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The Indian Journal of Tuberculosis

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TUBERCULOSIS AND MEDICAL EDUCATION

With eight to ten million estimated patients with X-ray evidence of Pulmonary Tuberculosis out of which at least quarter would be sputum positive, and considering the numerous patients with extra pulmonary lesions, there is no doubt that Tuberculosis continues to be our foremost health problem. This is particularly so for tuberculosis has the inherent tendency to keep up the vicious cycle of spread from one to other thus threatening to result in an ever increasing problem of disastrous proportions. It must be tackled effectively, vigorously and promptly on a community basis.

It then follows that the army of workers, that would be needed to tackle the deadliest of our enemy, needs to be adequately armed with knowledge of how to deal with it. Not only the medical and para-medical personnel engaged in official Tuberculosis services must be adequately taught and trained but the general practitioners and specialists in diverse branches of medicine must also be well equipped to deal with tuberculosis for a considerable proportion of tuberculous patients are treated outside organised services. Since the national tuberculosis control programme envisages integration of tuberculosis with the general health services of the country, adequate knowledge about diagnosis, treatment and prevention of tuberculosis must be imparted to all medical, nursing and para-medical students who after completing their training will be required to man the peripheral health institutions.

As the medical student of today is the practicing doctor of tomorrow he must get adequate training of tuberculosis in his undergraduate course of studies. The Tuberculosis Association of India has done well in setting down some well defined norms of teaching and training in medical institutions both at the undergraduate and postgraduate level. While thorough grounding in the clinical aspects of tuberculosis is essential during the training of undergraduate medical students, they must also be exposed to the community aspects of the problem during their under-graduate training. In other words, the time allotted to the study of tuberculosis in under-graduate curriculum should be so modified that the student must get a picture of tuberculosis control which he or she will have to face while working as 'basic' doctor. The Medical Colleges will do well to adopt these suggestions. They should also organise Refresher Courses for the General Practitioners with the co-operation of Voluntary Agencies in the field of Tuberculosis.

As far as the training of para-medical personnel namely, health visitors, laboratory & X-ray technician is concerned, although the National Tuber-

culosis Institute at Bangalore has undertaken this aspect of training to fit the district teams with adequate knowledge for running the District Tuberculosis Programme, the medical colleges as also the State Demonstration Centres have to give the basic training for these classes of workers as also to organise refresher courses for them to keep up the level of knowledge acquired at National Tuberculosis Institute. There is also a sound suggestion that State Training and Demonstration Centres should undertake training of District teams to lighten the work of N.T.I, and to speed up the establishment of programme.

The Staff and equipment of these centres may have to be augmented to take on this added responsibility. They should then also be able to take on the work of supervision over the District Tuberculosis Programme in all the districts in the State.

Now that the Indian Medical Council have classified 'M.D. Tuberculosis and Respiratory Diseases' as a broad speciality the teaching departments of the speciality in Medical Colleges will have to be suitably expanded. It has already been suggested that the O.P.D. Department of Teaching Hospitals should be full-fledged TB Clinic with Health Visiting section for Domiciliary Treatment. The student and nurses must have a model of community TB services in their own campus. It is also necessary to attach a BCG team to the Tuberculosis and Respiratory Diseases Department of the Medical College for BCG is one of the most important steps in control of tuberculosis. Every medical student and every nurse must be trained in the technique of BCG vaccination so as to be able to lend help in the extensive BCG programme necessary to cover all the Primary school and pre-school age children in our country.

Let us all take up this particular aspect of management of tuberculosis seriously. Need for knowledge as also for refreshing it in those who have been trained before is a dire necessity to make our National Tuberculosis Programme effective.

THE CLINICAL SPECTRUM OF ATYPICAL MYCOBACTERIOSIS

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Abstract

A total of 31 strains of atypical mycobacteria were isolated in the laboratories of the AIIMS, New Delhi from children under the age of 15 years, during the period 1966 up to Sept., 1971. Of these, clinical data is presented on 28 children: 7 presented with pulmonary tuberculosis, 5 with osteomyelitis, 4 with tuberculous meningitis, 2 with tuberculous cervical adenitis, 2 as pyrexia of unknown origin, and 1 with aortitis. The diagnosis of tuberculosis was uncertain in 2 children, while 5 had unrelated diseases, where the mycobacteria isolated were considered casual recoveries. No major distinguishing features could be attributed to tuberculosis due to atypical bacterial infection, as compared to that due to *M. tuberculosis*. Minor differences are discussed.

The mycobacteria isolated were considered definitely pathogenic in relation to the child's disease in 3 cases, probably pathogenic in 11 cases, possibly pathogenic in 6, probably non-pathogenic in 2, definitely non-pathogenic in 5, while in 1 case information was incomplete.

The source of the isolations was: pus from discharging sinuses in 4, pus aspirated from a cervical abscess in 1, cerebrospinal fluid in 5, subdural fluid in 1, pleural fluid in 1, pharyngeal swab in 1, sputum in 2, and gastric lavage material in 13.

Introduction

The atypical mycobacteria have been established as pathogens capable of producing human disease resembling that due to *Mycobacterium tuberculosis* so closely that it is agreed that such disease be designated tuberculosis also. They have been classified by Runyon into four groups, depending on various growth characteristics, pigment production and biochemical reactions.¹⁵ The widespread prevalence of these organisms is in marked contrast to their low pathogenicity. They are responsible for only 3-5% of cases of tuberculous disease. In developed countries, as the incidence of tuberculosis decreases, that of atypical mycobacterial disease appears to be increasing. In reviewing the etiology of tuberculous cervical adenitis reported from Great Britain, Australia and the U.S.A., Keay found 75% of cases were due to atypical mycobacteria.⁹ On the other hand, underdeveloped countries, with a high prevalence of tuberculosis, have a much lower disease rate of atypical mycobacteriosis. Selkon quotes the figure of 0.1%—0.9% of all pulmonary tuberculosis being due to atypical mycobacteria

as the rate for Africa, India and Hong Kong, of 1-10% for the U.S.A., and 10% for W. Australia.¹⁸

The rarity of disease due to these mycobacteria in India is shown by Bhatena et al who cultured only 1 scotochromogen in a total 28 strains of acid-fast bacilli cultured from a large series of autopsy material, the rest all being *M. tuberculosis*.² Thomas reports only 2 isolations of atypical mycobacteria in 341 cases of pulmonary tuberculosis in Madras, even these two being considered non-pathogenic.¹¹ Joishy reports a total of 44 isolations of atypical mycobacteria from human pathologic material in Bombay, the majority of which were rapid growers or Runyon Group IV.⁸ This group showed the lowest skin sensitivity rate in a study from the A.I.I.M.S., New Delhi, where a total of 16% of 200 consecutive children admitted, showed a skin reaction of 6 mm or more to a battery of atypical mycobacterial antigens. Sensitivity to PPDS A, Y, G, B and F, was found in 11.5, 8.5, 8.0, 7.5 and 1.5 percent of children, respectively.¹⁸ That there is widespread prevalence of these organisms in India, though

not of disease due to them, is also shown by Wijsmuller's study of skin sensitivity to PPD-S and PPD-G in a South Indian village population.²² Almost 100% of children by the age of 10 years, showed some reaction to PPD-G, which increased in size with age. The large variation in sizes of the skin reactions suggests infection by related organisms producing cross sensitivity.

We present in this paper a summary of the disease pattern in all children under the age of 15 years, from whom atypical mycobacteria have been isolated from any source, from 1966 up to the present time.

Material and Methods

The pathological material submitted to the laboratory was stained by the Ziehl-Neelsen method, as well as cultured on Lowenstein-Jensen medium slopes. Cultures were checked once a week, and finally discarded after 8 weeks if no growth had occurred by then. Subcultures were made whenever growth occurred. Colony characteristics and pigment production were noted. The niacin, catalase and peroxidase tests were done on all mycobacteria isolated. Due to shortage of personnel, it was not possible to do full investigation for identification of the mycobacterial groups.

The children had a complete history and physical examination. Wherever possible they were contacted later, for as full a follow-up as possible. Investigation for tuberculosis included a tuberculin skin test done in the past one year, with 1 tuberculin unit (T.U.) of PPD-R.T. 23, with added Tween 80, supplied by the Guindy laboratories, Madras. Before that, old Tuberculin (O.T.) was used in a dose of 10 T.U. in 0.1 ml of a 1 in 1000 dilution. Induration of 10 X 10 mm or more, at 48 hours, was considered a positive test. Lower reactions should be charted by size, but occasionally, have been marked only as "negative" on the chart. Tuberculin skin tests were done on the family also, wherever possible.

A chest film on the child and family was taken in most cases. Other investigations, done as considered necessary, included cerebrospinal fluid examination and culture, pus culture for pyogenic organisms, and liver or lymphnode biopsy. In all cases, an effort was made to demonstrate mycobacteria by smear and culture from any tissue available. Where such investigations had been omitted during the child's original hospital stay, an effort was

made to contact the child later for full investigation and treatment.

Results :

A total of 31 strains of atypical mycobacteria were isolated. 3 charts could not be traced. 28 children were studied.

Clinical presentations in the 28 children were : 7 with pulmonary tuberculosis, 5 with osteomyelitis, 4 with tuberculous meningitis, 2 with tuberculous cervical adenitis, 2 with a picture of pyrexia of unknown origin (P.U.O.) with later confirmation of diagnosis of tuberculosis, and 1 with aortitis. The diagnosis of tuberculosis was doubtful in 2 children, and not tenable in 5 children, in whom the isolation of mycobacteria was considered casual.

Table I lists the diagnostic features in the total group. Table II presents the etiologic relationship to the disease of the mycobacteria isolated.

Abbreviation used in tables and text :

A.M. =Atypical mycobacteria

P+ + = Definitely pathogenic

P+ = Probably pathogenic

P = Possibly pathogenic

P— =Probably not pathogenic

C = Casual recoveries

U =Pathogenicity unknown

O.T. = Old Tuberculin

P.P.D. = Purified protein derivative

T.U. = Tuberculin units

E.S.R.— Erythrocyte Sedimentation rate

Tr =Treatment

F.U. = Follow-up

Hb = Hemoglobin

Wbc = White blood cell count

n.a.d. =nothing abnormal detected

N.R. =No record

N.D. =Not done

P.U.O. =Pyrexia of unknown origin

C.S.F. =Cerebrospinal fluid.

TABLE 1
 Diagnostic features in 28 children with atypical mycobacterial isolations

Series number	Source of A.M. isolation and probable pathogenicity	Tuberculin skin test	E.S.R.	Other relevant laboratory data	Biopsy	X-ray	History of contact with tuberculosis	Diagnosis and final outcome
1								
1	Gastric lavage P+	O.T., 10 T.U. =12 x 12mm	49mm	—	Liver: Focal mononuclear infiltration Fatty change	Consolidation: areas of rt lung	+	Tuberculosis: pulmonary and disseminated Unimproved.
2	Gastric lavage P+	—	—	—	—	Basal consolidation: rt lung	+	Pulmonary tuberculosis Improved.
3	Pharyngeal swab P+	O.T., 10 T.U. —"neg"	25mm	Hb=5.5 Gms.	—	Consolidation: upper zones of both lungs	—	Pulmonary tuberculosis Anemia. Malnutrition. Improved.
4	Gastric lavage P+	O.T., 10 T.U. =4 x 4mm	—	Empyema fluid sterile on culture for pyogenic organisms	—	Rt pleural effusion Rt basilar infection	—	Empyema and pneumonitis? Tuberculous Improved.
5	Pleural fluid P+	O.T., 10 T.U. —"neg"	40mm	Pleural fluid: 27600 lymphocytes per cmm Culture: neg for pyogens. A.M. cultured Bonemarrow: non-specific reactive	Lymph node: Lymphosarcoma	Left pleural effusion. Mediastinal mass	—	Lymphosarcoma with pleural mediastinal and lymphnode involvement? Superinfection by A.M. Improved.
6	Gastric lavage P	O.T., & P.P.D. "neg"	—	—	—	Consolidation: apex of rt lung	+	Pneumonitis? Tuberculous completely well at 2 yrs. F.U.
7	Sputum U	—	11mm	—	—	—	—	Respiratory infection Pathogenicity of AM-unknown report incomplete No follow up.

1	2	3	4	5	6	7	8	9
8	Gastric lavage P+	O.T., 10 T.U. "neg"	16mm	—	—	Chest : Opacity : rt upper zone, Bones : Tuberculous dactylitis	—	Tuberculous dactylitis No follow up.
9	Pus from sinus P	—	—	Pus from sinus grew staphylococcus aureus, coagulase +ve as well as A.M.	Bone curren- tings : non- specific chronic osteomyelitis	Chronic osteomyelitis —rt fibula	—	Chronic osteomyelitis, due primarily to either A.M. or staphylococcus aureus, with superinfect- tion by other organism. Improved.
10	Pus from sinus P+	PPD-1 T.U. 13 x 10mm	—	Pus from sinuses cultured staph aureus twice, kebsiella, proteus & pseudomo- nas once each A.M. also cultured.	Bone curren- tings : non- specific chronic osteomyelitis	Chest : nad Bones : chronic osteomyelitis- left tibia & left humerus. Thickening of cortex of rt clavicle	—	Chronic osteomyelitis primarily due to either A.M. or staphylococcus aureus, with superin- fection by other organism Improved.
11	Pus from sinus P	—	—	Pus from sinus grew staphylococcus aureus, coagulase +ve as well as A.M.	—	Chest : nad Bones : Chronic osteomyeli- tis : rt femur & rt acetabulum	—	Chronic osteomyelitis primarily due to either A.M. or staphylococcus aureus, with superin- fection by other organism Improved.
12	Pus from sinus P	—	(i) 54mm (ii) 165mm (iii) 100mm	Pus from sinus grew staphylococcus aureus, coagulase +ve as well as A.M.	Bone curren- tings : chronic non-specific osteomyelitis	Bones : Chronic osteomyelitis left femur, ileum and ischeum	—	Chronic osteomyelitis primarily due to either A.M. or staphylococcus aureus, with superin- fection by other organism Improved.
13	Gastric lavage P	O.T., 10 T.U. = 3 x 3 mm Later PPD 1 T.U. = 14 x 15 mm	—	Consistent with tuber- culous meningitis gradual improvement	Liver biopsy- normal	Chest miliary tuber- culosis	—	Tuberculosis : Miliary and meningeal. Sequelae : Minimal left hemiparesis Improved.

1	2	3	4	5	6	7	8	9
14	CSF P+++	O.T., 100 T.U. "neg"	—	CSF compatible with tuberculous meningi- tis. Culture neg. for pyogens	—	Chest : hilar & peri- bronchial lympho- adenopathy with calci- fication. Skull : Increased intracranial tension	—	Tuberculous meningitis Died.
15	CSF P+++	O.T., 10 T.U. "neg"	—	CSF compatible with tuberculous meningi- tis. Culture neg. for pyogens	—	Chest : mediastinal widening	—	Tuberculous meningitis Died.
16	Gastric lavage P+	O.T., 10 T.U. =10 x 8 mm	—	CSF compatible with tuberculous meningi- tis. Culture neg. for pyogens	—	Chest : collapse con- solidation lingular lobe	—	Tuberculous meningitis with pulmonary tuber- culosis Died.
17	Gastric lavage P+	PPD 1 T.U. =10 x 9 mm 3 months later =16 x 18 mm	—	—	Lymphnode biopsy : Tuberculous lymphadenitis	Chest : 1) normal 2) 2 yrs later : opacity- rt base 3) 2 mos later : con- solidation : left lung 4) 3 mos later : rt hilar adenopathy parenchyma clear	—	Tuberculous cervical lymphadenitis Improved.
18	Pus aspirated from cervical node abscess P+++	—	—	—	—	—	—	Tuberculous cervical lymphadenitis abscess formation No follow up.
19	Gastric lavage P+	O.T., 10 T.U. =9 x 9 mm	55 mm	Hb=8 Gms% Bonemarrow : Iron deficiency anemia Tests for Typhoid brucella, rhenmatoid & L.E.-neg	—	Chest : nad Abdomen : nad	—	Malnutrition P.U.O. Probable Abdominal Tuberculosis Improved.

