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B.C.G. VACCINATION

One of the subjects which received attention during the technical discussions at the 14th World Health Assembly in New Delhi in February last was the place of BCG Vaccination in the control of tuberculosis. It was generally agreed that BCG Vaccination has a definite place especially in countries where tuberculosis infection is still high and that it should be carried out in groups which are especially exposed to infection. It was emphasised that in countries where extensive BCG Vaccination was found necessary the best results can be achieved by concentrating on population below the age of fifteen. Attention was also drawn to the need of vaccinating infants.

In this context the article on "Tuberculosis trends in Hong Kong A major victory for BCG Vaccination" by Dr. A. S. Moodie appearing in this issue of the Journal is of special significance to us in India. While Dr. Moodie is cautious in asserting that the main cause for the phenomenal drop in tuberculosis mortality among the lower age groups in recent years in Hong Kong is due to BCG Vaccination among infants there seems to be little doubt that this is one of contributory factors.

One remarkable fact revealed by Dr. Moodie is that the technique used for infant vaccination in Hong Kong is the multiple puncture method. It would also appear that this is carried out by midwives and others with generally low standard of education. The generally accepted technique in other countries is the intra-dermal vaccination. The experience of Hong Kong makes one pause and think. It is obvious that an inter-dermal technique is more scientific, because in this one can be fairly sure of the exact quantity of vaccine

that has gone into the tissues. It will also facilitate comparison with work done in other centres with the possibility of scientific evaluation at a future date.

However, it seems necessary to emphasise the need for keeping an open mind on this question and accept methods and techniques that can be used on a mass scale even by ordinary workers that may be available in a country. The question is whether the multiple puncture method, either the simple one used in Hong Kong or the more refined one used elsewhere (Rosethol, USA) should be given a fair trial. Before advocating the use of this method some controlled studies may be necessary to assess the allergy-producing capacity by the use of this technique. If the results obtained by these multiple puncture method are comparable or if the technique give as good or nearly good allergy as the other, one is justified in adopting the simpler methods especially in vaccinating infants, and probably those under five years of age. This study should not, however, be confused or mixed up with the other studies connected with BCG which are aimed at finding out the efficacy of the vaccination itself which is a long term study.

Tuberculosis Trends in Hong Kong— A Major Victory for B.C.G. Vaccination?*

By

A. S. MOODIE

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The title of my talk is “Tuberculosis Trends in Hong Kong—a major victory for B.C.G. Vaccination?”

I put the title in the form of a query as I do not pretend that this is a controlled study, but is rather, the evaluation of a practical programme developed and expanded with a minimum of resources, both material and personnel, to meet a tuberculosis situation of almost epidemic proportions under the most trying economic and environmental circumstances.

I will deal firstly with the background of the problem, outline the control measures adopted, and discuss shortly the results obtained.

With regard to background, Hong Kong may be known to a number of you as a centre of communications, which has come into prominence in the post-war period. In some ways it can be compared to the ancient city States, being largely a city with little in the way surrounding country. Into its almost 400 square miles much of which is steep hill sides and barren islands is crowded a population equal to the combined totals of Singapore, Sarawak, and British North Borneo. The growth of population is rapid and recent so that the housing situation has been very acute. On first arrival many solved their housing problem by building shacks with such materials and in such places as were available with complete absence of even the most primitive sanitary facilities.

Vigorous efforts have been made directly by Government to house these people under more satisfactory condition, in seven-storey blocks with communal facilities, schools, etc.

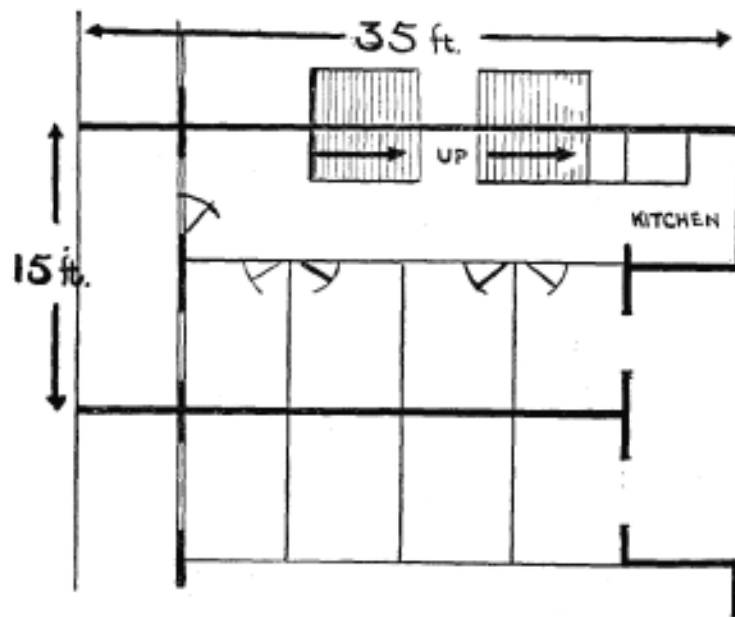
Government assisted indirectly also in rehousing the “white collar class” in the provision of flats at an economic rent.

But despite these efforts which provided enough accommodation to house a large city, the growth of population has been such that the housing problem although less acute, is still a very considerable one. The bulk of the population are still accommodated in the traditional type of tenement.

This is normally of four floors each floor being of about 550 square feet subdivided internally by 6 feet partitions into a number of cubicles—the number

*Presented at the XVII Conference of Tuberculosis & Chest Diseases Workers, Cuttack, 1961.

varying according to locality, the average being about five, each of which houses one family.



Here we have a typical layout of four cubicles and verandah which is also used as living space and with common cooking and sanitary facilities.

Such conditions of overcrowding on a refugee background are, of course, an ideal breeding ground for a tuberculosis epidemic. In the year 1951 the tuberculosis situation was as follows :

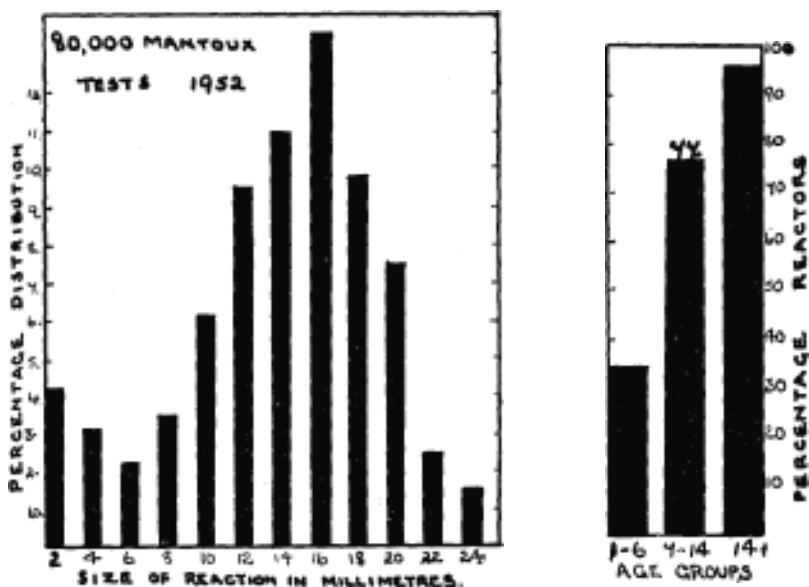
One death in every five was caused by this disease.

Almost 40 % of the tuberculosis deaths occurred in children under 5 years of age, i.e. 8 % of the total deaths from all causes were children under 5 years who died of T.B.

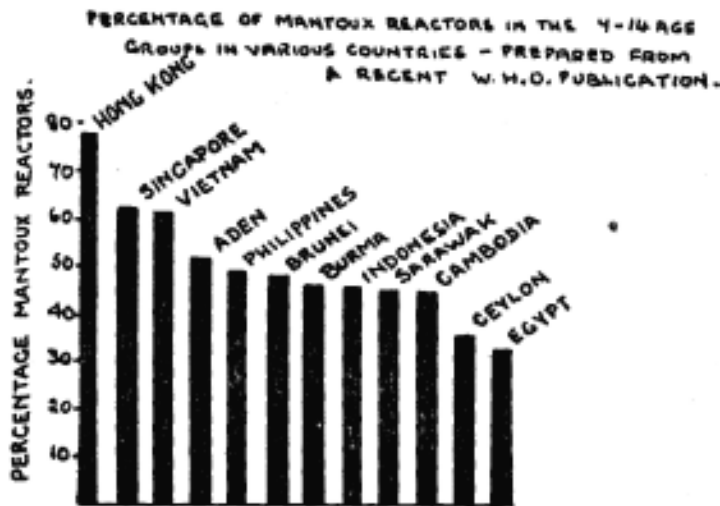
2% of the adult population had active tuberculosis — a total of between 40,000 and 60,000 cases in all in adults with an unknown but obviously large number in children.

To deal with this problem there were two large outpatient clinics and about 500 hospital beds and little hope of substantial improvement. It was, therefore, decided to centre the control programme on the clinics using ambulatory treatment on a large scale, use the hospital beds for selected cases with a definite prospect of recovery and to give B.C.G. vaccination on as wide a scale as possible.

The help of the W.H.O. was enlisted for the B.C.G. vaccination campaign, The preliminary investigation showed the following results:



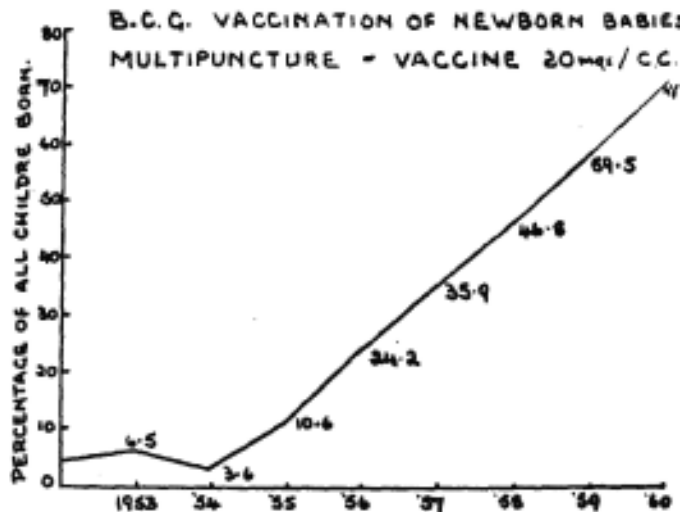
The histogram shows the typical picture of specific tuberculin sensitivity with little indication of non-specific factors. The age distribution chart of reactor shows 36% under 6 years and 77% in the group 7-14 years. This latter group is now accepted as the yardstick for the comparison of the severity of the T.B. problem in one community as compared with another.



This table prepared from a recent publication issued by W.H.O. indicates that the T.B. problem in Hong Kong was worse than any other in this or in fact in any other part of the world, being almost 20% worse than the next on the list. Thus we had a severe tuberculosis problem with a fairly high incidence of active disease in

adults with a very high mortality in children, a reflection, possibly of the ample opportunities afforded by the housing conditions for the spread of infection. Children were obviously being infected very early in life when they are most susceptible to progressive disease.

