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NATIONAL TUBERCULOSIS SURVEY

A survey must have a definite purpose and in its planning, help of other disciplines and faculties should be taken unreservedly to achieve the objective. In this the statisticians, next to the specialists, generally play the most important role from the initial to the final stages.

For such a survey to have a national character in a vast country like India, even a good localised one may fail to fulfil the objective, as tubeculosis is influenced by many social and other factors. Survey of total population is also not possible for many reasons. Proper and adequate samples have to be accepted from a number of centres representing different zones of the country. For uniformity and proper interpretation of the results of the investigations the survey should be controlled at every stage by a central "working group". Use of a common protocol with unambiguously defined terminologies, explanation and demonstration of all techniques to each participating unit, synchronous start and keeping to a time schedule, are some of the essentials for a survey using multiple centres.

However important these essentials may be, the key to the success of the survey depends almost entirely on the 'organisation'. Men with persuasive personality, dedication and team spirit are needed for the purpose. In selecting the leader, supervisor, staff and centres, these considerations should receive earnest attention.

The Indian Council of Medical Research has previous experience and is best placed to plan and undertake the second national survey. During the years 1955-58 it undertook the first survey the findings of which were published as "Tuberculosis in India — a sample survey" in a "Special Report, series No. 34". This is the only epidemiological study on the subject which can be regarded to have a national character. Rupees six lakhs, provided by the Government of India, was spent for the survey. As the participating units and others like UNICEF had helped in many ways, this sum of money proved adequate. The expenditure is likely to be far more now.

The object of the survey was strictly limited to determine the "prevalence rate" of the disease. This was urgently needed to design the 'Five Year Plans' for the control of the disease and more so for a later survey to assess the impact of such a programme by a comparative study. For the first time it was shown that this rate is about equal in urban and rural areas. This revelation brought home the gravity of the situation, as not only 80% of the population live in the rural areas but no facilities for diagnosis and treat

ment exist there. The control programme had, therefore, to be planned in this light. Our stress on the "District Control Programme" is an outcome of this knowledge.

Prevalence rate of active and "probably active" cases as determined by careful X-ray study, varied from 13 to 25, and bacteriologically positive cases varied from 2 to 8 per 1000 population above the age of 5 years in cities, towns, and villages in different zones namely, Delhi, Calcutta, Patna, Hyderabad, Madanapalle and Trivandrum. There will be, therefore, about 7 million active pulmonary tuberculosis cases in the country, of which about one-third are highly infectious.

The rate showed continuous increase with age. This finding was against the general concept that tuberculosis is a disease of the young people. As expected, the disease proved more prevalent in poorer section of the population, and the disease at the time of diagnosis was already extensive in most cases. Females suffered less than males in older age-groups.

These findings exploded many current concepts and made us aware of our total load of tuberculosis,' its concentration in sex, society and habitations and helped greatly in more exact formulation of our "Control Programme".

To obtain proper value, this survey should be followed by another similar one. Under the rapidly changing conditions of the country and with the knowledge gained from the conduct of our control programme, the second survey may have to be remodelled without any loss of its comparative value with the first. Justification of tagging-on other studies like "prevalence of infection" and "drug-resistant infection" in the community should also be considered, as a substantial part of materials, laboratory services and organisational needs can be met through those of this survey. The study on 'infection', not included in the last survey, can provide us a good picture of the status and trend of tuberculosis. The tide of the dangerous phenomenon of drug-resistance can be determined by a comparative study with the one made by the Indian Council of Medical Research a decade ago.

Time and Tide wait for none. Wealth of knowledge and experience, gained from the past, however, do wait, but not for ever. It is high time for the second epjdemiological survey. Indian workers are second to none in the experience of field-services and surveys. They can certainly plan and execute a survey and model it within the limits of our financial capacity without undermining its comparative value. The Tuberculosis Association of India has submitted to the I.C.M.R. a detailed proposal, approved in detail by its Technical Committee, for undertaking a Second Survey. We fervently plead and wish that the Indian Council of Medical Research, supported by the Government of India, undertake this great responsibility to end blind pursuit of a programme.

ANALYSIS OF CHILD PATIENTS ADMITTED TO TB SANATORIUM, TAMBARAM, OVER A PERIOD OF 5 YEARS

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Studies on pulmonary tuberculosis in children have been conducted by various workers based on Mantoux posilive children, child contacts and recent tuberculin converters, institutionalised children with pulmonary tuberculosis and also on cases referred from various outpatient departments and paediatric clinics. It is understandable, therefore, that findings in the different studies should be at variance since the clinical material is not strictly comparable and the design, duration and intensity of the observation varies from study to study.

Two significant reviews on Tuberculosis in Children, one at Highwood (Bentley et al 1954) on tuberculous children admitted during a period of 5 years (1942 to 1946) and followed up for a further period of 5 years (1947 to 1952) and the second at Brompton (Davies 1961) from 1930 to 1952 on patients who attended the child contact clinic al the Brompton Hospital, suggested a similar study on children patients admitted in Government Tuberculosis Sanatorium, Tambaram.

Material and Methods

136 children below 12 years admitted over a period of 5 years in the 20 bedded paediatric ward at Government TB Sanatorium, Tambaram, constitute the subjects for this analysis. Admissions were mainly from the city of Madras and its neighbourhood. Only those who require institutional treatment in the opinion of the specialist were admitted. All the children showed a positive reaction of over 10mm with Mantoux lest. In this study we have excluded extrathoracic tuberculous lesions in children like meningitis, skeletal tuberculosis etc.

Classification

For analysis the Brompton hospital classification given below has been adopted.

Thoracic

(a) Primary (b)"Adult-type"
Simple
Atypical
Segmental
Pleural

A, Active Lesions

B. Inactive Lesions

The different types were distinguished by their radiographic characteristics.

Primary thoracic lesions were recognised by involvement of broncho-pulmonary lymph nodes.

Simple primary lesions were those in which only the components of a primary complex were visible.

In general the pulmonary component was an opacity in the lung parenchyma varying in size and position. In some it was quite inconspicuous. In others the opacity was obvious, varying in size upto that of a walnut. It was inorc or less rounded in shape, of a moderate and even density with an indefinite outline (Macphersou 1939). The nodal component of the primary complex also varied in its manifestations. In some, broncho-pulmonary node enlargement was obvious, in others no abnormality was detected until calcification appeared. The node abnormality was always predominantly one sided and usually appeared strictly unilateral. The paratracheal nodes were often visibly involved. Occasionally involvement of the group of nodes at the carina was detected radiographically.

Atypical primary lesions showed abnormalities of broncliopulmonary nodes and were therefore grouped as primary lesions but their components showed unusual features; for example in some the pulmomary component was larger and in some there were multiple pulmonary opacities. Larger groups of nodes were involved both unilaterally and bilaterally.

Segmental lesions showed the radiograpbic appearances either of collapse or consolidation or of obstructive emphysema involving either individual segments or lobes. The pleural lesions were all pleural effusion.

Adult-type lesions were distinguished by the absence or insignificance of broncho-pulmonary node involvement; they had the characteristics of spreading in the lung fields and of the development of cavitation.

General Analysis

Boys	Girls	Total
74(54%)	62	136

If 3-year age segments are taken from 0 to 12 years, the incidence, among those studied, is evenly distributed. As in the Brompton and Highwood studies, there is predominance of boys in the group with enlarged nodes and pleural effusions. However the segmental lesions were more in girls unlike in the other two studies,

Source of Infection

Contact history

Known		*Unknown*
Mother	34	90
Father	7	
Mother & Father	1	
Sister	1	
Grand Mother	2	
Mother & Sister	1	
	46	

Both in the Highwood and Brompton surveys it was noted that children infected by confirmed cases developed overt tuberculosis and the consequences of the infection were more serious than those with the source of their infection unproved. At Highwood it was found that the tuberculous mother was a source of tuberculosis more frequently than the tuberculous father and that the siblings were relatively uncommon as source cases, which is confirmed in our series also.

Symptomatology

	No. of cases
Fever	76
Cough	105
Dyspnoea	24
Chest pain	2
Haemoptysis	16
Hoarseness of voice	3
Diarrhoea	8

Co-Existing Condition

Eosinophilia

Diabetes

Nut. Dystrophy

The commonest symptoms were cough and fever. In the 3 children who had hoarse voice, the sputum was positive for M. tuberculosis in smear and culture. One of the children had juvenile diabetes also.

Analysis of radiological appearances

Thoracic	136	Right					left					Bilateral
		*U	M	L	2Z	3Z	U	M	L	2Z	3Z	
Primary	39-29**	14	6	9	—	—	4	3	3	—	—	—
Atypical Primary	25	1	2	1	—	—	2	1	—	2	—	16
Segmental	16	4	1	7	—	—	1	—	2	—	—	1
Pleural	3			3								
Adult type	24	2	1	1	3	1	1	1		2	4	8

* Adenopathy only

** UML refers to upper middle and lower zones and 2Z means two zones are involved.
All the 24 adult type cases were positive for M. tubercle which were sensitive to smear & culture.

***Comparison of series from Brompton** Hospital, **Highwood Hospital and Great Ormond** Street Hospital and **Government** TB Sanatorium, Tambaram*

	Brompton 1961	Highwood (Bentley and others, 1954)	Great Ormond Street (Walker 1955)	Tambaram Sanatorium 1972
Simple Primary	35%	28%	49%	50%
"Atypical" Primary	5%'	3%	2%	18%
Segmental	9%	15%	24%	12%
Pleural Effusion	3%	20%	3%	2%
"Adult-Type"	8%	11%	2%	18%

Simple Primary

Adenopathy	
Brancho Pulmonary	6
Tracheobronchial	16
Paralracheal	3
All Groups	4
Bilateral	80
Total	109

Adenopathy alone was seen in 22% of our cases as against 67% in Highwood and 34% in Brompton. The primary complex was in the right lung in 62 per cent of cases in the Highwood series and 74 per cent in our series whereas in the Brompton series when all cases were taken together right sided lesions were slightly more common than left. When only those in whom the lung component was visible are considered, the left lung was more commonly affected and the upper zone of left lung field was more frequently affected.

Atypical primary

In 25 cases unusual forms of parenchymatous and nodal lesions of primary complex were seen. Out of this 16 had bilateral distribution and of the remaining, 4 were in the right and 5 in the left lungs. Most of them showed scattered or diffuse lesions. In the Brompton series 4 per cent of cases were atypical.

Segmental

In Brompton series 9% of active thoracic lesions in primary group were segmental lesions, more common in boys than girls, more common in children infected early in life and more than twice as common in the right lung as in left. Middle lobe lesions accounted for a third of the total and were nearly 3 times as common as the two next most frequent sites which were the complete R.U.L. and anterior seament of the R.U.L. alone.

In Highwood series incidence of segmental lesions was approx. 15%. Symptomatic Bronchiectasis developed in 5-9% of cases, confined to lobar lesions and only to lower and middle lobe lesions.

In our series 12% of all cases with visible lung lesion showed segmental lesions. 6 cases showed evidence of Bronchiectasis.

Pleural effusion

In both Brompton and Highwood survey it was found to be more common in adolescents and young adults and predominantly on the right side. All our 3 cases were right sided and were above 8 years of age,

Adult type : (Chronic Pulmonary Tuberculosis of Highwood)

The Brompton survey showed the age of the children at the time of primary infection is all important for the immediate and subsequent prognosis and development of adult type of pulmonary tuberculosis. The older the child greater the chances of developing the adult type.

The Highwood survey also showed that

this type **is** seen in the older children, more oftenin girls than boys and frequently following a recent primary infection than one acquired at an earlier age.

In our series also the older children (18 of them were over 8 years) showed this type and in the majority of them the source of infection was a confirmed case.

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TUBERCULOSIS IN CHILDREN

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Childhood tuberculosis is still a big problem in our country. These children attend mainly the Paediatric Clinics and to a lesser extent out-patients' department of Tuberculosis Clinics. It is known that as tuberculosis gets under control the pattern and extent of infection and disease in childhood are affected first. Unfortunately, the diagnostic indices in childhood tuberculosis are not as sharply defined as in adult types or bronchogenic tuberculosis. It is therefore not very easy to compare the pattern at different times.

The study is an analysis of children who were diagnosed as suffering from tuberculosis in T.B. Control & Training Centre at Nagpur. The TB Centre is situated in the campus of the Medical College Hospital, Nagpur and therefore all the children who are suspected to be suffering from tuberculosis are routinely sent to the TB Centre for investigation such as 70 mm. X-ray chest and MX, Test. This is an analysis of cases for the years 1967-1969.

Methods and Material

All the children (age groups 0-14 years) are first given a tuberculin test with 1 TU of PPD. RT.23. The reactors (10mm and above) are considered as infected with mycobacterium tuberculosis and termed as positives. An X-ray film (70 mmx70 mm) is taken for all the children. The diagnosis is based on history, tuberculin status, clinical impression and radiological assessment.

Observation

Table No. 1 shows age-group wise attendance of children. It will be seen from this table that a total of 3 9,603 children attended the TB Centre. It is seen that about 60% of those who attended were from the age-group 5-14 years.

TABLE I

Total outdoor attendance-children 1967-69

Age—Groups <1	1-4	5-14	All ages
1490	6437	11676	19603

Table No. II shows the cases in different age-groups. The percentages given are of the total attendance. 5.3% children were put under treatment. In the age-groups 1-4 and 5-14 the percentage of children put under treatment is similar but of those belonging to age-group less than 1 year, only 2% were put under treatment.

TABLE II

Number of children put under treatment

<1	1-4	5-14	All ages
30 (2.0%)	347 (5-4%)	661 (5.7%)	1038 (5.3%)

Table No. Ill shows sex-wise distribution of cases put under treatment. 54.5% were males whereas 45.5% were females.

TABLE III

Sexwise distribution of cases

Male children	Female children	Both sexes
566 (54.5%)	472 (45.5%)	1038 (100.0%)

Table No. IV shows the percentage of cases in different age groups to the total children put under treatment. In the age group below I year there were only 2.2% cases whereas in age-groups 1-4, 33.4% in 5-9, 37.2% and in 10-14 years 26.5% cases. It is thus seen that there is very small number of cases in age-group 0-1 year and bulk of the cases were in 1-9 years.