1	2	3	4	5	6	7	8	9
20	Gastric lavage P+	O.T., 10 T.U. "neg" 1 yr later 17 x 20mm	125mm	Urine—nad Liver function tests— nad. Tests for thyphoid, brucella, inf. mono- nucleosis & rheuma- toid disease—neg. Bonemarrow culture for brucella—neg.	—	Chest: nad 1 yr later: fibrotic lesion left apex. 2½ yrs later: left hilar adenopathy. Abdomen, Knees & ankles—nad.	—	P.U.O. Later: Pulmonary tuberculosis Improved.
21	Gastric lavage P+	PPD, 1 T.U. =8 x 8 mm	50mm	ECG—left ventricular hypertrophy. Bid urea 23 mg%, L.E. prep—neg. Urinalysis— nad. Urine culture— nad.	—	Chest: Calcified nodes left hilum Parenchy- matous lesion—left lung. Aortogram: Diffuse narrowing— lower thoracic & abdominal aorta	—	Takayasu's disease (Aortitis) Improved.
22	Sputum P—	O.T., 100 T.U. —neg	38mm	Hb=5.2 Gm% Serum Fe=28 mcg% Total Fe binding capacity=348 mcg% Bonemarrow—iron deficiency anemia. Stools: Cardia+ Oxyuris+Urine—nad	—	Chest, abdomen, barium swallow—all normal	—	Malnutrition, Anemia Avitaminosis A. Giardiasis, Oxyuriasis, Improved.
23	Gastric lavage P—	O.T., 10 T.U. —neg	23mm	Stool— E. Histolytica and Ankylostome	—	Chest & abdomen— nad	—	Malnutrition, Anemia Amebiasis, Ankylosto- miasis Improved.
24	CSF C	—	—	CSF—nad except for growing A.M.	—	Skull: nad Chest: nad	—	Afebrile convulsion ? Epileptic focus. Birth Trauma Improved.
25	CSF	O.T., 10 T.U. —neg	—	CSF—nad on cyto- logic and biochemical investigation. Cul- ture—neg for pyogens grew A.M.	—	Skull: Gross enlarge- ment of skull, separa- tion of sutures, and thinning of tables	—	Hydrocephalus Ventr- iculojugal shunt done. Died on day of opera- tion. Due to ? aspiration.

	1	2	3	4	5	6	7	8	9
26	CSF AM C	PPD 1 T.U. =0	—	CSF compatible with pyogenic meningitis. Staphylococci on direct smear. Culture: neg for pyogens (antibiotics given for 2 days before admission and CSF exam.)	—	Chest: nad	Family survey showed fibrotic lesion—r mid lung in father with PPD 1 T.U.=15x14mm. Brother: calcified hilar lymph nodes with PPD neg. All asymptomatic	Recurrent pyogenic meningitis following basilar skull fracture. Well on 2 yrs follow up.	
27	Subdural fluid C	PPD 1 T.U. =2 x 2mm	—	CSF—nad except for protein of 100 mg. CSF: culture neg. for AFB or pyogens. Subdural tap—few drops of hemorrhagic fluid obtained, +ve for A.M.	—	Skull: sagittal suture synostosis Chest: nad	Sagittal suture synostosis. Craniotomy done. 2 yrs follow up—well (no anti-tubercular therapy given)		
28	Gastric lavage C	—	—	—	—	Chest: nad	—	Bronchiolitis Well.	

TABLE II

Etiologic Relationship of A.M. isolated to disease

Types of Presentation	Total Number of Cases	Atypical Mycobacteria					
		Definitely Etiologic	Probably Etiologic	Possibly Etiologic	Probably not Etiologic	Definitely not Etiologic	Un-known
Pulmonary	7		4	2			1
Osteomyelitis	5		1	4			
Meningitis	4	2	2				
Lymphadenitis	2	1	1				
P.U.O.	2		2				
Aortitis	1		1				
Doubtful diagnosis	2				2	5	
Casual recoveries	5						
Total	28	3	11	6	2	5	1

Discussion :

As the atypical mycobacteria are widely distributed in nature, and can be recovered from gastric contents of normal subjects or of those whose disease bears no relation to tuberculosis, criteria must be applied before these organisms can be considered etiologically related to the disease in a subject⁵. Criteria of different workers have been summarised in a review by Fogan⁵. Kamamoto applies the standard of either one of two major, 3 or 4 minor criteria, being necessary for establishing etiologic relationship to disease²³. These criteria are :

Major Criteria :

1. Repeated discharge (more than 4 times) of atypical mycobacteria in large numbers (more than 100 colonies), and the presence of clinical symptoms that may be attributed to these bacilli.
2. Presence of a lesion containing atypical mycobacteria, and the histopathologic changes due, possibly, to these bacilli.

Minor Criteria :

1. Discharge of the bacilli either on several occasions (more than 4 times), or in large numbers (more than 100 colonies).

2. Coincident discharge of the bacilli with the course of the disease.
3. Presence of the bacilli in an organ or tissue, the histopathologic features of which are not known.
4. Stronger positive reactions in the skin test with atypical mycobacterial tuberculin than with human tuberculin; or coincident change in the degree of skin reaction at atypical mycobacterial tuberculin with the course of the disease.

It will be seen that major criterion no. 2 was satisfied in 3 of our cases—1 with cervical adenitis (no. 18), and 2 with tuberculous meningitis (no. 14 and 15). In eleven other cases, the isolation of the organisms, and the failure to isolate *M. tuberculosis*, in association with tuberculous disease, makes it very probably that they are etiologically related. However, more than one isolation is required for diagnosis, unless mycobacteria are cultured from the affected tissue itself.

Of the pulmonary cases, no. 5 is of special interest. Lymphosarcoma was diagnosed by lymphnode biopsy. The pleural effusion contained a heavy lymphocytic cell content, which was not considered malignant. Atypical mycobacteria were cultured from the pleural fluid. It is known that these organisms are of lower

virulence, and tend to attack tissue which is already damaged by other disease processes. It is possible that mycobacterial infection of the pleura took place due to the loss of immunological capacity of the body known to occur in lymphomas. The heavy lymphocytic response in the pleural fluid would indicate lymphomatous pleural involvement also.

Case no. 1 illustrates the types of hepatic lesions found in association with pulmonary or extra-pulmonary tuberculosis. Fatty change, seen in 30% of all cases of tuberculosis, is rare in the absence of malnutrition, except in tuberculosis. Focal mononuclear infiltration is an even commoner lesion¹⁰. However, only granuloma with caseation, destruction of the reticulin framework, or with AFB present, is diagnostic of tuberculosis¹⁷.

In a number of cases, the tuberculin skin test was listed as "negative". This could mean a reaction of anywhere from 0 to 9 mm. Atypical mycobacterial infections produce a low skin sensitivity to antigens prepared from *M. tuberculosis*. So a "negative" skin test is compatible with such a diagnosis. A completely negative reaction, however, would be rare in any mycobacterial infection, though it can happen under certain conditions such as malnutrition¹¹, and severe disease such as miliary and meningeal tuberculosis. Case no. 19, though severely emaciated, produced a 9 x 9 mm reaction to the tuberculin test. In the 4 cases of meningitis, the reaction was "negative" in two, 3x3 mm in one, and 8X 10 mm in 1.

Of the osteomyelitis cases, only no. 8, the child with tuberculous dactylitis, was definitely tubercular. The other four had chronic discharging sinuses, through which superinfection could have occurred by either mycobacteria or the staphylococcus aureus, of an osteomyelitis primarily due to the other organism. Biopsy of curettings showed nonspecific chronic osteomyelitis. However, atypical mycobacteria tend to produce a more exudative and non-specific inflammatory reaction, than does *M. tuberculosis*, which produces a slower and more granulomatous type of response¹⁴. Also, in experimental as well as clinical bone and joint tuberculosis, biopsy specimens frequently reveal a non-specific inflammatory reaction for a varying period, before final biopsy reveals granulomatous lesions.

In suspected skeletal tuberculosis, evidence of tuberculosis elsewhere in the body and in the family should be sought. However, pulmonary tuberculosis is associated in only 50%

of such cases⁴. Family survey is often negative in atypical mycobacterial infections, as transmission from person to person probably does not occur, infection occurring from the environment. In these four children, chest films were normal in two, and there were no other cases of tuberculosis in the family. Absence of much new bone formation and of sequestration distinguishes tuberculous from pyogenic osteomyelitis.²⁰ This does not hold good, however, when there is superinfection by pyogens. Two of these four (nos. 11 and 12) showed predominantly lytic destructive changes with minimal sclerosis.

Healing without anti-tubercular drugs would tend to favour a pyogenic etiology. Atypical mycobacteria are usually resistant to first-line anti-tuberculous drugs i.e. isoniazid, streptomycin and PAS., and are more likely to respond to 2nd line drugs, especially cycloserine and ethionamide. However, surgical excision, wherever feasible, covered with even first-line drugs, remains the treatment of choice. All these four children had sequestrectomy, curettage, drainage, and/or excision of sinuses covered with short courses of Penicillin and Streptomycin in two-week to two-month periods. One was later started on full treatment with first line anti-tubercular drugs (no. 9). On this regime, partial healing occurred in one (no. 11), while two (no. 9 and 10) are completely recovered on follow-up. In conclusion, though we have not enough evidence for a definite diagnosis of atypical mycobacterial osteomyelitis in these four children, it remains a good possibility.

Of the four children with tuberculous meningitis, only one survived. Of the three who died, one came to hospital in the third stage; one took treatment irregularly at home, relapsed, and presented with block and increased intracranial tension; and one was treated late due to a wrong diagnosis of pyogenic meningitis. French describes tuberculous meningitis as the commonest cause of the syndrome of meningitis in association with pneumonitis and hydrocephalus or split sutures.⁶ A shunt operation was indicated, and is now being done, even in the presence of active meningitis.

Tuberculous cervical lymphadenitis seen in two children, with abscess formation in one. Abscess formation occurs more often in atypical mycobacterial infections.¹² The majority of atypical mycobacterial lymphadenitis is due to scotochromogens. Grouping of the organisms was not done in these two children.

The two children presenting as pyrexia of unknown origin, finally showed evidence of tuberculosis.

The two children with doubtful tuberculous disease had no definite evidence of tuberculosis and had enough other pathology to explain the clinical picture.

The child with aortitis had evidence of tuberculosis, as has been found in many such patients in India and Japan^{12,19}.

In conclusion, it can be seen that atypical mycobacterial disease can present with as wide a clinical spectrum as disease due to *M. tuberculosis*. Minor differences, in the type of disease are discussed. The etiologic role of the organisms in any individual case remains in doubt unless strict criteria are applied.

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PLEURAL PUNCH BIOPSY IN TUBERCULAR PLEURAL EFFUSIONS—TO FIND OUT COMPARATIVE VALUE OF SINGLE AND MULTIPLE SPECIMENS*

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Introduction

In our earlier work (Pragani et al, 1962 and Deshmukh et al, 1968) we had shown that pleural biopsy with Harefield punch gave positive results to the extent of 47 to 71 per cent. The present work was undertaken to compare the results of pleural biopsy at different sites and to compare the results of single specimen with multiple specimens from the most promising site namely, scapular line.

Material and Method

50 consecutive cases of pleurisy with effusion diagnosed at O.P.D. of the TB Department of Sir J.J. Group of Hospitals, from January 1970 to December 1970, were taken for the present study. None of these patients had received any anti-tuberculosis drugs before they presented themselves with symptoms.

The diagnosis of pleural effusion was established by :—

1. Clinical examination
2. Fluoroscopy or X' ray of the chest
3. Thoracocentesis and examination of the fluid
4. Pleural biopsy

X-ray examination was done to confirm the clinical diagnosis and was repeated after complete aspiration to see if there was any residual fluid as well as to see if there was any complication such as surgical emphysema or hydropneumothorax.

Thoracocentesis and aspiration of the fluid was done with the Harefield punch biopsy needle. Pleural biopsy specimen was taken after complete aspiration of the fluid. The following sites were selected for taking the biopsy specimen.

1. Scapular line
2. Posterior axillary line
3. Mid axillary line.

* This paper is based on the thesis submitted to Bombay University by one of the authors for M.D. Tuberculosis of Bombay University (S.S.V.)

The procedure of biopsy was as follows:—

Group I (Case Nos. 1 to 25) :

In these cases a single specimen was taken from each of the three sites mentioned above.

Group II (Case Nos. 26 to 50) :

Here, 3 specimens were taken by tilting the needle through a puncture in the scapular line. A single specimen was also taken from the other two sites.

The results of histopathological examination were expressed as follows :—

1. Tuberculosis:

Collection of epithelioid cells with or without caseation and Langhans giant cells.

2. Chronic Inflammation :

Necrotic material with polymorph and lymphocytes with fibroblastic reaction.

3. Acute Inflammation :

Fibrinous exudate with polymorphonuclear infiltration.

4. Fibrosis without evidence of inflammation :

Fibroblastic proliferation with collagenisation and occasional inflammatory cells.

5. Malignancy :

Cells with hyperchromatic nuclei infiltrating in between muscle bundles may be anaplastic or differentiated.

Results

It is observed that of the fifty patients 42 (84%) were males and 8 (16%) females.

18 patients (36%) were between 15—25 years of which 13 were male and 5 were female. 15 cases (30%) were between 26—35 years (13 males and 3 females). 13 cases (26%) were between 36—45 years of age—all were male. Remaining 4 cases (8%) were between 46—55 years of age.

TABLE 1

Distribution of patients according to their age and sex

Age in yrs.	No. of cases	Sex Male	Female
15—25	18	13	5
26—35	15	12	3
36—45	13	13	—
46—55	4	4	—
Total	50	42	8

Of the 50 cases, 37 showed pleural effusion without any involvement of lung parenchyma, while 13 showed pleural effusion along with lung lesion. Straw colour fluid was aspirated in 44 cases (88%), pus in 4 cases (8%) and haemorrhagic fluid in 2 cases (4%).

TABLE 2

Biopsy results in I—25 cases (group I)

Pathology	Sites		
	I	II	III
Tuberculosis	14 (56%)	9 (36%)	9 (36%)
Chronic Inflammation	8 (32%)	13 (52%)	8 (32%)
Acute Inflammation	—	—	—
Fibrosis	2 (8%)	2 (8%)	2 (8%)
Malignancy	—	—	—
Inadequate Biopsy Tissue	1 (4%)	1 (4%)	6 (24%)

Above table shows biopsy results on specimens from first 25 cases (Group I). 14 specimens (56%) from site I (scapular line) shows tuberculous changes, while 8 (32%) showed chronic inflammation. 2 (8%) showed non acute inflammation and the biopsy tissue was inadequate in one (4%).

Of the specimens collected from site II (posterior axillary line) 9 (36%) showed tuberculosis, 13 (52%) chronic inflammation, 2 (8%) non active inflammation and the biopsy was inadequate for one (4%).

Of the specimens at site III (mid axillary line) 9 (36%) showed tuberculous changes, 8 (32%) showed chronic inflammation, 2 cases (8%) showed non active inflammation and the tissue was inadequate for histopathological examination in 6 (24%).

Thus it is observed from Table 2 that the biopsy specimens collected at the posterior scapular line gives maximum positive results in tuberculosis—56% as compared to 36% at site II or site III.

Of the 25 patients, 16 (64%) proved to be tuberculous by collecting specimens at all 3 sites and of these 14 (85%) were detected by collecting specimens at Site I while only 8 (50%) and 7 (42%) by collecting specimen at Site II & III respectively indicating that the specimen collected at site I are far superior to those collected at Site II & III as far as the confirmation of tuberculosis is concerned.

Only 8 cases (32%) of the 14 patients proved tuberculous at Site I, were positive when specimen was collected at site II and 7 (28%) where the specimen was collected at Site III.

