Patient’s Self-interpretation of Tuberculin Skin Tests*

Charlotte Colp, MD, FCCP; Adina Goldfarb, MA; Isaac Wei; and John Graney, MD

Background: In the outpatient use of tuberculin skin testing (purified protein derivative [PPD]), it is at times inconvenient to have a patient revisit for interpretation. Therefore, we assessed patients’ ability to self-interpret these test results.

Methods: In keeping with prior custom, patients were seen by an experienced nurse, who performed skin testing with PPD intermediate strength as well as mumps and Candida anergy control tests in some cases, and explained the procedure. The patients were asked to return 48 to 72 h later, at which time one of the researchers recorded their test interpretations before they were again evaluated by the nurse.

Results: Sixty-eight patients were studied, of whom 59 returned at appropriate interval. Eighteen patients had a positive PPD test reaction of 10 to 20 mm induration, which only one patient correctly identified as a positive test result. However, positive anergy control tests were correctly interpreted in 10 of 27 cases.

Conclusion: The small number of positive PPD test result recognition by these patients may be partially attributed to their lack of education, as well as foreign birth and denial of illness. PPD results should be checked by an experienced professional.

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Key words: Mantoux test; purified protein derivative; skin test; tuberculin test

Abbreviations: PPD—purified protein derivative

The re-emergence of tuberculosis in the 1990s has prompted the medical community to reintroduce aggressive surveillance methods. The tuberculin skin test is “the simplest, most accurate, and most frequently” used test to assess tuberculosis exposure.1 Thus, tuberculosis skin testing remains a valuable diagnostic tool for the detection, control, and elimination of tuberculosis. Unfortunately, the tuberculin (purified protein derivative [PPD]) tests must be interpreted 48 to 72 h after placement. Sometimes a return visit at that time is inconvenient for the patient and/or the healthcare facility, so that reliance is placed on interpretation of results by the patient or a relative. However, there is little documentation in the literature of the reliability of such readings. We performed a prospective evaluation of patients’ self-interpretation of PPD (and sometimes control skin tests) in an inner-city general hospital outpatient clinic.

Materials and Methods

Subjects in this study were patients at the Adult Primary Care Clinic in Beth Israel Medical Center, New York City, for whom PPD skin testing is performed as part of their routine health maintenance.

In performing the tuberculin test, 0.1 mL of stabilized tuberculin PPD (Connaught Laboratories; Swiftwater, Pa) is injected intradermally on the volar surface of the right forearm using standardized techniques. When indicated, additional testing is performed to distinguish patients who are tuberculin negative from those who are anergic. The anergy test consists of 0.1-mL injections of mumps skin test antigen (Connaught Laboratories) and of allergenic extracts of Candida albicans (Berkeley Biologicals; Berkeley, Calif) to the volar aspect of the left forearm.

This procedure was performed in a fashion similar to that practiced in this clinic prior to the initiation of this study: the injections were given by any one of the staff nurses available, all of whom were experienced in tuberculin skin testing, who at the same time explained the procedure to the patients or their families, briefly describing the interpretation and significance of a positive test, as well the difference between the PPD and the control tests. The patient was given a revisit appointment in 48 to 72 h and the nurse stressed the importance of returning at that time for the test reading. A translator assisted in communicating when necessary.

When the patients returned, they were interviewed by one of the study principals (A.G. or I.W.), prior to seeing the nurse. A standard questionnaire (Appendix) was administered to assess patients’ knowledge about tuberculosis and the interpretation of their skin test. These study principals were thus responsible for recording patients’ awareness of any induration present and their impressions of their test results. Subsequently, one of the experienced registered nurses measured all positive results by palpation of induration or by using the ball point technique.2 Induration of 10 mm or more was considered to represent a positive PPD test reaction, while the control tests were considered positive if any induration was present.

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Table 1—PPD Interpretations

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
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<tbody>
<tr>
<td>PPD tests performed</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>PPD tests read</td>
<td>59</td>
<td>87</td>
</tr>
<tr>
<td>Positive PPD reactions per</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>Patient</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Attempts were made immediately to contact all patients who failed to keep their appointments and to have them return within 24 h for their PPD test reading. However, only one such patient came in after failing to keep her original appointment; her skin test result was negative.

Results

A total of 68 PPD tests were performed for 43 female and 25 male subjects. Two-thirds of the patients were foreign born; 22 were Caribbean Hispanics from either Puerto Rico or the Dominican Republic, and 2 were born in Russia. Patients had a mean age of 51 years. Only 12 had education beyond high school, while the remaining had a mean of 8.3 years of formal education.