TABLE IV

Age-distribution of cases

<1	1-4	Age group 5-9	10-14	All ages
30 (2.9%)	317 (33.4%)	386 (37.2%)	275 (26.5%)	1038 (100.0%)

Table No. V shows source of cases. Of the 771 cases whose source could be ascertained, 376 or nearly 50% cases came of their own, whereas 42% were referred by other institutions. 267 cases did not bring a referral slip with them. However it is felt that a large majority of them are actually referred.

TABLE V

Sources of cases

Own initiative	376(49%)
Referred from other institutions	323(42%)
Private Practitioners	72 (9%)
Not known	267
Total	1038

Table No. VI gives information about history of contact. 37% of the cases gave a definite history of contact. In about 51% of cases no contact history was present. In about 12% cases no definite history was available.

TABLE VI

***History of** contacts*

Contact history present	**379(37%)**
Contact history absent	**545**
Not known	**114**
Total	**1038**

Table No. VII shows source of contact. In 59.4% of cases parents were suffering from tuberculosis, whereas in 10%, it was siblings. Other relations infected 29% of the children and neighbours 1.6%.

TABLE VII

Sources of contact

Parents	**225(59.4%)**
Siblings	**38(10.0%)**
Other relatives	100(29.0%)

Table No. VIII shows tuberculin status of the children put under treatment. It will be seen from this table that 82.7% cases were tuberculin positive. But still there was a group of 17.3% in whom the tuberculin status was negative but because of the other evidence they had to be put under treatment.

TABLE VIII

Tuberculin reaction

<10mm.	163(82.7%)
>10 mm.	805(17.3%)
No report	65
Total	1038

Table No. IX shows radiological classification of cases according to status. The group 'primary or post-primary' includes simple primary complex, hilar adenitis, miliary, segmental lesion, plural effusion. 110 or 10.6% of cases had adult type of tuberculosis. Of these 20 cases were found to be tuberculin negative. There were 20 sputum positive in the adult type and 7 sputum positive in the other.

Table No. X shows agewise distribution of cases with the type of tuberculosis. The group 'others' includes all cases of extra-pulmonary tuberculosis i.e. lymphadenitis, TB bones and joints, TB meningitis etc. It is seen from this table that adult type of cases show an increasing trend with the increase in age. Similar trend is also seen in the cases of plural effusion but the number of cases is small.

Progressive primary cases were maximum in age-group 1-4 years, whereas simple primary cases were maximum in the age-group 1-9 years. Other type of cases appear to be evenly distributed.

Discussion

Presented in the study is an analysis of cases that were diagnosed to be suffering from Tuberculosis in the years 1967-69. Of the total attendance of children 5.3% were put under treatment but in the age group less than 1 year only 2% were put under treatment. In the sexwise distribution of the cases though males showed a higher percentage, if the total attendance of male children is taken into consideration the higher prevalatjce in males can be explained.

TABLE IX

*Radiological classification of cases **according to t**heir tuberculin status*

Type	Neg.	Pos.	Not available	Total
Adult Type	20 (2Sp.+)	65 (9sp.+)	25 (9sp.+)	110(10.6%) (20sp.+)
Primary or post primary	148 (3sp.+)	740 (3sp.+)	40 (lsp.+)	928(89.4%) (7sp.+)
Total	168 (17%)	805 (83%)	65	1038

TABLE X

Radiological classification in different age-groups

	> 1 Yr.	l-4Yrs.	5-9 Yrs.	10-14 Yrs.	All ages
Adult Type	—	*25*	*33*	*52*	*110*
Primary or post-primary	*30*	*322*	*353*	*223*	*928*
Miliary	—	3	2	1	6
Pleural Effusion	—	6	12	19	37
Progressive Primary	14	65	17	9	105
Simple Primary	6	111	170	84	371
Others	10	137	152	110	409
	30	347	386	275	1038

A large number, about 50% of children attend on their own. It is felt that the rest are all referred though they may not exactly have a referral note with them. In the table on contact history, apart from parents even other relatives also contributed as source of contact significantly.

The tuberculin status shows that we had to put about 17,3% of cases under anti-TB treatment even though their tuberculin test results were negative. The batches of tuberculin did differ as the study is spread over a length of time. It has also been observed that the number of cases who are tuberculous and yet tuberculin negative is too large to be explained away as exceptional cases. It is felt that there should be a provision for stronger tests than I TU for such cases.

In the 21st All India Conference of Tuberculosis and Chest Diseases workers held at Calcutta we had presented analysis of childhood tuberculosis for the years *1962-64.* There is a difference of 5 years between the two studies. In these 5 years the overall prevalence in those attending hospitals remained the same. 5.9% of the cases were found to be tuberculous then and 5.3% suffering from tuberculosis now.

About 10% of cases who were put on treatment in 1962-64 were tuberculin negative. In this study 17.3% were tuberculin negative. The definition in the earlier study of tuberculin positive was 8 mm or more whereas in the present paper it is 10 mm or more. Therefore it is reasonable to say that about 12% to 15% cases who are negative to 1 TU tuberculin are put on anti-TB treatment.

As regards type of disease it has already been mentioned that adult type of tuberculosis

showed an increase with the increase in age. No valid conclusion can be drawn regarding type of disease now arid in the earlier study.

As regards reponse to treatment the present series showed an overall better response (Table not presented). In the earlier study the cases which did not show improvement or actually deteriorated were 13.2% whereas in the present study no cases deteriorated and only 2% of cases did not respond to treatment. This is probably due to the change in the durg regimens. Earlier in majority of cases INH alone was given whereas m the present study a minimum double drug was given.

INTEGRATION OF BCG VACCINATION IN THE GENERAL HEALTH SERVICES IN RURAL AREAS

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I. Introduction

BCG vaccination is being conducted in India as a mass campaign, aiming to achieve a high initial vaccination coverage of the population at risk. The initial coverage thus achieved could be maintained through vaccination of the newborns—as a service—at an epidemiologically appropriate age. It is extremely difficult to gear the mass campaign for such maintenance vaccination. This can best be done by integrating the BCG vaccination service with the general health services.

In rural areas, smallpox vaccinations are done mainly by the field staff of Primary Health Centres (PHC). BCG vaccinations could also be done by the same personnel as part of their routine duties. However, in designing a methodology of integration of BCG vaccination with other functions of PHCs, the following operational aspects have to be carefully defined in addition to defining the age at which BCG vaccination will be offered: (i) categories of PHC personnel that will do BCG vaccination: their training and supervision, (ii) whether their other responsibilities will permit them to undertake this work also, (iii) the method of contacting the eligibles—maintenance and use of records for this purpose, (iv) the suitability of equipment to be used for such vaccination, (v) suitability of the vaccination technique for this purpose and, (vi) the logistics of supply of vaccine and other requirements. The operational aspects achieve considerable importance when it is realised that several kinds of personnel from the 5,000 or more PHCs in India would be undertaking BCG vaccination when BCG service is integrated in the functions of PHCs.

The present investigation was planned to study the feasibility of routine BCG vaccination of the newborns by the PHC personnel, using the normal records maintained by them for identifying the eligibles for BCG vaccination.

2. Objectives

Feasibility of integration of BCG vaccination with routine PHC activities was studied in terms of;

(i) completeness of records maintained by field workers i.e. what proportion of the actual newborns were registered in those records and to what extent could the entries be updated at the time of visit of the field worker to the village for BCG vaccination,

(ii) the ability of the field worker in contacting all the eligibles and their vaccination i.e., the proportion of eligibles contacted by the field worker and the proportion vaccinated,

(iii) the reliability of vaccination report i.e., the proportion of those reported vaccinated in whom vaccination lesions could be confirmed by the field investigators of the National Tuberculosis Institute (NTI), Bangalore and,

(iv) the opinion of field workers regarding feasibility of integration of BCG vaccination in the general health services.

3. Operational design of integration

The operational aspects mentioned above were considered in the proposed design of integration as follows: (i) BCG vaccinations would be administered by Auxiliary Nurse Midwives (ANM) and Basic Health Workers (BHW)—who also do primary smallpox vaccinations—in their own areas of operation, (ii) training to these field personnel for BCG vaccination would be given by the BCG team leader of District Tuberculosis Centre (DTC), (iii) BCG vaccinations would be done only for one month in the year (and same month each succeeding year) to facilitate production and distribution of vaccine as only a limited number of PHCs will be supplied with BCG vaccine each month and adequate accumulation of eligibles in each village will ensure that vaccine wastage is minimal, (iv) all children born 15 months prior to the month fixed for BCG vaccination would be eligible* for direct BCG vaccination, (v) the eligibles for BCG vaccination would be identified from the routine records maintained by BHWs and ANMs viz., register of unprotected children maintained for the purpose of primary smallpox vaccination

*Children 0-15 months old were considered eligible because primary smallpox vaccination is generally offered at the age of 3 months and there are some refusals for any vaccination, including BCG vaccination, of children aged below 3 months. Thus, children aged below 3 months not vaccinated because of high refusal rate will be eligible for vaccination in ihe next year.

or, the family registers, (vi) a compact BCG kit would be designed, eliminating the insulated jug since only freeze-dried BCG vaccine would be used and (vii) BCG vaccination would be given, with syringe and needle, intradermally.

The operational problems of supplies, supervision and assessment (post vaccination allergy) were kept outside the purview of the study.

4. Methods

One PHC (Bettahalsur) in Bangalore district, Mysore State, was selected for the study. The PHC caters to a population of about 100,000 persons distributed in about 150 villages. The entire area served by the PHC is divided into I'D smaller areas, each with a population of about 10,000 under the care of a BHW. The BHW visits every household in his area once a month for active surveillance for malaria eradication, collection of vital statistics, etc. Within the area of a BH,W, a smaller area with a population of 4,000—5000 is allotted to an ANM who visits each village once a month mainly for maternity and child welfare work. She also maintains a register for unprotected children wherein she enters particulars of newborn children, giving smallpox vaccination when they are about 4 months old. For population not covered by the ANM, the BHW himself maintains the register for unprotected children and carries out the primary smallpox vaccinations. In the study area with 10 BHWs and 10 ANMs, 2 BHWs and 5 ANMs were selected for the study.

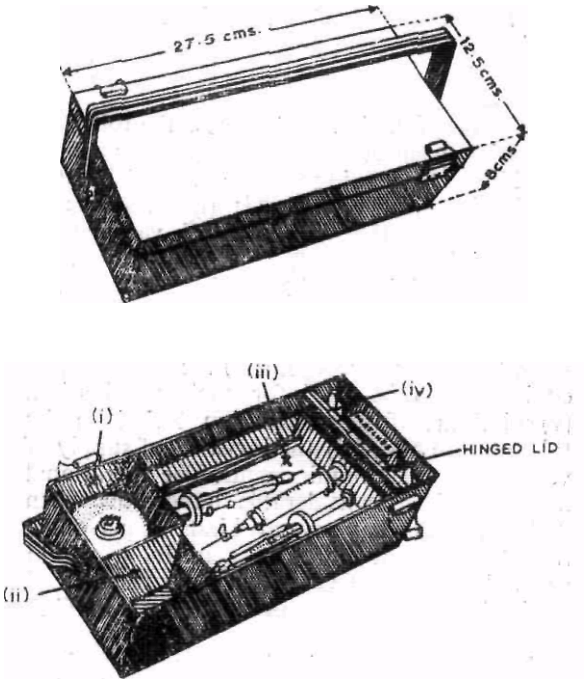
The selected field workers were trained for BCG vaccination by an NTI field investigator of similar calibre as the BCG team leader in the District Tuberculosis Programme (DTP). The training given at the PHC and in some surrounding villages was interspersed in their routine working and lasted for about 3 weeks.

After the training, each field worker prepared a list of children eligible for BCG vaccination from the register of unprotected children or for the family records. On an appointed day in each village, BCG vaccination of children was included with other routine duties but at the time of visit, the field worker updated the list when he/she found newborns not registered previously. The first 10 vaccinations of each field worker were carefully supervised by the NTI field investigator but the rest of the vaccinations were conducted independently. The field workers were given one month to complete the work in their respective areas. After completion, they were interviewed by a medical officer from the NTI regarding their opinion on integration of BCG vaccination in the general health services.

In order to estimate the correct number of eligibles in the population, an NTI field investigator carried out a complete registration in 16 villages i.e., for a population of about 1,000 in each of the field worker's area, just prior to starting the study. Again 3 months after vaccination, in a sample of villages the NTI field investigator visited each household where a child was reported vaccinated in order to read vaccination lesions to test correctness of reporting.

Fig. 1 shows the BCG vaccination kit* that was used in the study. The kit consists of a rectangular aluminium box closed by a removable lid, held together by clips. The rectangular box measures 27,5 cm x 12.5 cm x 8.0 cm. In the box a removable partition is placed which divides the box into 5 separate compartments, 4 of which are easily seen. These are (i) .a compartment for spirit lamp, (iij a compartment for keeping ampoule files, some cotton etc., (iii) a central compartment for keeping the syringe box (the standard

FIG. I
THE MODIFIED BCG KIT



*BCG kit designed by the BCG Assessment Team, NTI, Bangalore.

syringe box at present used in the mass campaign) and (iv) a compartment for keeping the ampoule of reconstituted BCG vaccine in an upright position. Underneath the syringe box compartment is the fifth compartment where freeze-dried vaccine and normal saline ampoules can be kept. The compartment containing the reconstituted BCG vaccine ampoules can be closed by a hinged lid. The kit is made of aluminium of 0.1 cm gauge and without the syringe box land other contents weighs about 780 gins. Each kit, without the syringe box, syringes and the spirit lamp, costs Rs. 35.

5. Material

The 2 BHWs and 3 ANMs had between them a population of 33,128 persons (1971 census), as shown in Table 1. That BHW1 had a larger population than others can be explained by the fact that an ANMS was not posted in his area and the BMW himself was conducting the smallpox vaccinations in the entire area.