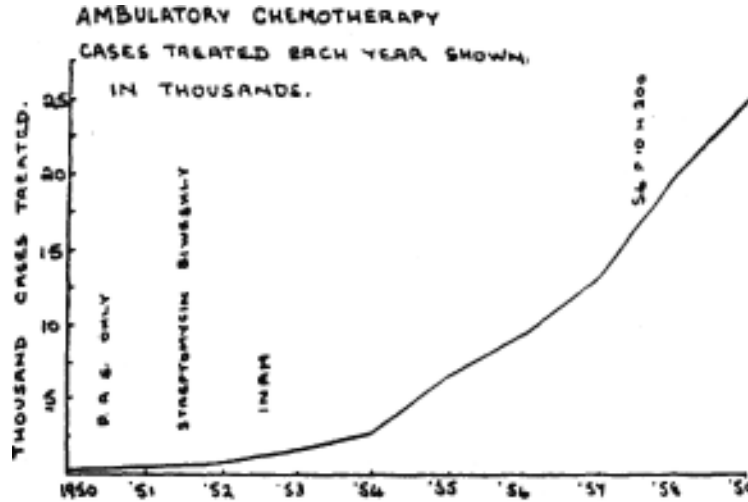
The policy of the W.H.O. is to exclude from B.C.G. campaigns children under the age of two years, a policy with which under normal circumstances one could have no quarrel. Our circumstances were such that we considered that protection would have to be given at an earlier age and that if we could give vaccination at birth we might be able to reduce the high infant mortality from this disease. This idea is attractive as it precludes the need for preliminary T.T. and so reduces the number who get "lost". After a preliminary study involving 8,000 babies we decided to use 20 mgm. vaccine by multipuncture method as being suitable for use by unskilled operators. This vaccination is given concurrently with smallpox vaccination on a purely voluntary basis. Conversion rates between 60% and 90% are obtained according to the operative. This side of the scheme has been pushed with some vigour as this will show:



The total for the year 1960 was 71.5% of all babies born.

With the increasing variety of drugs becoming available for treatment, the ambulatory chemotherapy side has been much expanded. Last year the total daily average of streptomycin injections given was in the region of 5,000 and about 25,000 patients in all received continuous treatment. The treatment is so organised that one doctor can look after 15,000 patients, or in terms of all staff, one staff to 150 patients. The cost of treatment for one year is approximately 50 U.S. dollars, 60% of which is involved in overhead charges so that a maximum of 40% is utilised in drugs. In schemes in rural areas or in less highly organised units, the percentage of the total expenditure on drugs is considerably less than 40. And it is suggested that in order to improve efficiency of treatment, better organisation is required with full drugs rather than save on the drug bill. The wide-spread use of drugs was a calculated

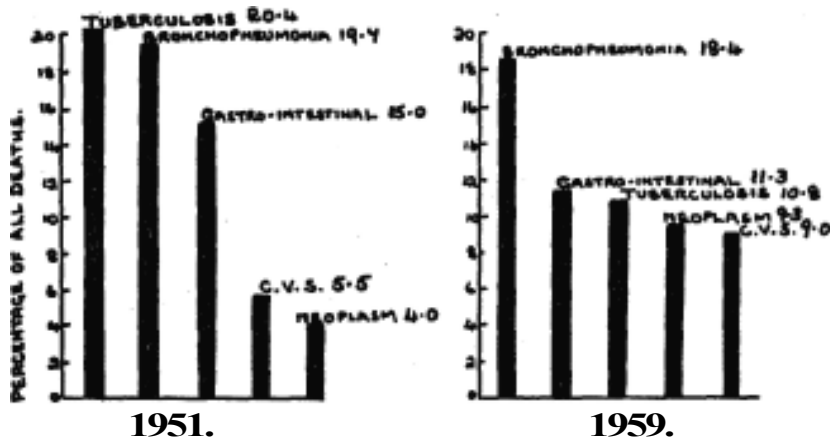
risk and it appears that resistant organisms are more of an individual than a community risk.



This graph shows the growth of the programme.

The visible effects of the programme has been a noticeable reduction in the number of very sick children attending the clinics and a greatly decreased pressure on children's beds so that we have been able to get to work on the problem of orthopaedic disease. The average age at death from tuberculosis has been raised from 25 to 37 years and tuberculosis has fallen from first to third place as a cause of death.

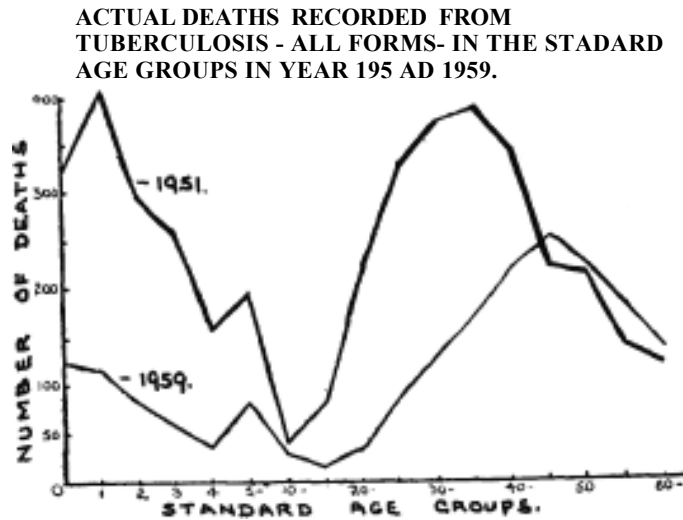
THE FIVE. PRINCIPAL CAUSES OF DEATH IN HONG KONG.



You will note that tuberculosis now accounts for 10.8% of all deaths as compared with 20.4 in 1951 and only 20% of these now occur in children under 5 years.

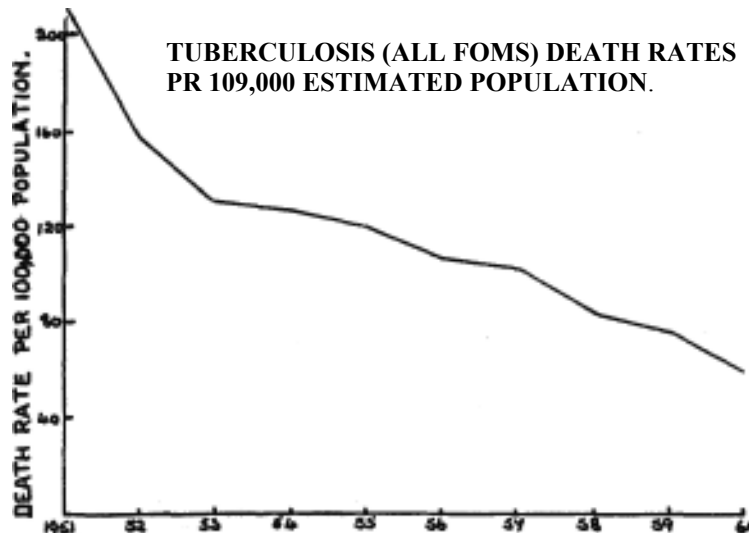
Thus deaths from tuberculosis under the age of five years account now for 2% of all deaths as against 8%.

The actual death returns for the years 1951 and 1959 show the following.



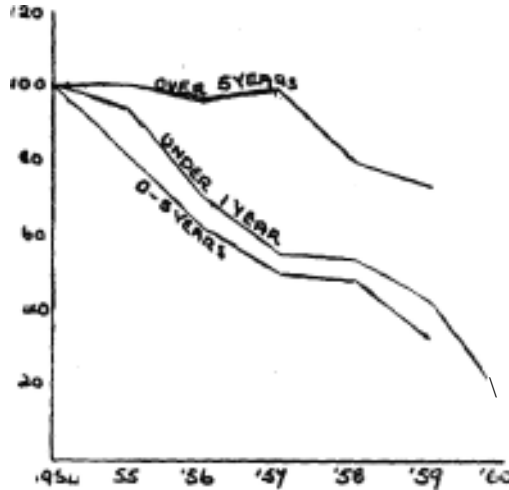
You will observe that there has been a substantial reduction at all except the ages above 45 years.

With regard to death *rates* this graph shows a steady fall each year, the largest falls being recorded in the first two years which we think were due to settlement of disturbances produced by migration. It is thought that these factors have largely been eliminated by the year 1954.



Arrangement of death rates according to age shows the following :

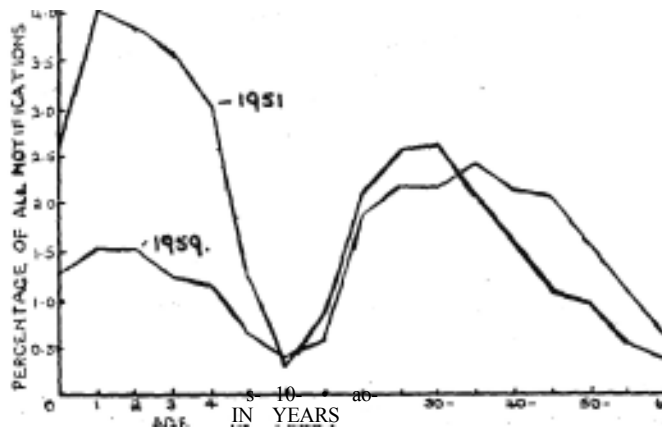
MORTALITY – TUBERCULOSIS (ALL FORMS) – RATES EXPRESSED AS PERCENTAGE RATE IN 1954



You will observe that I have used the year 1954 as a basis for comparison and that there has been rapid falls in mortality in the younger age groups while in the older groups the fall was not manifest until the year 1958— the year we substituted daily streptomycin for bi-weekly. There appears to be little doubt that some of the reductions were the result of treatment, but at the same time we were also able to show substantial reductions in morbidity.

While Tuberculosis Notifications are not accepted as a basis of comparison of morbidity in different countries they are acceptable for showing variations in trends within one particular country. This graph shows the changing pattern of notifications recorded.

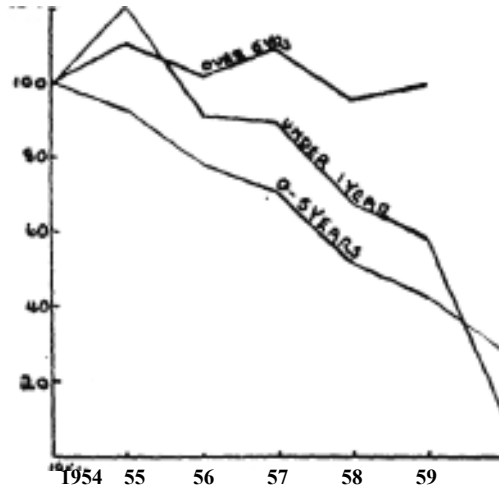
PERCENTAGE DISTRIBUTION OF NOTIFICATION OF TUBERCULOSIS – ALL FORMS – IN EACH YEAR OF LIFE IN 1951 AND 1959.



