THE CLINICAL AND FUNCTIONAL TERMINATION OF SURGICAL TUBERCULOSIS TEN YEARS AFTER.

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The material for this report is abstracted from a survey made by the Buffalo Tuberculosis Association of the first 470 cases of surgical tuberculosis that were discharged from Perrysburg from 1912 to 1926. The average period of time that had elapsed since treatment was more than 10 years and the number of cases examined was 300.

The survey occupied two years' time and a statistical analysis of the results consumed study through six months and a final analysis by the Statistical Department of the National Tuberculosis Association. An elaborate examination blank was used and the patients were examined by experienced members of the staff of the hospital and the Tuberculosis Dispensary Staff, including myself. Original data were taken from the histories at Perrysburg and the patients were re-X-rayed wherever possible. Each case study involved about three hours' time.

In the survey, we were interested to attempt to value the so-called medical treatment of surgical tuberculosis and also to attempt to place a value upon the Rollier treatment, but it was of greater importance to discover to what extent patients had survived their malady and how effectively they were functioning from an economic standpoint.

Patients suffering from bone or joint tuberculosis or for that matter any form of tuberculosis either arrested or apparently recovered, are at a very decided disadvantage in New York State in employment because of the stringency of the Labor Laws and the expense that is placed upon the employer of such a person who might activate or have it described that an accident, however trivial, had activated a previously existing tuberculosis. Getting a job in such an insurance set-up is no mean feat because such little accidents as stubbing a toe on a door sill, slipping on a floor but not falling, in an

office, have been ascribed as activating factors in such conditions under the New York State Law. Also to be remembered that under the New York State Law, witnessing the accident is not necessary. The patient's statement that it occurred is complete proof.

The economic status of the discharged tuberculous patient is placed in remarkable jeopardy by this situation and it is not appreciated apparently by workers in the tuberculosis field or by the public health authorities who have major control now of this problem. It was of first interest to us, therefore, to discover to what extent, in the presence of limited function due to tuberculosis, these victims could meet the economic situation. We were surprised at their relative actual success, at the number who were decently well and functioning satisfactorily, at the number who had jobs.

The patients selected were described as non-pulmonary cases; however it was admitted among us that there was a discoverable pulmonary focus that might have been the cause of the secondary surgical focus; however, for clinical purposes they were non-pulmonary cases. Because of the interest to us, we included all the cases of primary tuberculous pleurisy with effusion without apparent lung lesion.

We found the compilation a very complicated affair, as statistical comparison must be reduced to the smallest number of facts and to have these facts parallel in each case compelled long study of individual case problems in attempting to so simplify them.

The least number of foci in any case was two, the presumed point of primary infection and the localizing clinical lesion. Many presented three and not an inconsiderable number presented four or more. We were almost forced to the conclusion that a statistical comparison would be impossible because of the individuality of each case. With these limitations in mind, the following statistical data are presented:

TABLE I.

Location or Type of Lesion	Number of Cases
All lesions	470
Joints	149
Hip	73
Knee	32
Ankle	18
Shoulder, elbow, wrist	26
Vertebral column	58
Bone shaft	63
Intestines and peritoneum	99
Genito-urinary system	44
Kidney	33
Other	11
Pleurisy with effusion	27
Eye	20
Other	10

It will be observed that two-thirds or 201 cases were tuberculosis of the bones or joints. Of this number of bone or joint tuberculosis, 62% occurred in the lower extremity, 12% occurred in the upper extremity, and approximately 25% occurred in the spinal column. The soft tissue tuberculosis was distributed in non-pulmonary sites with the exception of the pleurisy with effusion.

COMPLICATIONS OR OTHER LESIONS.