The NTI field investigator found that 4.5% of the total population was in the age group 0-15 months. 1,342 children were estimated to be in the age group of 0-15 months and, therefore, eligible for BCG vaccination.

The completeness of records and the reliability of reporting objectives (i) and (iii) were examined in relation to the total eligible for BCG vaccination. The efficiency of contacting of the eligibies and their vaccination objective (ii) was examined separately for children aged below 3 months and those 3 to 15 months old to see if there was a higher refusal rate for vaccination of the children aged below 3 months since smallpox vaccinations were being offered only after that age.

6. Findings

6.1 Completeness oft online records and possibility of their updating

Table 1 presents completeness of records as maintained by the field workers and the extent to which they themselves could update those records for BCG vaccination at the time of visit to the villages. Of the estimated 1,342 eligible children, the field workers had already registered 678 children (50.5%) in their routine records. The percentage of the registered varied from 21% to 80% amongst the field workers; the ANMs had registered on the low side. However, at the time of visit to each village in their respective area, the field workers were able to update the registration by "on the spot" enquiries and bring up the percentage of children registered to 82% of the estimated eligibies. Thus though the registration in the routine records was initially not quite satisfactory, the field workers themselves could bring it up easily to a fairly satisfactory level.

TABLE 1

Completeness of Records—Possibility of Updating

Area	Population	Estimated no. of eligibies*	Registered from records		Total registered	
			No.	% of col. 3	No.	% of col. 3
1	2	3	4	5	6	7
BHW I	13,198	535	328	61.3	390	72.9
BHW II	5,179	210	168	80.0	199	94,8
ANM I	4,994	202	42	20.8	193	95.5
ANM 11	4,591 '	186	82	44.1	149	80.1
ANM III	5,166	209	58	27.8	164	78.5
Total	33, 1 28	1,342	678	50.5	1,095	81.6

*4.05% of the total population; children 0-15 months old.

TABLE *2*

Efficiency of contacting the eligibles and their vaccination

Area	Total registered			No. contacted			Refused vaccination			Excluded			No. vaccinated			Percent vaccinated out of contacted		
	<3 m	3-15 m	Total	<3 m	3-15 m	Total	<3 m	3-15 m	Total	<3 m	3-15 m	Total	<3 m	3-15 m	Total	<3 m	3-15 m	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
BHW I	81	309	390	76	271	347	13	7	20	4	28	32	59	236	295	77.6	87.1	8 5.0
BHW II	57	142	199	50	111	161	18	7	25	6	12	18	26	92	118	52.0	82.9	73.3
ANM I	35	158	193	33	147	180	12	8	20	3	21	24	18	118	136	54.5	80.3	75.6
ANM II	35	114	149	33	93	126	12	15	27	2	6	8	19	72	91	57.6	77.4	72.2
ANM III	23	141	164	21	111	132	9	16	25	2	16	18	10	79	89	47.6	71.2	67.4
Total	231	864	1095	213	733	946	64	53	117	17	83	100	132	597	729	62.0	81.4	77.1
				92.2©	84.8©	86.4©	30.0*	7.2*	12.4"	8.0*	11.3*	10.6*						

Note : ©Percentage based on total registered

* Percentage based on number contacted

6,2 Ability of contact with eligibles and their vaccination

Table 2 shows the ability of the field workers in contacting and vaccinating the eligible children in their area. Of the 1,095 children actually registered by them, 946 (86.4%) could be contacted by the field workers at the time of visit to the villages. Of these 946 children, among 117(12.4%) the parents or guardians refused vaccination, the refusals being more among children aged below 3 months. Another 100 children in whom some illness was either seen or reported, were excluded from vaccination. The remaining 729 children, i.e. 77.1% of the children contacted by the field workers, were vaccinated. If the total registered population is considered, then out of the total 1,095 children registered, 66.6%(729) were vaccinated. It will be observed that vaccination coverage was lower among children aged below 3 months mainly because refusal rates were higher among them.

6.3 Reliability of vaccination reports

Table 3 presents the reliability of vaccination reports. Of the 729 children vaccinated in 57 villages, 491 children in 47 villages were selected for verifying the vaccination reports by observing vaccination lesions. Vaccination lesions were read among 442(90%) children (49 children could not be contacted) and in 425(96.2%) a scar or an ulcer was present at the site of vaccination. No evidence of vaccination was found among the remaining 17 children. Thus vaccination reports were confirmed as correct in a very large proportion of those reported as vaccinated.

6.4 Opinion of field personnel

The opinion of the 5 field workers on integration of BCG vaccination in PHCs functions was favourable. BCG vaccination, as envisaged, could be done by them in their area of operation without any detriment to their other duties. However, they held that the function would be very much facilitated if the following conditions were fulfilled:

(i) The population allotted to a BHW, for activities, could be reduced to 5,000 from the present 10,000.

(ii) The BCG kit, though convenient, could not easily be carried on a bicycle; a kit of the shape of a book (say 9" x 5" x 1.5") made of leather which can be kept in a bag while travelling on a bicycle was suggested.

(iii) The syringe and needle technique itself could be adopted without difficulty.

TABLE 3

*Coverage for **vaccination lesion** reading **ami the** evidence **of vaccination in each area***

Area	No. vaccinated	No. vaccinated in the villages selected for follow-up	Lesion read	Vaccination lesion present	
				No.	%
BHW I	295	99	92 (92.9)	84	91.3
BHW II	118	118	111 (94.1)	109	98,2
ANM I	136	94	84 (89.4)	84	1 00.0
ANM 11	91	91	84 (92.3)	84	100.0
ANM III	89	89	71 (79.8)	64	90.1
Total	729	491	442 (90.0)	425	96.2

Figures in **brackets** give the coverage **for** vaccination lesion reading.

7- Discussion

The investigation was conducted mainly to get first hand information about the feasibility of field personnel of PHCs conducting BCG vaccination as a part of their routine duties. The study sample was small and considerable variations may exist in staffing patterns and working methods in different parts of the country. It would be desirable to conduct similar studies elsewhere prior to considering integration of BCG vaccination in the general health services.

It was found that the PHC field personnel can .also conduct BCG vaccination in their respective areas of operation without detriment to their other duties. A satisfactory vaccination coverage of the newborns was achieved.

Tt will be obvious that those who could not be vaccinated during a particular year can be vaccinated during the next year and so on. Accumulating the newborns for a year and vaccinating them during a month has many operational advantages including less vaccine wastage. An ANM or a BHW, for a population of about 5,000 will, during the month when BCG vaccinations are to be done, do 8 to 10 vaccinations per day. Supply of 20 dose BCG vaccine ampoules will further reduce the vaccine wastage. Since a lower proportion of the children below the age of 3 months could be vaccinated (either the parents refused or because they had to be excluded due to some reason) the eligibility for BCG vaccination can be fixed as those aged 3 to 15 months.

It would be desirable to develop a simpler vaccination technique (e.g. vaccination with the bifurcated needle) that is equally effective but requires less supervision. The logistics of supply of vaccine, vaccination equipment, etc. should be carefully studied as well.

For urban areas a different operational design may become necessary before integration of BCG vaccination with general health services could be considered. Some of the principles, however, would have to be the same,

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THE VALUE OF DIRECT SMEAR MICROSCOPY IN THE DIAGNOSIS OF PULMONARY TUBERCULOSIS

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The use of direct smear microscopy in case-finding activities especially in under-developed countries is gaining more importance. Various studies have been made mainly in India to evaluate the efficiency and applicability of this method in varying conditions. The proportion of positives by direct smear microscopy among all cases of adult pulmonary tuberculosis would vary according to the diagnostic situation in which it is applied. It would also vary according to the epidemiological situation prevailing in the country

Objectives

To find the prevalence of direct smear positives among the symptomatics who reported at a chest clinic in Ceylon.

The proportion of cases who could be diagnosed by a single routine direct smear examination of all symplomatics.

Whether preliminary screening of symptomatics by 70 mm X-ray and repeated examination of the sputum of those with relevant shadows would reduce the proportion of unconfirmed cases.

The aim was not to compare the value of sputum versus the X-ray in different situations but to evolve a precedure that could reduce the proportion of unconfirmed cases.

Methods and Material

The Jaffna Chest Clinic is situated in the northern part of Sri Lanka serving a population of about 65,000. The following procedure was adopted at the chest clinic during the period of study, January—April 1971. After a test study it was assumed that all those who reported at the chest clinic other than those who came for mandatory examinations (routine X-ray of entrants to Government, Semi-Government, private institutions etc.) would come under the category of 'Symptomatics' i e. those with cough with 2 weeks" duration, pain in the chest, continuous fever, haemoptysis or other symptoms suggestive of pulmonary tuberculosis.

After registration, all symptomatics over the age of 12 were asked to go to the laboratory where a spot specimen was collected under the supervision of an unskilled employee who had enough knowledge and experience as to what type of specimen was most useful. Every effort was made to collect a satisfactory sample even if it meant spending several minutes with the patient. The patient then reported at the X-ray department where a 70 mm X-ray was taken and was requested to wait until the results were available. Those who reported after 10.30 a.m. were requested to come on the following day. Between 10.30—11 a.m. the exposed section of the film was cut off from the roll developed and read as a wet film. All those who showed a relevant abnormality were X-rayed on a large standard film. There was a deliberate over-reading of the 70 ram films so as not to miss even the very doubtful cases. By the time this was done the sputum results were already available and all those with a negative X-ray and negative sputum were seen and disposed of. The rest were seen along with the large film and all those who were confirmed with a positive smear were put on treatment. Those with relevant shadows but with a negative sputum were given a sputum container and requested to report at the clinic on the following day with an early morning specimen. This was repeated on 2—4 occasions unless a positive was obtained in the meantime. All positives, those til enough to need admission and those not likely to come for repeat examinations were actively encouraged to get admitted to a chest hospital for investigation and treatment. Whenever necessary a second spot specimen was collected from those who were likely to default. If, even after repeated negative reports, a patient was considered on clinical grounds to be having active pulmonary tuberculosis he was put on treatment. The records of those with shadows even remotely suggestive of active pulmonary tuberculosis were filed separately so that they could be followed up. They were requested to report for review after 2—3 months. Those who failed to turn up were requested by letter to report at the clinic. All patients who were admitted to other institutions were followed up in respect of their diagnosis and sputum. All specimens of sputum collected on the first day of the visit were cultured. The contamination rate at the time of study was so high that this had to be given up.

TABLE 1

	First Day	First Repeat	Second Repeat	Third Repeat	Total	Total Repeats
No. Examined	1765	132	67	38	2002	237
No. Positive	43	12	7	5	67	24
% Positive	2.4	9.1	10.4	13.1	3,3	10

Results

During the period of study January—April 1971 there were 90 working days.

The total number of first visits was 2623 with a daily average of 29. The number of symptomatics over 12 years was 1765 with a daily average of 20.

The results of the sputum examination are shown in Table I. In addition to these 67 patients 8 others were found positive on direct smear at admission to hospital.

One patient was sent from a hospital with a direct smear positive report but was negative both on X-ray and repeat microscopy. Review after 3 months showed no pathology. Thus there were 75 D.S. positive cases (4.2%) out of the 1765 symptomatics. Among these 43(2.4%) were found on the first spot, 55(3.1%) by one spot and one collected specimen and a further 20 by repeat examinations. With 75 as the denominator representing the total direct smear positives 43(57%) were caught on the first examination, 12(16%) on the second examination, 7(9%) on the third examination, 5(7%) on subsequent examinations, and 8(11%) on examinations outside the clinic. The total number of patients with relevant X-ray shadows i.e. those on whom at least one sputum examination is indicated was 238(14%) of the symptomatics. Among these, 84 patients including 9 unconfirmed cases were put on treatment. Among those who failed to come for a second examination there were two who would have been put on treatment on clinical grounds even without sputum confirmation (lost cases).

Thus there were 86 patients with pulmonary tuberculosis requiring treatment (TBP of the NTP of India.) There were 61 patients who were not considered to need treatment but were requested to come for a follow up. (Ob cases of the NTP of India). Of these 9 might have been put on treatment with less stringent criteria. Only 35 of the 61 reported for follow-up 3-6 months later. None showed any bacteriological or radiological deterioration.

The final position would be :

The total no. of symptomatics;	1765
No. with relevant pulmonary shadows:	238
Confirmed cases (By D.S.):	75
Definitely active cases (Clinically):	86
Probably active:	9
Observation only:	52

Discussions

The first priority in a tuberculosis control programme is the detection and treatment of those who are positive by direct smear microscopy. The prevalence of this group among all bacteriological!y confirmed cases would vary according to thi clinical situation and the epidemiological situation in each country. This study was mainly to evaluate the efficacy of direct smear examination in ideal conditions in a chest clinic i.e. its maximum potential.

Among 1765 symptomatics 43 cases could be diagnosed by direct smear microscopy of a single spot specimen without any previous screening procedure with a case yield of 2.4%. These represent 57% of the 75 cases confirmed by direct smear at some time or other, or 50% of the 86 clinically active cases.

If an initial screening is done with a 70 mm X-ray and repeated direct smear microscopy done on those with relevant shadows it was possible to obtain confirmation in 75(87%) of

the 86 definitely active cases or 78% of the 95 probably active cases or 51% of all the possible cases (i.e. the active, the probably active, and the observation cases).

This would show that sputum direct smear microscopy, if done properly has a very high potential and that the vast majority of true cases could be confirmed by this single and inexpensive tool.

As the study proceeded it was becoming quite apparent that the most important single step in the entire procedure of direct smear microscopy was the collecting of proper specimen of sputum from the patient and the selection of a suitable portion for the smear itself. The rest of the procedure, the staining and examination under microscope is generally done well, especially where there are qualified technicians available. An error made in the reading could be evaluated by cross-checking by another reader. But errors during the earlier part of the procedure cannot be corrected. The technician and other staff were aware of the dictum that a report could only be as good as the specimen provided. It would appear that the efficacy of direct smear microscopy if properly done could almost reach that of culture examination.

