NOTES ON THE VALUE OF TUBERCULIN-TESTING IN A RURAL DISTRICT

BY

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Following upon its discovery towards the end of the last century, tuberculin was extensively employed as a diagnostic agent. As the difference between infection and disease was not at first understood, its use led to numbers of healthy people being placed in sanatoria as the result of a positive reaction; and, indeed, it was suggested in the Tuberculosis Regulations of 1912 (England) that notification should not be made solely as the result of a positive tuberculin test. However, it was soon realized that whereas infection from tubercle bacilli was widespread, it was relatively seldom followed by disease, and the knowledge that a positive reaction was of no great diagnostic importance in an adult tended to undermine its value in clinical medicine, with the result that the use of the tuberculin test became limited, and was mainly confined to children.

Literature of Tuberculin-testing

This belief in a widespread infection by the tubercle bacillus is held as the result of various tuberculin surveys, some of the best known being those of Hamburger in Vienna, Calmette (1913) in Lille, and Fishberg (1932) in New York; the incidence of tuberculous foci found in necropsies supports the results of these surveys. These investigations were made in clinics and out-patient departments on people who for the most part lived in densely populated areas and whose standard of living was low. These limitations introduced the factor of selection, and the results—indicating an almost universal sensitivity to tuberculin by the time adolescence is reached—are consequently misleading, since they refer to a section of the community which by force of circumstances is peculiarly liable to infection. They are certainly not applicable to rural areas. The work of Heimbeck (1936) in Norway and Holm (1937) in Denmark on nurses and students aroused fresh interest in the value of this test, and more recently high percentages of nurses and university students in the U.S.A. were found to be Mantoux-negative.

A high percentage of positive reactors in a community indicates a large number of "open" cases or a contaminated milk supply: in either case dissemination of the infection will occur more readily in urban than in rural districts. As recognition of the early cases becomes more frequent through the examination of contacts and the increased use of radiography, and as institutional segregation and collapse therapy reduce the numbers of open cases which are "at large" in the community, there will be a corresponding reduction in the sources from which the infection may be contracted. We should therefore expect that in the future there will be a higher proportion of negative tuberculin reactors and an increase in the average age at which the primary infection occurs. The energy with which the bovine source of infection is attacked will be an important influence in reducing the number of positive reactors: this factor will vary in efficiency from the system of slaughtering tuberculin-positive cattle, as is done in the U.S.A., to the masterly inactivity which this problem encounters in Ireland.

The Present Test

Routine tuberculin-testing was started two years ago in this county, and below are tabulated the results, in their respective age groups, of such tests carried out on 151 people, all of whom were considered by us to be free from active tuberculosis.

	0-5 Years	5-10 Year	10-15 Years	15-20 Years	Over 20 Years	Total
Positive ..	4 (17%)	10 (30%)	18 (49%)	7 (44%)	28 (67%)	67 (45%)
Negative ..	19 (83%)	23 (70%)	19 (51%)	9 (56%)	14 (33%)	84 (55%)
Total ..	23	33	37	16	42	151

The routine adopted was: (1) percutaneous test with Hamburger's (forte) ointment; (2) Mantoux 1/100 dilution where no reaction to the percutaneous test occurred.

The percutaneous test was found to be unreliable, and negative results were not accepted unless confirmed by the Mantoux intradermal test. The latter, in our experience, proved reliable when compared with the results of clinical and radiological examination, and of the sputum tests.

These cases, of course, represent a selected group of the population; but, being mostly of the dispensary or "ticket" class, many of whom suffer from insufficient food, and all being referred by a doctor to one of the various tuberculosis clinics as possible cases of tuberculosis, they represent a section of the population which should show the highest proportion of positive reactors: the value of the test as a diagnostic agent would be greater among the more sheltered "private" type of patient. Several of these cases, especially those in the age groups 0-5 and 5-10 years, were referred as possible cases of abdominal tuberculosis, usually showing the vague signs and symptoms associated with this condition: by no other method known at present could this disease have been excluded.

In the age group "over 20 years" it is seen that of 42 new cases, 14 (33%) did not react to the intradermal test, thereby indicating absence of infection. Other experiences in the county would suggest relatively late age onset for primary infection:

(1) Of the 9 deaths known to have occurred in the county during the past year from tuberculous meningitis, 7 were of patients over 15 years: tuberculous meningitis is associated with a progressing primary infection.