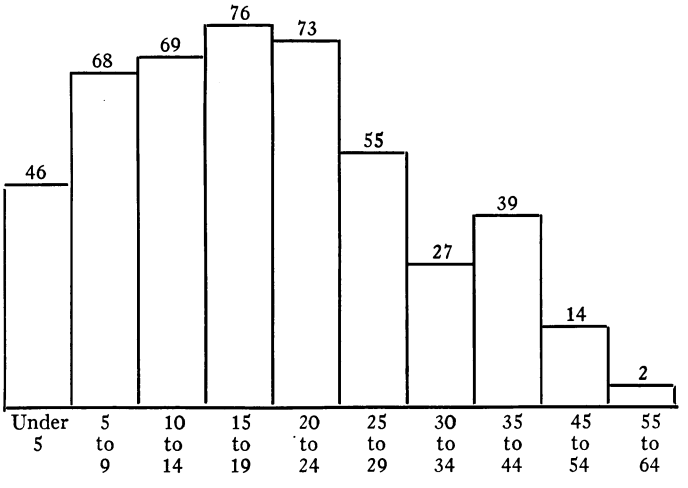
Two-thirds of the patients were handicapped by other lesions although classified here by the main lesion which in every case was non-pulmonary. Gland tuberculosis was relatively slight and was noted as an accessory localization and does not appear in this classification as an independent entity for treatment.

Half of all the patients were under 20 years of age. Those suffering from tuberculosis of the intestines and peritoneum had the greatest age incidence between 15 and 19. The largest age incidence for joints, including hip, knee, ankle and shoulder, was 10 to 14. Tuberculosis of the shafts or bone occurred most frequently under five years of age. The greatest age incidence in the spine group was between 20 to 24. Genito-urinary cases showed peak age group from 25 to 29. There were more men than women by 70 cases and the lesions are about equally distributed between the two sexes, except

that joints and genito-urinary lesions predominated in the male, and eye and intestinal cases predominated in the female.

TABLE II.

AGE DISTRIBUTION IRRESPECTIVE OF LOCALIZATION AS INDICATED BY THE FOLLOWING TABLE.



The average length of treatment was 18 months, although it varied from six months to five years. The cases requiring the longest treatment were the bone, joint and intestinal cases. Shorter periods were recorded in the pleural, genito-urinary, and eye cases.

The treatment was of the classic Rollier type, non-operative, with a minimum of apparatus and casts and there averaged throughout the year a daily exposure to the sun of at least one hour. Summer treatment, of course, being much longer than winter treatment and winter treatment supplemented by one or another form of artificial light.

PRESENT STATUS OF CASES.

On the 470 patients, 10% were completely lost sight of, so that we have a record of 90% of the total number; 339 or 72% are living, 84 or 18% are dead. The highest fatalities occurred in the kidney and the vertebral group. The lowest fatalities among bone, eye and joint cases.

TABLE III.

AVERAGE NUMBER OF YEARS SINCE DISCHARGE AND PERCENTAGE OF DEATHS ACCORDING TO TYPE OF LESION.

Type of Lesion	Total Cases	Lost Cases	Cases Studied	Total Years of Cases Studied	Average Years	Percentage Deaths of Known Cases
All lesions	470	47	423	2825	6.7	19.9
Joints	149	16	133	893	6.7	13.5
Hip	73	6	67	441	6.6	11.9
Knee	32	2	30	196	6.5	10.0
Ankle	18	4	14	94	6.7	14.3
Shoulder, elbow, wrist	26	4	22	162	7.4	22.7
Vertebral column	58	3	55	378	6.9	36.4
Bone	63	3	60	402	6.7	8.3
Intestines and peritoneum	99	12	87	545	6.3	18.4
Genito-urinary system	44	5	39	249	6.4	35.9
Kidney	33	2	31	190	6.1	38.7
Rest of system	11	3	8	59	7.4	25.0
Pleurisy with effusion	27	4	23	181	7.9	30.4
Eye	20	3	17	122	7.2	11.8
Other	10	1	9	55	6.1	22.2

Comment on the death rate table reveals some interesting points. First, the average death rate is 12% in the lower extremity, is 22.7% in the upper extremity, and is 36% in the vertebral column. This makes approximately a 1-2-3 ratio in the order of lower extremity, upper extremity and spine. The death rate in the genito-urinary system is more than 33%. An astonishing death rate is exhibited in the pleurisy with effusion. If this table presents no other fact, I feel that the indicated seriousness of primary pleurisy with effusion is underestimated and too lightly treated. These 27 patients with primary pleurisy with effusion presented one-third dead in about eight years. In patients, who had treatment, who were cautioned, and who had every opportunity for self-preservation, the death rate seems extraordinarily high.