You will observe that the whole picture has changed and that this is becoming more a disease of the older age groups. Making due allowances for changes in the age distribution and expressing these changes as rates we get this picture.

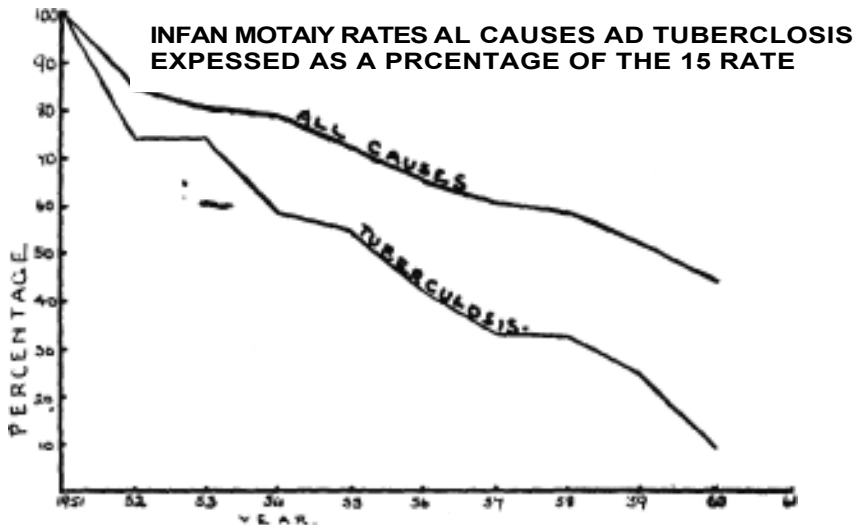
MORBIDITY - TUBERCULOSIS (ALL FORMS) - RTES

EXPRESSED AS PERCENTAGE ATE 154.



You will see that while morbidity rates in the older age groups has fallen by only one per cent in the younger groups the falls have been in the region of 50 %.

It is generally agreed that improvement in living conditions will reduce tuberculosis incidence, in the same way that it will reduce morbidity from most other causes. This is particularly the case in infants.



This graph shows that while there has been a substantial reduction in Infant Mortality Rates from all diseases which has no doubt been affected by the strenuous

efforts of the M.C.H. and other health services, it appears that there has been some factor which has had the effect of reducing the Infant Mortality Rate from Tuberculosis twice as rapidly as the rate from all causes.

To summarise, we have a community crowded together under economic and environmental conditions calculated to foster the spread of tuberculosis. There has been a slow but fairly steady improvement in the living conditions and an attack has been made on the tuberculosis problem, which was one of great severity, with ambulatory chemotherapy and B.C.G. vaccination almost entirely in newborns with minimum of isolation of infectious cases. During the period 1954-59 the *mortality* rate from tuberculosis in children under 5 years of age has fallen by almost 70%—almost two and half times more than that above 5 years. During this period the *morbidity* in adults has remained substantially unchanged, while at the same time the morbidity under the age of five years has fallen by 60%.

It would appear, therefore, that despite the improvement in living conditions the power of the tubercle bacillus to produce disease in adults remains unimpaired, but with fewer fatal cases, while its power to produce disease in the more susceptible section of the community—the young children—has been greatly reduced. It would be reasonable, therefore, to assume that the amount of infection at large in the community has been somewhat reduced by intensive chemotherapy but I cannot believe that this factor alone has been enough to produce such dramatic reduction in infant morbidity. I am personally convinced that some additional factor is contributing in large measure to this end. B.C.G. vaccination appears to me to be the only factor which could produce such a selective effect on morbidity. The controlled trials at present being conducted by the M.R.C. have shown that this measure can confer protection under the conditions of living in United Kingdom with its high living standards and low level reservoir of community tubercular infection, these figures I have shown you suggest that even in a subtropical climate with much lower living standards, a high reservoir of community infection and unrestricted opportunity for spread of disease, B.C.G. vaccination offers a powerful and cheap additional weapon which can be decisive in the battle against tuberculosis.

A Note on Re-orientation of the Clinic System

By

B. K. SIKAND

(Director, New Delhi T. B. Centre)

The originator of the Clinic system—Sir Robert Philip, gave a very comprehensive approach, making the TB Clinic a community preventive organisation for tuberculosis, rating all activities as ancillary to this overall function of the clinic. If the term reorientation is to be used, it will apply to our attitude to Domiciliary Treatment. With the introduction of the antimicrobials, treatment has become the tool of prevention. To be an effective instrument of community service, the clinic must possess the following :

- (a) A well-trained whole-time specialist staff;
- (b) Efficient X-ray and Laboratory Service giving free service to the poor, if not to all;
- (c) Sufficient health visiting staff;
- (d) Free supply of antibiotics for the poor;
- (e) Functional integration with TB Hospital Service;
- (f) A social welfare organisation;
- (g) Full cooperation with the general practitioners ; and
- (h) A statistical organisation for planning and evaluation of results.

Some comments are necessary in view of the technical and financial difficulties in which our plans have to work :—

1. *Location, Size and Coverage* : No doubt a TB Clinic must be located at a place most convenient to the community it is meant to serve. New clinics should as far as possible be set up as specialized units of the General Hospitals. The building lay-out of the rooms should be such as to allow smooth and orderly flow of patients through different sections. A clinic must, however, be assigned to a well-demarcated area, so that with more than one clinic in a city, overlapping is avoided and the preventive programme in a community is fixed on one organisation. In areas of high density of population, and till we have the shortage of funds and personnel a clinic can efficiently (and without any undue hardship to the patients) serve a population of say 5-6 lakhs instead of putting up 2 or 3 smaller ill-equipped and poorly staffed units. This can save initial costs and economises on running as well, and also allows concentration of high class x-ray, laboratory and specialist service at one place. Whether the clinic is static, mobile or even occasional, depends upon local situation; but the principal of the specialised service must continue for the present.

In cities with a population bigger than half a million, it may become necessary to provide more than one well-equipped clinic (Basic Clinic) to avoid long travels by the patients. If such clinics are under a common authority, their

coordination will raise no problem. But if the Clinics happen to be under different agencies, the local Public Health Authority should provide the Home Visiting staff to all the clinics, and coordinate the preventive programmes through such a service.

As well-equipped clinics are likely to be few for a long time to come, and further when specific antibiotics have made it possible to carry out treatment of Tuberculosis as a simple routine, subject only to periodic detailed check up (to judge the efficiency and suitability of the drugs prescribed or the need of additional surgical measures), it is possible to extend the scope of usefulness of a TB Clinic, if some ancillary functions of the clinic e.g., drug distribution, day-to-day advice and care of the patients can be passed on to other agencies e.g., dispensaries, health centres and the general practitioners, provided they are prepared to function in such a coordination. Further, if the clinic staff position so allows, a good deal of avoidable overcrowding at a busy clinic may be overcome by opening "Drug Distribution Centres" at convenient points in the area covered by the clinic. These "Sub-Centres" may also be used to collect samples of sputum and urine, and Mantoux Testing and BCG vaccination of the contacts, thus avoiding unnecessary journey to the main Clinic by the patients and of the Mantoux negative contacts. Such a co-ordination and extension would extend the service of the clinic system to the Peripheral units of the population. Till, however, good clinic services are uniformly developed all over the country, there will be tendency to overcrowding from ill-developed adjoining areas to better equipped clinics, even when such attendance is consciously discouraged. Hence such clinics may be forced to take on a load greater than from its own assigned zone.

2. *Staff:* Preventive community work can only be expected from a whole-time well-remunerated staff. The pay scales of TB Specialists and their privileges should in no case be lower than those of the Public Health Staff at corresponding district levels. With enough para-medical personnel, the number of doctors for domiciliary visits can be kept low. They retain the functions of organisers, supervisors and specialists working with a big chain of para-medical personnel i.e. health visitors, educators, technicians and social workers etc. At least one health visitor for every 50,000 of the population is essential for good work. To give them clerical work in addition to home visiting is uneconomical.

Adding to the efficiency of the clinics by more staff and more funds is more urgent and will be more paying than adding only to their numbers. If enough staff, medical and para-medical is provided for contact with the patients, homes, slight longer distance does not mean much hardship to the patients. New clinics must, however, come where none exist.

Domiciliary Service

Now that the controlled trials have proved the earlier claims based on practical experience, that Domiciliary Treatment is as effective as Hospital Treatment, all hesitations and doubts in respect of this service must be put at rest, and it be given the financial support according to its place in the National TB Plans. If treatment is to be the tool of prevention in the community, the technique of prolonged, continuous combined therapy of adequate dosage has to be insisted. One can treat four patients in the home at the cost of one in the hospital. In our context, therefore, it is only reasonable to suggest that the total budget allocation for TB (both Capital and Running) should be earmarked in the ratio of 4:1 for the Clinics and Hospitals respectively. Without such an outlook the clinic service will remain stunted and unable to influence preventive community programmes. If prevention is to be the aim, some public health authority has to assure availability of this treatment service.

Health education of the patient and the family and preventive examination of contacts are important objectives of a Health Visitor's work in the Domiciliary

Service. Simple audio-visual demonstration, as for example, proper-use of handkerchief or easy disposal of the sputum can be arranged at the clinic and re-emphasized during routine visits by the Health Visitors during their routine home visits.

Antimicrobial treatment has brought its own problems in the Domiciliary Service. Apart from routine preventive advice in the home, to supervise regularity in self-administration of the drugs has assumed a high place in the health visitors work, as failures can only be avoided by continuous education, supervisions and checks. This work can be done even by persons with short period of training and other social agencies. Superstition, ignorance and socio-economic difficulties are responsible for irregularity in treatment and irregular discharges from the hospitals. Too many patients are irregularly and inadequately treated. Treatment failures lead to accumulation of patients who would have died and most of them are afebrile, ambulant and infectious and often, disseminate Resistant Bacilli. This is the biggest single challenge to the Domiciliary Service.

A big question is still not settled i.e. "Who should be treated". This means the clinic must undertake studies in Chemoprophylaxis and preventive chemotherapy of lesions of doubtful activity.

Social problems have to be investigated by the Medical Social Worker if available or through lay social workers of the Care Committees.

Records, forms and registers should, no doubt, be reduced to a minimum, subject to the relevant information being available at various points of the patients sojourn through the clinic service e.g. diagnosis, assessment, treatment and home conditions. Well kept clinic records can be the basis of many a valuable practical conclusions, apart from planned studies at Special Research points.

Early Diagnosis & Case-finding

Chemotherapy to function as a Public Health measure calls for case-finding programmes, and has to ensure that all discovered cases receive adequate treatment. As long as unknown cases continue to propagate infection, TB in the community will not diminish. No doubt contact examination is an excellent and an essential case-finding activity, but this alone is insufficient in the larger context of the community.