(2) Of 8 cases of glandular and 7 cases of joint tuberculosis, only 4 were in children under 15 years old: this form of tuberculosis is usually associated with a recent primary infection.

The delayed appearance of primary infection, or its absence, might seem paradoxical in a country where tuberculous disease is considered to be prevalent. However, it is possible that this high incidence may be much more apparent than real, based as it generally has been on clinical diagnosis and not always supported by bacteriological or radiological evidence. The lack of x-ray facilities does not necessarily mean missed cases, since these will eventually progress to a state in which their condition can be diagnosed clinically, but rather that a person may be designated tuberculous who is in reality suffering from one of the many chest conditions producing similar signs and symptoms; also, opportunities and facilities for post-mortem investigation are very limited in Ireland and are seldom employed.

The wholesale elimination of some families by tuberculosis, as is occasionally seen, is not the result of an unusually high general incidence of disease but of massive infection, in an overcrowded house, maintained by the refusal of the infectious members to receive institutional treatment.

The higher the percentage of negative reactors the greater the value of the tuberculin test as a diagnostic agent; the more rural the locality the more likely it is that such high percentage will be encountered.

The following two case reports are of interest in demonstrating the real value of the Mantoux test in the adult, for without its help most unfortunate mistakes would almost certainly have been made.

Case Reports

Case 1.—A youth aged 17 with a four-weeks history of "chest trouble." On May 7, 1940, the Mantoux reaction was negative. On May 18 the following radiological report was received from a Dublin specialist: "The upper two-thirds of both lung fields are uniformly studded with small nodular opacities which are extremely suggestive of an early miliary tuberculosis: a film taken in two or three weeks' time would probably show quite definite and typical changes." As a result of this report the patient was put in an observation ward in the county sanatorium, but since it was considered that the negative tuberculin reaction could not be accounted for by "negative energy," the fatal prognosis which would be inferred from such a report was not given to the relations. In the following month his general condition showed great improvement, his Mantoux reactions remaining negative on two further occasions when tests were made with fresh solutions. The radiological report on August 20, 1940, stated: "Detail is not quite so good owing to respiration, but there is no doubt that both lungs are almost clear. No calcification has appeared, and it seems just possible that the previous condition was a fine bronchopneumonia." His symptoms completely subsided,

his sputum never showed tubercle bacilli, and he is now in normal health and working regularly.

Case 2.—A youth aged 18 with a six-weeks history of cough and pain in left side. On April 5, 1940, the Mantoux reaction was negative. On April 29 the radiological report was as follows: "There is increased opacity in left mid-zone, with enlargement of this hilum. Almost certainly tuberculous. Please re-examine in a few weeks. Right lung normal." On May 17 the Mantoux reaction was negative (with fresh solution). Unfortunately the patient could not be induced to undergo a second radiological examination, and indeed he has refused to be further examined at the tuberculosis dispensary. However, I am informed by his doctor that he is quite free from symptoms and at present is doing strenuous farm work. It is very probable that this also was a pneumonic condition.

Commentary

As a result of these experiences the routine use of tuberculin, especially in rural areas, can certainly be recommended. The decrease in the sources of infection which will result from segregation, better housing accommodation, etc., should be followed by an increase in the number of negative tuberculin reactors in the community, with a consequent increase in the diagnostic value of this test. The new x-ray plants which are springing up in various counties will doubtless be used very energetically: the two cases described above will illustrate how even an expert may be mistaken in interpreting radiographs. Radiologists will not be available throughout the country, and the employment of this test may prevent a number of people being labelled "tuberculous" as the result of the interpretation of doubtful shadows on a radiograph in pathological terms.

Summary

The value of the tuberculin reaction (Mantoux test) is discussed in relation to the work of a rural tuberculosis dispensary.

The results of 151 tests performed in Leix are given.

Two adult cases are reported in which the diagnosis was vitally altered by the test.

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Reports of Societies

METHODS OF RESUSCITATION IN SHOCK

A joint meeting of the Sections of Medicine and of Surgery of the Royal Society of Medicine was held on January 27, with Dr. GEOFFREY MARSHALL in the chair, for a discussion on methods of resuscitation in shock. The discussion mainly concerned traumatic or wound shock as seen particularly in air-raid casualties.