False positives

It had been shown that repeated examination of sputum though increasing the sensitivity reduces specificity by producing more false positives. But in the situation of a chest clinic where the diagnosis is based on clinical, radiological, and bacteriological findings this is not likely to be a serious drawback as false positives could easily be identified and kept under observation.

In our experience the practice of completing the examination of symptomatics with a 70 mm X-ray and microscopy on the first day itself did not present any serious difficulties. This is easier in a clinic where the attendance is high and crowded in the earlier part of the morning (as is usual in most of the bigger chest clinics) as the roll could then be cut and developed on more than one occasion in the morning. The facility has been greatly appreciated by the public and has also greatly increased the morale and efficiency of the workers.

Conclusions

1. It is possible by direct smear microscopy to obtain a very high confirmation rate of suspected cases of adult pulmonary tuberculosis.

2. X-ray is best used as a screening tool and bacteriology as the main diagnostic tool.

3. As a rough guide, chest clinics and chest hospitals should aim a confirmation rate of over 60% of all adult pulmonary tuberculosis.

PLACE OF CONTACT EXAMINATION IN A TUBERCULOSIS PROGRAMME

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1. Introduction

Examination of contacts of tuberculosis cases* has been in vogue for a long time. This concept and practice arose from the concern of family physicians for the well being of all members of the family and the presumption that tuberculosis is a familial disease. The major concern was to find unknown incipient cases of tuberculosis in contact with the index case and treat them. It was thought that in this manner cases could be found in the early stages of the disease, though detection of an older case from whom the index case itself got infection was not ruled out. With the advent of BCG vaccination, the idea of protecting the uninfected contacts became an additional advantage of contact examinations. Later on, chemoprophylaxis of infected contacts was also added.

Some of these advantages may not be real, being based on impressions or hypotheses which have not been put to test. It is also possible that some of the advantages may no longer hold good. Because of the availability of powerful anti-tuberculosis drugs, the importance of very early detection of cases is considerably reduced. All cases (detected early or late) are being treated for at least one year. With the advent of community medicine, there was a widening of the sphere of activities and the idea of considering all close contacts instead of only family contacts was mooted (Blomquist, 1961). At present the need for well planned programmes is being increasingly realised and ideas of health planning and budgetting and cost-benefit analysis of health programmes are assuming more and more importance. The place of contact examination has to be carefully reviewed in view of these changing trends.

*WHO Expert Committee on Tuberculosis (1964) defined a *case* of tuberculosis as a person suffering from bacteriplogically confirmed disease. Persons with radiological evidence of disease but not bacteriological confirmation are called *suspects*. Raj Narain et al (1968) have shown that most (about 90%) of the suspects (diagnosed by two readers on single 70 mm X-ray pictures in a survey) are not likely to be cases of tuberculosis. Thus, a proper study of case finding should consider cases and suspects separately. This has not always been possible in this paper which uses information from a number of old studies and the data which are readily available from some Tuberculosis Centres.

2- Method of presentation

The main theme of the paper requires interpretation of the available data from the point of view of a planner. This is mainly brought out from Tables 1 and 2. It may be emphasized that the interpretations made from these two tables would be quite different from that which an epidemiologist would make. The latter would be interested in establishing comparable groups and even in small differences which are statistically significant. But for the planner, large differences obtained from broad comparisons of net results of following different methods (or strategies) are more important for arriving at priorities for the utilisation of resources.

In addition to this, some results of research studies are also presented and discussed for a more thorough review of the subject, including epidemiological considerations. For a proper understanding of this paper, this difference in approach between interpretations of data presented in sections 3 and 4 (Tables 1 and 2) and the research data presented in sections 5, 6 and 7 has to be borne in mind.

3. Comparative case yield from some population groups

Based on material from some research studies (for references, see Table 1) and data from some tuberculosis centres, the expected case yield for some population groups (viz., general population, cluster contacts, family contacts and symptomatic out-patients) have been studied (Table 1). Two conclusions are most striking :

(ij Symptomatics attending general health institutions and TB clinics have afar higher (12 to 60 times) case yield than the other 3 groups. That the former group had higher case yield is already known but the large differences observed here have not so far received much attention, probably because such attempts at quantification have not been made earlier.

(ii) For a programme planner, there is no appreciable difference in case yield between the contacts in households or clusters (4 to 9 per 1000) and the

TABLE 1

Yield of sputum positive cases from different types of population

Type of population	Case yield (sp +ves)* per 1000 examined	Age group	Source
1. General population			
(3) Rural and urban	2 to 8	5+	ICMR(1959)
(b) Rural	4	10+	Raj Narain et al (1963;
2. Cluster contacts	7	10+	Nair et al (1971)
3. Family contacts			
(a) Rural survey	6	10+	- d o -
(b) Urban TB Clinic (Delhi)*		all	Singh (1950)
Initial examination	43		
Subsequent examinations	6		
Both			
(c) New Delhi TB Centre*		all	Pamraet al (1970)
Initial examination	5 3		
Subsequent examinations	4		
Both			
(d) TDTC, Agra*	4	all	Personal communication
(e) TDTC, Nagpur*	3(4)**	all	- d o -
4. Symptomatic outpatients			
(a) Rural health institutions	62(73)**	10+	Bailyet al (1967)
(b) TDTC, Agra	187	all (mainly adults)	Personnal commtinicacion
(c) TDTC, Nagpur	75(88)*'	- d o -	- d o -
(d) Rural health institutions (All India average)	85(100)**	- do -	Quarterly reports from DGHS. New Delhi- April 1968 to March 1970
(e) District TB Centres (All India average)	91(107}**	- d o -	

* Includes contacts of suspects also.

** Results of direct microscopy only are available. Rao et al (1971) found that among the culture positives found by examination of symptomatic outpatients, 85% were positive by microscopy. The figures within brackets were obtained by applying this correction to get comparative figures for culture positives.

Note 1 : Figures given in this table arc not based on the same number of sputum specimens collected from each person. This could introduce some margin of error in comparisons (Chandrasekhar et al, 1970). However these errors do not affect the broad conclusions drawn from this table.

Note 2 : The variations in case yield under item 4 may be due to differences in the composition of outpatients attending different centres and in practices followed by various centres for offering different examinations to the outpatients. These comparisons should not be considered to reflect the case rinding efficiency of these centres.

TABLE 2

Case yield among symptomatics and contacts and the contribution of contact examination to case-finding in three TB Centres

	Centre I	Centre II	Centre III
1 Period	1964-68	1965-69	1961-65
2. Symptomatic*			
(a) Examined	32,126	66,417	94,148
(b) Cases and suspects found :			
Number	13,772	35,816	18,994
Per 1000 examined	429	541	206
3. Contacts			
(a) Examined	32,390	46,388	13,352
(b) Cases and suspecls found :			
Number Per 1000 examined	610 19	3,102 67	634 47
4. Cases and suspects from contacts as percentage of total cases and suspects	4.2	8.0	3.2
5. Contacts examined as percentage of total examined	50.2	41.1	12,4

Source : Personal communication and Annual Reports.

Centre I: New Delhi Tuberculosis Centre.

Centre II: TB Demonstration and Training Centre, Agra.

Centre III: Tuberculosis Demonstration and Training Centre, Nagpur.

Note: Any direct *comparison between centres,* from this table, *is not valid* because the situations in these centres differ.

general population (2 to 8 per 1000, ICMR, 1959).

Yield of cases and suspects (sputum negatives) together among contacts of cases was 4% and among contacts of both cases and suspects was 1.8% (Raj Narain et al 1966), as against a prevalence of 1.3% to 2.5% (ICMR, 1959) and 1.9% (Raj Narain et al., 1963) in the general population. The yield is no doubt higher among contacts of cases as compared to general population but is quite insignificant when compared to yield of cases and suspects among symptomatics attending tuberculosis centres (20.6% to 54.1% in Table 2, row 4).

The situation is similar even if only children below 15 years are considered (Majumdar and Menon, 1960). They found that the yield of cases among the "voluntary group" of 1354 children (mainly symptomatic outpatients) was 31.8 per 1000 as compared to only 2.6 per 1000 among family contacts comprising of 1132 children, i. e., more than 12 times.

From the above comparisons and figures in Table 1, it is evident that case yield among contacts is so low that contact examination can have only a very low priority under a planned tuberculosis programme, at least until the potentialities of examining symptomatic out-patients are fully utilised and additional resources become available to include groups of secondary importance.

4. Data from some tuberculosis centres

For three Tuberculosis Demonstration and Training Centres, the comparative case yield among symptomatics and contacts examined is shown in Table 2. This table shows in addition the cases and suspects (sputum negatives) diagnosed among contacts as a proportion of the total cases and suspects diagnosed i.e., the contribution of contact

examinations to the total case finding activity of the centre. The last row of the table indicates roughly what proportion of resources for diagnostic examination is spent on contact examination.

The most striking finding from Table 2 is that out of the total resources spent on diagnostic examinations, 50.2% is devoted by Centre I for contact examination which fetches only 4.2% of its total cases and suspects, and 41.1% by Centre II to get only 8% of its total cases and suspects. Further, the case yield among symptomatics is 23 times that among contacts at Centre I and 8 times at Centre II. It is also relevant that the symptomatic out-patients are a readily available group but on the other hand, considerable efforts are necessary to examine contacts.

Comparison of this situation with the performance of District Tuberculosis Programmes (DTP) throughout the country, which are mostly in their early stages of development, is interesting. In an average DTP, the peripheral health institutions carry out about 20% of the diagnostic examinations and find about 28% of the total cases diagnosed, as compared to the District Tuberculosis Centres carrying out 80% of the examinations and diagnosing 72%, of the total cases (Nair, 1971 a). Similarly about 23% of the total cases and suspects in an average DTP are diagnosed by peripheral health institutions, suspect cases diagnosed at DTC on referral being credited to the referring institutions.

In Tuberculosis Demonstration and Training Centre, Bangalore, patients are motivated to send their contacts for examination but no further efforts are made to get the contacts or to keep separate records for them. However, for patients diagnosed during a short period, separate records were kept. It was found that out of 1344contacts of 277 cases, only 169 (i. e., 12.6%) attended for examination. It is clear that considerable efforts will be necessary to get a good coverage for contact examinations and to keep seperate records for them. Thus, cost of one contact examination is likely to be considerably higher than the cost of examining one symptomatic patient coming to the clinic or health institution. On the other hand, where preliminary screening of contacts by tuberculin test is practised, the cost per contact examination may be reduced. Only a systematic study on cost per examination of symptomatics and contacts and cost per case diagnosed from these two groups can throw full light on the effective utilisation of resources, However, it is known that some specialised TB institutions have set apart special staff or staff time for contact, canvassing and examination. It appears from Table 2 also that sizeable proportions of the resources for diagnostic examinations (and not marginal only) are being spent on contact examination which yields only a very small fraction of the total cases and suspects (sputum negatives) diagnosed. If the amounts spent by these centres on contact examination can be utilised to perform managerial and or supervisory functions to lone up the tuberculosis programme in those districts or decentralised to examine symptomatics seeking treatment at other centres or general health institutions, the dividends may be many times higher. Similar analysis of the resources spent on other activities also may help in more efficient allocation and utilisation of resources. These are significant findings which indicate the need for more complete information for planning a programme.

Centre III had spent only 12.4% of the resources for diagnostic examinations on contact examination. Even so, it appears that this centre had realised the disadvantages of organising contact examinations and had given less importance to this from 1966. During 1969, this centre had examined only 745 contacts as compared to 33, 408 symptomatics (Personal Communication) thereby spending only about 2% of its case finding resources on contact examination.

The case yields among symptomatics and contacts given in Table 2, which include both cases and suspects (sputum negatives) are not comparable to the yield shown in Table 1 which refers to cases only. Relevant figures are not readily available for Centre I, but the results of a special study (given in Table 1) showed an yield of 5 cases per 1000 examined, if subsequent examinations are not considered. In Centres II and III, the yield of cases per 1000 contacts of cases and suspects was 4.3 and 8.3 respectively (Table 1). Such findings are not peculiar to India alone. For instance, in Kolin, Czechoslovakia, the case yield among contacts was 5.5 per 1000 examined (Styblo etal, 1967). Further, out of 348 cases diagnosed during 1961-64, only 8 (2.3%) were from contacts and compares with 3 to 8% for contacts and suspects together in Table 2.

Further, it appears from a study of the Annual Reports that cases and suspects are nearly equal in Centre 1. If so, yield of sputum positive cases among symptomatics maybe 215 per 1000 in Centre I. Corresponding figure for Centres II and III are 187 and 88 per 1000 respectively and for sympto-

matics attending general health institutions 73 to 107 per 1000 (Table 1). These variations may be due to differences in the composition of out-patients attending these institutions in different parts of the country and in the practices followed for offering various examinations to the out-patients (screening, order of examinations, interpretation of X-ray abnormalities and tuberculin test etc.).

The above findings show that the contribution from contact examinations does not at present justify the resources required to organise these in a systematic manner. Such a conclusion based on data regarding actual working of contact examinations and supported by comparative case yield of different population groups should form the most important criteria for judging the place of contact examination in a Tuberculosis Programme. However, for a more thorough study of the subjects the following aspects are also discussed :

a. Some epidemiological considerations;
b. Findings from some contact studies; and
c. Chemoprophylaxis and BCG vaccination of contacts.