Offer of X-ray and Laboratory facilities at nominal cost (Re. 1/- for each where 70mm cameras and culture facilities exist) to the general practitioner can increase their cooperation and thus help to locate many cases early.

Where general hospitals have 70mm camera units, it would be good investment for the TB organisation to have X-ray examination of all admissions, and such an activity may be financed by local TB Associations, provided discovered cases are referred to the local TB Clinics.

TB Clinics and hospitals should show the value of periodic X-ray examination of their own staff and their families.

Persistent efforts by the clinics to encourage X-ray examination of staffs of hospitals, Maternity & Child Welfare Centres, schools, domestic servants, food handlers, will pay dividends. Such activities can be encouraged if the clinics charge only the actual cost of materials from the employers. The latter should be helped to realise their moral responsibility for the treatment of the discovered cases for anti-TB work in general.

All goals, programmes and priorities will depend upon availability of resources. Intermediate goals may be advisable before big push is possible.

Economical Use of Mass X-ray Units

These units are expensive both in initial and running costs and are likely to be available in small numbers for a long time to come, and, therefore, their use must be rational and effective.

In areas where clinics are well established and prepared to handle and treat the cases discovered by such examination, this service for "case-finding" should be introduced as distinct from "Epidemiological Survey Projects". The National Sample TB Survey has shown that in large cities, there are small pockets or 'Nests' where large number of patients are found. It should be the duty of the clinics to comb such pockets, before going out to more healthy areas. For economy it is suggested that one unit for a big city can provide service to several clinics in the same city, till more help is available. Similarly in rural areas, several districts may be simultaneously helped by one unit. Such a unit should be under the local Health Department and should have its own staff of a doctor, radiographers, drivers, peons and a census team of 2 or 3 clerks. The programme for such a unit should be planned by the Health Officer on the advice of the local TB doctors with knowledge of epidemiology of tuberculosis in the area. The area clinic should be expected to make all the necessary arrangements to secure cooperation of the population to be surveyed, and the local health visitors should render all assistance at the time of examination in their areas. With cooperation from all, an attendance of 75-80 per cent can be arranged without much difficulty in a comparatively short time. Examination of the remaining 20-25 per cent is more time-consuming and may, therefore, not be insisted on at the present stage of our activities, as our object is case-finding and not epidemiological surveys. After the films are read by the doctor-in-charge of the team, the whole material with the relevant cards be passed on to the area clinic concerned, and will arrange for a second reading, and carry out further investigations, and arrange treatment and or follow-up as needed. With proper planning, wastage of time can be avoided, and the two units i.e. the clinic and Mass X-ray Units, are thus fully co-ordinated.

As regards the Industries, the E.S.I, or other employers e.g. Railways, should be encouraged to have their own independent schemes as they can afford such programmes independently.

Mass X-ray versus Fluoroscopy

Given experienced workers, the errors of X-ray screening can be reduced to a very low figure, which will be commensurate with practical TB work. Fluoroscopy may be used where for want of funds even small films cameras cannot be provided. It should be used only to screen the abnormal, which will be further investigated by large films. Errors in an experimental study in routine working conditions, was found under 2.0% in our hands,—the advantage sometime being in favour of the screening as against a small film. Proper precautions can easily reduce X-ray hazards. X-ray fluoroscopy could also be used to some extent in follow-up of the treatment cases and X-ray taken only at essential points.

B.C.G. Vaccination

A mass approach to B.C.G. will remain under the Public Health Department. The area clinic apart from vaccinating the family contacts should help to B.C.G. vaccinate the toddlers registered at Maternity & Child Welfare Centres, till this

becomes one of the latter's routine activities. TB Clinics should help vaccination of the new-born, through the local maternity hospitals and the paediatric services.

Financial Assistance

Though drug treatment is the heart of modern treatment, but much more is needed in terms of social and rehabilitation programme to make it acceptable and effective. For long time to come this must remain a non-official activity. Care Committees formation must be encouraged by the TB Clinics and it is the latter's essential duty. Only an efficient and disinterested clinic service can draw non-official persons for such an effort. The object of Care Committees is to help to complete treatment of the poor patients by various kinds of economic and social helps, through the clinics social welfare department. No doubt they can contribute liberally to meet some needs of some people, till in course of time the State meets all the needs of all people. Many activities can be canalised through the Medical Social Workers Organisation, and many activities of individuals and organisations interested in such a relief programme can be roped in.

For rehabilitation of the badly employed or those partially or uneconomically employed, schemes for vocational training and employment and rehabilitation have to be encouraged as a clinic activity. As our patients are mostly in their homes as "Institutional type of rehabilitation" is not thinkable in our context. The need and advantage of such an approach for rehabilitation through Work Centre are obvious enough.

A fair number of incapacitated individual arising from amongst the failures of treatment for various reasons are becoming a peculiar long-term problem. This should be the responsibility of the State social welfare organisation, rather than the Clinic social welfare agency. This is a long-term problem and cannot be met by voluntary effort, and has to be passed on to the State.

Functional Integration of TB Institutions

"Functional Integration" with the hospital system must be arranged. Hospitals must remain ancillary to the needs of prevention, admission not to be offered as a democratic right of a tax-payer, but to serve specific needs e.g. poor isolation facilities, medical emergencies and surgery. Discharge policies should be such that the needs of infectious cases are met by preference. The line of division of functions between TB Hospitals and the TB Clinics must be clearly understood and defined. Hospitals must deal only with treatment of patients while admitted in the hospitals, and the follow-up after their discharge from the hospital must revert to the clinic referring the case. Pulls and tears amongst agencies have to be recognised and effective integration be brought about. This can be brought about by mutual agreement among local authorities, and should be insisted at the technical level. An integrated approach to TB control amongst TB Specialists, will be helped by exchange of the medical staff between the clinics and the hospitals, if they are under a common authority.

Statistical Organisation

A proper statistical organisation for planning and evaluating clinics activity is essential. But obviously this can be a part of a big clinic, and this can and should give help to smaller units in the area.

Pulmonary Functions After Lobectomy

By

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Numerous reports in medical literature indicate the interest that has centred on the reduction of pulmonary functions accompanying resection of residual pulmonary foci (following medical therapy of tuberculosis).

While most workers believe that the functional loss is related to the extent of resection but in recent years some controversy has arisen as Vander Drift (1952), Limburg (1954) and Taylor *et al.* (1955) did not notice any relationship between functional loss and number of segments resected. The various factors that have been blamed are :—

1. the incidence of post-operative complications.
Limburg (1954) concluded from his study that the lack of difference in functional loss following segmental resection & lobectomy might be due to the greater incidence of complications amongst patients having segmental-resection.
2. the amount of functioning lung tissue removed (Woodruff *et al.* 1953, & Miller *et al.* 1958).
3. the changes in thoracic wall resulting after rib removal i.e. thoracotomy effect (Smith *et al.* 1954).

It was therefore decided to study the functional loss inflicted as a result of lobectomy and to study the effect of various factors, on it.

MATERIAL & METHODS

The cases of present study have been taken from K.T.B. Clinic & Hospital. The following pulmonary functions have been performed one week before and two months after operation.

1. Vital Capacity (V.C.)
2. Maximum Breathing Capacity (M.B.C.)
3. Residual Volume (R.V.)
4. Functional Residual Volume (F.R.V.)
5. Total Lung Capacity (T.L.C.)

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The patients were already acquainted with the use of spirometer several times before recording the tests.

In all 22 cases undergoing Lobectomy have been studied. Out of them 12 cases (54.6%) were males and ten cases (45.4%) were females. The male patients belonged to age group 25-35 years whereas the females belonged to age group 25-31 years.

All the cases belonged to stage II disease (the radiological classification was done according to the recommendations of subcommittee for classification of Pulmonary Tuberculosis 1940).

The lobes removed and the side of operations are indicated in the following table :—

TABLE No. 1

Operation performed	Side of operation	No. of cases	Percentage
Upper Lobe Lobectomy Middle Lobe Lobectomy	Right	12	54.5%
	Left	2	9.1%
	Right	Nil	Nil
Lower Lobe Lobectomy	Right	6	27.3%
	Left	2	9.1%

RESULTS AND DISCUSSION

The results are depicted in Table No. 2 & 3.

TABLE No. 2

Postoperative Reduction in pulmonary Functions after Lobectomy in Percentage of Preoperative Value

No. of cases	Operations	Vital Capacity		Maxmum Breathing Capacity		Residual Volume		Functionl Residual Volume		Total Lung Capacity	
		Range	Mea fall	Range	Mean fall	Rane	Mean fall	Range	Mean fall	Range	Mean fall
12	Right upper lobe lobectomy	10-20%	15%	10-22%	16%	14-27%	22%	12-23%	17%	12-21%	16%
2	Left upper lobe lobectomy	—	20%	—	15%	—	21%	—	19%	—	17%
6	Right lower lobe lobectomy	12-18%	15%	9-20%	14%	21-26%	23%	16-19%	18%	15-17%	16%
2	Left lower lobe lobectomy	—	18%	—	12%	—	24%	—	20%	—	15%
Total 22		10-20%	17%	9-22%	15%	14-27%	22%	12-23%	18%	12-21%	16%

TABLE No. 3

Incidence of Emphysema before and after Lobectomy

Grade of Emphysema	No. of cases preoperatively.	No. of cases postoperatively.
Normal	8 (36.3%)	16 (72.7%)
Slight Emphysema	10 (45.4%)	4(18.1%)
Moderate Emphysema	4 (18.1%)	2 (9.0%)
Advanced emphysema	—	—
Far Advanced Emphysema	—	—

I. Ventilatory Functions

All the cases studied demonstrated a reduction in vital capacity and M.B.C. The mean fall noticed being 17% in V.C. and 15% in M.B.C. Taylor *et al.* (1955) & Miller *et al.* (1958) reported a mean fall of 20% & 15% in V.C. and 15% and 20% in M.B.C. respectively. Thus some difference is observed in the figures reported by different workers. According to Taylor *et al.* (1955) this difference could be due to the day to day variations of motivation, to errors of measurement, and changes of respiratory muscle capabilities as well as to alterations of lung. Moreover, no aspect of pulmonary function is entirely uninfluenced by changes elsewhere in the thorax unless the mediastinum happens to be completely rigid.

The cases under review demonstrated an equal reduction both in V.C. and M.B.C. irrespective of whether an upper lobe or a lower lobe lobectomy was performed. Thus the loss of function appeared to be unrelated to the increasing volume or number of segments resected, a finding which is in conformity with the observations of Taylor *et al.* (1955) and Miller *et al.* (1958).

None of the cases in present series demonstrated an increase in M.B.C. after lobectomy as reported by Kelly & Pecera (1952) who noticed a definite improvement in M.B.C. after removal of two, three or four segments, a loss appearing only after excision of more than four segments. On the contrary we have noticed a nearly uniform reduction in M.B.C. in all cases irrespective of the number of segments removed.

The side of operation did not affect the postoperative functional loss seen.