ADDITIONAL TREATMENT INCLUDING SURGERY.

Approximately one-third of the examined patients required additional treatment after the initial treatment and 90% of the secondarily treated cases required additional treatment for the same lesion. Eleven cases had to be treated for tuberculosis in another part of the

body. Twenty-five patients resorted to surgical treatment after medical treatment. The examination of the cases treated surgically after the medical attempt at treatment involved the question of the success with surgery and of the patients' opinion of it.

The reason for the surgery was the failure of medical treatment or continued severe pain in the presence of an apparently healed lesion, with motion. This occurred most conspicuously in knee joints where recovery seemed complete, the patient, however, having pain on motion and pain on walking and requesting surgical relief by joint fixation.

We discovered no patient who had had successful surgical treatment who regretted the surgical attack, but it is interesting to note that a comparatively small number, 12% of bone and joint cases, found it necessary to resort to this form of relief.

Cause of Death.

There were 84 deaths in the entire group. Of this number, 30 had been considered on their initial treatment as having no pulmonary complications whatever, yet 11 died of pulmonary tuberculosis and only seven died of tuberculosis other than pulmonary. Three died of accidents and eight of other causes, not tuberculous.

Among the 55 deaths of patients having pulmonary complications on initial treatment, 34 died of pulmonary tuberculosis, 13 of tuberculosis of other organs, and six from non-tuberculous causes, one from accident and one from an unknown cause. Taking the group as a whole, over half the deaths resulted from pulmonary tuberculosis.

Disability Rating.

The cases were rated according to the disability of the organ affected by the primary lesion. It was recorded that 159 or 53% had recovered completely without disability or the least measurable disability. Forty-eight or 16% had only slight disability and 44 or 15% were considerably disabled, and 49 or 16% were completely disabled.

TABLE IV.

The definitions of the classifications used above are as follows:

Recovered completely	Complete recovery with no lameness, ankylosis, or limitation of motion.
Slight disability (less than 25 per cent)	Small limitation or ankylosis, with or without some continuance of infection.
Disabled to a considerable degree (25 to 75 per cent)	Considerable limitation, lameness, or continuance of infection to considerable degree.
Completely disabled (more than 75 per cent)	Complete or nearly complete disability, loss of organ (amputation, etc.), or entire uselessness of organ.

Nearly 70% of the total number examined had been salvaged entirely or nearly so. The greatest recovery rate was noticed in the intestinal lesions; of the total number 58, all but one had entirely recovered. Ten of the 13 eyes had entirely recovered and 33 out of the 49 bone cases.

TABLE V.

DISABILITY OF ORGAN AFFECTED BY TYPE OF LESION.

Type of Lesion	Total Examined	Entirely Recovered	Slight Disability	Disabled to a Considerable Degree	Almost Completely or Completely Disabled
All lesions	300	159	48	44	49
Joints	107	23	23	24	37
Hip	55	12	6	13	24
Knee	25	3	8	4	10
Ankle	11	4	4	3	0
Shoulder, elbow, wrist	16	4	5	4	3
Vertebral column	31	6	11	8	6
Bone	49	33	9	6	1
Intestines and peritoneum	58	57	0	0	1
Genito-urinary system	21	11	4	5	1
Kidney	17	8	4	4	1
Rest of System	4	3	0	1	0
Pleurisy with effusion	14	12	1	1	0
Eye	13	10	0	0	3
Other	7	7	0	0	0

WORKING CAPACITY.