5- Epidemiological considerations

5.1 Rationale of contact examination

The main basis for examination of family contacts was the impression that tuberculosis was highly infectious and was a familial disease. Raj Narain et al., (1966) have shown that 88% of children of age 0-4 years living with infectious cases in ill-ventilated houses under unhygienic and poor economic conditions had escaped infection. Sen (1959) observed that even among child contacts, less than 5 years old, sharing the same bed with an infectious case and from poor and very poor classes in a crowded area of Calcutta City about 39% only became infected and the remaining 61% had escaped infection. In both these studies, it has been suggested that all persons may not be equally susceptible to infection. On the other hand, Nair et al (1971) have indicated that the "Zone of Influence" of a case may extend upto the tenth neighbourhood and possibly beyond also. Thus, while tuberculosis is not highly infectious, the spread of infection is not confined to the family contacts alone. These epidemiological findings contradict both the above assumptions on which examination of family contacts is based. To overcome this, Blomquist (1961) had emphasised the need for a more realistic definition of contacts,

5.2 Incidence of disease in contacts and community

Prevalence of disease in contacts and community has been compared in Table 1. Incidence of disease among family contacts during a five year period was studied by Kamat et al., (1966) and Devadatta et al., (1970). They found that incidence of both cases and suspects together was 62 out of 528 and 77 out of 875 respectively, which correspond to annual incidence rates of 2.3% and 1.8%. However, number of persons with adult type of disease (cases and suspects together) were only 6 and 10 respectively, giving annual incidence rates of 0.2% in both the studies. The real significance of these incidence rates among contacts is not clear in the absence of incidence figures for the population from which the index "cases" came viz., the poor population living under very unfavourable circumstances in a large city like Madras. If the incidence rates in the general population living under these conditions were also of the same order or were not considerably smaller than the incidence rates among family contacts, the latter cannot be considered to be a high risk group which should get priority under a tuberculosis programme. In the absence of material for a proper comparison the position is not clear.

But some idea regarding the potentiality of contact examination sometime after the diagnosis of a case can be had indirectly from a study of the distribution of infection in the community. At any one point of time, out of the total infected persons in a rural population, only 2% were in households with cases (Nair et al, 1971). If 98% of the already infected persons are outside case households, it is very likely that about 98% of the new cases (from earlier infections) will also occur in course of time outside these case households.

In the above paragraph only new cases occurring from earlier infections have been considered and those arising from new infection have been left out. It is possible that the incidence rate may be higher among the newly infected but the number of newly infected persons in the community is so small compared to those already infected that cases among them can form only a small proportion of total new cases. (In a population of 100,000 there may be about 60,000 uninfected. If the incidence (or risk) of infection is about 2% (Raj Narain et al, 1965) there will be 1200 newly infected as against 40,000 infected. It is also significant that a large proportion of the newly infected will be outside case households and the number of cases which occur among

newly infected family contacts soon after infection, will be a still smaller proportion of the total new cases i.e., a negligible portion of the new cases occurring in the community. Therefore, examination of family contacts at a later date also cannot be sufficiently rewarding even if resources are available to organise a scheme to repeatedly examine contacts of cases diagnosed over a number of years, with satisfactory coverage. It is also relevant that the majority of contacts are children in whom both the prevalence and incidence of disease are quite small.

6. Findings from some contact studies

Anderson and Geser (1960) did not find household accumulation of cases in 9 African territories covered by prevalence surveys. Boyd (1964) found that cases do not occur concurrently among members of the same family. Raj Narain et al., (1966) found that in a rural population of 30,000 persons there were 75 households with cases but only one of these households had multiple cases. Styblo et al., (1967) stated that tuberculosis in the family contacts generally became manifested only sometime after the removal of the "source". Thus, neither can we expect nor do we often find more than one case in a household at any one time, it may be argued that these conclusions, based on the distribution of disease at any one point of time, are not valid. This objection is certainly not correct in so far as contact examination soou after diagnosis of a case is concerned as there is hardly any change in the situation within a short period after diagnosis when contact examinations are generally carried out, Even if we consider a longer period after diagnosis of a, case, the chance of finding another case in the same household may be quite small indeed, as stated earlier.

If an extended definition of contacts is considered by forming case clusters comprising of the case household and generally 4 households on cither side, the position is not much better (Nair el al, 1971). Out of 60 case clusters only 7 had multiple cases in spite of a very favourable definition of case clusters.

It should be pointed out that there are a number of studies which apparently contradict the above conclusions (Sen, 1959, Andrew, et al, 1969; Ramakrishnan et al, 1961, WHO Tuberculosis Chemotherapy Centre, Nairobi, 1961 and Williamson County Tuberculosis Study, 1963). No doubt the case yields among contacts have been high in these studies, but the following points are relevant, besides differences in methods used in these studies :

1. Some of these studies related to special groups of population and caution has to be exercised in generalising the conclusions. For a correct epidemiological comparison of case yields from contacts with that of general population the prevalence figures for those pockets of the general population from which the contacts come have to be considered. Sen (1959) had tried to account for this factor to some extent by carryingout a general survey in the area from which the index cases were drawn. While the prevalence of cases and suspects in the city was 1.7% (ICMR, 1959), he found that the rate for his study area was 2.4%. If the poorer sections only of this area were considered the prevalence might have been still higher and perhaps not different from the 3.7% which was observed among the contacts living in "bustees" in that area.

2. For selecting groups which should get priority for case finding under" a programme, it is necessary to compare different population groups, as in Table 1, and also consider problems involved in tackling these groups and getting adequate coverages.

3. Contacts of both cases and suspects (sputum negatives) have been mixed up in some studies. The logic of including family contacts of suspects {non-infectious cases) is not clear. If the case is non-infectious the family contacts cannot be exposed to any special risk. At least, separate findings for contacts of cases and suspects (sputum negatives) could have made the position more clear.

4. Only a small proportion of the "cases" among contacts have adult type of disease which forms the bulk of "cases" in surveys of general population against which case yield from contact exami nation has often been compared. For example, out of 62 "cases" found among contacts, by Kamat et al. (1966) only 6 (10%) had adult type of disease. Corresponding figures by Devadatta et al (1970) were 10 (13%) out of 77 "cases".

5. Majority of the "cases" found among

contacts (even adult type of disease) are likely to be suspects (sputum negatives) in most of these studies. While Raj Narain et al (1968) showed that about 90% of suspects and even the majority of suspects with cavity are not likely to be cases of tuberculosis. Fox (1964) stated that "It is a common experience in developing countries to find that considerable proportion (sometime as much as a quarter) of the patients being treated for tuberculosis do not, in fact, have the disease at all or else have healed lesions". It is also well known that a large margin of difference can arise between even experienced X-ray readers and that "the greatest dissensions concern the etiology (tuberculous or non-tuberculous) and the clinical importance "(active" or "inactive") of the shadows" (IUAT, 1965). Under these circumstances, comparison of case yields including suspects will not be quite reliable.

6. A large proportion of the cases and suspects (particularly the latter) diagnosed among contacts were children as compared to the small number of such cases found in clinics or general population. The difficulties in correct diagnosis of disease among children are well known. This difference in composition of case is relevant for programme which mainly deals with disease among adults.

7. Chemoprophylaxis and BCG vaccination of contacts

Kamat et al (1966) and Devadatta et al (1970) have stated that there is scope for both Chemoprophylaxis and BCG vaccination in close family contacts, particularly those under 5 and 10 years of age respectively. However, following Fox (1964) they have emphasised "that any chemoprophylactic measure must necessarily by fitted into the overall tuberculosis programme for the country and be given a lower priority than the treatment of patients, particularly in developing countries with limited resources". In addition to this important aspect, some more relevant questions may have to be answered before Chemoprophylaxis of family contacts can be considered for inclusion in a tuberculosis programme. Is the risk of developing tuberculosis among already infected persons more when they are family contacts of a case? Are the newly infected persons living with cases more likely to develop primary and post-primary disease than other newly infected persons? These questions may become more relevant if and when resources permit inclusion of Chemoprophylaxis under the programme.

The position with regard to BCG vaccination is somewhat different. There is, no doubt, evidence that infection is more among family contacts (Raj Narain et al, 1966, Singh, 1960, Majumdar and Menon, 1960) and also among cluster contacts (Nairet al 1971). But, this is the position *upto the time of diagnosing the case* and the major additional risk to the contacts resulted from exposure to the index case *before diagnosis* (Andrews et al,. 1960). On the other hand, Kamat et al (1966) and Devadatta et al (1970) found very high annual rates of 39-45% and 43-58% respectively for incidence of infection among family contacts studied over a 5 year period. They had defined newly infected as a person with induration of O-4 mm to 5 TIT PPD who showed an increase of at least 10 mm on subsequent testing. According to Raj Narain el al., (1965) an increase of 10 mm from an original induration of 0-9 mm to 1 TU PPD gave a much higher incidence rate (8%) as compared to that estimated by more reliable methods (about 2%) which corresponds to an increase in induration of about 20 mm. Further, repeated tests were carried out among the contacts and boosting of allergy might have also played some part (Raj Narain et, al. 1966 a). The extraordinarily high incidence of infection among contacts in the two studies referred to may be mainly due to the methods of estimating the risk and also probably to the special population considered itself having a high incidence and not the contacts alone. Further, if the risk of infection to contacts was really high *even after diagnosis of the case,* the rates for incidence of infection among contacts of cases treated at home and in the sanatorium could not have been the same as was observed by Kamat et al.,(1966) and Devadatta et al , (1970). Thus there is no evidence to conclude that the contacts of the index case receiving treatment under the programme have a higher risk of getting infected and therefore they cannot be considered to be more in need of BCG vaccination than the population itself. Moreover, vaccination of contacts will automatically be done in a control programme which includes BCG vaccination on a regular and continuous basis.

Some other considerations

It has been stated earlier that only about 2% of the already infected persons in a rural community were living in case households,

Even from social considerations, it may not be justifiable to concentrate attention (case finding and treatment or chemoprophylaxis) on this 2% in preference to the other 98% of infected persons, unless the presence of the case in the household can lead to a much higher incidence of disease in the former group. Infected family contacts of suspects (non-infectious patients) are even less eligible for such special attention under a programme.

The systematic examination of family contacts of currently diagnosed cases and securing adequate coverages is not an easy task. Maintenance of proper records for this purpose is an additional problem requiring not only staff but also printed cards and forms, filing cabinets etc. These requirements are considerably enhanced if re-examination of contacts of previously diagnosed cases is also to be carried out on a systematic basis and becomes a strain on the resources of any ordinary TB centre.

It may be argued that the examination of contacts increases the confidence of the family and thereby helps to ensure treatment regularity. As considerable resources are involved in organising contact examinations, it may not be appropriate to base it on the above hypothesis which has not been tested. There is no evidence at present to show that patients whose contacts have been examined are more regular in treatment than other patients. Treatment regularity may depend on many factors and very little is known about these. Even considering that satisfying the family members is an important factor, it should not be difficult for the doctor to convince the contacts or the patients that only those contacts with symptoms suggestive of tuberculosis need be examined and that others who develop these symptoms later on should report to the nearest health institution or TB centre. This educative approach is likely to lead to increased awareness and action taking among symptomatics in the community in course of time, it would be worthwhile to study the utility of confining contact examinations to those contacts with symptoms suggestive of tuberculosis. This will considerably reduce the number to be examined and may give almost the same number of cases as at present.

In planning a tuberculosis programme, it is necessary to consider how best the limited resources could be utilised for case finding, treatment and prevention. The best results for case finding (maximum number of diagnosed cases for minimum of resources) can be obtained if the resources are used to examine groups with the highest case yield. Thus, contact examination can find a place in case finding under a planned tuberculosis programme only if contacts of cases diagnosed from a group with the highest case yield. It may be stressed that this concept of looking for case finding methods with highest case yields for inclusion under a tuberculosis programme is dynamic and that a method which is not eligible for inclusion today can become eligible later on because the group to be examined under the method may improve its relative position with respect to case yielding capacity or because the programme has already made full use of the method which gives highest case yield and is therefore ready to include another method which gives the second highest case yield. Similarly, the situation may also vary from one country to another or between different population groups within the same country.

It may be asked, why should examination of symptomatics and of contacts be seen as a question of either/or i.e., as two methods of case finding competing for resources. If the resources spent on contact examination were marginal (it is difficult to believe so from Table 2) or if either group were not available subsequently for case finding then only the planner need not choose between the two methods. A true picture on cost can only be obtained after a proper cost analysis, as pointed out earlier. The argument, often advanced, that contact examination helps to keep the available staff more fully occupied would not carry much weight from the cost accounting point of view. In any case, the time spent on contact examinations could be more usefully spent on crucial managerial functions such as implementation, supervision and maintenance of the programme in dispensaries and hospitals, and thereby strengthen the District Tuberculosis Programme in the district. In institutions like State Tuberculosis Centres these resources could be used for expansion or improvement of research and training. Thus, contact examination cannot be considered as an inevitable or desirable activity and the planner has to consider the priority lo be given for this activity, under the programme.

9. Conclusion

From the above paragraphs, it is quite clear that contact examination cannot be considered as a case finding method under the National TB Programme, at least until the potentialities of examining symptomatic outpatients are fully utilised and additional resources become available to include groups of secondary importance. Neither epidemiological consi-

derations, nor case yield from some contact studies, nor comparative case yield from different population groups, nor its contributions in some well established TB centres justify such a step. Current belief that contact examination needs only a marginal additional expenditure is not substantiated and the true picture can be obtained only from proper cost analysis. Resources for case finding which are now being used for contact examination could be utilised more effectively and economically if these are diverted for managerial/supervisory functions to improve the district TB programme or for examination of symptomatics seeking relief in various health institutions in the neighbouring areas.

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SPONTANEOUS PNEUMOTHORAX— A REVIEW OF 92 CASES

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Introduction

Spontaneous pneumothorax is said to have occurred when air enters the pleural space without any external cause. But there is always some underlying pathology, as a result of which it occurs. It is an emergency which, at times, may be so grave as to endanger the life of a patient unless the appropriate treatment is given immediately. Itard is said to have used the term spontaneous pneumothorax for the first time in 1803. However, Lennaec is credited with giving a detailed description of its signs and symptoms. In 1931, Palmer and Taft believed that pulmonary tuberculosis was responsible for spontaneous pneumothorax in 80-90 p2r cent of the cases. Kjaegaard (1932) showed that majority of cases of spontaneous pneumothorax were non-tuberculous in nature. After this many papers have been published on this subject and now almost all the workers in the West are of the opinion that rupture of a bleb or bullous is the commonest cause of spontaneous pneumothorax. Since the majority of cases, coming to us, had developed spontaneous pneumothorax as a complication of pulmonary tuberculosis it was thought worth while to review all the cases of spontaneous pneumothorax admitted to our unit.