II. Residual Volume

All the cases showed a reduction in R.V. The mean fall after removal of different lobes being 22 %. We did not notice any relationship between the number of segments resected and volumetric reduction, a fact which has also been mentioned by Miller *et al.* (1958).

In none of the cases postoperative increase was noticed.

III. Functional Residual Volume

It was reduced in all the cases, the mean reduction being 18% of preoperative values.

This reduction in F.R.V. indicates the absence of an average increase of expansion of all remaining segments, but it does not mean that some expansion in segments remaining on the side operated does not occur in these cases. In the absence of the data of unilateral volumetric measurements no comments can be made on the amount of expansion occurring in remaining segment on the operated side, though radiologically there was evidence of expansion of remaining lung segments on the operated side in all the cases in present study.

IV. Total Lung Capacity and Radio R.V.I.T.L.C. x 100

It was reduced in all cases studied, the mean reduction being 16%.

In none of the cases there was an increase in the ratio postoperatively. Thus none of the cases developed emphysema after the operation (refer Table No. 3).

V. Thoracoplasty vs. Resection

The two great objections against thoracoplasty are its mutilating character and the resultant reduction in ventilatory functions rendering the patient unfit for work.

In our pulmonary Function Laboratory (where the present work under review has been conducted) Charan and his associates have noticed minimal deformities along with a lesser loss in ventilatory functions following a one staged four rib modified roof thoracoplasty, an attempt has therefore been made in the following paragraphs to compare the loss in ventilatory functions after this procedure with those found after resectioned therapy.

The functional loss seen after one staged four rib modified roof thoracoplasty was 17% and 12% respectively in V.C. and M.B.C. as opposed to a loss of 17% in V.C. and 15.5% in M.B.C. after lobectomy.

The present study therefore shows that four rib modified roof thoracoplasty compares well with lobectomy as far as the postoperative functional loss is concerned, and thus to discard the thoracoplasty on the criteria mentioned above in cases where both are feasible is not justified. However, the reason why resection has become the choice methods of treatment is because the lesion is permanently removed with its attendant advantages and the mortality and morbidity of resection procedure compares favourably with those of thoracoplasty.

FACTORS RESPONSIBLE FOR POSTOPERATIVE LOSS AFTER RESECTIONAL THERAPY

Since the functional loss after 4 rib modified roof thoracoplasty and lobectomy is similar, it implies that repeatedly the loss seen after lobectomy is not only due to thoractomy effect as has been put up by Smith *et al.* (1954) but that there are some other factors connected with it also. At least one of the factors is the amount of functioning lung tissue removed.

Mathur & Bahadur (1960) from our Pulmonary Function Laboratory in a study of functional loss after pneumonectomy in two cases with stage II disease reported a greater loss in ventilatory functions as compared to those cases where a destroyed or an unexpanded lung was removed. This was due to functioning lung tissue removed.

Thus the present study suggests that the amount of functioning lung tissue removed is one of the factors which determines the reduction in pulmonary functions

noticed after lobectomy. Therefore, the aim of surgeon should be to remove as little functioning pulmonary tissue as possible.

CONCLUSIONS

Pulmonary Functions in 22 cases undergoing resectional surgery have been studied. The data obtained permit the following conclusions:—

1. A mean reduction of 17% in Vital Capacity and 15% in M.B.C. occurs. No difference in the percentage of reduction was noticed in ventilatory functions whether an upper lobe or a lower lobe lobectomy was performed.
2. A reduction of F.R.V. indicates that equal expansion of all remaining segments does not occur in post operative period.
3. There was no evidence of development of emphysema in postoperative period.
4. The functional loss after resectional surgery appears to be due to both thoractomy effect and the amount of functioning lung tissue removed.

SUMMARY

The literature on functional loss seen after Resectional Surgery has been reviewed and a report on 22 cases presented.

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Pulmonary Functions After Thoracoplasty

By

A. CHARAN, J. B. L. MATHUR

&

P. BAHADUR

(King George's Medical College, Lucknow)

The history of thoracoplasty in the treatment of pulmonary tuberculosis dates back in the year 1885 when first operation of this type was performed by de Cernville of Lausanne. Since then various modifications have been done in order to counteract the mutilating effects of this operation, to achieve a higher rate of cavity closure and consequent sputum conversion.

At present rehabilitation of patients is considered a vital programme in the treatment of Pulmonary Tuberculosis, hence greater stress is being laid now-a-days on the recognition of functional disabilities consequent to any surgical approach. As regards latter the best way to assess is by the consideration of pulmonary functions.

All workers have reported a significant degree of reduction of pulmonary functions after thoracoplasty. Cournand & Richards (1941) and Lindahl (1954) pointed to the Scoliosis as one of the causes of diminution of function after thoracoplasty. Bruce (1946) reported that a major contributory cause of functional loss consists in pleural complications. But Little (1956) commenting on this aspect pointed out that the loss appeared to be independent of the site of thoracoplasty, the type of disease before operation and the age of patient. Moreover, the complications of thoracoplasty such as torn pleura, Somb space infection, or evanescent pleural effusion had no significant effect. He agrees with Gaensler (1955) that functional impairment is proportional to the extent of rib resection.

In the present study an attempt has been made to study the ventilatory loss after thoracoplasty and to determine the various factors affecting it.

MATERIAL & METHODS

The material for study was selected from cases admitted to K. T. B. Clinic & Hospital. A detailed examination of Pulmonary Functions was done in each case considered suitable for thoracoplasty. The following tests were performed:—

1. Vital Capacity (V.C.)
2. Maximum Breathing Capacity (M.B.C.)
3. Residual Volume (R.V.)
4. Functional Residual Volume (F.R.V.)
5. Total Lung Capacity (T.L.C.)

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For this study the cases were divided into two main groups:—

Group—A

Sixteen cases belonged to this group and in them a *Two Staged Thoracoplasty* was performed. The pulmonary function tests were studied one week before the first stage operation and were repeated one week before undertaking of second stage and again about two months after the second stage was completed. The results have been classified as Pulmonary Functions “Before the Operation” and the values obtained after the completion of first stage as “After Upper Three Rib Thoracoplasty”. The values obtained after the completion of second stage were classified under two sub-heads:—

Group—A-1: as “Pulmonary Functions after Upper Five Rib Thoracoplasty”.

Group—A-2: as “Pulmonary Functions after Upper Seven Rib Thoracoplasty”.

Group—B

Ten cases belonged to this group and in them a one-stage *Four Rib Modified Roof Thoracoplasty* was performed. The pulmonary function tests were performed one week before the operation and were repeated again about two months after the completion of thoracoplasty.

All the cases were given respiratory exercises in the pre-operative as well as post-operative period. Before recording the values pre-operatively the patients were already acquainted with the use of spirometer several times.

Some of the classifications used in our Pulmonary Function Laboratory are as follows:—

(i) Radiological Classification

The cases are classified according to the recommendations of Indian Tuberculosis Association (1940) into three stages depending on the extent of parenchymal involvement.

(ii) Measurement of Scoliosis

In patients who develop scoliosis after thoracoplasty, this deformity is measured as reported by Lindahl (1954). The measurement is done by marking the spinal processes on the back and then measuring the curvature formed thereby in relation to a straight line from the nape to the upper Lumbar Vertebrae. The measurement is done in millimetres.

The degree of scoliosis observed is graded as follows:—

Minimal	...	Range 0—10 mm
Moderate	...	Range 10—25 mm
Severe	...	Range over 25 mm

(iii) Grading of Ratio R.V./T.L.C. X 100

Since the normal figures for this ratio in our Laboratory range from 25% to 35% we have found the following as a convenient classification:—

Normal	...	25—35%
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Slight Emphysema	...	36—40%
Moderate Emphysema	...	41—50%
Advanced Emphysema	...	51—60%
Far Advanced Emphysema	...	Over 60%

Technique of Operation

(i) Two Staged Thoracoplasty

The operation was done in two stages. In the first stage, first three ribs were resected along with the corresponding transverse process. After an interval of 6-8 weeks the second stage was undertaken. Further 2-4 ribs along with the corresponding transverse processes were removed depending on the extent of disease seen pre-operatively.

(ii) Four Rib Modified Thoracoplasty :

The operation was performed in one stage. The ribs removed were 2nd, 3rd, 4th and 5th. They were disarticulated at the costotransverse articulation and the corresponding transverse processes left intact. Thus in this operation the first rib and the transverse processes were left intact.

After resection of ribs, Semb's extrafascial apicolysis was done with reconstruction of the roof. The lung was mobilised up to the sixth rib.

ANALYSIS OF RESULTS

The case distribution in each group is shown in the following Table No. 1.

TABLE No. I

Group	Cases	Sex		Extent of disease			Side of operation	
		Male	Female	Stage I	Stage II	Stage III	Right	Left
A								
A1	6	6 (100%)	Nil	Nil	4 (66.6%)	2 (33.3%)	2 (33.3%)	4 (66.6%)
A2	10	10 (100%)	Nil	Nil	8 (80%)	2 (20%)	6 (60.0%)	4 (40.0%)
B	10	10 (100%)	Nil	2 (20.0%)	4 (40.0%)	4 (40.0%)	6 (60.0%)	4 (40.0%)

The changes noted in different lung volumes are shown in Table 2.

The incidence and effect of post-operative scoliosis on the ventilatory functions is shown in Table No. 3a and 3b respectively.

The effects of pre-operative extent of disease on ventilatory functions after thoracoplasty are shown in Table No. 4.