It is quite understandable that medical recovery may mean one thing and working capacity mean another. The effectiveness of cure means ability to work. Two hundred and sixty-six or 89% of the

examined cases were working, or in the case of children, were at school. Twenty-two or 7% were ambulant but unable to work, 11 or 4% were bed cases.

TABLE VI.

WORKING CAPACITY BY TYPE OF LESION.

Type of Lesion	Total Examined	Working	Ambulant	Bed Cases	Unclassified
All lesions	300	266	22	11	1
Joints	107	95	6	5	1
Hip	55	47	5	3	0
Knee	25	22	1	2	0
Ankle	11	11	0	0	0
Shoulder, elbow, wrist	16	15	0	0	1
Vertebral column	31	23	4	4	0
Bone	49	44	4	1	0
Intestines and peritoneum	58	57	1	0	0
Genito-urinary system	21	16	5	0	0
Kidney	17	13	4	0	0
Rest of system	4	3	1	0	0
Pleurisy with effusion	14	13	1	0	0
Eye	13	11	1	1	0
Other	7	7	0	0	0

TABLE VII.

Working	This includes cases normally working but unemployed at present, children in schools, and young children able to carry on normal play activities.
Not working—ambulant	Unable to work, but not bedridden.
Not working—bed patients	Unable to carry on any activity.

The relation of the disability of the organ affected to working capacity is shown below.

WORKING CAPACITY OF PATIENTS ACCORDING TO DISABILITY OF ORGAN AFFECTED.

Disability of Organ Affected	Total	Working Capacity: Working	Ambulant	Bed	Unclassified
All cases examined	300	266	22	11	1
Entirely recovered	159	156	0	2	1
Slightly disabled	48	44	3	1	0
Considerably disabled	44	31	13	0	0
Almost completely disabled	49	35	6	8	0

This table shows that even in the cases where the organ itself is lost or useless, the patient has been able so to adjust his life that he is able to work or carry on normal school activities.

CONCLUSIONS.

The first point that impressed us who examined these patients, was the remarkable number who appeared in robust health and who had adapted themselves to a satisfactory occupation. We could not say that the picture did not present a marked social limitation, but the astonishing thing to us was that they had succeeded so well.

Also we were agreeably surprised by the cheerful mentality of the group as a whole. While it was difficult to get the patient in for examination at any of the selected points because of the working time of the patient and because these examinations had to be done at the convenience of the patient rather than the doctor, nevertheless they welcomed a checkup and there was not the usual attitude of the cripple among them. They seemed to understand intelligently that their malady was a small part of a greater picture and that the terrors that they had suffered from were trivial, as compared to the great major calamity that might have occurred.

We were enlightened as to what might be termed regional anatomical death rate and we were surprised at the high death rate in primary pleurisy with effusion. Surgical treatment was necessary in only 12% of the cases. Medical treatment was effective in 88%.

DISCUSSION.

DR. ROBERT T. MILLER: Dr. Garvin presented very briefly a report on work extending over a long period of time, a tremendous lot of work involving what he has done, so it cannot fail to command our respect.

It is very difficult nevertheless to attempt to make any comparison between so-called medical and surgical conditions of tuberculosis on the basis of even such a report as this. The condition of disease as to the state of advancement, as to age of patient, and as to social conditions varies so tremendously that it seems well-nigh impossible ever to make such a comparison, and little is to be gained by such an effort. He shows in 88 per cent of these people medical treatment sufficed. That is a tremendously high ratio. But he also shows that one-third of these people needed a second treatment, and in that third 90 per cent of them needed another treatment because of recurrence of trouble in the primary lesion. He showed about 88 per cent who are up and able to make their living, who are independent, who are no longer dependent upon the community. He shows about two-thirds with no disability or with but slight disability. However, one may wonder a little bit as to whether a knee joint so treated, which is still a bit painful and which is still handicapping the patient a little bit, can be taken as a cured knee joint. I am not saying that by way of

criticism but simply in an attempt to illustrate the great difficulty in studying the various factors involved: when is a case well; how permanent is the cure? These are tremendously difficult things to bring out.