Material and Methods

Records of all cases of spontaneous pneumothorax admitted to the Chest unit of the Medical College Hospital, Rohtak, between September, 1965 and August. 1971 were reviewed. 92 such cases had been admitted to our unit which comprise the material of this paper. A detailed history of each case had been taken. Repeated examination of sputum for tubercle bacilli had been done. Detailed examination of pleural fluid for tubercle bacilli and other micro-organisms had been curried out by all methods and cytology of fluid also studied. Frequent radiological check up had been employed during management of these cases. Results following treatment by bed rest, repeated aspirations of air and/or fluid, tube thoracotomy and in one case decortication were studied and classified as cured, improved, left against medical advice and died. Patients were classified according to age, sex and side of involvement. No attempt was made to classify the patients by degree of pneumothorax as that was not considered to he an important factor in the overall management of these cases.

Observations

Age and sex incidence. (Table 1) There were 74 male and 18 female patients in this series. 55 male and 16 females were below the age of 40 years and 19 males and 2 females were above 40 years. The youngest patient was 3 years old and Uie eldest was 65 years of age, both being males.

TABLE 1

Age and sex incidence in cases of spontaneous pneumothorax

Age in years	Number of cases Male	Female	Total
0—10	4	0	4
11-20	16	4	20
21-30	17	7	24
31-40	18	5	23
41—50	7	2	9
51-60	9	0	9
Above 60	3	0	3
Grand total	74	18	92

Side of involvement. In 55 cases pneumothorax occurred on the left side and in 36 it involved the right side. One case developed it first on the right side and then on the left side after an interval of 2 months.

Aetiology. (Table II) Out of 92 cases, spontaneous pneumothorax developed as a result of rupture of an active tuberculous focus in 47 (Group I). In 10 patients although active tuberculous foci were present in the contralateral/same lung or in both the lungs, yet the cause of spontaneous pneumothorax was considered to be rupture of a scar or an emphysematous as a consequence of scarring (Group 2). The distinction in the aetiology of group I and group II cases was based on the fact that in the former empyema developed in

TABLE 2

Aetiology ***of spontaneous pneamothorax***

Aeliological factor	Number of cases
Group 1 Pulmonary tuberculosis	47
Group 2 Healed tuberculous scar	10
Group 3 Pyogenic lung focus	16
Group 4 Emphysematous bulfous or bleb	1 1
Group 5 Undetermined	6
Group 6 Miscellaneous	2
Total	92

all the cases because of contamination of the pleural space by the tuberculous material whereas in the latter empyema did not develop in any case although some serosanguinous fluid did develop in 5 of these cases which was absorbed within a few days.

Sixteen patients had developed non-tuberculous pus in addition to pneumothorax (Group 3). In none of them any lung lesion was visible radiologically. They gave history of acute respiratory infection prior to development of symptoms of pneumothorax and all of them had pyopneumothorax at the time of admission. In one of them Staphylococcus pyogenes had been obtained from the pus, in 10 mixed flora and in 5 no organisms could be obtained. Sputum as well as pus were negative for tubercle bacilli on repeated examination in all these cases.

Eleven cases gave history of chronic bronchitis and the cause of pneumothorax in them appeared to be an emphysematous bullous or bleb (Group 4). Emphysematous changes were present in the lungs radiologically in 8 but emphysematous bullae were visible only in one patient.

There were 6 cases in whom the cause of pneumothorax could not be determined definitely (Group 5). In them neither any previous history of acute or chronic respiratory illness was available nor any active lesion could be seen in the skiagram of chest. Since some scars could be seen radiologically it was thought that the cause of pneumothorax was rupture of some scar or emphysematous bullous in these cases.

Out of 2 cases included in the miscellaneous group (Group 6), one developed pneumothorax as a result of secondary deposits from osteogenis sarcoma and the other was suffering from scleroderma and had corticosteroids for its treatment. It is very difficult to say whether corticosteroids were instrumental in producing pneumothorax in her.

Bacteriological findings. In group 1 sputum was positive for tubercle bacilli in 30 patients and in 10 tubercle bacilli could be obtained from pus. No tubercle bacilli could be found in sputum or pus in 13 cases. In group 2 seven patients had tubercle bacilli in sputum but in none of the 5 patients who developed serosanguinous fluid could the tubercle bacilli be obtained from the pleural fluid.

Symptoms. Pain in the chest was present in 80 patients and dyspnoea in 75 out of 92 cases. 22 patients had fever and 7 gave history of haemoptysis. Two patients already on treatment for pulmonary tuberculosis did not present with any symptoms pertaining to pneumothorax which was detected in them on routine examination.

Treatment. 4 patients were treated only conservatively and no air or fluid was aspirated from the pleura! space in them.

Aspiration by needle. In 10 cases aspiration of only air from the pleural space was done by artificial pneumothorax apparatus. When 4-5 aspirations of air in the first 48 hours failed to re-expand the lung or showed that intrapleural pressure was being built up rapidly tube drainage under water seal was resorted to and those cases were included under that heading. Air as well as fluid aspiration by needle was done in 23 cases and out of these 15 had refused tube thoracotomy. In the rest of them leakage of air had stopped within 48 hours and serosanguinous fluid did not yield any organisms. In 8 patients the pocket of air was small and leakage of air had stopped before admission and fluid was required to be removed. Five of these 8 cases had pyopneumothorax and had refused tube drainage. Pleural cavity was kept as dry as

TABLE 3

*Results **of treatment in** cases of spontaneous pneumothorax*

Aetiological group	Number of cases				
	Discharged otherwise	Cured	Improved	Died	Total
Group 1	6	12	19	10	47
Group *2*	1	9	—	—	10
Group 3	—	13	1	2	16
Group 4	1	7	3	—	11
Group 5	3	1	1	1	6
Group 6	1	—	—	1	2
Grand Total	12	42	24	14	92

possible by needle aspiration even if the pus had to be removed daily,

Tube thoracotomy. In 47 cases tube drainage under waterseal was instituted, in 4 of them for removal of air only, in 15 for removal of pus only and in 28 for drainage of both pus and air.

Decortication of lung with parietal pleurectomy and tailoring thoracoplasty was done in one patient in whom tube drainage had failed to close the empyema space and pleura was very thick.

Results (Table III). 12 patients left the hospital against medical advice and are shown as discharged otherwise. 42 got cured and 24 had improved. Those cases who at the time of discharge from the hospital had a small pocket of air or thickened pleura are shown as improved. Patients having thickened pleura had either refused surgery or had been considered unfit to undergo decortication.

Fourteen patients died and out of these 10 had extensive bilateral pulmonary tuberculosis complicated by pneumothorax. One had scleroderma. The exact cause of death in an old man could not be determined. He had infiltrations in both the lungs and his sputum was repeatedly negative for tubercle bacilli. No evidence of malignant disease could be found in his life time.

Discussion

The incidence of spontaneous pneumothorax is much more in males as compared to females and 74 of our cases were males out of 92 patients. Marked preponderance of males over females has also been reported by other workers. Seventy one of our cases were below the age of forty years. Although the cases presented here were much different actiologically than the cases reported by others yet the preponderance of males and much higher incidence below the age of 40 years is comparable to others mentioned above. 55 of our patients had pneumothorax on the left side, 36 on the right and one had it on both the sides. Almost equal incidence on the right and left sides has been reported by many workers. However, Seremetis encountered it on the left side in 58 percent of his cases, an incidence similar to the one reported here.

Out of 92 cases, 47 had developed spontaneous pneumothorax due to rupture of an active focus of tuberculosis and 10 as a result of rupture of a scar or an emphysematous bullous as a sequel to healed tuberculous foci. This shows that tuberculosis was responsible for spontaneous pneumothorax in 62 per cent of our cases directly or indirectly. Armstrong and Mitchel while reporting 2 cases of spontaneous pneumothorax during steroid therapy in cases of pulmonary tuberculosis observed that although previously spontaneous pneumothorax was not uncommon in rapidly progressive pulmonary tuberculosis it has not been their experience since the advent of chemotherapy. Inouye et al. state that spontaneous pneumothorax is not a common finding in a tuberculosis sanatorium. Reemtsma et al.

reported 20 cases of spontaneous pneumothorax complicating pulmonary tuberculosis and in their paper they have quoted Berry having reviewed the subject of pneumothorax extensively and reporting 75 similar cases from their service in 1932. But during the last 3 decades almost all the papers published on this subject, in the Western literature, mention the rupture of a bullous or bleb or a weak point in the visceral pleura to be the commonest cause of spontaneous pneumothorax. The reason for a majority of cases being tuberculous in origin in this review is that pulmonary tuberculosis is still a very common disease in our country and most of our cases seek proper medical advice quite late and by that time the disease has already progressed to a great extent. This fact is also reflected in mortality figures which show that out of 14 deaths in this series 10 were due to extensive pulmonary tuberculosis complicated by pneumothorax. When a subpleural tuberculous caseous focus or a cavity ruptures into the pleural space tuberculous pyopneumothorax is the inevitable result and this occurred in 47 of our cases. Results of treatment are rather poor in such cases and only 12 of them got cured. When the cause of spontaneous pneumothorax is rupture of a healed tuberculous focus, prognosis is very good because pus does not form and whatever serosanguinous fluid develops in the pleural cavity is easily manageable. Nine out of 10 such cases in this series got cured.

In 16 cases pyopneumothorax appeared, most probably, after rupture of a small pyogeni lung focus. This presumption is based on the fact that all of these cases had been admitted with pyopneumothorax and no lung lesion was seen radiologically. No tubercle bacilli could be obtained from the pus or sputum after repeated examination. History of acute respiratory infection was available in them. These cases respond very well to tube thoracotomy and broad spectrum antibiotics and 13 out of 16 patients became all right. It has been reported that most of the case of non-tuberculous pyopneumothorax occur in extremes of life as a complication of Staphylococcus pneumonia or abscess. But 13 out of 16 of our cases were young adults and only in one of them Staphylococci had bsen obtained from the pus. The reason for this appears to be that most of our village folk (majority of our patients belonged to that stratum of society) and poor people even in the urban areas are quite prone to develop respiratory infections of varying nature because of their dusty and hazardous occupations and do not care much for such ailments and come to thu hospital under the pressure of severe symptoms produced by pulmonary suppuration or pyopneumothorax.

Seventy one out of 92 cases developed pleural fluid and 63 of them had frank pus (47 tuberculous and 16 non-tuberculous). Haemothorax did not develop in any case.

During the last 3 decades almost all papers on spontaneous pneumothorax mention the rupture of an emphysematous bullous or bleb to be the commonest cause of it but in the cases presented here this appeared to be the cause only in 11 cases. These patients gave a history of chronic bronchitis and emphysematous changes were present in their lung but bullae could be detected radiologically only in one case. Six more patients which have been included in the undetermined group could also be included in the former group but I have not done so because none of them gave any history of chronic bronchitis and in none the bullae could be seen in the skiagram. Their skiagrams showed some scarring in the lungs which could have been due to old healed tuberculous foci but they have not been included in group 2 also because none of them have been treated for tuberculosis.

Osteogenic sarcoma frequently metastasises in the lungs but pneumothorax is a rare complication of it. We had only one case in whom amputation of the right leg had been done for osteogenic sarcoma 8 months before he came with metastases in the lungs complicated by pneumothorax on the left side (Fig. 1).

High recurrence rate i.e. 52 per cent has been reported by Lynn. Pneumothorax recurred in only 3 of our cases. One was 25 years old female who had scleroderma and had been given corticosteroids. She got 5 episodes of pneumothorax on the left side. Other two cases were suffering from pulmonary tuberculosis having positive sputum but the cause of pneumothorax in them was rupture of an old scar in the opposite lung. One of them had 3 episodes and the other 2 episodes on the left side, the explanation for low recurrence rate appears to be due to the fact that in majority of our cases there was an underlying inflammatory process in the lung which led to pus formation and pleural adhesions subsequently.

The aim of treatment is to relieve the symptoms, to restore the lung function by full re-expansion, to avoid recurrence and to cure the underlying disease in the lung. Conservative treatment is advisable only in those cases who have less than 15 per cent lung collapse and have no dyspnoea. Tube drainage under

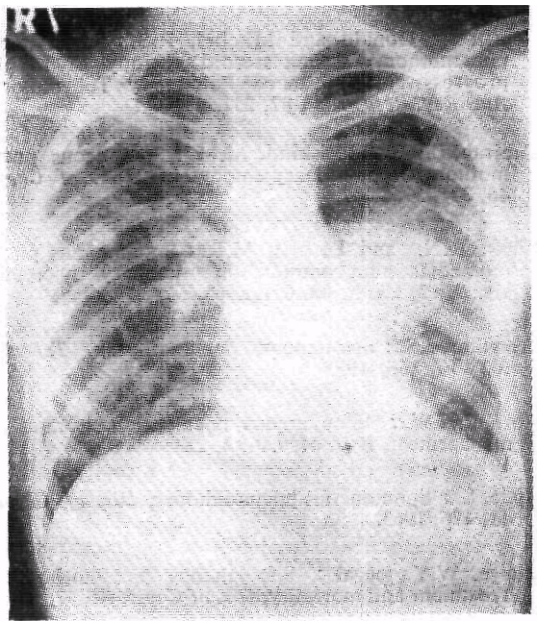

Fig. 1

P. A. view of chest of a case having secondary deposile in the lungs with pneumothorax on the left side. His leg had been amputated for osteogenic sarcoma previously.