TABLE No. 2

Effect of Thoracoplasty on Lung Volumes (In percentage of pre-operative value)

No. Of Cases	Extent of rib resection	Effect on V.C.		Effect on M.B.C.		Effect on R.V.		Effect on F.R.V.		Effect on T.L.C.	
		Range Of reduction	Mea Reduction	Range Of reduction	Mea Reduction	Range Of reduction	Mea Reduction	Range Of reduction	Mea Reduction	Range Of reduction	Mea Reduction
16	Upper 3 ribs	11-36%	22%	8-26%	16%	7-15%	11%	9-16%	13%	7-26%	15%
6	upper 5 ribs (Gr. A1)	18-38%	28%	12-28%	20%	18-25%	21%	19-26%	21%	20-29%	24%
10	upper 7 ribs (Gr. A2)	23-47%	34%	18-30%	24%	14-27%	23%	15-28%	23%	19-39%	28%
10	Fou ribs modified roo Thoacoplasty (Gr. B)	10-27%	17%	6-20%	12%	14-26%	19%	13-28%	20%	18-30%	24%

TABLE No. 3A

Type of Thoracoplasty and Incidence of Scoliosis

No. of cases	Type of thoracoplasty	DEGREE OF SCOLIOSIS			
		No scoliosis	Minimal scoliosis	Moderate scoliosis	Severe scoliosis
*					
16	upper 3 ribs	Nil	2(12.5%)	12 (75%)	2 (12.5%)
6	upper 5 ribs	Nil	Nil	4 (66.6%)	2 (33.3%)
10	upper 7 ribs	Nil	Nil	6(60%)	4- (40%)
10	Four rib modified Roof Thoracoplasty	4 (40%)	4 (40%)	2 (20%)	Nil

TABLE No. 3B

Effect of Scoliosis of Ventilatory Function (in Percentage of Pre-Operative Value)

No. of cases	Extent of operation	Average Reduction in V. C.				Average Reduction in M. B. C.			
		No Scoliosis	Minimal Scoliosis	Moderate Scoliosis	Severe Scoliosis	No Scoliosis	Minimal Scoliosis	Moderate Scoliosis	Severe Scoliosis
16	upper 3 rib*	Nil	11%	21%	36%	Nil	8%	16%	26%
6	upper 5 ribs	Nil	Nil	23%	38%	Nil	Nil	23%	38%
10	upper 7 ribs	Nil	Nil	26%	44%	Nil	Nil	39%	44%
10	Four rib modified roof Thoraco-plasty	11 %	16%	27%	Nil	11%	18%	27%	Nil

TABLE No. 4

Effect of Pre-Operative Extent of Disease on Post-Operative Reduction in Ventilator Functions

Total no. of cases	Extent Of Operation	STAGE I			STAGE II			STAGE III		
		Cases	Mean fall in V.C.	Mea fal in M.B.C.	Cases	Mean fall in V.C.	Mea fal in M.B.C.	Cases	Mean fall in V.C.	Mea fal in M.B.C.
1	Upper 3 ribs	Nil	Nil	Nil	12	22%	16%	4	21%	16%
6	Upper 6 ribs	Nil	Nil	Nil	4	28%	23%	2	28%	20%
10	Upper 7 ribs	Nil	Nil	Nil	8	34%	24%	2	29%	22%
10	Four ribs modified roof toraco-plasty	1	10%	9%	4	16%	9%	4	16%	16%

Ratio R. V/T. L. C. X 100

Pre-operatively out of the twenty-six cases studied a normal ratio was seen in twenty-two cases (84.6%), evidence of slight emphysema in two cases (7.7%) and of moderate emphysema in two (7.7%) cases.

Post-operatively a change in the ratio was noticed only in four cases (15.4%) and in the rest there was no change. The results are depicted in the following Table No. 5.

TABLE No. 5

Ratio R.V./T.L.C.x100	Degree of Emphysema	Percentage of cases pre- operatively		Percentage of cases post- operatively	
		Group A	Group B	Group A	Group B
25-35%	Normal	14 (87.5%)	8 (80.0%)	10 (62.5%)	8 (80.0%)
36-40%	Slight	2 (12.5%)	—	4 (25.0%)	—
41-50%	Moderate	—	2 (20.0%)	2 (20.0%)	2 (20.0%)
51-60%	Advanced	—	—	—	—
Over 60%	Far advanced	—	—	—	—

DISCUSSION**I. Ventilatory Functions**

In the present series of sixteen cases in which pulmonary functions were studied before and after upper three rib thoracoplasty (i.e. after completion of first stage) demonstrated a mean reduction of 22% of the pre-operative value in Vital Capacity and 16% in M.B.C. Little (1956) reported a fall of 21.1% in V.C. following upper three rib thoracoplasty and Gaubatz *et al* (1938) observed a reduction of 15% in M.B.C. after an apical thoracoplasty.

Ten cases in whom a one stage four rib modified roof plasty was performed demonstrated a reduction of 17% in V. C. and 12% in M.B.C. Thus a greater loss in Ventilatory functions was noticed after conventional upper three rib thoracoplasty as compared to the four rib modified roof plasty.

The only explanation for this difference can be the difference in the degree of scoliosis which follows after these two operations (refer Table No. 3a). Since factors such as asymmetrical freeing of a number of muscles attachments notably those of scalenus, pectoralis minor and erectores dorsi muscle as well as excision of the first rib and the anterior segments of other ribs, together with transverse process of the vertebrae determine the degree of scoliosis seen post-operatively, naturally one expects to get lesser scoliosis after four rib modified roof thoracoplasty as the only factor producing scoliosis in these cases would be asymmetrical freeing of a number of muscle attachments.

This is borne out by the figures in present study (refer Table No. 3b showing effect of postoperative scoliosis on ventilatory functions).

The other factor which is responsible for the reduction in pulmonary functions after thoracoplasty is the extent of rib resection. An increasing loss of pulmonary functions was noticed with increasing extent of thoracoplasty (refer Table No. 2).

The extent of disease seen pre-operatively did not effect the reduction seen in the vital capacity and M.B.C. after the operation (refer Table No. 4). This is in

conformity with the work of Kaltraider (1938), and Gaensler (1955) who reported that the diminution in respiratory functions after the thoracoplasty was independent of the initial condition of lung.

In the present series there was no case of pleural complication after thoracoplasty, so no comments can be made on the work of Bruce (1948) who reported that a major contributory cause of functional losses consists in pleural complications.

II. Residual Volume

A diminution in residual volume was observed in all the cases studied. After removal of three ribs, four ribs, five ribs and seven ribs the mean fall noticed was 11%, 19%, 21 % and 23% respectively. Higher mean fall in residual volume has been reported by some workers. McIntosh (1935) observed a diminution of 36% in cases where a concomitant Phrenicotomy was done along with thoracoplasty. In present series in none of the cases a concomitant phrenic paralysis was done. Courmand & Richards (1941) observed a mean fall of 27% after removal of 7.1 ribs, the range being 3 to 9 ribs. In the present series the range of rib resection was only from 3 to 7 ribs.

Thus implicit in this study is the fact that the extent of rib resection determines the loss in residual volume after thoracoplasty.

III. Changes in Functional Residual Capacity

There was a reduction in functional residual capacity in all cases studied. In two staged conventional thoracoplasty after resection of three ribs, five ribs and seven ribs it was 13%, 21 % and 23% respectively. This measurement actually represents the collapse which has been achieved as a result of thoracoplasty. It shows an increasing extent of collapse with increasing extent of rib resection.

The interesting feature of present study is that the amount of collapse achieved with four rib modified roof thoracoplasty (mean reduction in F.R.V.—20%) equals that achieved with two staged conventional five rib thoracoplasty (mean reduction in F.R.V.-21 %).

There is a controversy whether thoracoplasty produces a compression collapse or a relaxation collapse. It is not possible to deduce any conclusions from the present study.

IV. Ratio R.V./T.L.C. x 100

In the present series no significant change was noticed post-operatively. Courmand & Richards (1941) in a series of 13 cases comparable with our group in that they had not received any collapse measures in the form of A. P. or Phrenic before thoracoplasty also did not notice any change in this ratio. If thoracoplasty emphysema does not develop in the immediate post-operative period.

CONCLUSIONS

The present study permits of the following conclusions :—

1. V.C. and M.B.C are both reduced after thoracoplasty. The extent of reduction is determined by the number of ribs removed and the amount of scoliosis that develops.
2. The lung collapse which occurs depends on the amount of ribs resected.

3. A comparison of the four rib modified roof thoracoplasty with the upper three rib thoracoplasty showed that there occurred in the latter a greater degree of scoliosis and consequent greater reduction of V.C. and M. B. C.

Thus with Four Rib Modified Roof Thoracoplasty one expects to get a lesser reduction of V.C. and M.B.C. along with a sufficient collapse. The deformities are also much reduced in incidence. Though the number of cases studied have been small but there appears to be ample justification in changing over from the old method of two staged thoracoplasty to one staged Four Rib Modified Roof thoracoplasty.

SUMMARY

Twenty-six cases of pulmonary tuberculosis undergoing thoracoplasty has been studied and a preliminary report of Pulmonary Function tests done before and after thoracoplasly has been presented.

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Criteria for the Issue of Fitness Certificate

By

B. K. SIKAND

(Director, New Delhi, TB Centre)

It would be agreed that infectivity of the patient is one of the main criterion for fitness. It is, however, very difficult, if not impossible, to decide when a patient ceases to be infective. If the facilities for culture of sputum or laryngeal swab are not available in an institution, the position becomes much worse. Madras Chemotherapy Centre has, however, reported that if 2 direct smears are negative, almost 80% of the infective cases will be excluded. I would, therefore, suggest that the standards of sputum examination should be so devised that gross infectiousness of the patient could be excluded and further safety will be assured if the sputum result is considered in conjunction with radiological assessment.

Criteria for institutions where culture facilities are available

- (a) Two consecutive cultures of sputum or laryngeal swab taken at monthly interval should be negative. If, however, the skiagram still shows a cavity and either surgery is not possible or the patient refuses surgery, 3 consecutive cultures may be negative.
- (b) Radiologically the lesion should be regressing and the bulk of the exudative reaction should have cleared and/or lesion predominantly productive.
- (c) No toxaemic symptoms present.

Criteria for institutions where culture facilities are not available

The main criteria here would have to be radiological. Further, a decision will have to be taken whether to let the man go back to work early (to solve his economic problems) or to insist on a longer period of no sputum or negative sputum' *after* the radiological criteria have been fulfilled. I would suggest.

- (a) *If the patient is bringing out sputum:*
 - (i) The lesion should not be progressing and the bulk of exudative reaction should have cleared and/or lesion predominantly productive. Cavity may or may not have closed.
 - (ii) Sputum negative for two months, each monthly examination to consist of direct smear examination on 3 consecutive days and concentration examination of the 3 days' pooled specimen.

OR

Direct smear negative on 6 consecutive days and concentration of the pooled specimen of 6 days also negative, (iii) No toxaemic symptoms present.

- (b) *If the patient is not bringing out sputum:*
 - (i) The lesion should not be progressing and the bulk of exudative reaction should have cleared and/or the lesion predominantly productive. Cavity may or may not have closed.
 - (ii) Two bronchial lavages should be carried out at monthly intervals and the lavage material examined by direct smear and concentration should be negative.
 - (iii) No toxaemic symptoms present.

CONDITIONS UNDER WHICH A PATIENT MAY NOT BE TAKEN OFF WORK

If the criteria for fitness are to be laid down, it is also essential to specify the conditions under which the patient may be allowed to continue working while under treatment. It has been amply proved that if antimicrobial treatment is good and adequate, rest is not essential provided the patient has no toxaemic symptoms. If such a patient is taken off work it may only retard his recovery by creating additional economic difficulty. I would, therefore, suggest the following conditions under which the patient may continue working:—

1. Sputum negative by direct smear on 3 consecutive days or the patient is not bringing out any sputum;
2. No cavity seen on the plain x-ray ;
3. The lesion if exudative should not be more than 10 sq. cm. in extent or if predominantly productive not more than 2 zones of the lung.
4. No toxaemic symptoms present.

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News & Notes

Our President Honoured

Rajkumari Amrit Kaur, who has been President of the Association for the past over thirteen years was selected by the International Conference of Social Work for the Rene Sand Memorial Award. This award is in memory of Dr. Rene Sand of Belgium who founded the International Conference of Social Work about three decades ago and was its President upto the time of his death in 1953. It is given for outstanding social work with special reference to health. Rajkumariji is the first person from any Asian country to have been selected for this Award.