What impressed me in the report more than anything else concerned intestinal tuberculosis. Dr. Garvin had 58 cases of intestinal tuberculosis, all but one of whom recovered entirely. This is to me a very surprising figure. It seems to me that this is a particularly interesting group of cases, and I would urge Dr. Garvin to concentrate upon it.

But 12 per cent of the people with tuberculosis of the bone and joints have required operation. That is manifestly a very great advantage both as to the receiver and giver of operations. I have a great deal of sympathy with the point of view that wherever possible surgery should be avoided.

Another interesting thing concerns the death rate. Curiously enough, the death rate in the spine and in the cases of pleurisy with effusion was one-third of the cases in each instance. That seems a very strange thing. Finally, a thing which one would expect, half the cases died of pulmonary tuberculosis, I suppose.

It must be a very difficult thing to present in a few minutes so elaborate a study as this, and I think Dr. Garvin is to be very greatly congratulated not only upon the work but upon the presentation which he has made. (Applause.)

DR. TRUDEAU: I was most interested in those cases on primary pleurisy with effusion. I agree with Dr. Garvin that it certainly seems very high, and I am wondering if he has any explanation to give us for that high death rate in the first place, and in the second place how many of that 30 per cent death rate died of pulmonary tuberculosis.

DR. HUGH M. KINGHORN: I would like to add a remark to what Dr. Trudeau has said. Some years ago the medical examiner of one of the large insurance companies sent me a reprint of an article he wrote on the subject of the end results of pleurisy with effusion. Fifty per cent of the cases of pleural effusion of this company, in five years, came down with frank pulmonary tuberculosis—not one-third, but 50 per cent.

Now, another important point he made was this: that if these patients got by for three years following the pleurisy with effusion they were good, full medical risk. This brings up the point of the very important question of pleurisy with effusion. It is a very serious question, as it is a very serious disease. So often we rely on the X-ray interpretation following the pleurisy, but there is no evidence of tuberculosis in the lung. However, later, within a very few years, these cases come to us with far advanced tuberculosis

Formerly I used to consider pleurisy with effusion as a mild infection. Today I regard it as a very serious infection.

It also brings up the point, how should these cases be treated. So often the pleurisy will clear up and in three weeks the patient is sent off for a holiday. The unfortunate fact is that no X-ray is taken of the lung following the pleurisy. If you do that you will very often find, I think, in the pleura evidence of some parenchymatous infiltration, as well as in the lung.

I believe it is a good practice to put these patients at complete bed rest for a period of at least four months. Treat it as a very serious disease. Treat it for a whole year as a very serious disease and you will find that following this plan you will have very few relapses and very few attacks of tuberculosis following.

DR. LYMAN: Just to clear up one point that I did not understand. As I understood Dr. Garvin, he stated that 30 per cent of his cases with pleurisy with effusion had died. Then in the last tables he showed that out of 14 cases of pleurisy with effusion 12 of them were entirely well—12 out of 14—and I don't quite get it.

DR. MCPHEDRAN: Regarding the incidence of these extra-pulmonary lesions, I want to say that in our cases followed during the past nine years we have not seen a case of extra-pulmonary tuberculosis develop in a child who had not previously been recognized as having a lymph node large enough to be shown radiographically. Of course it is a relatively small incidence among our cases, but it seems to me it is an additional reason for cases with lymph node lesions getting bed rest until there is no retrogression.

I have another point on pleurisy with effusion. In our series those that had pulmonary effusions were of the childhood type. The subsequent lesion develops, in our series at least, in the apex, an entirely different part of the lung than here, and I doubt the continuity of the lesion.

DR. JAMES JOHNSTON WARING: Dr. Federoff, of Denver, who has quite an experience, a unique experience, with ocular tuberculosis, and who has done a great deal of experimental work with this condition, has been kind enough to let me examine the chests of a number of his cases, and I have been quite struck with the fact that in many instances of severe ocular tuberculosis there has been no manifestly serious lesion of the lung whatsoever.