Above table shows that 25 biopsies were done at scapular line by multiple specimen method—19 specimens (80%) showed tubercular changes while 1 showed secondaries of adeno-carcinoma. 4 cases (16%) showed chronic inflammation, 1 case (4%) showed acute inflammation.

Biopsy done at site II showed definite tubercular changes in 9 (36%), 9 cases (36%) showed chronic inflammation and 1 case (4%) showed acute inflammation. No active inflammation was noted in 4 cases (16%) while in 2 cases (8%) biopsy tissue was inadequate for histopathological examination.

In tubercular pleural effusion, multiple specimens at scapular line gave far more positive results than at posterior axillary or mid axillary line (80% as compared to 36% and 32% at posterior axillary line and mid axillary line respectively).

Of the 25 patients in Group II, 19 patients had evidence of tubercular aetiology as proved by results of pleural biopsy taking 3 specimens at Site I, while at Site II and III only 8 and 7 respectively were positive. Single specimen at Site II and III added only one positive result to the 19 obtained from Site I, making a total of 20 positive results. Multiple specimen at

TABLE 3

Co-relation of histopathohgy results at site I to that at site II and III in 1—25 cases (group I)

Results at Site I	Results at Site II and III								
	Total	Tuber.		Ch. Inf.		No. Inf.		Tissue Insuf.	
		II	III	II	III	II	III	II	III
Tuberculosis	14	8	7	5	3	—	—	1	4
Chronic Inflammation	8	-	1	7	4	1	1	—	2
Fibrosis	2	—	—	1	1	1	1	—	—
Tissue Insufficient	1	1	1	—	—	—	—	—	—
Total	25	9	9	13	8	2	2	1	6

- I At scapular line by single specimen
- II At posterior axillary line by single specimen
- III At mid axillary line by single specimen.

TABLE 4

Biopsy results in cases 26—50 (group II)

Pathology	Site		
	I	II	III
Tuberculosis	19 (80%)	9 (36%)	8 (32%)
Chronic Inflammation (16%)	4	9 (36%)	11 (44%)
Acute Inflammation	1 (4%)	1 (4%)	—
Malignancy	1 (4%)	—	—
Fibrosis	—	4 (16%)	4 (16%)
Inadequate Biopsy	—	2 (8%)	2 (8%)

Site I is by far the best way for diagnosis in patients suffering from pleurisy with effusion.

As a single specimen from Site I in Group I patients gave only 14 positive results in 25 cases, it may be concluded that multiple specimen rather than one specimen are more likely to give positive results although it must be admitted that these two groups are not strictly comparable.

Discussion

Results of pleural biopsy done by different

types of needles and by various authors in cases of pleurisy with effusion are shown in Table 6.

It can be seen from the above table that the best results with Vim Silverman needle were obtained by Hellar et al (75% positive results). Others using Vim Silverman needle could only get positive results varying from 12 to 45%. Results with punch biopsy appeared to be better (48 to 60%). In our present series we got 50% positive in scapular line whereas 32 to 36% at other sites by single specimen method. No such comparison appears to have been made up till now.

There is no doubt that scapular is the most suitable site for assuring a high percentage of positive results. As the patients with pleural effusion lies down most of the time, the pleural effusion is collected in posterior part of the pleural cavity and so this area is more likely to show tubercular changes than at any other area.

Levine and Cugell (1962) illustrated how the percentage of positivity can be improved by repeating the biopsy two or three times in cases where the initial biopsy does not give definite diagnosis. In their study of 202, Cope needle biopsies of pleura and rib in 160 cases were analysed. Of these patients 106 had effusion at the time of biopsy and 44 did not. Table 7 shows diagnosis established by repeated biopsy.

TABLE 5
Co-relation of histopathology results of 3 specimens at site I to those of single specimen at site II and III
in cases 25—50 (group II)

Results at Site 1—3 specimens together	Total	Results at Site II and III									
		Tuber. II	II	Ch. Inf. II	III	Acute Inf. II	III	No. Inf. II	III	Tissue II	Insuf. III
Tuberculosis	19	8	7	6	8	1	—	2	3	2	1
Chronic Inflammation	4	1	1	3	1	—	—	—	1	—	1
Acute Inflammation	1	—	—	—	1	—	—	—	—	1	—
Milignancy	1	—	—	—	1	—	—	1	—	—	—
Total	25	9	8	9	11	1	—	3	4	3	2

TABLE 6

Name of author	Year	Method	No. of cases	Positive results	$\frac{o}{/a}$	Non Contributory biopsy	%
De Francis et al	1955	V.S. Needle	6	2	33	4	67
Hellar	1956	V.S. Needle	20	15	75	5	25
Donochee et al	1957	V.S. Needle	78	30	39	48	61
Mestitz et al	1958	Punch Biopsy	152	97	64	55	36
Misra et al	1958	V.S. Needle	35	4	12	31	88
Weiss et al	1958	V.S. Needle	31	23	70	8	30
Laggat et al	1959	Punch Biopsy	20	12	60	8	40
Mathur et al	1959	V.S. Needle	30	10	35	20	65
Anjara et al	1960	V.S. Needle	36	12	36	24	64
Pragani et al	1960	Punch Biopsy	17	8	48	9	52
Carpenter et al	1961	V.S. Needle	47	22	45	25	55
Deshmukh et al	1968	Punch Biopsy	70	50	71	20	29
Benjamin et al	1969	Punch Cope	10 30	18	40	22	60
Present study	1970	Punch Biopsy	25* 25**	20 14	80 56	5 9	20 44

* Punch biopsy by multiple specimen method

** Punch biopsy by single specimen method.

Above table shows that at the first time 57 cases (55%) were showing tubercular changes while 70 cases (69%) were diagnosed after repeating biopsy four times.

Thus these results show that multiple specimen is better than single specimen method

especially if taken at the scapular line.

Benjamin et al (1969) in their study through the same skin puncture two or three bits were taken by tilting the needle in different direction. Out of 20 cases of tuberculosis effusion they found 8 cases (40%) positive-

TABLE 7
Diagnosis established by repeated biopsies

No. of Biopsies	No. of Diagnosis
1st	57
2nd	7
3rd	3
4th	3
Total	70

In our series of multiple specimen method (scapular line) 19 cases (80%) out of 25 showed tubercular changes while 1 case (4%) showed malignancy. Biopsy done by single specimen method (scapular line) showed 14 cases (56%) tuberculosis.

Summary and Conclusions

Pleural biopsy was performed in 50 consecutive patients with tubercular pleural effusion. These cases were attending O.P.D. of the TB Department of Sir J.J. Group of Hospitals, from January 1970 to December 1970. Harefield punch biopsy needle was used in all cases. These cases were divided into two groups of 25 patients each.

In first group, single specimen was collected at scapular, posterior axillary and mid axillary line. In second group, three bits were taken through same puncture by tilting the needle in different directions in the scapular line while at posterior scapular and mid axillary line only single specimen was collected.

The following conclusions can be drawn :—

1. In the diagnosis of tuberculous pleural effusion, pleural biopsy is more reliable and quicker than any other method.
2. Harefield punch biopsy of parietal pleura is found to be a simple and safe procedure. It gives no great discomfort to the patient,
3. In first group of the 25 patients, 16 (64%) proved to be tuberculous by collecting specimen at all three sites and of these 14 cases (56%) were detected by collecting specimen at Site I, indicating that the specimen collected at Site I are far superior to those

collected at Site II (36%) and Site III (36%) in terms of confirmation of tuberculosis aetiology.

4. In group II of the 25 cases, 20 patients (80%) proved to be tuberculous by collecting specimen at all three sites and of these 19 patients (76%) were detected by collecting specimens collected at Site I by multiple specimen method indicating that Site I (with multiple specimen method) are far superior to those collected at Site II (36%) and Site III (32%) in terms of confirmation of tuberculosis aetiology.

5. As a single specimen from Site I in group I patients gave only 14 (56%) positive results in 25 cases while in group II with multiple specimen from I, 20 (80%) positive results were obtained, it may be concluded that multiple specimen are likely to give more positive results than single specimen method especially when taken from scapular line.

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ROLE OF ANONYMOUS MYCOBACTERIA IN PATHOGENESIS OF HUMAN TUBERCULOSIS

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During the last few years a number of reports have appeared in literature regarding isolation of mycobacteria from patients of tuberculosis, which were different in several respects from the well known *Mycobacterium tuberculosis hominis* or *bovis*. (Buhler and Pollak, 1953, Tempe and Runyon, 1954, Nassau and Hamilton, 1957, Davis, et al, 1966). These Mycobacteria have been designated as "Anonymous Mycobacteria" by Runyan (1959). Essentially anonymous mycobacteria differ from the usual *Myco. tuberculosis* by being non pathogenic to guinea pigs and taxonomically may be placed between the pathogenic tubercle bacilli and the saprophytes. Reports on the role of anonymous mycobacteria in human disease have appeared both in Indian and foreign literature, although the exact incidence varies widely and the role appears inconclusive. (Mahapatra, 1961, Kaur and Chitkara 1964, Bear et al, 1965 and Wolinsky et al, 1957).

Keeping in view a number of unsolved problems concerning anonymous mycobacteria, the present study was undertaken to evolve a satisfactory scheme for identification of anonymous mycobacteria, their classification into various assemblies and to ascertain their incidence in this part of India.

Material and methods

The primary isolation of Mycobacteria was done from sputum, urine, cerebrospinal fluid, bronchial aspirate and pleural fluid specimens taken from the cases of various types of tuberculosis in the Department of Pathology and Bacteriology of K.G. Medical College, Lucknow and G.S.V.M. Medical College, Kanpur

Specimens were cultured on modified Lowenstein-Jensen's Medium as prescribed by the International Union Against Tuberculosis. Each specimen was cultured in four bottles and one was incubated at 25° C, one at 37° C, one at 44° C as well as one was wrapped in black paper and incubated at 37° C.

Each culture was examined at weekly intervals for a total period of 12 weeks and was declared sterile if no growth appeared after this period.

Control strains also studied at the same period included *Myco. tuberculosis* var *bovis*, *Myco. phelei*, and *Myco. tuberculosis* var *hominis* (E 5) obtained from state serum institute, department of tuberculosis, Copenhagen, Denmark, and H 37 Ra and B&G strains, obtained from Trudeau Foundation, Medical Research Laboratories, Sarnac Lake, New York.

Colonies were observed for morphology and texture. Growth was typed as Dysgonic or Eugonic using criteria defined by Sula et al, 1963.

Each strain was further studied for following properties; Chromogenisity using the criteria of Guy (1960); growth in synthetic 'N' medium (Collins, 1962); Cord formation in Tween albumin medium (Dubos and Davis, 1946); Niacin test (Konno, 1960); Neutral red test (Dubos and Middle brook, 1948); Catalase test (Sula et al, 1963); Arylsulphatase test (Pattyn et al, 1965); Amidase test (Bonicke, 1962); for acetamidase, benzamidase, urease and nicotinamidase; Esterase test (Nakayam et al, 1963); Nitrate reduction test (Virtanen, 1960); and Indirect antibiotic sensitivity test (Canetti et al, 1963) for Streptomycin, PAS, INH, Viomycin, Thioacetazone, and Ethionamide.

Animal pathogenicity was carried out for only 12 strains of anonymous mycobacteria (Photochromogen 1, Scotochromogen 2, and Non chromogen 9). Two adult healthy albino mice 1J to 2 months old with a weight of 20 to 25 grams were used for each strain. A suspension of 1 mg of an young culture in 0.5 ml of saline was injected in their tail vein. The animals were observed daily for their health, food intake and alertness upto seven weeks. Those found dead were autopsied. The necropsy in the rest was carried out after eight weeks. The liver spleen, kidneys and lungs were examined macroscopically and microscopically for any evidence of tuberculosis.

When anonymous mycobacterium was identified in a culture three repeat specimens were collected at intervals of two to three weeks to confirm the presence of the same strain of anonymous mycobacteria and to

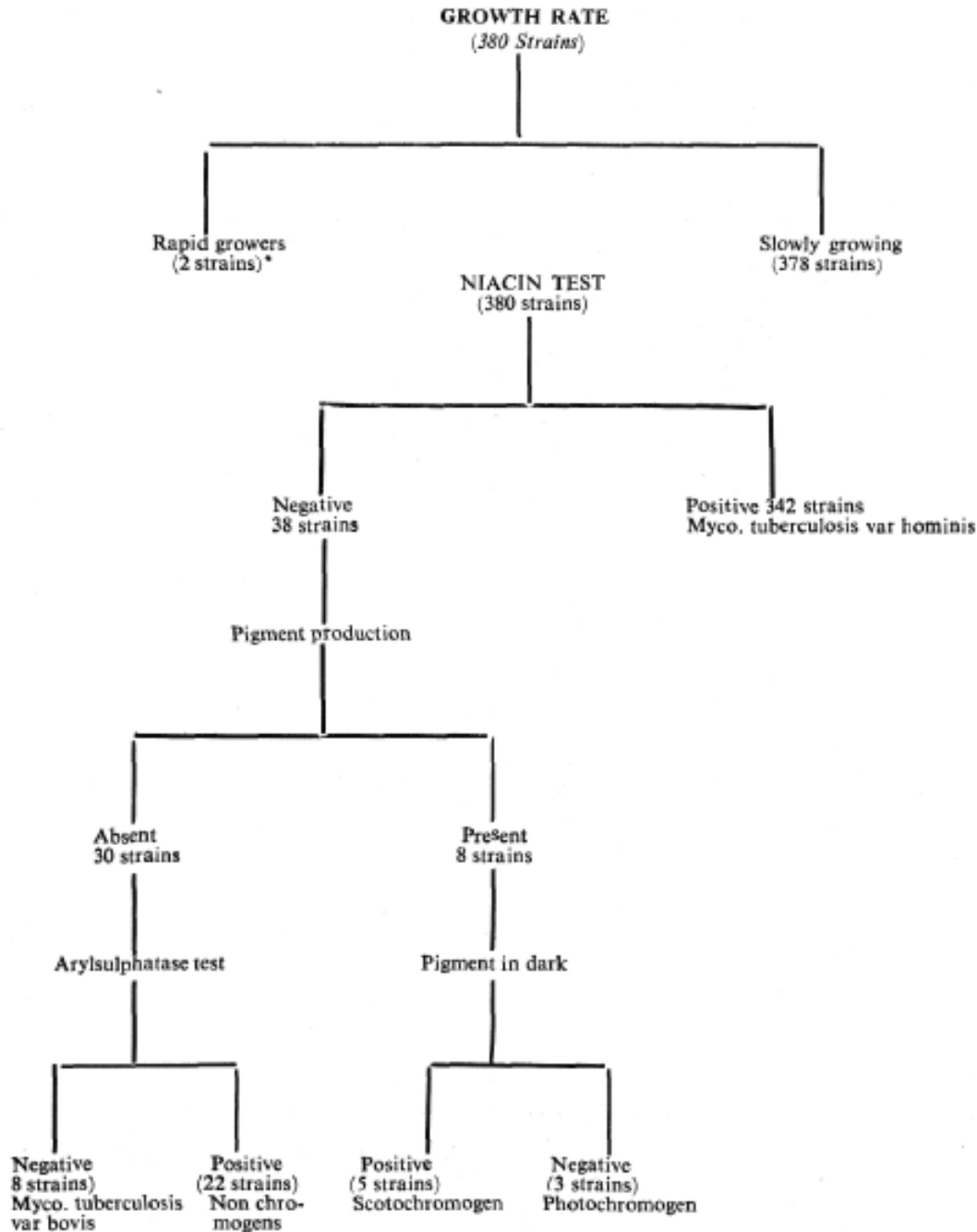
exclude a simultaneous presence of typical mycobacteria.

Results

A total of 1,597 cases of tuberculosis were studied. The diagnosis was made on clinical, radiological findings and special tests whenever indicated. The culture was positive for

mycobacteria in 380 (24%) cases. Table I shows the source and the incidence of the positive cultures.

