VERY LOW PROBABILITY LUNG SCAN FINDINGS:
A NEED FOR CHANGE

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ABSTRACT

This study was conducted to determine the prevalence of PE in patients with V/Q scans interpreted as representing a very low probability (VLP) of PE (1-3 small segmental perfusion defects with a normal chest radiograph). An analysis of the entire data set obtained during the PIOPED study was performed. Of the total of 1,359 patients in whom the presence or absence of PE was confirmed, 80 (6%) patients had the VLP pattern. Only 2 of 80 patients (2.5%) had PE, both patients had partially occlusive thrombus within a single lower lobe segment. Both patients were also referred from surgicl wards, had a history of previous surgery within 3 months and a history of immobilization within 3 days prior to scan. Both patients with PE and VLP patterns had intermediate pretest odds. However, 36 patients with similar lung scan findings and no evidence of PE also had intermediate pretest odds. The remaining 40 patients had low pretest odds (two patients did not have pretest odds entered into the data base). We conclude that the very low probability interpretation criterion is a valid diagnostic category and should be a separate part of any schema for interpreting V/Q lung scans. The pretest clinical likelihood of PE did not change the post test probability of PE for very low probability lung scan interpretation as they did for low, intermediate or high probability lung scan interpretations.
Key words: pulmonary embolism; V/Q scintigraphy; Tc-99m MAA

INTRODUCTION

The ventilation perfusion (V/Q) lung scan has been shown to be a useful diagnostic test in the evaluation of patients with suspected pulmonary embolism (PE). Several diagnostic schema for interpreting V/Q scan have been suggested (1-3). Criteria for the interpretation of V/Q lung scans from the prospective investigation of pulmonary embolism diagnosis (PIOPED) study are classified as normal, very low, low, intermediate or high, probability of PE (3). Yet, in the original PIOPED publication as well as subsequent publications the results of V/Q scans interpreted as representing a very low probability of PE have been combined either with those of patients with normal or low interpretations (3-6). The purpose of this analysis was to determine the prevalence of PE in patients with V/Q scans interpreted as representing a very low probability of PE (1-3 small segmental perfusion defects with a normal chest radiograph).

METHODS

An analysis of the entire data set obtained during the PIOPED study was performed. The participating

centers, patient enrollment, V/Q scan and pulmonary angiogram acquisition and interpretation parameters have been previously published (3). Only patients with V/Q scans interpreted as representing a very low probability of PE were included in this analysis. The presence or absence of PE was determined based on pulmonary angiography and one year follow up (4). The clinican's pretest assessment of the likelihood of PE was recorded using a continuous scale from 0-100% based on the information provided by a standardized history, physical examination, chest radiogrphs prior to knowledge of the V/Q scan results.

RESULTS

In the total PIOPED population PE was confirmed in 399 patients and excluded in 960 patients. Among these patients 6% (80 of 1,359) had V/Q scan interpreted as representing a very low probability of PE. Only 2.5% (2 of 80) of these patients had documented PE. Both patients with PE were referred from surgical wards and had a history of immobilization (strict bed rest for at least three days prior to the scan). Pulmonary angiograms of these patients demonstrated a low pulmonary clot burden with partially occlusive thrombus present within a single lower lobe segment. Neither patient developed complications related to PE or anti-coagulation therapy.

Among the patients with very low probability V/Q scan interpretations and no evidence of PE, 24 patients had negative pulmonary angiograms while 54 patients received no anti-coagulation and had no evidence of PE on one year follow up.

Both patients with PE and very low probability lung scan interpretation had an intermediate (20%-80%) pretest probability of PE. However, 36 patients with similar V/Q scan findings and no evidence of PE also had an intermediate pretest clinical likelihood of PE. Forty patients had low (less than 20%) pretest probability of PE. In two patients the pretest clinical likelihood of PE was not entered into the database.

DISCUSSION

The original PIOPED V/Q scan interpretation criteria were developed and initially tested by the Nuclear Medicine working group prior to the commencement of the PIOPED study (3). Based on data obtained during the PIOPED study minor revisions to the interpretation criteria were made and subsequently validated in a consecutive series of 104 patients (5,6). However, in the revised criteria, patients with very low probability V/Q scan interpretations were

combined with those with low probability lung scan interpretations. Controversies exist on usefulness of the low probability V/Q scan interpretation. Some clinicians feel that this interpretation is misleading and prefer to interpret V/Q scans into one of three categories, normal, non-diagnostic or high probability of PE (7,8). Others find the low probability category helpful in virtually excluding the diagnosis in patients who have a low clinical suspicion of PE (4,9,10).

In this reprot we specifically examined patients with very low probability V/Q scan interpretations. In the PIOPED series, which were conducted at six tertiary referral centers, 6% of patients had V/Q scans interpreted as representing a very low probability of PE. The prevalence of this interpretation in non-tertiary referral centers is likely higher. The proportion of patients with V/Q scan interpreted as representing a very low probability of PE who actually had PE was less than 3%. The pretest clinical likelihood of PE did not change the post test probability of PE for very low probability lung scan interpretation as they did for low, intermediate or high probability lung scan interpretations. From this report we conclude that the very low probability interpretation criterion is a valid diagnostic category and should be a separate part of any schema for interpreting V/Q lung scans.

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