I was struck with the table shown by Dr. Garvin here, in which in 13 instances of ocular tuberculosis 10 had shown complete recovery. Dr. Federoff also has demonstrated one very interesting thing in this connection, and that is the non-specific focal reaction in ocular tuberculosis, for instance, due to the administration of an anti-typhoid vaccine.

DR. EDGAR MAYER: I should like to know how the diagnoses of the extra-pulmonary lesions were made. The very low incidence, or rather the high mortality rate, in the spinal tuberculosis as against the tuberculosis of the lower extremities may suggest that perhaps some of these cases were Perthes' disease, in which we know that there is a very good prospect of recovery, as against the true formation of tuberculosis. In other words, were these diagnoses made by guinea pig inoculation? Secondly, the terminology of these lesions. I believe we will have to get to the point where we will define the different types of lesion as well as the anatomical destruction. I mean by that whether it is a synovial form of tuberculosis, which is the type that will give restoration of function, as against the type of true bony destruction—and I think we must agree with the orthopedists upon that, that the treatment of it is surgical fusion for the most part, except in the rarest instance where one gets with a very mild destruction of bone a restoration of function.

PRESIDENT HAMMAN: I didn't myself feel that that figure of 30 per cent of the cases of pleurisy with effusion dying of tuberculosis in a period of eight years was high. Many years ago, in going over the subsequent result of all the patients that had been in the Johns Hopkins hospital with pleurisy with effusion, the investigation showed that at the end of five years over 40% had developed manifest pulmonary tuberculosis, and those statistics have been verified elsewhere.

The old figures that Dr. Boaz gathered in Boston forty or fifty years ago showed that after a period of five or six years, roughly 50 per cent of the patients that had pleurisy with effusion then had obvious pulmonary tuberculosis.

Will you close the discussion on this paper, Dr. Garvin?

DR. GARVIN: One thing it seems to me that this survey gives us, because in Buffalo there is practically one point of contact with the problem, we have a fair estimation of the localization of tuberculosis in the community as a whole, so that the incidence in the various parts of the body gives us a fairly accurate basis to go upon.

Regarding pleurisy with effusion, when we were in the study of this matter, Dr. Grosvenor and I had quite a discussion about it. His first and spontaneous reaction was that it was not true, and I said, "Well, the statistics absolutely show that it is true as plainly as can be. We will review the hospital records and see if this is wrong." Finally he withdrew his objection as to the accuracy of the statement.

It seems to me that even among us, who are quite interested in tuberculosis, the tremendous seriousness of the so-called primary idiopathic pleurisy with effusion does still need emphasis.

In regard to the eye tuberculosis we were surprised ourselves about that, and while these cases are classified on the basis of the important lesion in the eye, yet in every case did we find a lung lesion, and we included one serious lung tuberculosis who developed an eye lesion here, but who so perfectly recovered that we felt justified in including it.

Now the question of the lung lesion or the primary focus; we believe that the primary focus in all of these cases was in the lung. To give one little case illustration of a child that developed a foot lesion first, and then a wrist lesion, and then was photographed in apparent health, showing just some innocent, apparently well-healed tubercles; three weeks after the picture was taken this nine-year-old child had an eight-ounce hemorrhage.

The question of accuracy of diagnosis: Of course, where we had a sinus, these joints were not needled, but where we had a sinus we had the opportunity of smearing that sinus, and the diagnosis was made by perhaps inference in a good many cases; that is, the whole ensemble of the picture quite definitely suggested tuberculosis and no other disease.

I can specifically state about Perthes' disease because we excluded 16 definite Perthes of the hip.

The recovery rate in intestinal tuberculosis rather surprised me, and I, perhaps, doubted the diagnosis there more than at any other point. These patients all had a small lung lesion and predominantly showed the evidences of intestinal tuberculosis by X-ray, through examination and otherwise, and we felt that we were right, although there again by absolute inspection that was not proven. The recovery rate there seems to be highest.