On the basis of the growth rate; niacin test, pigment production and arylsulphatase test, these 380 strains were provisionally differentiated into different types of mycobacteria according to the scheme given below.



*Scotochromogens on the basis of biochemical and other properties.

TABLE 1
Incidence of positive cultures

Source	No. of specimens	Culture positive	Percent of positive
Sputum	1458	373	25.5
Urine	94	2	2.0
Cerebrospinal fluid	12	1	8.3
Pleural fluid	29	3	10.0
Bronchial aspirate	4	1	25.0
Total	1597	380	

Only two strains produced visible growth within 7 days. Hence they were labelled as rapid grower but on the basis of other properties they were found to be Scotochromogen. The Remaining strains exhibited visible growth after 14 days.

Altogether 32 strains (8.4%) of anonymous mycobacteria were isolated out of 380 positive cases of tuberculosis. These strains were all from sputum. The different growth characteristics are given in table 2.

An optimum growth of all the anonymous

TABLE 2
Culture characteristics of anonymous mycobacteria

Culture characteristics	Photochromogen	Scotochromogen	Non chromogen
1. Type of growth			
Eugonic	3	7	8
Dysgonic	—		14
2. Texture of colony		7	10
Rough, dry, granular	—		12
3 Smooth, moist, soft			
3. Colour of colonies			
Buff	3	2	8
Cream	—	5	4
Whitish	—		10
Light yellow	—		
Lemon yellow	—		
4. Pigment production			
In light	3	7	
In dark	—	7	—
5. Temperature of growth			
25°C	—	7	8
37°C	3	7	22
44°C	—		12
6. Growth in synthetic			
‘N* medium	—	—	—
7. Cord formation			
Serpentine cords	—	7	10
Poor cords	3		12
No cords	—		

mycobacteria was obtained at 37°C. However, all the strains of scotochromogens, (100%) and 8 strains of nonchromogens (36%) exhibited their growth at 25°C as well. The 12 strains of nonchromogens (34%) could also grow at 44°C. The incubation period for visible growth varied with different types of mycobacteria. The growth of human tubercle bacilli appeared within 3 to 8 weeks and that of the bovine tubercle bacilli between 5 to 8 weeks, whereas the anonymous mycobacteria could grow within 1 to 4 weeks.

Analysis of the data on cord formation showed that 99.5% of the strains of Myco. tuberculosis var hominis and bovis formed cords, whereas 3 strains (100%) of photochromogens and 10 strains (45%) of non chromogens formed poor cords.

The biochemical properties of anonymous mycobacteria are shown in table 3.

All the anonymous mycobacteria were niacin negative. While correlating the results of niacin, nitrate reduction and nicotinamidase tests it was observed that all the human strains were positive for all these three tests, whereas none of the strains of bovine and anonymous mycobacteria were positive for all these three tests. The three strains of photochromogens showed only nitrate reductase and nicotinamidase activity. All the strains of the anonymous mycobacteria exhibited a strong catalase activity and only the photochromogens were neutral red positive.

TABLE 3

Biochemical properties of anonymous mycobacteria

Test	Photochromogens	Scotochromogens	Non chromogens
Niacin test			
Positive			
Negative	3	7	22
Nitrate reduction test			
+++			
+++	3	7	22
Negative			
Arylsulphatase test			
-1 ++			
Negative	3	$\frac{2}{5}$	$\frac{4}{18}$
Estrase test			
+++			
Negative	3	$\frac{3}{4}$	22
Amidase test			
Urea	3	0	8
Nicotinamide	3	0	22
Acetamide			
Benzamide			
Catalase test			
+++			
++	3	7	22
Negative			
Neutral Red test			
Positive			
Negative	3	7	22

The drug sensitivity pattern of anonymous mycobacteria is shown in table 4.

Photochromogens and Scotochromogens are mostly resistant to all antitubercular drugs studied, while non chromogens showed variable results. It was interesting to note that all anonymous mycobacteria were INH resistant but strongly catalase positive in contrast to INH resistant Myco. tuberculosis hominis and bovis which were catalase negative.

Results of animal pathogenicity tests are shown in table 5.

Four strains of the non chromogens and

the single strain of photochromogen produced characteristic lesions in the lungs of the mice. (Fig. 1 and 2).

Discussion

The present study serves to demonstrate that anonymous mycobacteria are responsible for a sizable percent of the tuberculous lesions in man. Bogen (1968) from India, in an inconclusive report on the study of 500 strains of mycobacteria suggested that besides typical tubercle bacilli, atypical mycobacteria can be isolated from the clinical specimens. The relative distribution of different strains in India as reported by Patel et al, (1966),

TABLE 4

Drug sensitivity pattern of anonymous mycobacteria

Drugs	Photochromogen		Scotochromogen		Non chromogen	
	S	R	S	R	S	R
Streptomycin	1	2	—	7	12	10
PAS	—	3	—	7	7	15
INH	—	3	—	7	2	20
Viomycin	2	1	—	7	15	7
Thioacetazone	—	3	—	7	7	15
Ethionamide	—	3	—	7	7	15

S—Sensitive R—Resistant

TABLE 5

Rate of mortality of mice inoculated with the anonymous mycobacteria

Time of death	(Control) E5(2)*	Photochromogen (2)'	Scotochromogen (4)-	Non chromogen (18)*
1st week	—	—	1	1
2nd week	—	—	—	—
3rd week	—	—	—	—
4th week	—	—	—	1
5th week	—	—	—	1
6th week	—	—	—	1
7th week	—	—	—	1
8sh week (Sacrificed)	2	2	3	13

*Figure indicate number of mice inoculated in each group.

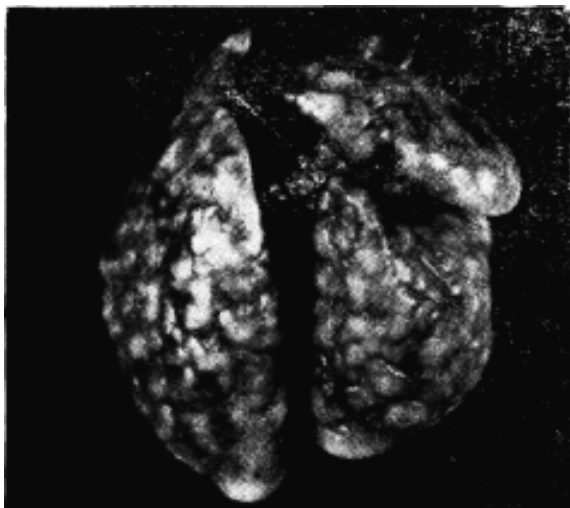


Fig. 1

Lung of albinomice showing confluent tubercles after 8 weeks of inoculation with photochromogen.

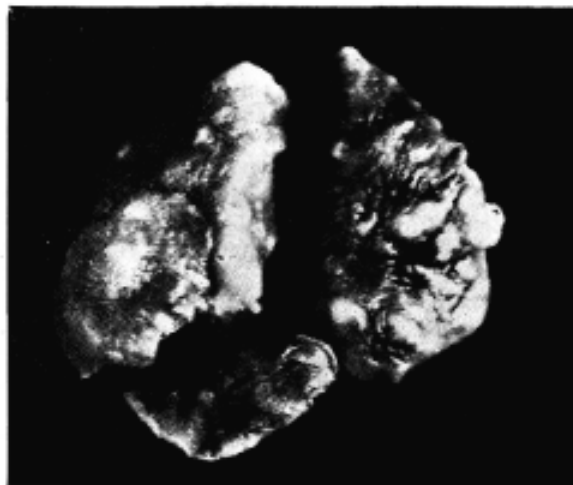


Fig. 2

Lung of albino mice showing fewer tubercles after 8 weeks of inoculation with non chromogen.

Mahapatra (1961) and Kaur and Chitkara (1964) show varying patterns. Patel et al (1966) from Baroda in a study of 41 strains isolated from 342 sputa, have found 34% incidence of anonymous mycobacteria; Kaur and Chitkara (1964) on the other hand, in a study of 50 strains have noted an incidence of 28%. The isolation of 8% of anonymous mycobacteria in this study is in close proximity to the findings of Mahapatra (1960) who observed an incidence of 5.0% amongst 125 strains of mycobacteria. Though anonymous mycobacteria have a predilection for white population as reported by Hedvall (1960) and Levis et al (1958), their prevalence as obvious from this study, is not uncommon in this country. There is no doubt about the pathogenicity of these strains, because in none of the cases a typical strain of mycobacteria in association with the anonymous mycobacteria was isolated. This observation is further supported by the fact that only the same strain of anonymous mycobacteria were constantly isolated in pure growth on three repeat occasions.

Information regarding the prevalence of the types of anonymous mycobacteria in India is scanty. Mahapatra (1961) in a study of 125 strains isolated 4.0% non chromogens and 1.0% scotochromogens from the sputum of the patients of pulmonary tuberculosis. Kaur and Chitkara (1964) studied 50 strains of mycobacteria and found 8.0% scotochromogens and 20.0% non photochromogens. The incidence

of various types in our material was 0.7% photochromogens, 1.0% scotochromogens and 5.9% non chromogens. This indicates that involvement of lungs by anonymous mycobacteria was mostly due to non chromogens.

Animal pathogenicity test was carried out in only 12 strains of anonymous mycobacteria, so their pattern of pathogenicity in mice cannot be dogmatically declared. However, it appears that photochromogens are pathogenic to mice. Among non chromogens 44.4% were pathogenic to mice. Runyon (1959) and Youmans (1963) have shown that photochromogens produce lesions in mice scotochromogens rarely and non chromogens, however, gave inconclusive results.

Summary

Out of 1,597 cases of tuberculosis, culture positive for mycobacteria in 380 (24%) cases, of these 32 (8.4%) cases showed presence of anonymous mycobacteria. All these strains of the anonymous mycobacteria were isolated from patients of pulmonary tuberculosis. These include 3 photochromogens, 7 scotochromogens and 22 non chromogens.

Photochromogens produced eugonic, rough, dry, granular and buff coloured growth, which on exposure to light formed deep yellow pigment. Optimum growth appeared on 37°C. These were neutral red positive, although poor cord former and strongly catalase positive.

These strains were niacin negative though nitrate reductase positive and hydrolysed urea and nicotinamide. But they were arylsulphatase negative and esterase positive.

The scotochromogens produced eugonic, smooth, moist, soft and yellow growth. They produced pigment in light as well as in dark. Optimum growth was obtained at 37°C, but they could grow well as 25°C as well. Inability to grow in Synthetic 'N' medium differentiates scotochromogens from saprophytic mycobacteria. They did not form the cords and were neutral red negative. These strains were niacin negative, nitrate reductase negative, arylsulphatase and esterase variable, but did not hydrolyse any of the four amides.

Non chromogens resemble typical types of tubercle bacilli in growth. The growth was more of dysgonic type. The optimum growth was present at 37°C although some strains also exhibited growth at 25° C and 44° C. They were neutral red negative, niacin negative, nitrate reductase negative, hydrolysed urea and acetamide, esterase negative but were arylsulphatase test positive.

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CASE REPORTS

SPINAL INFILTRATING EPIDURAL TUBERCULOSIS SIMULATING SECONDARY DEPOSIT

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Tuberculosis has become the arch simulator in neurological practice in this country with many an occult facet repeatedly unravelled. Tuberculosis patients can become paraplegic for a variety of reasons, a significant minority of such paraplegias are due to epidural granulomas. Tubercular epidural granulomas infiltrating and extending outside the spinal canal into the soft tissues mimicking an epidural secondary deposit is extremely uncommon. Hence the following case is considered worth presenting.

Case Report

L.B., A 20 year old married house wife was admitted to Neuro-surgery unit of Osmania General Hospital on 31-3-1971 with paraplegia and incontinence of urine. Three months prior to admission she first noticed pain in the back in the upper dorsal region which radiated across the chest and was aggravated by coughing, sneezing and even bending forwards. Six weeks later she developed slowly progressive weakness of both lower limbs and became paraplegic. Motor weakness was associated with numbness of both lower limbs and urinary incontinence.

Physical examination revealed a moderately nourished rather anaemic young lady but otherwise in good general health. She was in distress due to flexor spasms in both lower limbs. Neurological examination revealed spastic paraplegia with grade 0 power with flexor spasms in both lower limbs, mild disuse atrophy in legs, hyper reflexia of deep tendon reflexes and extensor plantar responses on either side. There was sensory loss for all modalities below dorsal three dermatome. There was retention of urine which required indwelling catheter. D-1 and D-2 vertebrae were tender on percussion.

Investigations

Urine analysis, chest x-ray, blood V.D.R.L. were normal. E.S.R. was 40 and 82 mm for the 1st and 2nd hours respectively. Complete blood picture showed 11 grams% of haemoglobin, 3.8 millions per c. mm of red blood

cell count, white blood cell count was 7,200 per c. mm with normal differential count.

Skiagrams of the dorsal spine (fig. 1) showed erosion of the pedicle of C-7 and dorsal 1 vertebra. Myelography showed epidural type of block at the level of Dorsal IV vertebra. Cerebrospinal fluid analysis showed protein 900 mg%, sugar 55 mg% and chlorides 650 mg%. There were 8 cells per c. mm and all were lymphocytes.

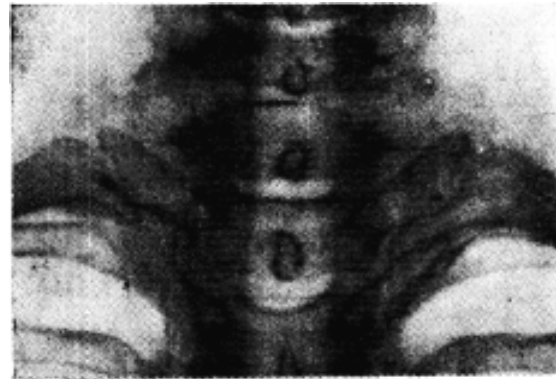


FIG. 1

Skiagram of the **spine** showing erosion of pedicles of cervical one vertebra

Operation :—Midline skin incision was made from C6-D2 vertebra. Retraction of the muscles revealed the presence of greyish brown necrotic tumour which infiltrated the muscles and also eroded the spinous processes and laminae of C7 and D1 vertebrae. There was epidural tumour extending over three vertebral levels in the dorsal region and also involved the lateral gutters. Dura was not opened. Total mass of tumour removed weighed about 20-25 grams.

Pathology :—Multiple bits of tumour were received. Histology (fig. 2) was characteristic of tuberculosis. In some areas muscular involvement by the tubercular process could be made out.

Post-operative course :—There was partial recovery of motor and sensory functions after

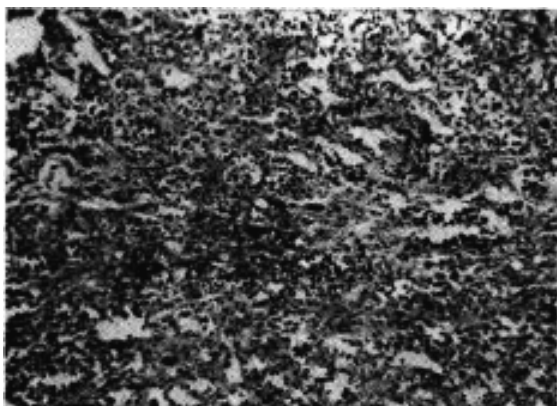


FIG. 2

Microphotograph of the tumour showing typical features of tuberculosis

the operation. Patient was able to void urine. Patient was lost for follow up after 2 months,

Discussion

Tuberculosis in and around the spinal canal is protean in its manifestations. Pott's disease of the spine is too well known. Spinal meningitis of tuberculous origin, both primary and secondary with radiculo myelopathy has been exhaustively described by Wadia and Dastur (1969). The rare manifestation of intra-spinal tuberculoma has been documented by Arseni and Samitca (1960), Rao and Subramaniam (1962) Wadia and Dastur (1969) etc. Epidural tuberculous granuloma unaccompanied by gross changes in the vertebrae presents a more difficult diagnostic problem. It has been suggested that these lesions are sometimes primary and haematogenous (Johnson et al. 1962). But the etiology of few such cases reported has not been beyond dispute. Autopsy examination of patients in whom detailed investigations were

unrewarding may reveal obvious spinal tuberculosis (Griffiths et al, 1956) and nothing short of autopsy can finally exclude the possibility of vertebral involvement. Small lesions confined to the laminae or pedicles are easily missed on X-ray and adequate examination of the vertebral bodies is not possible at operation. Clinically, lesions of this sort are most commonly seen in young adults and for various reasons, they are mistaken for more familiar disorders like malignant deposits in epidural space, multiple sclerosis, prolapsed disc etc. The case reported above brings home the above few points. There was radiological evidence suggestive of malignant deposit while at Surgery, there was not only involvement of bone but even infiltration into para-vertebral muscles. A similar case has been reported by Kocen and Ransone (1970).