RAJKUMARI AMRIT KAUR

President, Tuberculosis Association of India

In selecting Rajkumariji for this distinction the dispatch says: "Your whole life work, your concern with the people and with their health, their well being and their responsible place as free individuals in a free society—all these illustrious pages in your life and work for the people of India and of the whole world provide the reasons

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for your selection for the Rene Sand Award". The Award was received by Rajkumariji on January 12, 1961 in Rome before a large and distinguished international gathering.

The Tuberculosis Association of India is proud to record this international distinction conferred on its President, and congratulate her.

XXII Annual Meeting

The XXII Annual General Meeting of the Tuberculosis Association of India will be held in New Delhi on April 25, 1961 in the conference hall of the Association at 11-15 A.M.

The Central Committee of the Association will also meet on the same day.

The Conference of Secretaries will be held at 9-30 A.M. on 24th April, 1961. The Standing Technical Committee of the Association will meet in New Delhi on April 26th and 27th, 1961.

Health Visitors' Course

The 1961 Tuberculosis Health Visitors' Course commenced in the New Delhi TB Centre on 2nd January, 1961. Seventeen candidates deputed by various States are under training.

Post-graduate Refresher Course, Calcutta

The Bengal Tuberculosis Association will conduct a post-graduate refresher course in Calcutta for two weeks sometime in March this year.

Library

The library maintained by the Tuberculosis Association of India at its headquarters office has now a collection of about 700 medical books and periodicals. Recently it has added to its library a few books on nursing and Tuberculosis.

Sixteenth International TB Conference

The following are the details of the Scientific Sessions of the Sixteenth International TB Conference to be held in Toronto, Canada, from the 10th to 14th September, 1961 under the joint auspices of the IUAT, Paris and the Canadian TB Association.

Sunday, 10th September

3 P.M.

Inaugural Meeting, in the Canadian Room of the Royal York Hotel, Toronto, under the patronage of His Excellency, Major-General Georges P. Vanier, DSO, MC, CD, Governor-General of Canada.

The Honourable J. Waldo Monteith, Minister of National Health and Welfare.

The Honourable M. B. Dymond, M.D., Minister of Health for Ontario.

Monday, 11th September

9 A.M.—1 P.M.

Primary drug resistance of the tubercle bacillus (bacteriological, therapeutic and epidemiological aspects of the problem) Chairman of the Panel: Prof. B. KREIS (France).

Principal Rapporteur: Dr. Gertrud MEISSNER (Germany).

10 A.M.—1 P.M.

How to inform the general public that tuberculosis is not yet under control.

Chairman of the Panel: Dr. G. J. WHERRETT (Canada).
Principal Rapporteur: Dr. Mageret NIX (Canada).

- 2-30—5-30 P.M. Primary drug resistance of the tubercle bacillus (bacteriological, therapeutic and epidemiological aspects of the problem).
Communications on the subject.
Free communications (Subjects and speakers to be announced in the final programme).

Tuesday, 12th September

- 9 A.M.—1 P.M. Pulmonary tuberculosis in persons above fifty years of age (epidemiological, clinical and therapeutic aspects).
Chairman of the Panel : Prof. A. OMODEI ZORINI (Italy).
Principal Rapporteur : Prof. Ph. V. CHEBANOV (USSR).
- 9 A.M.—1 P.M. Prospective role of voluntary tuberculosis associations throughout the world.
Chairman of the Panel: Dr. T. GEDDE-DHAL (Norway).
Principal Rapporteur: Dr. J. MEIJER (The Netherlands).
- 2-30—5-30 P.M. Pulmonary tuberculosis in persons above fifty years of age. (epidemiological, clinical and therapeutic aspects).
Communications on the subject.
- 2-30—5-30 P.M. Methods of improving and checking the taking of the prescribed drugs by tuberculous patients (Study of the problem in consideration of the different sociological and economic conditions prevailing).
Chairman of the Panel: Dr. P. V. BENJAMIN (India).
Principal Rapporteur: Dr. Wallace FOX (Great Britain).
- 2-30—5-30 P.M. Free communications (Subjects and speakers to be announced in the final programme).

Wednesday, 13th September

- 9 A.M.—1 P.M. New concepts regarding the significance of tuberculin sensitivity (with special reference to the problem of low-degree sensitivity).
Chairman of the Panel: Dr. Sven Nissen NEVER (Norway).
Principal Rapporteur: Dr. Carroll E. PALMER (USA).
- 9 A.M.—1 P.M. Respiratory insufficiency in pulmonary tuberculous patients.
Chairman of the Panel: Prof. J. K. KRAAN (The Netherlands).
Principal Rapporteur: Prof. Paul SADOUL (France).
- 2-30—5-30 P.M. The problem of rapid inactivation of isoniazid.
Chairman of the Panel: Dr. A. R. ARMSTRONG (Canada).
Principal Rapporteur: Dr. Leon Herbert SCHMIDT (USA).

- 2-30—5-30 P.M. The problem of the relation between sarcoidosis and tuberculosis.
Chairman of the Panel: Dr. Sven LOFGREN (Sweden).
Principal Rapporteur : Dr. J. G. SCADDING (Great Britain).
- 2-30—5-30 P.M. Free communications (Subjects and speakers to be announced in the final programme).

Thursday, 14th September

- 9 A.M.—12-30 P.M. The Eradication of Tuberculosis in the different countries according to existing conditions (Theoretical problems and practical solutions).
Chairman of the Panel: Prof. Walsch MCDERMOTT(USA)
Principal Rapporteur: Dr. G. CANETTI (France)
- 2—4 P.M. Communications on the subjects.

Those who wish to attend the Conference may contact the Secretary, Tuberculosis Association of India, 3 Red Cross Road, New Delhi for further details.

IAUT Membership

The Tuberculosis Association of India recommends to the International Union Against Tuberculosis, Paris, names of those who wish to become ordinary members of that Union from India for the year 1961. Membership fee is Rs. 21/- per year. Members of the Union will receive, free of cost, copies of the quarterly bulletin and newsletter published by the Union. Those wishing to enrol themselves as ordinary members may write to the Secretary, Tuberculosis Association of India, 3 Red Cross Road, New Delhi-2.

Award of Colombo Plan Fellowship to Shri B. M. Cariappa

Shri B. M. Cariappa, Secretary, Tuberculosis Association of India, New Delhi has been selected by the Government of India for the award of a Colombo Plan Fellowship to visit Canada at the time of the Seventeenth International Tuberculosis Conference in Toronto in September next. The duration of this fellowship is about three months.

Shri Cariappa is a member of the Health Education Committee of the International Union. He will also be presenting a paper at the Toronto Conference on the role of non-Official bodies in the fight against Tuberculosis. Shri Cariappa will visit TB Institutions and non-Official Organisations in Canada, and at the invitation of the National Tuberculosis Association of the United States of America, he will visit the United States also. The other delegates sponsored by the Government of India are six doctors from India.

Shri Cariappa is the Secretary and Treasurer of the Eastern Regional Committee of the International Union Against Tuberculosis, an informal meeting of which will be held at Toronto at the time of the International Conference. The last meeting of this Committee was held in Sydney, Australia in May, 1960.

The Indian Journal of Tuberculosis

ABSTRACTS

Vol. VIII

Abst. No. 2

The Use of Corticosteroids in the Treatment of Sarcoidosis

The cause of sarcoidosis remains unknown and Corticosteroids is the only drug which has influenced in a way its cause. Probably not more than 10 per cent of patients with this disease require Corticosteroids.

Indications.—1. Involvement of a Vital Organ such as brain, spinal cord or heart.

2. Acute or subacute involvement of eye.
3. Progressive pulmonary parenchymal involvement.
4. Persistent hypercalcaemia.
5. Acutely or subacutely ill patients.
6. Progressive or disfiguring lesions of the skin.

Patients who do not require treatment are:—

1. Bilateral hilar or paratracheal lymphadenopathy with minimal or no symptoms.
2. Non-progressive pulmonary lesions with no or minimal symptoms.
3. Chronic fibrotic pulmonary parenchymal lesions.

Method of Treatment : Can be given by mouth or locally for ocular or dermal lesions. The concomitant use of antituberculous drugs is indicated in all patients whose sarcoidosis is being treated with steroids and who react positively to the tuberculin test.

Duration of Treatment : Will depend upon the degree of involvement.

(A Statement of the Committee on Therapy. Am. Rev. Resp. Dis., Vol. 82. No. 5, Nov., 60.)

The Chemotherapeutic Management of Treatment Failures and Relapses in Pulmonary Tuberculosis

By the term "Treatment Failure" includes those patients in whom the total therapeutic programme (drug, time and surgery when appropriate) has been unable to bring about an inactive state.

By 'Relapse' is reactivation of disease after a period of inactivity.

In either instances, the bacilli may or may not be resistant to the Chemotherapeutic agents previously employed.

Treatment Failures : 1. In patients who had inadequate period of therapy, the same drugs should be used in standard dosage pending susceptibility studies if rapid progression of the disease is not taking place.

2. Those with rapid progression of the disease, a change in drug therapy is recommended by substitution or addition of one or more new drugs.

3. A short term combination of two or more of the following drugs such as Cycloserine, pyrazinamide Viomycin or Kanamycin may be used.

4. Streptomycin or P.A.S. should be discontinued after susceptibility studies indicate drug resistance while the use of Isoniazid may be continued.

5. Treatment failure patients for thoracic surgery may benefit from a short course of Pyrazinamide with Cycloserine or Viomycin.

6. Patients who previously had no isoniazid should have isoniazid as the first drug of choice.

7. Tetracyclines may be used in patients with P. A. S. resistance or P.A.S. intolerance. Thiocarbanidin or streptovaricin are not suitable substitutes for P.A.S.

8. When effective drug coverage is lacking patients' activity should be limited in contrast to the freedom of ambulation permitted original treatment cases with effective drug coverage and good Prognosis.

9. Adreno Corticosteroids and Corticotrophin should not be employed for patients with resistant organisms.

Relapses : The recommendations pertaining to treatment failures apply equally to relapses.

Dosage :

(a) *Streptomycin :* 0.5—1 Cm. daily or 1 Gm. two or three times a week.

(b) *Isoniazid:* 3—5 mgm per Kg. of body weight per day orally. Higher dosage of 12—24 mgm per Kg. may increase therapeutic efficacy particularly in patients in whom rapid inactivation of isoniazid is suspected with higher

dosages 50 mgm of Pyridoxine per day to reduce the risk of Isoniazid neurotoxicity.

(c) *P.A.S.* : Sod. P.A.S. is the preferred form (15 Gm. of the acid daily).

(d) *Cycloserine* : 0.5 Gm. in divided dose orally. With higher doses neurotoxicity is likely to occur.

(e) *Pyrazinamide* : 20—40 mgm. per Kg. per day orally in divided doses. Hepatic toxicity is likely to occur.

(f) *Viomycin* : 1—2 Gm. twice weekly, but renal disease is a Contra indication.