Routine Measures and Transfusion

DR. R. T. GRANT said that in cases seriously injured, with severe loss of blood, the simple measures of rest, warmth, head-down position, and morphine, while they might temporarily improve the patient's state, were usually insufficient for his recovery. In any case severely injured and suspected of considerable loss of blood, transfusion should begin at an early stage. But the simpler measures should not be neglected even in serious cases. Rest did not mean that the patient should be made to lie still; it meant making him feel as comfortable as possible, getting the examination of his wounds over quickly and smoothly, and allaying his fear and pain. Morphine was given almost as a routine, and he had not seen bad results follow injection of 1/4 grain. Sometimes this had been followed by return of blood pressure to normal levels coincident with relief of pain. But by some patients the drug was not well tolerated and might induce or aggravate nausea or vomiting. Warmth

was useful in promoting comfort, but heat must be applied with care and moderation. He doubted whether it was wise to attempt a rapid warming of the patient. The raising of the foot of the bed was a measure always worth trying when blood pressure was low.

With severely injured patients, however, transfusion was also necessary. Here Dr. Grant placed the emphasis on the severity of the injury and the loss of blood rather than on blood pressure. Normal pressure and pulse rate, and even good facial colour, were compatible with much loss of blood. If choice between the two was not restricted by supply, he used blood rather than plasma, because haemorrhage seemed to play so large a part in producing the depressed state of the patient. The amount required for resuscitation varied from patient to patient. The largest amount in his series of cases, called for because of continued bleeding, was 13 pints over a period of 28 hours. Restoration and maintenance of normal systolic blood pressure (100 mm. Hg and over) could be taken as the chief indication that an adequate amount had been transfused. For early transfusions a rate of one pint in a quarter to half an hour was sufficient, and for later transfusions a slower rate—one pint over one or more hours—unless these later transfusions were required to compensate for renewed bleeding. Rise of pressure accompanying a rapid transfusion was not always maintained, whereas with a slower injection the rise continued.

In most cases improvement was pronounced within a few hours of beginning transfusion, but as a general rule, in the absence of continued bleeding, if no improvement took place after giving two or three pints of blood or plasma at an adequate rate, later improvement was unlikely. He added that in his experience operation should be carried out as soon as possible after the patient was revived.

The Phases of Shock

MR. R. VAUGHAN HUDSON said that the military surgeon dealt with the strong and healthy, but the civilian surgeon dealt with trauma inflicted not only upon the normal but upon those burdened with constitutional disturbances such as diabetes and cardiovascular disease. It was self-evident that the close co-operation between physician and surgeon should be maintained in war. War had demonstrated again and again that the apparently weak might survive an injury identical with that which killed his healthy fellow. Two other factors were added in the case of civilian war casualties as compared with peacetime accidents—namely, the incredible dirtiness of the casualty due to debris, and the condition known as "blast."

Shock inevitably accompanied an injury; it was the expression of or the response to an injury. The fundamental changes were manifested by the cortical centres and the vegetative nervous system. The cortex expressed either undue exaltation or confusion and depression, either of which might accompany the changes in the nervous system, which in its turn exhibited a prodromal, an intermediate, and a conclusive phase. These phases might succeed one another with great rapidity. In the prodromal period the compensatory mechanism of the nervous system exhibited its conservatism by a slow pulse and normal blood pressure—a dangerous period, frequently unrecognized or ignored. In the intermediate stage there was early failure of the compensatory mechanism, with a slow pulse and falling blood pressure. In the conclusive stage the pulse rate was rising, the blood pressure low, and circulatory failure established. Shock, therefore, appeared to be a disturbance of the circulatory mechanism. Clinically all these phases were accompanied by coldness, pallor, peripheral spasm of arteries and veins, and tonelessness of tissues. Recovery passed through the same phases, but in the reverse order, though the pulse rate might still be raised in spite of the fact that the blood pressure was within normal limits.

Although whole blood was considered to be the best anti-shock measure, in wartime he had reserved its use mainly for exsanguinated patients, and had employed plasma or in a few cases serum, and these had been highly efficacious. The earliest improvement in the general condition of the patient must be seized in order to treat the wound. Here the speaker described the ideal organization in the reception of injured. In the resuscitation ward a plasma drip should be given to all patients with wounds and to others who were considered likely to need