Summary

An unusual case of epidural tuberculous granuloma producing spinal compression and simulating a malignant secondary deposit is reported. Brief mention is made of other tuberculous lesions producing paraplegia.

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CONGENITAL TUBERCULOSIS

G. N. TEWARI AND S. P. AGRAWAL

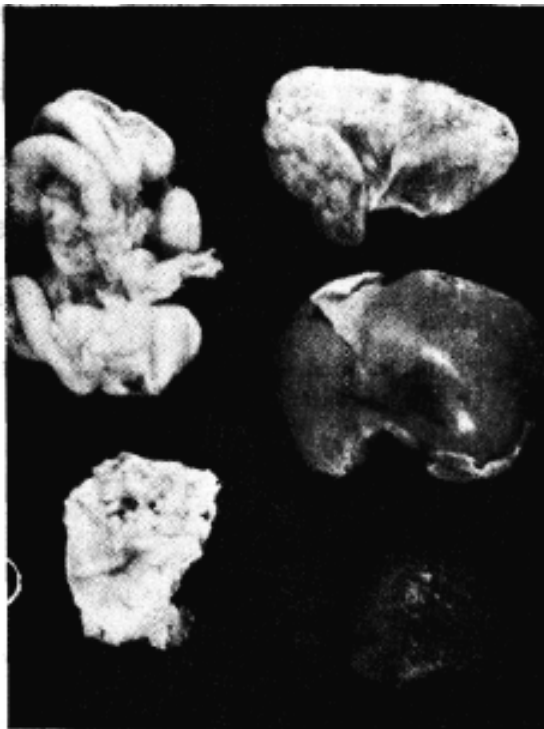
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In spite of the fact that tuberculosis is rampant in this country, it is very un rarely met With in the first few weeks of life. Wenlund found only 6 patients under 12 months of age out of 131 children suffering from tuberculosis. Ratner (1951) could not find even a single case of transplacental infection out of 260 babies born of mothers having active tuberculosis.

Recently, the authors met with a case of 12 Weeks old infant presenting with massive ascites, hepatosplenomegaly which on autopsy and histopathological examination proved to be a case of generalized tuberculous infection. Because of its rarity, this case is being reported herewith.

Case Report

Baby, 12 weeks old, Hindu, female was admitted on 2.2.1970 in the Children's Hospital, College of Medical Sciences, Banaras



Congenital Tuberculosis autopsy specimen of Spleen, Liver lung, intestine with matted mesenteric lymph nodes.

Hindu University, Varanasi, with complaints of gradual distension of abdomen and failure to thrive for the last 2 months. She was a full term normal delivery at home and was the first issue of the parents. Apart from mild gastrointestinal upsets like diarrhoea or vomiting there was no history of fever, cough, jaundice or bleeding. No vaccination of any sort was given. She was fed on artificial milk.

On examination : The baby was fully conscious, emaciated, with a pot belly. The height was 22.5", H.C. 15.7" and weight 2.8 kg. Small shotty lymphnodes were palpable in the cervical region. Pulse was 140/mt. and temperature 98.4°F (axilla). There was no jaundice or cynosis. The abdomen was markedly distended and umbilical hernia was present. There were no prominent veins in the abdominal wall. Shifting dullness and fluid thrill were present. Liver was enlarged 3 cm. in the right mid clavicular line and was firm and non-tender. Spleen was palpable 4.5 cms. and was firm. Clinical examination of the respiratory, cardiovascular and nervous systems did not reveal any abnormality.

Investigations : Hb. was 6.5 g. %, total W.B.C. count 16,400/cum. with poly. 94%, lympho. 5% and eosino. 1%. There were no immature cells seen in the peripheral smear. The E.S.R. was 27 mm. in first hour (Wintrobe). Urine examination revealed albumin 1+. Sugar, bile pigments and urobilinogen were absent. Stool examination showed plenty of pus cells. Plain x-ray of the abdomen showed evidence of ascites along with some gas shadows in the gut. Ascitic fluid examination revealed total protein 1.19 g. % with 340 cells per cumm., majority of which were lymphocytes. Tuberculin test could not be done due to short stay of the patient.

Course : The patient was put on drops of teramycin and injection of crystalline penicillin. She expired on 4.2.1970 approximately 50 hours after admission. A partial autopsy was performed and loops of intestine with enlarged matted mesenteric lymphnodes, liver, spleen and right lung were removed.

Gross and Histopathological findings : The mesenteric lymphnodes were enlarged and matted. There were small and big whitish

opaque areas externally and over the cut surface from which caseated material oozed out. Spleen was enlarged showing pin head sized tubercles in the subcapsular area. The surface was congested and in between there were pale irregular areas. Liver was also enlarged with pin sized tubercles dispersed over the surface. The pleura was irregularly thickened and external surface of the lungs showed whitish opaque circular areas of variable size. The bronchi were prominent and similar whitish opaque dots were scattered on the surface. Microscopic examination revealed generalised miliary tuberculosis of liver, confluent tuberculosis of spleen, tuberculous lymphnodes and tuberculous pneumonia.

Discussion

In the first few weeks of life, though tuberculosis is rare it runs a fulminating course. It may be in part due to delay in early diagnosis, poor defence mechanisms and immature physiologic responses. The so-called congenital tuberculosis is now a well established clinical entity. It is almost fatal if not treated early. Beitzke (1935) after reviewing 101 cases of congenital tuberculosis established the following diagnostic criteria :

- (1) the tuberculous nature of the lesion must be proved.
- (2) a primary complex in the liver and the glands in the porta hepatis is proof of the congenital nature, since the organism must be carried via the umbilical vein.
- (3) the condition can only be regarded as congenital in other circumstances if tuberculous lesions are found in the foetus in utero, at birth, or shortly after birth provided all extrauterine sources of infection can be eliminated with certainty.

The above criteria are applicable only if the infection is transplacental. In other groups of congenital varieties where infection has been acquired during birth by inhalation or ingestion of infected liquor amnii, the primary complex is not found in the liver but scattered tuberculous foci are seen in the lungs or the alimentary tract (Corner et al, 1955). In transplacental infection symptoms usually appear early, within the first two weeks of life, and the disease runs an acute course. When the infection has been acquired during delivery, symptoms are delayed but in both instances the disease progresses and the patients usually

die within two weeks to eight months (Shaffer, 1963). Though the prognosis is grave in such cases, it is more hopeful if treatment is started early. Five cases of congenital tuberculosis successfully treated have been recorded. (Hudson, 1956, Cashman, 1959).

In our case the patient started having symptoms at the age of 4 weeks, a fulminating course and died within 2 months of illness. Later on, the mother of the patient who was apparently normal was investigated and she was found to be suffering from tuberculosis. The x-ray chest of the mother showed tubercular infiltration of the left lower lobe. The sputum was repeatedly negative for acid fast bacilli. She is on anti-tuberculous treatment and is doing well. This gives the possibility that the patient must have acquired infection in utero or during passage through birth canal by ingestion of the infected liquor, the site of primary infection being the alimentary tract. Due to poor host reaction and resistance the disease soon became generalized resulting in quick death of the patient.

The object of this report is to lay emphasis on the fact that the fatality in new borns and early infancy can be minimised by proper scrutiny of the pregnant mothers and newborns for evidence of disease and their early and adequate therapy.

Summary

A case of congenital tuberculosis is reported with brief review of literature.

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AMYLOIDOSIS IN TUBERCULOSIS

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The term amyloidosis is used to describe a hyaline material which accumulates between parenchymatous cells and in connective tissue of organs. Association of amyloidosis and tuberculosis is well known. Tuberculosis is a common cause of secondary amyloidosis (Anderson 1957; Mathur and Jhala 1964; Chitkara et al. 1965; Reddy and Parvathi, 1968). Reddy et al. (1970) reported that incidence of amyloidosis in tuberculosis was 19% in autopsies. Studies from western countries have reported higher incidence of amyloidosis in tuberculosis (Cohen 1943; Kozello 1965; Yoshizumi, 1962). Recently, studies demonstrating changed pattern of amyloidosis in treated patients of tuberculosis have appeared in literature. Yoshizumi (1962) reported a sharp decline in incidence of amyloidosis in tuberculosis since the use of chemotherapy. Maltchik (1959) observed that amyloidosis involves lesser number of organs when it occurs in chronic form of tuberculosis.

We are reporting a treated patient of bilateral pulmonary tuberculosis with secondary amyloidosis and miliary tuberculosis.

Case Report

R.N., aged 35 years, male was admitted with complaints of cough with expectoration 2 years, fever and occasional streaking of sputum 11 years and generalised weakness 4 months.

On examination the patient was anaemic. Physical examination of respiratory system revealed involvement of both lungs. The liver was enlarged, tender with a smooth surface. Other systems revealed no abnormality.

Relevant investigations revealed: Hb 8.5 gm%; TLC 7000/cmm, DLC; P 48, L 50. E 2. Sputum was positive for A.F.B. Urine and stool were normal, x-ray chest showed bilateral generalised infiltration with a doubtful cavity in the right mid zone (Fig. 1).

The patient was kept on antitubercular drugs. His condition deteriorated on 11.1.70. His B.P. became low and despite revival measures he expired the same day at 7.20 P.M.

At autopsy the body was that of an young

male who was emaciated, the subcutaneous fat being scanty. Examination of the thoracic cavity revealed pleural adhesions on both sides. Cut surface of the lungs revealed cavities of sizes varying from 2-4 cm in diameter. Their walls were smooth. The surrounding lung parenchyma showed focal areas of caseation, 1-2 mm in diameter. The tracheobronchial

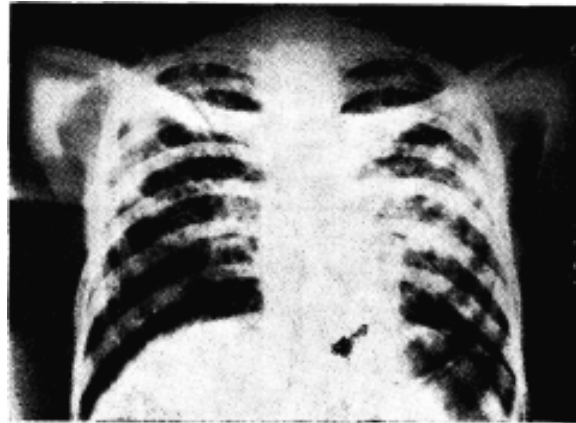


Fig. 1

P.A. view of chest showing bilateral infiltration with a doubtful cavity in the right mid zone.

lymph nodes were enlarged. The small intestines revealed multiple pinhead sized nodules on the mucosal surface. The liver and spleen were enlarged and pale. Their consistency was firm and borders sharp.

Microscopic examination revealed fibrocaseous pulmonary tuberculosis in both lungs with tubercular bronchopneumonia. The tracheobronchial lymph nodes, small intestine and spleen showed miliary tuberculosis. Extensive amyloid deposition was seen in the liver, both adrenals and spleen, while the kidneys showed mild deposition of amyloid material. The aorta showed atheromatous plaques.

Discussion

In the present case of bilateral pulmonary tuberculosis in the associated diagnosis of amyloidosis could be established only after autopsy. Cohen's (1943) observed that 75% cases of amyloidosis have albuminuria or cast

and therefore, their presence in the urine should make one suspect amyloidosis. Clinically in our case urine examination revealed no abnormalities. Congo red test and gum biopsy were also not done because of lack of clinical diagnosis of amyloidosis. Autopsy of the patient on 12.1.71 confirmed the diagnosis of bilateral pulmonary tuberculosis. The patient was also found to be suffering from generalised miliary tuberculosis and amyloidosis. Secondary amyloidosis was seen in liver, spleen, kidney and adrenal, whereas, miliary tuberculosis was observed in intestine lymph node and spleen. Anderson (1957) reported that liver, kidney, spleen and adrenal are commonly involved in secondary amyloidosis. Olekhnovich (1958) reported that in 42 cases of tuberculosis with amyloidosis, kidney was involved 42 times, spleen 40 times and liver 30 times. In our case spleen was the only organ which demonstrated the presence of both amyloidosis and miliary tuberculosis. Anderson (1957) reports that the spleen is most commonly involved organ in amyloidosis as well as it is one of the organs involved at the earliest stages. Miliary involvement of intestine, lymph node, spleen in our patient of fibrocaceous pulmonary tuberculosis was possibly due to haematogenous dissemination in preterminal stages of bronchogenic tuberculosis, as our patient died within two weeks of admission in the hospital. Our case also demonstrates that tuberculous involvement of an organ is not a pre-requisite for amyloidosis. Furthermore, amyloid deposits in an organ do not favour development of tuberculosis because both amyloidosis and tuberculosis involved various organs in the present case. But both amyloidosis and tuberculosis simultaneously involved only spleen. Maltchik (1959) observation that amyloidosis involves lesser number of organs when it occurs in chronic forms of tuberculosis is contradictory to our case finding as in the present case amyloidosis involved organs like liver, spleen, adrenal and lungs. Yoshizumi (1962) reported that there is no difference in pathologic involvement of organs by amy-

loidosis either before or after chemotherapy. Yoshizumi (1962) demonstrated a sharp decline in incidence of amyloidosis with the advent of chemotherapy. It is not possible for us to comment on incidence but the lower incidence of amyloidosis in our country as compared to western countries, may be due to the lack of diagnosis. As in our case diagnosis of amyloidosis could only be made after autopsy which is a rare diagnostic procedure in our country.

Summary

A case with fibrocaceous pulmonary tuberculosis with generalised secondary amyloidosis of adrenal, liver, spleen and kidney and miliary tuberculosis of spleen, intestines and glands, is reported. Importance of autopsy in diagnosis of amyloidosis is emphasised.

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MEDIASTINAL EMPHYSEMA-COMPLICATING THE MANAGEMENT OF PULMONARY TUBERCULOSIS

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The term Mediastinal Emphysema was first used by Hamman (1937), but Laenec (1827; described it under the name of Interlobular Emphysema. Largely on the basis of clinical studies by Hamman (1934, 1937, 1945), Mediastinal Emphysema or Pneumomediastinum (air in the mediastinum) both as a primary (spontaneous) disease or as a complication of other conditions, has become a well established clinical entity. It is a rare complication of pulmonary tuberculosis (Basu et al., 1963). Although, generally the condition is benign, it can occasionally be fatal (Gray & Hanson, 1966). Three cases of this rare and interesting clinical entity are being reported here as complications during management of pulmonary tuberculosis.

Case Reports

Case No. 1 : K.P. Male, 30 years, was brought to this hospital on 3-1-1970 with the complaints of severe Dyspnea and precordial pain radiating to the left shoulder and neck. Symptoms appeared suddenly after a severe jolt that he received while riding a bicycle driven by his friend who had suddenly applied the brake. The patient, otherwise, was not injured at all. It was revealed by the referring medical officer of the local Railway Hospital that the patient had been taking anti-tubercular treatment for the last four years and a left upper lobectomy had been done about two years back in November, 1967. He had remained symptom-free after the operation. The patient was dyspnoeic. There was no evidence of cyanosis.

