COMPARISON OF TINE AND INTRADERMAL PPD TESTS FOR TUBERCULOSIS IN HOSPITAL PATIENTS

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SINCE the tuberculin tine test was described by Rosenthal (*1*) in 1961, there have been studies comparing it with the intradermal tuberculin skin test with purified protein derivative (PPD–S) (*2–6*). The impressions from results of these studies have been that the tine test is a good screening test, but that the intradermal test remains the diagnostic standard. The diagnostic use of the tine test is considered limited because of uncontrollable variables in the manufacture of the antigen and application of the test. These include (*a*) the crudeness of old tuberculin as an antigen, (*b*) the variable potency of old tuberculin, and (*c*) poor control of dosage, which varies with force, depth, and duration of puncture.

After the tine test was made available for general use in July 1964 at the Public Health Service Hospital, Baltimore, Md., there developed among the house staff the impression that it was not sufficiently sensitive. This impression prompted this study, which is a comparison of the tine and intradermal tests and an assessment of the use of the tine test in hospital practice.

Materials and Methods

The tine test is administered by using a stainless steel ring with four prongs (tines) attached to a plastic holder. The prongs have been dipped in 4-times concentrated old tuberculin, then dried and sterilized. The device is disposable. The ring is applied firmly for approximately 1 second to clean dry skin of the forearm, leaving a visible impression of the four punctures and ring.

Two hundred medical and surgical inpatients at the Public Health Service Hospital, Baltimore, Md., were tested. These patients were consecutive adult admissions whose tuberculin reactivity was not already known and who would be hospitalized long enough for reading of the test. Mean age of the patients was 49 years; 86 percent were men, 14 percent women. The group consisted mainly of American seamen and dependents of military service personnel.

Intermediate PPD was prepared to a concentration of 0.0002 mg. per 0.1 ml. dose (10 tuberculin units) and administered intradermally. The tine test was administered to the left arm and intermediate PPD was injected into the right arm of each patient. Testing was done in January, February, and March of 1965 by two physician members of the staff, and results of all tests were read after 72 hours by one medical resident (R.G.). Measurements of an induration of 3 mm. or more at any prong site of the tuberculin tine test area and an induration of 5 mm. or more at the site of the intradermal injection were considered positive reactions.

Results

In 186 (93 percent) of the patients there was agreement of the two tests. Both tests were positive in 123 patients (61.5 percent) and both negative in 63 (31.5 percent). Fourteen patients (7 percent) had a positive reaction from the tine test and a negative reaction from the intradermal test. Of the 14 approximately one half had no reaction to PPD, and the other

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half had small indurations of less than 5 mm. Using the intradermal test as the standard, there were 7 percent false positive and no false negative reactions to the tine test. The numerical results are summarized in the table.

Comparison of tuberculin tine test and intradermal skin test results, Public Health Service Hospital, Baltimore, Md., January–March 1965

Tuberculin tine test	Intradermal skin test		Total
	Positive	Negative	
Positive	123	14	137
Negative	0	63	63
Total	123	77	200

Discussion

Most comparative studies of these two tests have been in large groups of young people, such as school or military populations. In these groups the incidence of tuberculin reactivity has been very low, and the large number of tests necessitated participation of many persons for administering the tests and observing the results. These factors have limited the comparability of the tests.

However, Badger (*2*) and Capobres (*3*) carefully controlled testing and reading results of tests of older hospitalized patients, and their observations were remarkably similar to ours. One difference was the presence of a small fraction of false negative tine tests in their reports: 3 percent by Badger and 4 percent by Capobres. The significance of this difference is questionable when considered in terms of the acknowledged 6–10 percent error in intradermal skin test reading by experts (*6*, *7*).

Thus it is apparent that a negative tine test is a significant piece of information about the individual patient, essentially ruling out tuberculin reactivity. Our evaluation has stressed the sensitivity of the test by requiring a 3-mm. induration for positivity and by using the 10 tuberculin unit dose of PPD. Still no false negative results were observed. In retrospect it seemed apparent that the basis for the opposite impression among the house staff was imprecise knowledge of the criteria for positivity of the tine test.

The false positive reactions probably are explainable in terms of the limitations of the test listed at the beginning of this paper. However, those false positive reactions associated with weak reactions to PPD are suggestive of cross-reactivity with nontuberculous mycobacterial infections.

In this connection the tine test and intradermal test were compared in Houston by Hsu and her associates in a population with a high incidence of low-grade tuberculin reactivity (*5*). A significant number of false positive reactions to tine tests were observed. The majority of these persons subsequently were shown to be strongly reactive to purified protein derivatives from the Battey and Bridges strains of mycobacteria.

There is much to recommend the tine test as a routine hospital admission procedure. It gives meaningful information. The disposable device is sterile. There is no risk of hepatitis. No extra equipment is necessary. Administration requires minimal skill and time.

Summary

The intradermal tuberculin skin test with purified protein derivative and the tuberculin tine test were compared to assess the usefulness of the tine test in hospital practice. Two hundred inpatients at the Public Health Service Hospital in Baltimore, Md., were given one test on each forearm.

Reactions coincided in 186 patients (93 percent): both tests were positive in 123 patients (61.5 percent), and both negative in 63 (31.5 percent). Fourteen patients (7 percent) had a positive reaction from the tine test and a negative reaction from the PPD. Of the 14 about half had no reaction to PPD and the remainder had an induration of less than 5 mm. Using the intradermal test as standard, there were 7 percent false positive and no false negative reactions to the tine test.

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