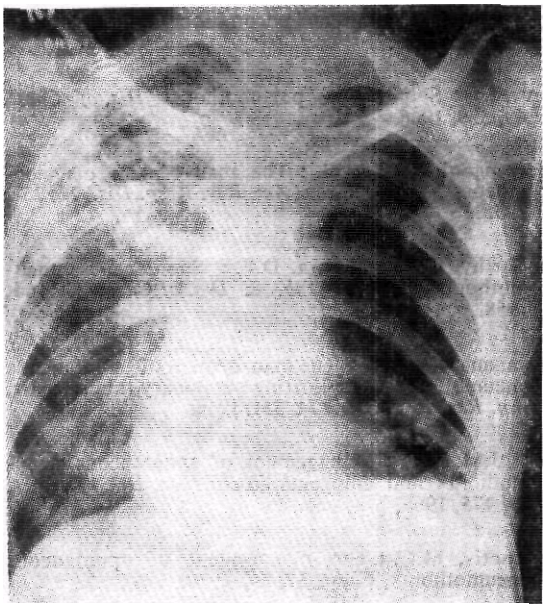

Fig. 2

P.A. view of chest of a case of pulmonary tuberculosis with pyopneumothorax on the let side.

Water seal is the treatment of choic: ill patients **having** massive **pneumothorax, tension pneumothorax,** severe dyspnoea with or without cyanosis irrespective of degree of collapse of the lung (these are the patients whose lung

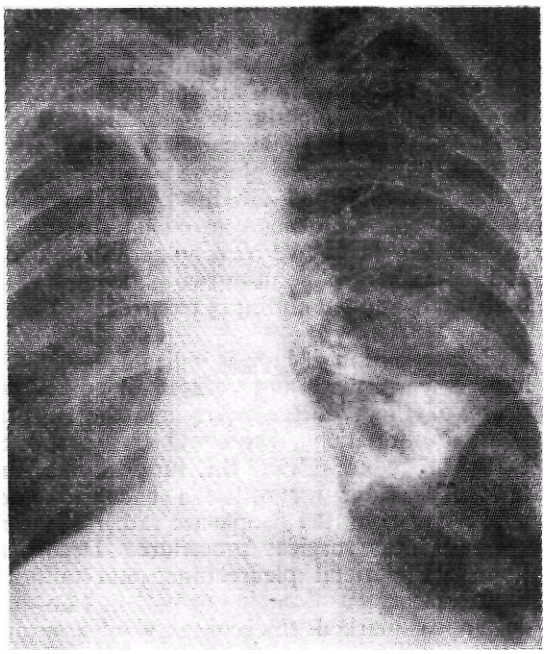

Fig. 3

P. A. view of chest of a case of pulmonary tuberculosis having pneumothorax due to rupture of a healed scar or emphysematous bullous on the left side.

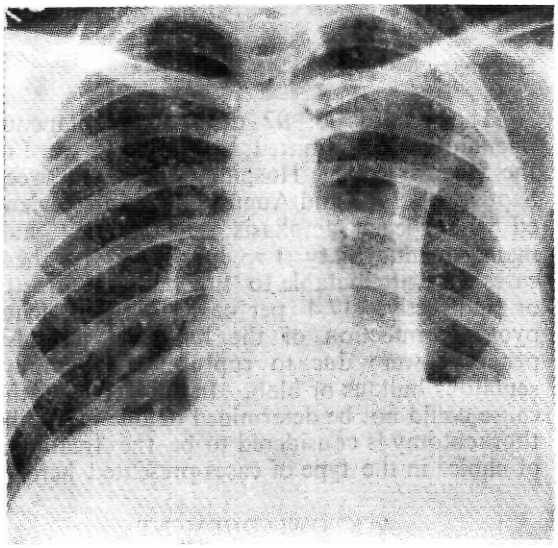

Fig. 4

P.A. view of chest of a case having non-tuberculous pyopneumothorax **on the** left **side.** No active lung lesion is seen.

function is markedly reduced due to chronic lung disease and become dyspnoeic even with a little collapse) cases having pyopneumothorax particularly when bronchopleural fistula is present and patients developing haemopneumothorax which is rather a rare complication. When a patient refuses tube thoracotomy, repeated aspirations of air and/or fluid should be done as frequently as indicated. Local irritants like iodised talc, camphor in oil, silver nitrate, 50 percent glucose solution and patient's own blood etc. for producing adhesians in cases of recurrent pneumothorax are of doubtful value. We tried 50 per cent glucose and patient's own blood in two patients but in both of them pneumothorax recurred.

Decortication of lung is indicated when the lung is captivated and refuses to expand because of thick cortex overlying the pleura. Some of our patients who could have benefitted by the procedure refused this surgical intervention. We cater for rather a backward area where most of the people are rather afraid of even a minor surgical procedure. Decortication with parietal pleurectomy and tailoring thoracoplasty was done in one patient who had developed marked thickening of pleurae and ernpyema space was persisting after effective drainage. Thoracotomy is indicated in cases of recurrent pneumothorax in suitable cases and if any localised bullae or cysts are present these may be removed and pleurectomy done. Massive haemopneumothoraxor destroyed lobe or lung may warrant lobectomy or pneumonectomy,

Summary

The records of 92 cases of spontaneous pneumothorax admitted to the Chest ward of the Medical College Hospital, Rohtak, between September, 1965 and August, 1971 were reviewed with special emphasis on aetiology and management. Sixty two per cent of these cases were attributable to tuberculosis directly or indirectly. 17.4 per cent followed acute pyogenic infection of the lung and only 11.9 per cent were due to rupture of an emphysematous bullous or bleb. In 6.5 per cent the cause could not be determined definitely. Tube thoracotorny is considered to be the treatment of choice in the type of cases presented here.

ACKNOWLEDGEMENT

I am thankful to Dr. Vijay K. Arora, Registrar of our department for helping me in collecting data for this paper.

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BOOK REVIEW

Advances in Respiratory Care and Physiology by Thomas B. Caldwell and Frank Moya, Publishers Charles C. Thomas, Springfield, Illinois. Price $ 16.75.

This excellent monogram is based on the proceedings of the post-graduate seminar in Anaesthesiology which is an annual feature and is attended by many authorities on the subject. It deals fairly comprehensively with the nature and multiplicity of mechanisms of oxygen and carbon-dioxide transport in the human body and measurements which are pre-requisites of control of respiration by modern Anaesthesiologists. The influence of oxygen and carbon-dioxide on pulmonary and cerebral circulation has also been elaborated. Since it is impossible to measure precisely either excess ventilation or excess perfusion, these are usually quantified in terms of their effects i.e. their contribution to dead space and to venous admixture. The effects of a variety of gaseous agents commonly used by the Anaesthesiologists have also been mentioned. The monogram also deals with the problems of inhalation threapy (both organisational and technical), indications, use, abuse and hazards of aerosols, 1PPB, tracheotomy and oxygen therapy. Improvement of pulmonary function and the ventilation pattern with these have been duly emphasised. Major differences between adults and children and problems of inhalation therapy in premature infants have been clearly brought out. The criteria, complications, bed-side application of evaluation tests have also been mentioned. Useful information on emergency care, resuscitation and mobile coronory care have also been included. The role of drugs, telemetery, defibrillators have been dealt with in a practical manner.

On the whole, this small book provides current knowledge on the subject in a cohesive form, also indicating future developments and challenges. Although the book is of limited value for general practitioners, it will be extremely useful for students of pulmonary physiology and Anaesthetics. The get up of the book is excellent and the style easy and pleasing.

NEWS AND NOTES

24TH TB SEAL SALE CAMPAIGN

The 24th TB Seal Sale Campaign was inaugurated in India on the 2nd October, 1973. President V.V. Giri in a Special message appealed to the people to buy TB Seals in large number to help fight the TB menace. The Campaign will terminate on 26th January, 1974, the Republic **Day. The** new Seal design carries the 'butterfly' motif.

XXIIND INTERNATIONAL TB CONFERENCE

The 22nd International TB Conference was held in Tokyo from 20th to 28th September, 1973. Mr. T. Shimazu, President of the I.U.A.T., presided. The Conference was inaugurated by Princess Chichubi of Japan. The subjects discussed covered scientific and social aspects of TB control both in high and low prevalence countries, as well as Chemotherapy, Pathogenesis and Immunity in Tuberculosis, etc.

Dr. M.S. Chadha, Vice-Chair man, Tuberculosis Association of India and President, Eastern Region of the **I.U.A.T.** attended the conference on behalf of Eastern Regional Coommittce. Others from India were : Dr. S P. Pamra, **Dr. M.L.** Mehrotra, Dr. T. Manickam, **Dr. S.P.** Tripathy, Dr. M.M. Singh, Dr. Reddy (who is in Japan under a Colombo Plan Fellowship), Dr. Jagannathan and Shri B.M. Cariappa.

Dr. Chadha, Dr. Pamra and Shri Cariappa participated in the Council meeting of the Union as Councillor members from the Tuberculosis Association of India.

MEETINGS OF THE REGIONAL COMMITTEES

Dr. M.S. Chadha, President of the Eastern Region, took over from Mrs. Ruth Hendry and presided over the Executive and Council meetings of the Eastern Region in Tokyo. There were two meetings of the Executive Committee. Dr. Chadha participated in the Council meeting of the **I.U.A.T.** as a Councillor from India and also as the President of the Eastern Region.

MEETING OF CHIEF EXECUTIVES

Shri B.M. Cariappa, participated in the conference of Chief Executives of National TB Associations affiliated to the IUAT in the council meeting of the Union and the **Eastern** Region. He participated in the Executive Committee meetings of the Region.

9TH MEETING OF THE EASTERN REGION

The 9th Conference of the Eastern Region of the International Union will be held in New Delhi in 1972. The Conference will be held jointly with the 29th National Conference on TB and Chest Diseases in Delhi in November 1974. Dr. M.S. Chadha, the President of the Eastern Region, has also been nominated as President of the 29th National Conference.

INTERNATIONAL CONFERENCE IN MEXICO

The 23rd International Conference on Tuberculosis will be held in Mexico during September, 1975.

WORLD CONGRESS IN ASTHMA

The Asthma and Bronchitis Foundation of India will be organising a world congress in New Delhi some time in 1974. Details can be had from the A.B. Foundation of India, C/o Vallabhbhai Patel Chest Institute, Delhi-7.

INTERNATIONAL SEMINAR ON TUBERCULOSIS

British Council for Rehabilitation of the Disabled will be holding the fifth International Seminar on "Rehabilitation of Disabled People, the New Era" in London from 1st to 5th July, 1974. The Seminar and Exhibition will be held in the Central Hall, Westminister, London. For particulars write to : Conference Secretary, REHAB, Tavistock House (South), Tavistock Square, London WC IH 9LB.

PRESIDENT'S BROADCAST TALK

Shri S. Ranganathan, President, Tuberculosis Association of India, gave a broadcast talk on the Tuberculosis Problem from **Delhi** on the eve of Diwali.

DR. BENJAMIN ORATION

The Tuberculosis Association of Andhra Pradesh has instituted an oration in memory of **Dr. P.V.** Benjamin. Dr. S.P. Pamra, Director, New Delhi TB Centre, has been

chosen to deliver the oration in Hyderabad on 2nd November, 1973,

WANDER-TAI ORATION

The Tuberculosis Association of India has instituted an Oration from 1973 in association with M/s Wander Limited, Bombay. The oration is designated as "WANDER-TAI ORATION". Dr. R.N. Tandon, Retired Professor-Physician and Head of the Department of TB, K.G. Medical College, Lucknow has been chosen for the first oration which will be delivered at the 28th National Conference on Tuberculosis and Chest Diseases.

TAI GOLD MEDAL

The Tuberculosis Association of India Gold Medal will be awarded this year to Dr. Khushdeva Singh of Patiala in recognition of his outstanding contribution to the cause of tuberculosis. The medal will be awarded at the inaugural session of the 28th National Conference on Tuberculoris and Chest Diseases.

TAI CASH PRIZES

The Tuberculosis Association of India Cash Prize of Rs. 500/- will be presented this year to Dr. K.G. Kulkarni, Medical Officer, OHT Clinic, Sewri, Bombay, for his article on "Bacteriological study for TB Lymphadenitis" which was adjudged by a Special Committee of the Association as best out of ten articles received for the competition. The prize will be awarded at the 28t.h National Conference.

The cash prize of Rs, 300/- for the best essay by a final year medical student will be presented io Shri K. Ganapathy, final year medical student. Medical College, Madras, for his article on "Differential Diagnosis of Pulmonary Tuberculosis".

KHUSHI RAM SHIELD

The Tuberculosis Association of India has decided to institute a Shield to be awarded from 1974 to a State Associations for outstanding voluntary work. It was decided to name this Shield as "KHUSHI RAM SHIELD" in appreciation of Rai Sahib Khushi Ram's generosity in donating to the Special Endowment Fund which now amounts to Rs. l,00,000/- out of Rs. 1,50,000/- promised bv him.

CHANCHAL SINGH AWARD

Sardar Amar Singh of Delhi has donated a sum of Rs. 10,000/- to be utilised by the Tuberculosis Association of India to commemorate the memory of his brother, the late Sardar Chunchal Singh.

DONATION OF DRUGS

The Amar Singh Chanchal Singh Charitable Trust, Delhi, has donated to the T.A.I, anti-TB drugs worth about Rs. 34,500/- during the period September 1972 to October 1973 for free distribution to TB patients taking treatment in its institutions.

TWENTYEIGHTH NATIONAL CONFERENCE

The 28th National Conference on Tuberculosis and Chest Diseases will now be held in Madras during the third week of December, 1973 instead of Bhopal.

SEMINAR AND SHIBIRS

A Seminar on Tuberculosis was organised by the Uttar Pradesh TB Association in cooperation with the Indian Medical Association during its 14th Annual Conference held at Bareilly on 21st and 22nd October.

The Technical Committee of the Tuberculosis Association of Andhra Pradesh organised a Seminar on Tuberculosis during October. Dr. S.P. Pamra, Director, New Delhi TB Centre, was the moderator of the Seminar on "Changing trends in the management of Tuberculosis".

A Symposium-cum-Panel Discussion on Tuberculosis Control was organised in Panchgani on 29th September on the occasion of the Diamond Jubilee Celebrations of the Bel-Air Sanatorium. The celebrations were jointly organised by the Medical Service Committee of the Rotary Club of Bombay, Panchgani and Maharashtra State Anti-TB Association. Specialists from Bombay and Poona participated in the symposium.