Hamman's sign and air crepitus in the neck were present. The presence of air in the mediastinum was confirmed by radiography (Plates No. 1 & 2). The patient became asymptomatic within a week after complete rest and mild sedation.

Case No. 2 : S.R., 20 years, male, was an old case of pulmonary tuberculosis. He was being treated with the standard anti-tubercular drugs from 14th December 1969 and with pneumoperitoneum from 27th February, 1970, first as an indoor patient and later on as an out-patient of this hospital. He came in the

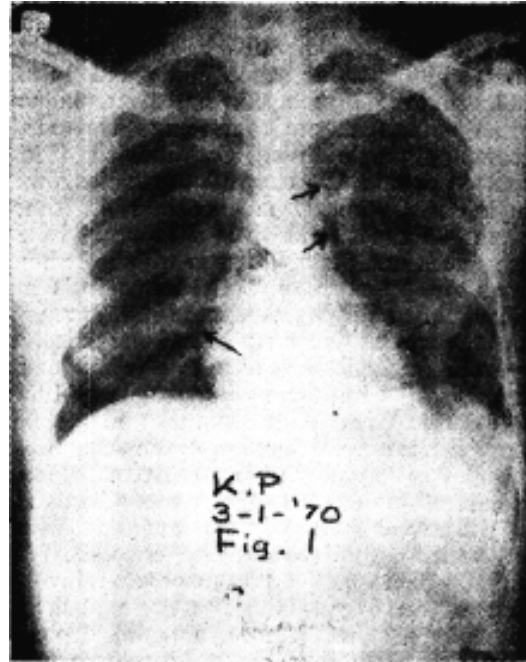


Fig. 1. Showing presence of air in the mediastinum

evening of 25th March, 1970 with severe pain in the precordium and neck, choking sensation and dysphagia after having had a pneumoperitoneum refill of 1000 cc in left iliac fossa (the routine elective site of refills as followed in this hospital), the same morning.

On examination, Hamman's sign was nicely elicited and air crepitus was felt in the neck. Diagnosis of Mediastinal emphysema was confirmed by x-ray chest (Plates No. 3 & 4). Within a fortnight, emphysema disappeared with complete bed rest and mild sedation in addition to routine anti-tubercular treatment.

Case No. 3 : B.S.T., 57 years old male, was being treated for pulmonary tuberculosis with second line drugs (Ethionamide, cycloserin and pyrazinamide). On 19th February, 1970 pneumoperitoneum was initiated. Later, on 13th March, 1970 a refill of 1000 cc was given. On 15th March, 1970 patient passed few loose

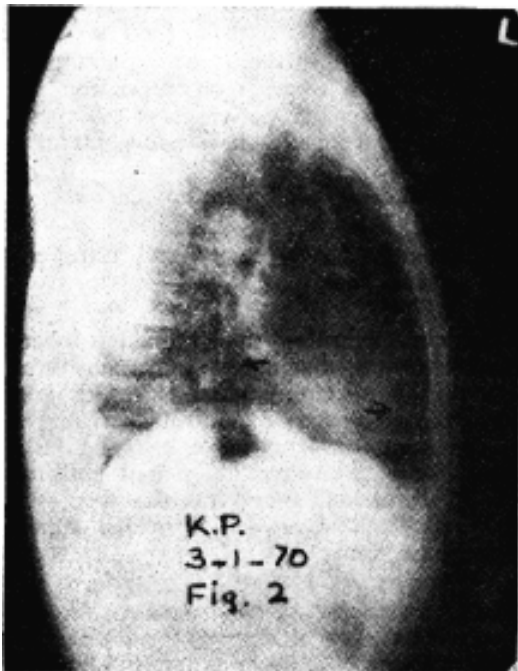


Fig. 2. Showing presence of air in the mediastinum

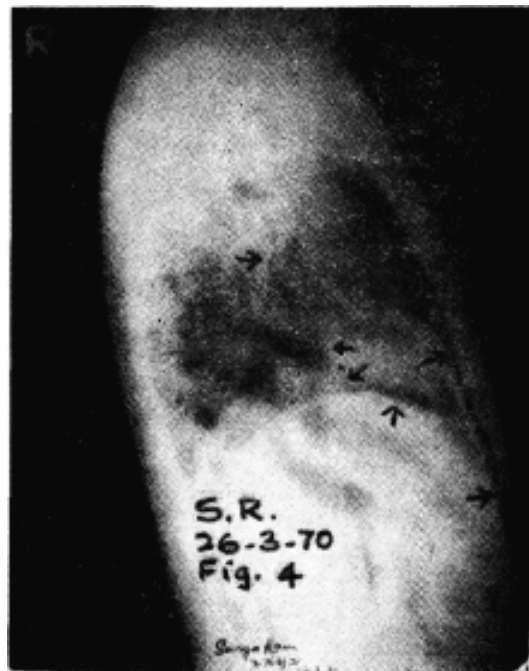


Fig. 4. Showing diagnosis of mediastinal emphysema

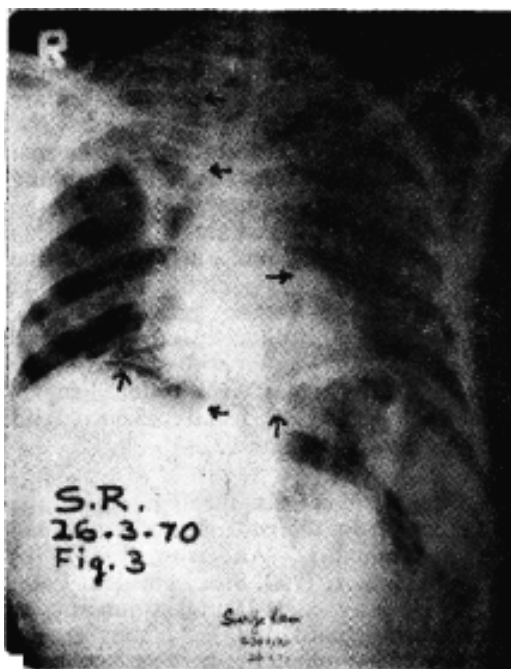


Fig. 3. Showing diagnosis of mediastinal emphysema

motions and complained of a choking sensation in the throat, dysphagia, hoarseness of voice and mild pain in the chest.

Hamman's sign, air crepitus on both sides of neck and definite radiological evidence confirmed the diagnosis of mediastinal emphysema (Plates No. 5 & 6).

Patient was treated on the same lines i.e. sedation and complete bed rest which relieved the patient from symptoms attributable to mediastinal emphysema within a period of 10-12 days.

Discussion

It is rather a matter of coincidence that all the above three cases turned up in a comparatively rapid succession over a period of about one year and that all these three cases were caused by different etiological factors in association with the management of pulmonary tuberculosis.

The available anatomical routes by which the air may gain access to the mediastinum may be—

- (1) Perforation directly into the mediasti-

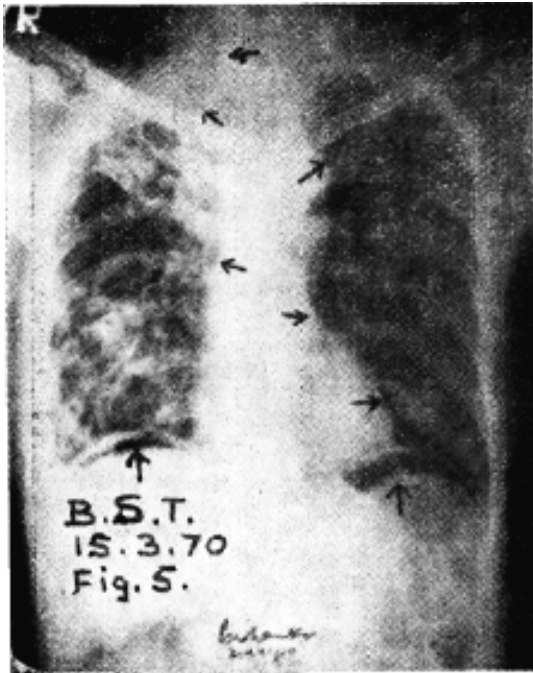


Fig. 5. Showing diagnosis of mediastinal emphysema



Fig. 6. Showing diagnosis of mediastinal emphysema

num from oesophagus, trachea and bronchi.

- (2) Rupture of alveoli into pulmonary interstitial tissue with dessection by air, along the perivascular and peribronchial sheaths- into mediastinum.
- (3) From deep facial planes of the neck.
- (4) From peritoneal cavity and retroperitoneal space.

First case who had undergone left lobectomy developed mediastinal emphysema three years after the lobectomy due to a severe jolt. The jerk probably caused sudden increase of pressure in the bronchial tree bringing out a sheering force to cause either small perforation of the bronchial stump into the mediastinum or leak from the residual bronchial stump left after lobectomy.

Two cases (second and third) from the present series were undergoing pneumoperitoneum therapy. Such cases were observed for the first time in this institution (even though thousands of pneumoperitoneum refills have been given by now).

For the pneumomediastinum to occur secondarily to the pneumoperitoneum no route by which air reaches mediastinum from the peritoneal cavity has been accepted generally. Most attempts of explain this complication are not based on sound anatomical principles but only on hypothetical defects in the normal anatomy. Possible routes include (i) along the undersurface of diaphragm through the diaphragmatic hiati, when air is placed deep to the transversus abdominis, (ii) through the foramen of Morgagni (space of Larry) along side the superior epigastric vessels, when the air is inadvertently introduced into the rectal sheath, (iii) along the superior surface of the diaphragm, when the air is introduced superficial to the posterior rectal sheath and transversus abdominis muscle.

Diaphragmatic defects through which the air can escape from the peritoneal cavity, may be (a) inflammatory (Anderson, 1945), (b) congenital (Mallies, 1939, Sita Lumsden, 1949, Smith, 1943, Kayne, 1948), (c) traumatic or (d) degenerative (Laird, 1945). Air may escape into the mediastinum by passing upwards from the retroperitoneal space or directly through the aortic or oesophageal openings of diaphragm by rupture of unsupported peritoneal membrane.

Severe pain in the chest which can radiate to the neck and left arms and said to be the most important presenting symptom of the mediastinal emphysema (Scott, 1937, Millar, 1945, Fagin & Sewab, 1946, McCabe, 1947) was present in all three cases of this series. This emphasises the significance of mediastinal emphysema in the differential diagnosis of many important conditions like myocardial infarction, angina pectoris, pericarditis, pulmonary embolism, mediastinitis, pleuresy, intercostal myalgia, dissecting aneurysm of aorta etc. Symptoms of dysphagia and presence of a feeling of air crepitus was presented by all the three cases, reported above.

Crunching, crackling, clicking or bubbling sounds synchronous with heart beat (systolic contraction of heart Hoffman, 1943), heard best over the precordial region along the left sternal margin in 3rd to 6th intercostal apices in sitting up or left lateral decubitus position—called Hamman's sign—was present in all the three cases. This is the single important physical sign in cases of mediastinal emphysema.

Pneumothorax was stated to be a commonly associated condition in 33% (Hamman 1945) to 60% (Flavel Malt 1957) cases of mediastinal emphysema. It was not the cause in any of our three cases.

The authors are of the opinion that mediastinal emphysema should be strongly suspected when association of severe chest pain in the precordium, Hamman's sign and surgical emphysema over the neck and chest is present. Its presence should be confirmed by radiography. Air in the mediastinum can be seen in P.A. view as a sharp distinct line running parallel to the left or some time to the right border of heart. In the lateral film generally there is evidence of collection of air behind the sternum. Air is often visible above the sternal notch and the facial planes of neck, pleural cavity, retroperitoneal subcutaneous tissue and rarely in the pericardial sac. Radiological confirmation was available in all the cases of this series.

Most of the cases do not need any specific treatment except symptomatic management and antibiotics as illustrated by cases of this series. In cases where mediastinal emphysema is causing respiratory and circulatory embarrassment, specific measures have been suggested i.e. (i) use of high pressure chamber (Waring, 1944); (ii) needle aspiration of emphysematous tissue (Cliff, 1955); of pneumothorax when present (Heald & Wilder, 1949); and of

mediastinum (Collins, 1946); (iv) splitting of the sternum in severe cases (Hamman, 1945); (v) inhalation of 95% oxygen (Fine, Hermanson & Frehling, 1938) (vi) Tracheostomy (Pecera & Hochwold, 1958) and (vii) Hyperbaric oxygen therapy (Gray & Hanson, 1966). Fortunately our cases responded to complete rest and mild sedation within one or two weeks.

Summary

Three cases of pulmonary tuberculosis with mediastinal emphysema of different origin like pneumoperitoneum and severe jolt to the body in lobectomised patient are presented with a brief discussion of the interesting and important features in clinical picture, diagnosis and treatment.

ACKNOWLEDGEMENT

Authors are thankful to Professor K.D. Gupta, Principal and Controller, S.P. Medical College & Associated Group of Hospitals, Bikaner for his permission to publish these cases.

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BOOK REVIEWS

PULMONARY TUBERCULOSIS & COMMON CHEST DISEASES By Dr. M.D.

DESHMUKH. Published by Unichem Laboratories Ltd. Bombay. Price Rs. 5.80, Pp 229.

Tuberculosis is at the present moment our biggest public health problem. Sociological studies have shown that a patient with symptoms suggestive of pulmonary tuberculosis almost invariably reports for the first time at a general health facility, public or private. It is, therefore, imperative that the basic doctor of tomorrow should be given a working knowledge of tuberculosis during the course of his under-graduate training. Howsoever comprehensive and instructive lectures and demonstrations may be, they cannot easily replace a text book on the subject. Thus there is a real need for a text book for under-graduates on tuberculosis and other chest diseases.

The contributors are all eminent physicians with long experience of under-graduate and post-graduate teaching of tuberculosis and chest diseases. They therefore know fully well the requirements of present day student. The book gives in fairly simple language and lucid style, ideally suited for the immature mind, all that the under-graduates need know about this subject. Unnecessary controversies have rightly been avoided. The book does not deal with merely the clinical aspects of these diseases but also their impact on the community, their prevention and also the national control programmes. The description of the important and commonly met with non-tuberculous chest diseases is apt and concise and yet takes into consideration fully the Indian conditions. In short all that an under-graduate need know about tuberculosis and other chest diseases finds a place in this book. To that extent it amply fulfils the needs of the students. The Editor and contributors deserve congratulations and will earn the gratitude of many under-graduates who will benefit from the book.

There is however one lacuna. Index should be and is an essential feature of any text book or reference book. It is not understood why the Editor has done away with the Index in this book.

Lastly, the book inspite of over 200 pages of text and nearly 50 X-ray re-productions on

art paper is very moderately priced at Rs 5.80, which is well within the means of those for whom it is meant. The publishers and printers are to be highly complimented for this thoughtful step.

S.P.P.

FOR THOSE WHO LIVE AND BREATHE (Second Edition) By THOMAS L. PETTY & LOUISE M. NETT. Published by Charles C. Thomas, U.S.A. Pp 109

Chronic bronchitis and other obstructive respiratory diseases are not so far so common in this country as in the affluent western world. However, industrialization and urbanisation and increase in smoking habits and environmental pollution will naturally take an increasing toll of this sickness, and the day is not far off when these diseases will become an important problem in our country also.

Two specialists of a Respiratory Care Unit in USA have explained in this booklet the aetiology, pathogenesis and management of the obstructive respiratory diseases in simple non-technical language. The book is not only very informative but also makes an interesting reading. One of the chapters is devoted to provide a sufferer with appropriate guide lines for management of the disease. It has been very well brought out how 'bronchial hygiene' can lead to amelioration of symptoms and rehabilitation of the patient to enable him to live a fairly full and useful life inspite of disability. The book thus fulfils a great need and should be of benefit to the sufferers.

The book however will have a limited utility in this country. With such an excellent get up of the book, its price, though not mentioned, is likely to be very high and, therefore, prohibitive for a large number of persons in this country. Similarly, some of the sophisticated appliances recommended in the book are also not likely to be available for quite some time.