(g) *Tetracycline* : 2—4 Gm. orally in daily divided dosage.

(h) *Kanamycin* : 1 Gm. daily in divided dosage but incidence of eighth nerve toxicity is higher.

(i) *Thioamide* : 0.5—1 Gm. daily orally in divided dosage.

Duration of Chemotherapy : should be at least eighteen months of uninterrupted chemotherapy. Though optimal duration of treatment is not yet known, hospitalization for treatment failures and relapses is very important.

(*A Statement of the Committee on Therapy. Am. Rev. Resp. Dis., Vol. 82, No. 5, Nov., 60.*)

The Use of Dihydrostreptomycin in Tuberculosis

Dihydrostreptomycin is more toxic to the auditory system than is streptomycin which produces vestibular damage.

Further the vestibular damage occurs after larger doses of the drug. It does not progress after Cessation of therapy and may be compensated to a variable degree.

In contrast deafness may occur after small doses of dihydrostreptomycin and may progress or even begin after the antimicrobial has been discontinued.

Hearing loss is usually irreversible and characterized by loss of speech.

Although the occurrence is rare, but unpredictability of dihydrostreptomycin in producing hearing loss, difficulty of recognition of early, toxic effects and the irreversibility of damage produced indicate that dihydrostreptomycin should not be used in the routine treatment of Common bacillary infection nor should this drug be used in commercially available combinations, with other antimicrobials.

At present the use of dihydrostreptomycin in tuberculosis should be limited to special cases in which there is reason to avoid vestibular

toxicity and in rare instances of specific hypersensitivity to Streptomycin.

(*A Statement of the Committee on Therapy. Am. Rev. Resp. Dis., Vol. 82, No. 5, Nov., 60.*)

An Evaluation of Chemotherapy in Pulmonary Tuberculosis—High Doses of Isoniazid plus P.A.S. versus Low Doses of Isoniazid plus P.A.S.

High Doses of Isoniazid (11-20 mgm per Kg. daily P.A.S. 10Grams daily) plus pyridoxine (100 mgm. daily) were administered to 113 patients. Ninetyone patients received low or conventional doses of Isoniazid (300 mgm. daily) plus P.A.S. (12 Grams daily).

No significant Clinical advantage seems to result from high doses of Isoniazid.

The difference in results between both groups was less than 5 per cent.

(*Stephen J. Berte and William G. Dimington. Am. Rev. Resp. Dis., Vol. 83, No. 1, Jan., 61.*)

Prednisolone in Treatment of Pulmonary Tuberculosis : A Controlled Trial

The trial was designed to assess the effects of adding prednisolone to the standard treatment with Streptomycin, Isoniazid and p-aminosalicylic acid of patients with pulmonary tuberculosis caused by bacilli initially sensitive to all three of these drugs.

91 cases were in the control group treated with antibacterial drugs alone and 87 in the group treated additionally with prednisolone 20 mgm. daily for the first three months.

All but four patients received antibacterial drugs for 12 months or longer and results were compared after observation for 12 months.

In the Prednisolone group especially those more acutely ill, showed rapid Clinical improvement, gain of weight and fall in sedimentation rate.

Although the rate of Cavity closure was not increased, general radiographic improvement was more rapid throughout the 12 months period in prednisolone group, the difference between the two groups being statistically significant in the first four months.

Sputum conversion was hastened in the prednisolone group to a statistically significant degree upto the end of the second month but by the end of six months, no difference was observed, ail but one of the 178 cases became sputum negative on culture.

No permanent deleterious effect was observed in the prednisolone treated patients though a temporary rebound phenomenon was observed radiographically on ceasing prednisolone therapy in 11 % cases.

(*N. W. Horwe : B. M. J., Feb. 6th—10, 61.*)

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ABSTRACTS

Vol. VIII

December, 1960

Abst. No. 1

The influence of Corticosteroid Hormones in the Treatment of Tuberculous Meningitis in Negroes.

The mortality rate amongst the 17 patients treated with antituberculous drugs alone was 52.9 per cent as compared to 18.8 per cent amongst the 16 who received Corticosteroids Hormones in addition to antituberculous drugs.

In the former group, 4 patients had Cerebro Spinal block and all died. In steroid regimen only one of the 9 patients with Cerebro Spinal block died.

Corticosteroids hormones used with isoniazid, Streptomycin and P. A. S. are extremely valuable in the treatment of advanced cases of tuberculous meningitis, particularly when used early in the presence of Cerebro Spinal block.

B. F. Vol Javee and R. F. Corpe : Anter. Rev. Resp. Dis.: Vol. 81, No. April, 60.

A Rapid Mouse Test For the Diagnosis of Pulmonary Tuberculosis.

III. Validation of the Test with Specimens from 1,000 Patients.

Of the 362 patients in the study, 145 patients (40 per cent) yielded specimens which were positive by the mouse test in twenty days whereas the specimens from 75 patients (20 per cent) were positive by culture in fifty-two days.

Of the 75 patients positive by culture, 84 per cent gave positive results by mouse test in five days and 96 per cent in ten days whereas no cultures were positive in ten days.

David Gate and Elizabeth A. Lockhart: Amer. Rev. Resp. Dis., Vol. 81, No. 5, May, 60.

A Comparison of Isoniazid Cycloserine with Isoniazid P.A.S. in the Therapy of Cavitory Pulmonary Tuberculosis.

X. A Report of the Veterans Administration-Armed Forces Co-operative Study.

The efficacy of Cycloserine and Isoniazid regimen was measured against Isoniazid and para-aminosalicylic and P.A.S. given concurrently to a control group of patients with Cavitory tuberculosis in fourteen co-operating Hospitals.

In the Isoniazid Cycloserine group there was roentgenographic progression of the disease in 7 per cent compared with an incidence of 2 per cent amongst the Control group.

Clinical failure to respond to treatment necessitated change of drug regimen in 12 per cent of the cases as compared with 2 per cent in Isoniazid P.A.S. treated group.

Toxic symptoms were in 18 instances in the Isoniazid Cycloserine group of the nature of one had convulsive seizure, one instance of optic neuritis, 3 hypersensitivity reactions and 13 had mental aberrations or behaviour changes.

In the Isoniazid P.A.S. group there were 9 hypersensitivity reactions including one death from acute yellow atrophy.

Patrick B. Storey: Amer. Rev. Resp. Dis., Vol. 81, No. 6, June, 60.

Out Patient Chemotherapy for Tuberculosis.

Of the 264 tuberculous patients discharged from the hospital with medical consent and recommended to continue outpatient Chemotherapy, 26% did not return to the Clinic for renewal of Drug Supply.

40% did not take any drug or less than 50% of the drug prescribed.

25% were taking within 90% of the regimen advised.

H D. Ireland; Am. Rev. Resp. Dis., Vol. 82, No. 3, Sept., 60.

Characteristics of Mycobacterial Populations Found in the Sputum of Tuberculous Patients After Prolonged Isoniazid Therapy:

Single sputum specimen of 46 patients who had Isoniazid Therapy for at least 2 years was studied regarding characteristics of Isoniazid-resistant Populations of tubercle bacilli.

Based on guinea Pig Virulence, the Isoniazid resistant sputum isolates seemed to fall into 5 different types of populations of tubercle bacilli.

Based on their Catalase activity it fell into three categories:

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(1) those of high Catalase activity which were guinea pig virulent.

(2) those of moderate Catalase activity which were not virulent for guinea pig.

(3) those of low Catalase activity which were usually non-virulent for guinea pigs.

Lenora R. Peizer; Aaron, D. Chaves; Daniel Widelock; Amer. Rev. Resp. Dis.; Vol. 82, No. 4, October, 60.

Thioglycollate, Peroxidase, Natural Red, Serpentine Cord, and Niacin Tests for Group Differentiations of M. Tuberculosis Anomymous (Atypical) Acid Fast Bacilli and Saprophytic Mycobacteria.

Peroxidase, neutral red Serpentine Cord and niacin tests can distinguish human tubercle bacilli from atypical and saprophytic mycobacteria but they cannot distinguish between atypical from the Saprophytic group of organisms.

But Thioglycollate test can distinguish between all three groups.

Maurice S. Tarshis; Dis. Chest., VOL XXXVIII, No. 4, Oct., 60.

A Study of Respiratory Effects of Prednisone in diffuse Air Way distruction.

Prednisone was given to 14 patients with Chronic pulmonary emphysema and comparison was made between its effect on their symptoms and pulmonry function tests.

Half the patients noted subjective improvement while receiving prednisone, none showed any significant change in pulmonary function tests including Air Flow and gas exchange.

The failure of Prednisone in fairly high doses to produce improvement in any of the objective tests of pulmonary function suggests that long term steroid therapy is not justified in chronic pulmonary emphysema.

James H. Cullen and William M. Reidt, Amer. Rev. Resp. Diseases; Vol. 82, No. 4, October, 60.

A Study of Essential Haemoptysis.

97 patients with Haemoptysis of undetermined origin were followed over a period of 9J years. Of the various causes of haemoptysis of undetermined origin are:

1. Mucosal ulceration beyond the vision of Bronchoscopist.
2. Undetected Bronchiectasis of a single Radicle.
3. Pulmonary Hypertension.
4. Systemic Hypertension.

5. Blood Dyscrasias.

6. Small infarct without x-ray evidence.

7. Vicarious menstruation.

8. Varicosites about the Carina and upper lobe orifices.

81 or (83.5 percent) have been followed for periods ranging from 1 to 10 years.

4 of the 81 were dead of causes unrelated to the haemoptysis.

77 or (95 percent) are known to be living. 3 of the known living patients subsequently were found to have mitral stenosis congestive failure, or primary Pulmonary hypertension.

None of the cases subsequently developed Carcinoma or tuberculosis.

The patient should have a periodic check up and specially the Pulmonary artery pressures should be investigated.

Raymond J. Barrett and William M. Tuttle; Jour. Thor and Cardio Vascular Surg., Vol 40, No.4, October, 60.

Post-operative Empyema: Etology, Prevention and Treatment.

Mortality, morbidity and Postoperative complications are directly related with the extent of pulmonary resection.

The Principle of fully expanded lung and empty or obliterated pleural space can be accomplished after lobectomy and segmental resection. The Principle cannot be applied after Pneumonectomy. Accordingly a more meticulous sterile-technique must be carried out after Pneumonectomy.

Postoperative Empyemas have been divided according to the extent of resection i.e. after

(a) Pneumonectomy,

(b) When less than a Pneumonectomy has been done. These two categories have been further divided into:

(a) Those with Bronchopleural fistula,

(b) Those without Bronchopleural fistula. The best treatment for empyema is prevention. The actual treatment can be divided into:

(a) aspiration and sterilization by needle or closed thoracotomy tube,

(b) open or closed drainage followed by Thoracoplasty when needed.

O.C. Brantigan and C.Y. Hadidian. Dis. Chest, Vol. XXXVIII, No. 4, Oct., 60.