Fifty-nine patients (87%) returned in 48 to 72 h for their PPD reading. Eighteen had a positive PPD test result ranging from 10 to 20 mm induration. Of these, only one patient correctly identified a positive test result; ten considered the test result negative (although four of these ten patients did note that the test site was swollen or raised); seven patients (five of whom also noted signs of induration) could not make a judgment on their test result (Table 1). Most of these patients expressed some awareness of the nature of tuberculosis as a lung disease, as well as an indication that a positive test result would indicate exposure to or presence of the disease. However, on being told that their skin test result was positive, most were not concerned, and believed that their problem would be adequately handled by the clinic staff.

Mumps and Candida skin tests were performed on 45 patients. Twenty of these patients had a positive reaction of 6 mm induration or more in 1 or both of these tests, and 7 subjects interpreted these results correctly. Two of those seven patients simultaneously failed to correctly identify positive PPD test results on the other arm.

During the performance of this study, it became quickly apparent that patients were unaware of their positive skin test results; therefore, the last 24 patients studied were methodically counseled by the study principals when the skin tests were injected. The single patient who correctly identified his positive skin test result was from this intensively counseled group. However, in this latter group, three patients had positive PPDs that they failed to identify, and only three of seven correctly identified positive control tests.

Only one patient in this study indicated that she had a history of exposure to tuberculosis. She had a positive PPD reaction of 15 mm but was not aware of the result. One patient had an abnormal chest radiograph consistent with tuberculosis; she also incorrectly interpreted her positive PPD test result.

Conclusion

We evaluated the ability of a group of inner-city clinic outpatients to interpret their PPD and anergy control skin test results. Almost all of these patients failed to correctly identify positive reactions to the PPD tests, even after they received specific instruction. Similar findings have been reported by Howard and Solomon,8 in their study, only 37% of positive reactors were aware of their test result. Risser et al9 report fairly good results for patient self-assessment at a Veteran’s Administration clinic; however, an appreciable proportion of their patients were either deemed unable to perform the self-assessment and eliminated from the study or failed to return for validation of their reports by the nursing staff. Finally, Navin et al4 report excellent self-reading results in a group of college students.

Undoubtedly, the lack of education and sophistication of our patients was at least partially responsible for their inaccurate PPD evaluations, especially in relation to the college students in the study by Navin et al.4 However, our clinic population consists of the type of patients for whom PPD testing is most frequently performed and most important.

Use of an actual three-dimensional demonstration chart such as accompanied test kits (Tine), illustrating the features of a raised, indurated reaction, might have been more useful than the verbal instructions that we gave to our patients. However, such charts are not routinely available and their use has not been validated. Our patients proved unreliable in both detection and evaluation of induration.

In analyzing the causes of our patients’ failure to correctly interpret PPD tests, it should be noted that this testing was performed and explained to these patients in the setting of a general primary care clinic. As will generally be the case in such settings, patients were simultaneously being evaluated or treated for a variety of other medical problems and usually received instructions about a number of matters in addition to PPD testing. The sheer flood of information was too much for many patients to absorb at once.

Finally, in view of the frequent correct identification of positive control skin test results, we believe that there is a major element of denial involved in many patients’ evaluations of their positive PPD skin test reactions. This would explain the slightly better performance of these patients in identification of positive anergy control test results. There is still a stigma.
attached to the diagnosis of tuberculosis. Indeed, one of us (C.C.) noted similar denial of positive PPD test results in a private practice with patients of higher educational level than our clinic patients.

The conclusion to be derived from this study is that patients cannot be relied on to correctly interpret their PPD test results, and all test results must be validated by trained medical professionals.

REFERENCES

APPENDIX 1: PATIENT QUESTIONNAIRE

What is tuberculosis? (symptoms and means of transmission)
Do you know if any of your friends or family members have tuberculosis?
What exposure did you have with this/these individual(s)?
Have you had prior TB testing? Where? When? What was the result?
Do you think you might have tuberculosis? Why?
Do you know what is the purpose of the skin test you were given? What?
A positive result from the skin test means you have been exposed to the disease; what does a positive reaction look like?
What do you think is the result of your skin test? Why?

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<thead>
<tr>
<th>PPD</th>
<th>Candida</th>
<th>Mumps</th>
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<tbody>
<tr>
<td>Is the area red?</td>
<td>Was the area itchy?</td>
<td>Is the area swollen?</td>
</tr>
<tr>
<td>Is the skin flat or raised?</td>
<td>What do you think will happen as a result of this skin test?</td>
<td>What do you think are the results of the control? Why?</td>
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