The authors are to be complimented for their interesting, personalized and lucid style.

S.P.P.

PUBLIC HEALTH AND TUBERCULOUS IN U.S.S.R.

The constant rise in living standards both material and cultural, the improvement in conditions of work and daily life in the Soviet Union and the vast campaign of public health and hygiene have led to considerable progress in the protection of the health of the people.

In 1913 mortality in Russia was 29.1 per 1000. Infant mortality was 269 per thousand in the first year and 43 percent before the age of 5 years. In 1970 infant mortality was 25 per 1000.

The average expectation of life in the Soviet Union in 1913 was 32 and it became 70 years in 1970. The public health service in the U.S.S.R. is that it is a State service. The State has taken the entire responsibility for the protection and improvement of the health of the people. The service is free. In the year 1970, 2,900,000 roubles were spent to maintain the public health services.

For a family of four in the year 1969 the state allowed 263 roubles in contrast to 91 copecks per inhabitant in the year 1913.

The State has 700,000 doctors, more than 2 million feldcher i. e. low grade medical staff who have received 4 years medical training, (while a qualified doctor has spent 6 years in studying). The Medical ratio is 26.6 doctors per 10000 inhabitants while in 1913 it was 1.8.

The country is divided into medical sectors. Each Sector especially urban area corresponds to 2000 adult inhabitation. This sector the "Outchastok" is placed under the medical responsibility of a general practitioner, who works from a multi-purpose clinic to which are attached a certain number of sectors. If the patient can travel he comes to consult the general practitioner for his sector at the clinic. If not this doctor goes to visit the patient. The relations between doctors and patients are free from material calculations and full of mutual respect. The sectors are not only for adults, but there are 'Outchastock' for children (one paedetrician for 1,000 children) and with large scale industrial undertaking, there is a works 'Outchastock' responsible for the medical supervision of 1,500 to 2,000 workers.

In the general clinic which is both nerve centre and junction box for all the sectors, there are various specialists dealing with those patients whose state does not require hospital admission or isolation.

Regarding Tuberculosis, the general clinic and the Sector Physician play an important role because they establish diagnoses only. Case finding apart from mass examinations is the province of the tuberculosis clinic.

There is close relationship between the tuberculosis clinic and the general clinic. It is one of the major responsibilities of the general clinic to search cases of Tuberculosis and once the diagnosis of Tuberculosis is established the general clinic and the general physician have nothing to do and he becomes the responsibility of the tuberculosis clinic.

In the Soviet Medical System, tuberculosis constitutes a separate branch as a specialised service. The tuberculosis clinic works on the same plane as the general clinic but on a different scale. There is the similar territorial division but each Sector with its own tuberculosis specialist has a population of about 20,000 inhabitants. There are two nurses, one of whom has to visit the patients in the houses where as the other helps the specialist with his office work. Once the diagnosis made by the general physician has been confirmed, the tuberculosis clinic looks after the patient until he is cured.

The general rule is immediate admission to the hospital either in the clinic itself or in a sanatorium. It is important for every new patient to begin his treatment in good conditions, in a hospital, in a sanatorium and not at home so that he will understand the seriousness of his condition. A hospital stay of 12 months or even longer is quite commonplace.

Patients observe ambulatory treatment with great prudence.

Hospital treatment including the drugs are free.

The patient receives his whole salary for a year and his job has to be kept for him. If after he is cured his physical capacity is found to be diminished, the clinic has to request the administration of the factory to give him lighter work.

The clinic also supervises the contacts of the patient. Everyone who has been in contact with the patient, the members of the family, his colleagues at work are called to the clinic where they undergo radiological and possibly bacteriological examination. The patients, homes are visited by the tuberculosis

specialist and by the nurse attached to the centre.

All patients and contacts have a file at the clinic which makes it possible to carry out a follow up examination of all forms and patients every year. Every case of tuberculosis has to report to the epidemiological service.

B.C.G. Vaccination: Of the new borns is done routinely in the maternity clinic within 7 days of the birth of the child and rate of coverage is 97%. The vaccination is repeated after a tuberculin test at the age of school entrance (6) years. On this occasion it is carried by the paediatrician of the sector. Then again after a tuberculin test it is repeated at 14 to 15 years and at the end of school life at 17 years. The method used is by the intradermal route. Certain categories of the adult population e.g. doctors, teachers, persons working in the poor industries etc. are submitted to vaccination. The clinic is responsible for the vaccination of these latter categories of adults who are especially in contact with the general population and for the vaccination of the families of the patients.

Case Finding

Mass X-ray examination is carried out every 2 years, on every one over the age of 13 and is the responsibility of the clinic.

There is people council for every tuberculosis clinic and for every general clinic. For it the people are drawn from the general population, factories, educational institutions, Red Cross, Trade Unions etc. The activities are multiple varying from checking the state of the premises and the quality of the food to supervising ambulatory treatment at home and assembling the population for mass radiographic examination. Every Sector tuberculosis specialist has the help of seven voluntary workers, members of the Red Cross. They constitute the real human and social link between the general population and the clinic.

The active members of the Red Cross receive a specialised training given by tuberculosis specialist and qualified nurse. They participate in the fight against tuberculosis by explaining to the population the origins of the propagation of tuberculosis and the prophylactic measures by which it can be avoided.

They give direct help to the medical staff responsible for mass radiological examination by mobilising the population and helping with organisation and supervision of these operation.

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They participate in the work of chemoprophylaxis especially by distributing drugs to persons at risk of contracting the disease.

They help in persuading patients who are inclined to give up their treatment not to do so.

They take part in studies directed towards improving the patients' conditions of life and work.

The cooperation of the population in public health work is obtained in particular through the considerable amount of propaganda work carried out by the institute of Health Propaganda.

Health Education is an integral part of public health work. It is considered as one of the methods of curative medicine and especially of preventive medicines. Health education is considered a duty and a compulsory task.

Doctors, health workers and nurses ought to devote four hours out of every month's work to health education work among the general population, conference talks to small groups, discussion with patients' families etc. This amounts to millions and millions of houses of health propaganda.

Health Education is by wall newspapers, press articles, radio propaganda, television, cinemas, etc. etc. Moscow television is obliged to devote seven transmissions every month to problems of public health, the cinemas have to show documentaries issued by the institute of health education.

The institute issues regularly a printed bulletin which is no mean an easy task in view of the necessity of using about 20 different languages in order to reach the various population of the country.

Dr. Semian To-Kay stressed the need of understanding motivation. He felt there is often a wide gap between what people knew about disease, its treatment and prophylaxis and their own behaviour. They should apply principles which they know very well.

Detailed studies should be carried to discover effective methods of health education.

Tuberculosis morbidity in the U.S.S.R. is

diminishing by 15 to 17% per year. In most of the republics there has not been a single case of infantile mortality from tuberculosis for several years.

In Moscow and Leningrad, there has been no form of tuberculosis and it can be said that

forms such as tuberculosis meningitis and bone tuberculosis are on the way to disappear.

H.B.D.

From T Magazine, IUAT
December 1971

HEALTH CARES IN USSR

The last census of the year 1970 showed the total population of the U.S.S.R. to be 241.7 million.

In the size of the population, the Soviet Union stands third in the world, after China and India.

56 percent of the Soviet people live in urban areas.

There are 7,00,000 doctors with several million doctors assistance and hospital nurses to look after the health of the Soviet population.

The medical personnel have at their disposal a vast number of special vehicles as well as ambulance planes and helicopters.

Rural hospitals like those in the cities are equipped with the latest medical apparatus and instruments. The entire maintenance and further development of the medical services is borne by the Soviet State which was 9000 million roubles (over 74,000 million rupees) for the year 1971.

Youth Ref: Vol. VIII. July 1, 1972.

NEWS AND NOTES

ANNUAL MEETINGS

The Thirty-three Annual General Meeting of the Tuberculosis Association of India was held on 3rd May, 1972 in the Conference Hall of the Association. Dr. J.B. Shrivastav, Chairman of the Association, presided.

The Technical Committee of the Association met on 2nd May and the Conference of the Secretaries of the State TB Associations and Seal Sale Organisations in India held their meeting on the 3rd May, 1972.

NATIONAL CONFERENCE

The twenty-seventh National Conference on TB and Chest Diseases which could not be held in January last will now be held in Patna from 19th to 22st November, 1972. Dr. K.N. De of Calcutta will preside over the conference and Bihar State TB Association will play the host.

The main subjects proposed to be presented are: "Pulmonary function tests", "Cardio-pulmonary disease", "Population explosion and tuberculosis", "Tuberculosis in Children", "National Tuberculosis Programme", "Chemotherapy including management of resistant cases", "Changing trends in the prevalence and incidence of disease", "Sensitivity testing for second line drugs", "Air pollution in relation to TB" and "Public Health Nursing".

HEALTH VISITORS COURSE

The 1972-73 TB Health Visitors' Course commenced in the New Delhi TB Centre on 1st July, 1972. Thirteen candidates have joined. The duration of the course is for 9 months of which 5 months will be in the New Delhi TB Centre, 2 weeks in Lala Ram Sarup TB Hospital, Mehrauli, 2 weeks for examination and 3 months internship which will last from 1st January to 31st March, 1973.

ESSAY COMPETITION

The Tuberculosis Association of India will award in 1973 a cash prize of Rs.300/- to a senior under-graduate medical student in India for an original essay written in English on Tuberculosis adjudged best by this Association. The subject selected for the competition is "Differential Diagnosis of Pulmonary Tuberculosis". Further details may be had from the Tuberculosis Association of India, 3 Red Cross Road, New Delhi.

RE-ORIENTATION COURSE

A re-orientation course in Tuberculosis for Matrons and Tutors of Hospitals in northern states which run schools for pupil nurses was held in the New Delhi TB Centre from 17th to 29th April, 1972. The course covered causation, management, case-finding, prevention of tuberculosis and the national tuberculosis control programme.

This course was inaugurated by Prof. D.P. Chattopadhyaya, Minister of Health, Government of India, and was attended by 14 participants from the states of Jammu & Kashmir, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Maharashtra and Delhi. Travelling expenses, daily allowance etc. of the participants were borne by the UNICEF and the preliminary arrangements and selection of participants were made by the Nursing Adviser to the Government of India. Such courses are being regularly arranged by the New Delhi TB Centre for various categories of medical, nursing and para-medical personnel to enable them to play their full role in the implementation of the national programme.

REFRESHER COURSE

The South District TB Association of Tamil Nadu conducted a refresher course on behalf of Tamil Nadu TB Association on 11th and 12th March, 1972 at the old District Board Hall, Cuddalore. 7 women medical practitioners and 73 men practitioners undertook the refresher course.

MYSORE CONFERENCE

The 3rd Mysore State TB and the Chest Diseases Workers' Conference was held at Bangalore on 27th and 28th May, 1972 under the auspices of the Mysore State District TB Association. The conference was inaugurated by Shri H. Siddaveerappa, Minister for Health, Mysore, Dr. K.N. Somasundaram, President of the Mysore City Municipal Council, welcomed the delegates. An exhibition of scientific interest was opened by Shri B.M. Cariappa, Secretary-General, Tuberculosis Association of India. A souvenir brought out on the occasion was released by Dr. T. Manickam, Honorary Secretary, Mysore State TB Association.

Dr. H.V. Puttaraj Urs, Joint Director of Health Services (Medical), Mysore state, inaugurated the scientific session of the conference. Dr. S. Narayana Shetty, President of

NEWS & NOTES

the conference' presided. Dr. H.B. Dingley, Medical Superintendent, Lala Ram Sarup TB Hospital, New Delhi and Dr. Benjamin Isaac, Medical Superintendent, Church of South India Hospital, Mysore presented papers on "Drug Resistance" and "Lung Surgery in the Paediatric age group" respectively. Addressing the delegates, Shri B.M. Cariappa spoke on the role of medical practitioners and the public in anti-tuberculosis work.

SHIBIRS -MAHARASHTRA

The Maharashtra State Anti-TB Association held two Shibirs on successive days in two districts—Kalvan in district Nasik (29th Shibir) and Sangamner in district Ahmednagar (30th Shibir). The team consisted of Drs. M.D. Deshmukh, N.M. Wagle, S.S. Katdare, T.B. Master, K.G. Kulkarni and Mrs. S. Kulkarni.

The camp at Kalvan which is an Adivasi area was held on 26th March where 440 persons were examined, 109 screened and 36 cases of pulmonary tuberculosis detected. 3,000 children were given BCG and 250 children were given oral polio and triple vaccination.

The Shibir at Sangamner in Ahmednagar district was held on 27th March where 189 persons were examined, 151 screened and 78 cases of pulmonary tuberculosis detected. BCG vaccination was given to 1,457 children and oral polio and triple vaccination were given to 72 children. Besides, starting TB centres at both the places a "Well-baby" clinic was also started. Cards of health check up from birth were provided. Every month when children attend for preventive inoculations according to given schedule weight would be recorded and compared to that on card and thus timely advice could be given to prevent malnutrition.

HYDERABAD CONFERENCE

The Tuberculosis Association of Andhra Pradesh will be organising the Vth Andhra Pradesh TB and Chest Diseases' Workers' Conference in Hyderabad on 2nd and 3rd October, 1972,

CONFERENCES IN U.P. AND DELHI

The U.P. TB Association proposes to organise a TB Workers' Conference in Lucknow by the end of October this year. The Delhi TB Association is also finalising arrangements for a TB Workers' Conference to be held in Narela by the end of this year.

DR. B.B. YODH MEMORIAL RESEARCH CENTRE

The Maharashtra State Anti-TB Association has issued an appeal for funds in memory of Dr. B.B. Yodh, the doyen of medical profession in Bombay. Dr. Yodh who passed away on 30th October, 1971, was closely associated with the Maharashtra State Anti-TB Association since its inception in 1947.

Dr. B.B. Yodh was a pioneer of the "Organised Home Treatment Clinic" which over the years has become the focal point in the management of Tuberculosis. Over 20,000 families have so far been taken care of by the clinic where all investigations and treatment are given free of charge. The organisation of Shibir was also inspired by him.

The Maharashtra Association proposes to upgrade the present laboratory into a reference laboratory and research centre and name it after Dr. Yodh. The scheme involves an expenditure of Rs. 2 lakhs in the first phase and Rs. 2½ lakhs in the second phase. For details write to Dr. M.D. Deshmukh, Hony. Secretary, Maharashtra State Anti-TB Association, Jerbai Wadia Road, Sewri, Bombay-15.

TEXT BOOK ON TUBERCULOSIS

The Text-Book on Tuberculosis compiled by the Tuberculosis Association of India will shortly be released. Write for your copy to M/s. Kothari Book Depot, Acharya Dhone Marg, Parel, Bombay.

The Indian Journal of Tuberculosis

ABSTRACTS

Vol. XIX

July 1972

Abst. No. 3

Rifampicin in the re-treatment of severe cavitary pulmonary tuberculosis Part I"

Harukata BABA, Ryunosuke TAKAHASHI and Yo AZUMA. *Kekkaku* ; 1971, 46.429.

Seventy-nine far advanced cavitary cases of pulmonary tuberculosis with persistent positive sputum were treated with Rifampicin. AH patients had already been treated with primary as well as secondary drugs for many years without success. The results of 6 months' treatment with Rifampicin alone or in combination are presented. Group I was put on Rifampicin alone or in combination with drugs to which the bacilli were already resistant. In group II there was at least one drug in addition to Rifampicin to which the bacilli were sensitive. In group III Rifampicin was combined with two drugs to which bacilli were sensitive. The daily dose of Rifampicin was 450 mg. Some patients were treated with twice-weekly regimen.

After 6 months' treatment there were no appreciable radiological changes in any group. The bacteriological conversion rate was 16%, 78% and 90% in group I, II and III respectively. Taking cases with large cavities "alone into consideration, the conversion rates came down to 11%, 67% and 75% respectively. In 78 out of 79 cases the bacillary content of sputum was reduced very rapidly in one to 6 weeks. Most of the sputum conversions had taken place within 3 months. All the 23 cases that failed to convert showed bacilli resistant to 50 meg/ml of Rifampicin. Four cases relapsed. In only one case, a strain became resistant to ethambutol but remained sensitive to Rifampicin.