The Golden Jubilee of the Anti-TB Shibirs was also organised on the occasion. 272 persons were examined and 694 persons were given BCG vaccination.

The Tuberculosis Association of Kerala organised a Seminar on Tuberculosis Control in Trivandrum on 14th and 15th July, 1973. The Chief Minister of Kerala inaugurated the

Seminar in Kanakakunnu Palace. A large number of experts who participated in the Seminar included Dr. N.L. Bordia, Dr. S.P. Tripathy and Dr. Chakarborty. Professors of Medicine, Paediatrics and Headsjof Department of TB of the 4 Medical Colleges in the city also attended the Seminar.

The session on 'Integration of Tuberculosis Control Programme in the General Health Services' was presided over by Dr. Jacob Chandy. Secretary to the Government Health, Kerala, attended the concluding session.

OBITUARY

Dr. S.D. Store, Chest Specialist, K-E.M-Hospital, Bombay, passed away on 20th August, 1973. The Executive Sub-Committee of T.A.T. in their condolence resolution said : "Dr. Store was a member of the Central Committee of the Association and inspite of his heavy professional pre-occupation he took keen interest in promoting anti-tuberculosis work. His sudden and unexpected death has caused a void in the profession which it is difficult to fill. The Committee offers its deepest condolences to Mrs. Store and other members of the bereaved family".

Dr. S.S. Chabra, Dy. Medical Superintendent and Bacteriologist, Lala Ram Sarup TB Hospital, Mehrauli, passed away in New Delhi on 2nd October. He was in the service of the Association for over two decades. Apart from being good in his profession, he was a valued colleague and an amicable friend. The Association offers its deepest condolences to the bereaved family.

The Indian Journal of Tuberculosis

ABSTRACTS

Vol. XX October 1973 Abst. No. 4

Tuberculous pericarditis in the elderly

D.F. Smart J.A, Wellons and J.S. Adamaon Amer. Rev. Resp. Dis.; 1972, 105, 1019.

Eighteen patients of tuberculous pericardial effusion were seen between 1951 and 1970 in one hospital in USA, Their ages ranged from 14 to 78 with a median of 66 years. This is considerably greater than used to be reported previously. Sixteen patients were males; 16 were Negroes and as many as 10 were in the 7th and 8th decade of life. Diagnosis was confirmed by culture of pericardial fluid or tissue in 10 patients; by demonstration of granulomas containing AFB in sections of pericardial tissue in 4 patients and by culture for AFB from other sources in the presence of pericardial effusion in 4 patients. Eight patients gave an induration of less than 10 mm of PPD. Signs and symptoms of disease were similar to pericarditis in younger persons. Treatment in 17 case consisted of INH with at least one other drug. Six of these developed pericardial constriction and required pericardiectomy within the first year. There was no operative mortality. Analysis failed to pinpoint any factor which coutd allow prediction as to which patient would develop constriction. Corticosterojds were not given to any patient. Ten of the 18 patients had a mean survival of 90 mouths. Three deaths were due to tuberculosis and 5 died of other causes.

S.P.P.

Acid Base parameters in pleural effusions

R.W. Light. P.C. Luchsinger and W.C. BallJr. Amer. Rev. Resp. Dis.; 1972, 105,1011.

The pleural effusion associated with pneumonia snowed the most widely varying values of pH. It appears that the pleural fluid pH has predictive value in the course of these effusions. All treatment was inadequate to effect resolution of five effusions with a pH less than 7.2, even though none of these were grossly purulent. On the other hand all the 19 effusions with pH greater than 7.2 resolved with antimicrobial drugs even without drainage. The mean pH of tuberculous effusions was significantly lower than the mean pH of malignant effusions. A pH below 7.3 is highly suggestive of tuberculosis while a pH greater than 7.4 is highly suggestive of malignancy. Low pleural fluid pH may be due to both a high level of carbon dioxide and low bicarment of pleural fluid pH is useful in the diagnosis and management of pleural effusions,

S.P.P.

Remission in goodpasture's syndrome. Report of two patients treated by Immunosupression and review of the literature

A. Seaton el al Thorax; 1971, 26, 683.

Both patients hud proliferative glomerulonephritis without arteritis, severe iron-deficiency anemia without dietary deficiency, coagulation disorder or gastrointestinal lesion. Both patients had persistent pulmonary hemorrhage and a radiological picture suggestive of pulmonary haemo-siderosis. Both palients were treated successfully with adreno-corticosteroids and chlorambucil.

S.P.P.

Vital prognosis in intrathontcic sarcoidosis

Kaj Viskum & Kristian Thygeson Scand. Jour. Resp. Dis.; 1972, 53, 181.

Among 250 patients with sarcoidosis followed for an average of 7,4 years, the mortality was approximately 4 times that expected. The higher death rate was both due to sarcoidosis as well as other diseases. No sex differences in mortality were seen. The survival rate for patients with sarcoidosis was significantly lower than for a similar segment of the general population.

There was u suggestion that patients presenting with erythema nodosum had a better prognosis than other patients. Likewise, patients with an initially normal spirometry were shown to have a slightly better prognosis,

whereas no difference could be shown between patients presenting with hilar adenopathy alone and those presenting with parenchymal lesions. Patients with a proven duration of disease of at least one year prior to their admission had a poorer prognosis than patients with shorter duration disease.

S.P.P.

Manifestations and course of the disease in intrathoracic sarcoidosis

Kristian Thygesen & Kaj Viskum. Scand. Jour, Resp.Dis.; 1972,53, 174.

A retrospective analysis of 254 cases in Copenhagen admitted to hospital because of sarcoidosis is presented. The histological verification of the diagnosis was obtained in 192 patients. 46% of the patients were admitted because of suggestive symptoms and an abnormal chest skiagram and the remaining 54% had an abnormal chest X-ray but no symptoms were present. 60% of the cases were in the age group 20 to 39 years. Females predominated in the younger age groups but males in the older age groups. 3.3% of the patients had symptoms referred to eye (uveitis). 1.9% of the patiens had neurological disorders (2 had facial palsy, 1 paralysis of recurrent nerve, and 1 poly-neuropathy). 8.7% had erythema nodosum and 9.8% showed cutaneous manifestations of sarcoidosis. 85% were negative to 1 TU PPD. 2.7% had elevated serum calcium. Spirometry was performed in 225 patients and a modest decrease in vital capacity was observed in 29 patients. A likewise modest obstructive impairment was observed in another 17 patients. Frequency of various blood groups did not differ from the usual pattern in the general population. The initial chest X-ray showed hilar adenopathy in 21%, hilar adenopathy with parenchymal lung lesion in 52% and parenchymal lung lesion alone in 27%

Sixteen patients were treated for pulmonary tuberculosis. Ten of these had tuberculosis (4 with positive sputum before the diagnosis of sarcordosis was made). One patient showed evidence of bacillary tuberculosis concomitant with admission for sarcoidosis.

After an average of 7.4 years patients were followed up. 49% of those admitted with hilar adenopathy had a normal chest X-ray whereas this was so only in 28% of those with hilar adenopathy and parenchymal lung lesion and 19% of those with lung lesions alone. Of 219 patients alive and followed up, 89% had no disability in relation to work and 78% were completely free of symptoms.

S.P.P.

Fifteen year study of three hundred and fifty cases of sarcoidosis on a chest service.

J. Turiaf Amer. Rev. Resp. Dis; 1972, 106,320.

Of the 350 patients admitted in a Paris Chest Hospital with the diagnosis of sarcoidosis, 48% had been discovered on routine examination and the remaining 52% were discovered when they presented for investigations with symptoms. 83% were Europeans and the remaining were from East Indies and Africa. 72% were under the age of 40 years. Nearly 20% had been diagnosed as tuberculous before admission to the hospital. In 94% skiagram of the chest showed parenchymal and/or mediastinal involvement. 45% had sarcoid lesions in other organs. Pulmonary function, specially diffusing capacity, was disturbed in 20% in stage 1, 49% in stage II and 100% in stage III. Spleen was enlarged in 9%. Skin lesions were present in 12%, erythema nodosum in 6%, ocular involvement in 11% and parotid involvement in 11%. 80% were negative to tuberculin (10 units of Pasteur Institute tuberculin No. 48) Kveim test was positive in 77%, hyperglobulinaemia in 23.5% and hypercalcaemia in 6%. Biopsy of the lymphnode gave positive results in 72% of the 364 specimens. Biopsy of the bronchial mucosa was positive in 150 out of 243 specimens. Steroids were given in 60%. Indications for steroids were disturbed pulmonary function in stage I, no spontaneous regression within 3 months in stage II, all patients of stage III and those with ocular, neurological, cutaneous, renal, cardiac splenic and genital lesions. Initial dose was 40 mg tapered to 5 mg. Average duration of treatment was 2 years. Spontaneous cure occurred in 36%. Steroids succeeded in 32% and failed in the remaining 32%. The cure rate was 86% in stage 1, 70% in stage II (20% spontaneous and 50% with steroids). Thirteen patients in stage II relapsed after 2 years of steroid therapy within 3 to 6 months after discontinuation. Nineteen cases of skin lesions resolved spontaneously, 9 with steroid and 10 were failures. Five ocular cases cleared spontaneously; 21 cleared with steroid and 8 were failures. Mortality due to sarcoidosis or its complications was 1.7%.

S.P.P.

Clinical and pathological findings of multiple pulmonary hamartomas

M. Shiozawa, H. Hajikano and K. Fujimura. Raports of the Medical Research of the Japan Anti-TB Association; 197}, 19, 54,

Three cases of multiple pulmonary hamartomas. a very rare condition, are presented. Two cases were females aged 44 years and 40 years and one was a male 35 years old. The female cases were myofibroadenomatous hamartomas and the male myochondroadenomatous hamartoma. Radiologically they showed round or ovoid, sharply circumscribed, lobulatcd homogenous shadows with different sizes. Most of them were seen in the middle and lower lung fields. In 2 cases followed up for 4 to *5* years, there was a marked increase in their size. Ovarian cyst and uterine myoma were found in the female cases respectively. None of the three cases had any clinical sjrnploms and the> were detected during mass survey. Clinical course after removal was good in all cases.

Histologically they showed interlacing bundles of muscle fibre and connective tissue within which there were small spaces lined by single layer of cuboidal to tall epitheliums and ciliated epithelium in a few areas.

S.P.P.

Hodgkin's disease of the lung

Michael k. *Whitcomb ei al.* ***Amer.*** *Rev.* ***Resp. Dis.:*** *1973. 106, 79.*

Pulmonan involvement has been reported in 15 to 40% of cases of Hodgkin's disease. The lung condition of29 patients with Hodgkin's disease has been described. The diagnostic criteria were: (I) Presence of a radiological abnormality of the lung proved to be due to Hodgkin's disease by lung biopsy or autopsy (13 patients). (2) Presence of a radiological abnormality in ihe lung for which no other cause could be determined after detailed study and that was imresponsiu to treatment other than specific chemotherapy for Hodgkin's disease (16 patients). Lesions that progressed inspile of specific chemotherapy or radiation were not regarded as inconsistent with Hodgkin's disease of the lung.

Twenty patients were males and 9 females. The mean age of the group was 26 years, with a range of 1C) to 67 years. Majority of the patients were between 18 and 25 years and only 6 were older than 30 years. Eighteen had lung involvement at the time of initial diagnosis and the remaining 11 developed lung lesions from ! to 13 years after the diagnosis of Hodgkin's disease. In none of the patients with lung involvement at the time of initial diagnosis was ihe disease confined to thorax. Cough was the only pulmonary symptom present most consistently. Radiologically the lesions were either homogenous, confluent infiltrates or fibronodular infiltrates or discrete nodules or consolidation. In 26 out of 29 patients the disease was sclerosing nodular in type. Enlargement of the hilar nodes was present in all cases. Lung involvement without associated intra-thoracic adenopathy is possible but rare. Pleura! effusion was seen in 7 patients, superior vena caval obstruction in 2, phronic nerve paralysis in 2 and recurrent laryngeal nerve paralysis, broncho-esophageat fistula and alelectasis in one each as a complication.

Pulmonary disease was a major contributory factor to death in only two patients; one died of hemorrhage and the other as a result of broncho-esophageal fistula leading to aspiration pneumonia. In none of the other 15 patients who died was the pulmonary disease considered to have derange lung function severely enough to cause disease.

S.P.P.

Pulmonary dysfunction in rheumatoid disease

Sanders T. Frank, John G. Weg; Lionel E. Hurkleroad and Ray F. Fitch. Chest, Vol. 65, *No. 1, Jan. 1973.*

in 41 consecutive patients of rheumatoid arthritis, 41.4 percent had abnormalities of pulmonary diffusion, decreased vital capacity and total lung capacity with arterial hypoxaemia. Lung biopsy showed interstitial fibrosis. Usually patients were Asymptomatic and 47 percent had normal chest roentgenograms.

The clinical significance of pulmonary fibroses in rhematoid patients is unknown and disease is mild clinically and is slowly progressive. Thus pulmonary fibroses is common in rheunmatoid disease and should be regarded as an expected manifestation rather than unusual complication.

H.B.D.

Regional lymphadinitis following BCG vaccination (BCGitis)

Carballo and Sanchez, clinical pediatrics, Vol. ;/, No. J2, Dec. 1972.

Of the 1295 children vaccinated with BCG,

25 or 1.9 per cent developed regional lymphadenopathy (BCGitis).

In hair the cases the enlarged glands showed suppuration mostly in infants.

The frequency of BCGitis decreased with change from fluid to freez dried vaccine.

H.B.D.

Assessment of operative risk of pneumonectomy

Joseph Reichal Chest. Vol. 6, 25, Nov. 72.

Age, exercise tolerance, preoperative pulmonary function and associated diseases were co-related with post operative mortality and morbidity in a group of 75 patients undergoing pneumonectomy over a ten year period.

There was no cardiorespiratory mortality or morbidity subsequent to pneumonectomy in those whose standard exercise tests were normal.

Eight of the 14 patients who failed to complete the exercise tolerance test had serious cardiorespiratory complications.

H.B.D.