Four hundred fifty-six scans included the anterior and posterior projections as well as both laterals. Thirteen laterals were judged unsatisfactory and have been excluded. Four hundred forty-three scans were retrospectively analyzed. Scans with tapered basal activity due to congestive heart failure, but without defects, and scans with findings attributable to an enlarged heart were included in the negative group.

In obtaining the lateral views, caution was observed to position the patient in a true lateral decubitus. In the 99mTc scans, an information density of approximately 2500 cts/cm2 and a speed of 150 cm/min was used, while in the 131I scans, about 700 cts/cm2 information density and a speed of about 100 cm/min was used. The range differential was 70 percent.

The 281 abnormal scans were classified into one of the following categories (Table 1):

1. Anterior and posterior views are negative, but one or both laterals show the presence of definite defects.
2. Anterior and/or posterior views demonstrate defect(s), and the corresponding lateral projection demonstrates more extensive or additional defects.
3. Anterior and/or posterior views show defect(s), and the corresponding lateral projection demonstrates comparable defects.
4. Anterior and/or posterior views demonstrate defect(s), but the corresponding lateral shows minimal or no apparent defect.

RESULTS

Two hundred eighty-one scans demonstrated defects and 162 scans did not. In this series of 281 abnormal scans, 3.9 percent of the cases outlined defects in the lateral scan which were undetected in the straight projections alone (Fig 1). In 29.2 percent of the cases, the lateral scan was helpful not only in confirming defects already detected on the anterior and posterior projections, but also in demonstrating additional, and often more extensive, lung involvement (Fig 2). In a majority of the cases, 56.6

![Table 1](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/20966/ on 06/21/2017)

<table>
<thead>
<tr>
<th>Category</th>
<th>No Cases</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>3.9</td>
</tr>
<tr>
<td>2</td>
<td>82</td>
<td>29.2</td>
</tr>
<tr>
<td>3</td>
<td>159</td>
<td>56.6</td>
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<tr>
<td>4</td>
<td>29</td>
<td>10.3</td>
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VALUE AND PITFALLS OF LATERAL LUNG SCAN 549
The lateral view includes a lung field greater than its corresponding anterior or posterior view. This is because the anteroposterior diameter of each lung is greater than its transverse diameter. Wagner recognizes the usefulness of the lateral scan and recommends that it be done at the very least when the anterior or posterior views show defects.

There are, however, a number of inherent technical, anatomic, and physiologic considerations that may give rise to apparent abnormalities in the lateral scan and thus add some confusion to its interpretation. A true lateral projection is not consistently easy to obtain because the patient's clinical condition may not at times permit him to assume and maintain the lateral decubitus position; often an oblique scan results rather than a true lateral. Another problem is that the shoulder and proximal forearm invariably gets in the way of the upper probe during the scanning process. This may cause an artefactual lack of activity in the anterior apical area of the upper lung because of attenuation of photons, particularly when a low-energy radiopharmaceutical such as 99mTc macroaggregated albumin is used.

According to Krishnamurthy and co-workers, the lateral obtained from the bottom probe is more susceptible to anatomic distortion because of the upward displacement of the diaphragm, as well as compression of the dependent lung by the lower thoracic cage and cardiac structures.

There is usually a disparity in the size of the two laterals. The scan obtained from the bottom detector tends to be smaller, while the upper part of it tends to be larger. This is due to the fact that the upper lung is in a more expanded state with little respiratory motion from the hemidiaphragm, while the lower one is immobilized against the scanning table. In our series, this disparity in size between the two laterals was either less obvious or absent in patients suffering from chronic lung disease. All of these complications are related to the lateral decubitus position and can be eliminated by the use of a stationary imaging device, such as the scintillation...
FIGURE 2. (A—left). Note additional defects in the right lateral view (arrows) which were not discernible on the straight projections. (B—right). Right midlung defect also appears more extensive on the left lateral.

camera, where rotation of the detector head provides lateral views without placing the patient in the decubitus position.\textsuperscript{10}

Surprenant\textsuperscript{4} has shown that 15 to 30 percent of crossover activity is contributed by the other lung during lateral scanning. It was not surprising, therefore, that as many as 10.3 percent of the scans in the series having definite defects on the anterior and/or posterior projection, showed only obscure (or no) apparent defect on the corresponding lateral. This artefact has also been pointed out by Blahd.\textsuperscript{7} It occurs when one lung area is normal and the same level on the opposite side has a defect which is concealed because of detection of radioactivity originating in the normal side. A majority of the artefacts in these cases involved the upper half of the lung field, inasmuch as the heart and other mediastinal structures in the lower thoracic cage tend to absorb the photons from the lower section of the lung. In our interpretation, caution was taken not to read as abnormal \textsuperscript{99m}Tc upper lateral scans which showed apical lack of activity because of the shoulder.

Despite technical, anatomic, and physiologic problems that accompany their performance and interpretation, lateral scans are essential to localize accurately defects seen on the straight projections. Since the lateral scan was the only view that showed abnormalities in 3.9 percent of our patients, it would seem that it \textit{should be obtained} even when a patient's anterior and posterior scans are normal.

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REFERENCES

FIGURE 3. (A—left). Right lateral fails to reveal large area of non-perfusion seen on the straight projections. (B—right). Particularly in the upper lobe region (see arrow in A) because of cross-activity from the normal left lung.
ANNOUNCEMENTS

Graphic Methods in Cardiology—1975

The American Heart Association Council on Clinical Cardiology and the University of Rochester School of Medicine and Dentistry will present a three-day postgraduate course on Graphic Methods in Cardiology, 1975. The course will take place at the University, June 5-7 under the direction of Dr. Pravin M. Shah. For information, contact the University Conference Office, University of Rochester, Rochester, New York 14627.

International Symposium on the Mitral Valve

An International Symposium on the Mitral Valve will be held in Paris, France, May 26-28, under sponsorship of the French Society of Cardiology and organized by the Department of Cardiology of the Fondation de Rothschild and the Cardiovascular Research Center ARNTIC (Paris). For information write Dr. D. Kalmanson, Service de Cardiologie, Fondation Adolphe de Rothschild, 29 rue Manin, 75019 Paris, France.

Fifth Fleischner Society Symposium on Diseases of the Chest

The Fifth Symposium on Diseases of the Chest of the Fleischner Society will be held at the St. Francis Hotel, San Francisco, May 28-31. Instructional format will emphasize tutorial sessions and case presentations. For information, please write: Norman Blank, M.D., Program Coordinator, Department of Radiology, Stanford University Medical Center, Stanford, California 94305.

XXIII International Tuberculosis Conference

The XXIII International Tuberculosis Conference of the International Union Against Tuberculosis will be held in Mexico City, Mexico, September 22-26. The program will also include topics relating to chest diseases, as well as tuberculosis. President of the Congress is Prof. Miguel Jimenez, Mexico City. For information, address the Secretary of the Congress at Hospital para Enfermedades Pulmonares de Huipulco, Calzada de Tlalpan 4502, Apartado postal 22091, Mexico 22 D.F., Mexico.