S.P.P.

Rifampicin in the re-treatment of severe cavitary pulmonary tuberculosis Part II

Harukata BABA, Ryunosuke TAKAHASHI and Yo AZUMA *Kekkaku* 1971, 46, 481.

Sensitivity to 2 meg, 5 meg, 10 meg, 20 meg, 50 meg, of Rifampicin was studied in

112 human strains isolated from new cases and those already treated with first line and/or second line drugs. The criterion of resistance to Rifampicin for clinical purposes is 10 meg. In actual practice, however, Rifampicin resistance appears suddenly and completely to 5 meg/ml and 50 meg at the same time.

Marked individual variation was seen in Rifampicin blood levels. Two hours after administration of 450 mg. before breakfast blood level was 0-24 meg (median value 6 meg), 0.7-17 meg (median value 6.9 meg) after 6 hours and 0.2-9.5 meg (median value 2.1 meg) after 12 hours. In 12 cases second test was performed after 3 months or later. Significant difference was found in 2 hours value. Out of 12 cases, 6 showed no difference; in 3 the first test gave a higher value than the second and in the remaining 3 the second test gave a higher value.

No significant co-relation was seen between blood level and sputum conversion rate, since many other factors contribute to sputum conversion. It is found that some strains could be inhibited by blood concentrations lower than *in vitro* studies. Finally, the definite side effects of Rifampicin are liver damage, perspiration and gastro-intestinal disturbances.

The effect of pyrazinamide, rifampicin and cycloserine on the blood levels and urinary excretion of isoniazid.

V.M.K. Vehno and R. Koskinen, *Annals of Clinical Research (Helsinki)* ; 1971, 3, 277.

Effects of pyrazinamide, rifampicin and cycloserine on the blood levels and urinary excretion of INH in 26 tuberculous in-patients was studied. Cycloserine did not modify the inactivation of INH. Rifampicin slightly reduced the serum levels of acetyl INH at one hour after the oral intake of INH 15 mg/kg. The urinary excretion of total hydrazides remained unaltered. Pyrazinamide lowered the levels of acetyl INH in serum

after oral intake of INH, and ...this effect was Statistically significant ($p < 0.001$) in the slow INH acetylators. The urinary excretion of total INH hydrazides was also reduced, but the ratio of free INH to acetyl INH remained unchanged.

Pyrazinamide has the most pronounced effects on INH inactivation in slow INH acetylators, but the beneficial effects of INH-PZA combination in the tuberculosis-therapy do not seem to result entirely from a pharmacokinetic interaction.

S.P.P.

Observations on the action of rifampicin and ethambutol alone and in combination with; other anti-tuberculous drugs.

Gladys L. Hobby and Tulita F. Lenert. Amer. Rev. Resp. Dis. ; 1972, 105, 292.

Using conventional microbiologic techniques for enumeration of microbial population in vitro and H 37RV strain of myco-bacterium tuberculosis, data were obtained which indicate that sub-inhibitory amounts of rifampicin may increase the effectiveness of low concentrations of streptomycin or isoniazid and may prevent the emergence of streptomycin or isoniazid resistant cells. Rifampicin failed to increase the effectiveness of ethambutol and failed to prevent the emergence of ethambutol-resistant microbial cells. The data indicated that ethambutol alone decreased the number of viable microbial cell units only after a lag lasting up to 11 days.

S.P.P.

Acute Isoniazid Poisoning

Carolyn V. Brown. Amer. Rev. Resp. Dis. J 1972, 105, 206.

The recorded events of INH poisoning among 42 persons in Alaska from 1956 to 1971 are presented. Poisoning occurred as a result of excessive intake of INH either deliberately or through oversight amongst persons prescribed INH in a mass chemoprophylaxis programme. The range of drug consumed was from 0.5 gram to 30 grams. The estimated time between ingestion of INH and start of treatment ranged from 20 minutes to 24 hours and 9 of them died. The symptoms encountered consisted of nausea, vomiting, blurred vision, dizziness, slurred speech, rapidly progressing to coma. Physical examination showed hyper-reflexia, Babinski sign, severe hypotension, cyanosis, -metabolic acido-

Sis, albuminuria ; hyper-glycemia, hyperkalemia, oliguria progressing to anuria etc.

Essentials of treatment were to cure metabolic acidosis with sodium bicarbonate, forced diuresis using Ringer lactate solution or furosemide and high doses of intravenous pyridoxine, peritoneal dialysis and oxygen inhalations if necessary,

S.P.P.

Clinical observation of 12 cases of tuberculous meningitis

Kaoru SHIMOKATA, Yukio MANO, Hiroo NAKAMURA and Masahiko YAMAMOTO. Kekkaku; 1971, 46, 447:

Twelve cases of meningitis were seen in a Red Cross Hospital; in Japan from 1962 to 1970. Four were males and 8 females. One case was one year old: one in 10-19, 6 in 20-39, two in 40-59 years age group and 2 cases were more than 60 years old. Previous history of tuberculosis was present in 5 cases; in 3 the previous disease was diagnosed 1 to 4 years earlier and in the other 2 the date of previous disease was uncertain. Seven patients had miliary lesions at the time of diagnosis; 3 had re-infection type of disease in the lungs; 1 had renal tuberculosis and 1 retino-choroiditis. All were febrile. Two were unconscious at the time of diagnosis: out of the 10 conscious patients, 9 complained of headache and nausea/or vomiting was present in 3 cases.; Central nervous system disturbance, convulsion; and/or rigidity were observed in 5 cases. Tubercle, bacilli were recovered from the CSF in 6 cases.; Five cases recovered and 7 died. Corticosteroids were used in 11 of the 12 patients in addition to anti-tuberculous drugs. The authors conclude that tuberculous meningitis in recent years was seen mostly in adults in Japan, was the result of late dissemination and the prognosis was not so good.

The results of long-term follow up of pulmonary tuberculosis patients found by the tuberculosis prevalence surveys

Kazuro Kihare, Kekkaku; 1971, 46, 501

Pulmonary tuberculosis patients found in prevalence surveys in 1953, 1958 and 1963 were re-assessed in 1968. They were 4308 in all: 1308 of 1953 survey, 2090 of 1958 and: 1411 of 1963 surveys. The ratio of male to female patient was: 1.7 to 1. Far advanced cases were; approximately 7% moderately

advanced 30% and minimal 55%. The average age of patients was 37.1, 42.6 and 45.0 years in the 3 surveys respectively. Out of the 1953 survey patients, 23.8% were lost from follow up, 23.8% had died, 8.9% were still active, 35.4% had become inactive and 8.2% were alive but could not be examined radiologically. Out of the 1958 survey, 18.7% were lost, 18.9% died, 11.0% were still active, 41.9% had become inactive and 9.5% though alive could not be examined. In the case of 1963 survey patients, 12.7% were lost, 9.9% had died, 26.2% were still active, 39.5% were inactive and 1.1.8% were still alive but could not be examined.

Approximately 60% of the total patients received treatment. Whereas all the far advanced cases received treatment, only about 50% of the minimal cases accepted treatment. The proportion of cases lost from follow up and the proportion of cases surviving but not examined were higher among minimal cases and in the age group 15 to 44 years.

S.P.P.

Tuberculosis among patients with various radiological abnormalities followed by the chest clinic service

S. Grzybowski et al. Amer. Rev. Resp. Dis.; 1971. 104, 605.

The rate of development of active disease in a community varies widely in various categories. It is the highest in those with inactive disease who never received adequate anti-microbial therapy. It is quite high in persons with minimal apical scarring and those with pneumoconiosis. In most other categories the chance of developing active tuberculosis does not appear to be greater than that experienced by the large numbers of tuberculin reactors in the population. The highest rate noted in Canada was 128.2 per 10,000 person years and the lowest 7 to 8 per 10,000.

S.P.P.

Non-reactive tuberculosis & malignant blood disorders

Vidar Hansson, Sivert Svane and Olav Torgersen Journal of Oslo City Hospitals; 1972, 22, 5.

Clinical and autopsy data from 6 cases of non-reactive disseminated tuberculosis are presented. The average age of 6 cases was 61 years. In all of them hematological abnormalities dominated the clinical picture and the

tuberculous infection was discovered at autopsy. Four cases were mis-diagnosed clinically as acute myelogenous leukemia and one as myelomatosis. One patient probably had chronic myelogenous leukemia but she died of disseminated non-reactive tuberculosis while the leukemia was in remission.

Clinically there were no symptoms or signs suggestive of pulmonary tuberculosis. All patients had pyrexia, intermittent at first but high and continuous in the terminal phase. The only other symptoms were headache and severe loss of energy. Only one patient had previous history of tuberculosis. Tuberculin test was carried out in only 3 of the patients and it was negative in 2 of these 3. All patients had anemia and thrombocytopenia.

The lungs of all patients on autopsy showed disseminated tubercles or larger infiltrates. All patients had enlarged lymph-nodes which were tuberculous and had enormous number of AFB but no sign of leukemic infiltration. All patients had tubercles in the liver; 5 patients had tubercles in spleen also and one each in small interstines left kidney and aorta in addition. Histologically, the tubercles were atypical, consisted of miliary foci with necrosis but little or no cellular reaction but contained large number of acid fast bacilli.

Problems concerning the pathogenesis of non-reactive tuberculous lesions and the relation to the primary blood disorders are discussed.

S.P.P.

Mode of action of anti-tuberculous agents and ultrastructure of mycobacteria

Sutemi Oka, Junji Yamaguchi, Fumio Arijii, Koichi Madokoro, Nobuko Kumano and Kolaro Oizumi. Sci. Rep. Res. Inst. Tohoku Univ. C. (Japan) 1971, 18, 7.

The ultrastructure of tubercle bacillus as studied with an electron-microscope and the changes in ultrastructure produced by INH, rifampicin, kanamycin, ethambutol and cycloserine are described. Changes produced by rifampicin which is assumed to inhibit DNA-dependent RNA polymerase was found to be of decrease in the ribosomes and mesosomes under the electron-microscope. Kanamycin inhibits synthesis of protein and thus decreases the ribosomes and mesosomes. Ethambutol inhibits nucleic acid synthesis and produces vacuoles in the nuclei. The mode of action of INH still remains uncertain though its effect

was somewhat similar to that produced by ethambutol. Cycloserine was found to produce a selective change in the cell wall. Thus the inhibitory actions of various anti-tuberculous drugs differ considerably from each other. The results further show that a combination of three drugs was most effective. Kanamycin was the least inhibitory of the drugs that were studied. Further, the results were not so satisfactory if the bacilli were exposed to kanamycin first and then to the other drugs. The most effective drug should be used first, followed by others, if eradication of tubercle bacilli is to be achieved.

S.P.P.

Surgery for pulmonary tuberculosis

Maija-Liisa Saarinen, Kari Salmenkivi and Martti I. Turunen. Scand. J. Resp. Dis., 1971. 52, 77.

The results of pulmonary resection in 372 patients in a sanatorium in southern Finland have been reviewed. Two hundred and nineteen of these were operated before (series A) and 153 after 1st January, 1961 (series B). The indications for surgery and age and sputum status of patients at the time of surgery were similar in both series. However, patients of poorer socio-economic status and those with associated diseases were more frequent in series B. The chemotherapy on the other hand was also more efficient in series B. Similarly surgical techniques were also more developed in the latter series. Operative mortality rate was 0.9% in series A and 0.7% in series B. Total mortality including late results of disease or complications was 3.7% in series A and 1.3% in series B. 7.4% of the patients were incapacitated for work in series A and 1.4% in series B. The rates for those partially incapacitated were 20.6% and 19.0% respectively. 72% and 79.6% respectively were working full time. The post-operative ventilatory function was similar in both series.

S.P.P.

Radiological and physiological studies on overdistension of lung after pneumonectomy in patients with pulmonary tuberculosis

Chiu-jung YUAN, Hiroshi ANNO, Yoyo MIYAMOTO, Masatoshi SHIOZAWA, Yoshio IMURA and Tetsuya WATANABE. Kekkaku. 1971, 46, 437.

The relationship between pulmonary function and radiological findings was investigated in 53 cases of pulmonary tuberculosis after

pneumonectomy. The cases were classified radiologically into 4 types according to the degree of overdistension of the contralateral lung viz. none, slight, moderate and marked. The proportion of patients with moderate overdistension was higher among younger patients than amongst the older, thus indicating the better dispensability of the lung in younger patients. Regardless of the degree of overdistension, neither the vital capacity nor the total lung capacity showed any increase after the operation. The residual volume in relation to the total lung capacity also revealed no significant difference according to the degree of overdistension. These facts show that the distension of the contralateral lung is merely the morphological displacement of a part of the lung and is not accompanied by any increase in its function. The alveolar ventilation was found to be abnormally uneven in overdistended lung. The volume of poorly ventilated area showed increase and the ventilation per unit of alveolar volume showed decrease, thus resulting in arterial desaturation in some cases. Arterial oxygen saturation was less than 92% in two patients and they had in addition either chronic obstructive emphysema or chronic bronchitis which was presumed to be present before the operation. No co-relation was seen between the degree of overdistension and the occurrence of post-operative dyspnoea. In majority of the cases the arterial desaturation was improved after resection of the diseased lung. This might be due to the removal of venous admixture taking place previously in the diseased lung.

S.P.P.

Bronchiectasis

Erik Ripe, H. Selander and J. Wolodarski. Scand. J. Resp. Dis., 1971. 51, 96-113.

Sixty-six persons operated for bronchiectasis between 1958 and 1964 in Stockholm have been followed up. Eight patients died 3.8 years after the operation. The remaining 58 were examined 8.4 years after operation in respect of respiratory symptoms, chest x-ray, respiratory function, working capacity etc. The investigations showed that 27 patients (41 %) were completely cured by the operation, 21 patients (31%) had persisting respiratory symptoms and the remaining 10 (16%) had fresh disease accompanied by respiratory symptoms. Good operative results were usually obtained in patients with anaemic pneumonia initially, no or minor airway obstruction, absence of sinusitis and rhinitis, low age at the time of operation and bronchiectasis limited to the

basal segments of the lower lobes. Normal tolerance threshold for histamine chloride aerosol was also satisfactory in such cases. Continuous respiratory symptoms post-operatively, reduced static and dynamic lung volumes, low working capacity, rising frequency of days of illness and even deaths among 59% of the patients show that indications for operation should be more strict.

Information collected in this follow up study has been used to develop a linear discriminatory model for prognostication of long term results of surgery in bronchiectasis. The constructed model showed accuracy of 89%.

S.P.P.

Pigeon Breeder's lung. Clinical and immuno-logical observations

Bl Elhefors, L. Belin and L.A. Hanson. Scand. J. Resp. Dis., 1971, 52. 167.

The epidemiology of pigeon breeder's disease was analysed among 180 pigeon-breeders in an urban population of Goteborg. Eight percent of 180 persons interrogated had symptoms suggestive of this disease. Two had characteristic influenza—like picture with fever

and chills as well as a reduced diffusing capacity; 5 had cough and dyspnea; 2 had rhinitis and 4 had symptoms referable both of the nose and the lungs. Vital capacity and forced expiratory volume/1 sec. were significantly decreased in those who had suggestive Symptoms. An Arthus reaction (type III hypersensitivity) to pigeon serum was only obtained in two persons with severest symptoms. Immediate type I hyper-sensitivity was however present in symptomatic as well as asymptomatic persons. Precipitating antibodies were not found in healthy controls but in about 16% of the pigeon-breeders. Agglutinating anti-bodies were found in low titers in a few controls whereas increased levels were invariably present in pigeon-breeders. There was no significant difference in the occurrence of precipitins. and agglutinins in breeders with or without symptoms.

The diagnosis of pigeon-breeder's disease is based on clinical history, chest x-ray, lung function studies and immunological tests. These give a fairly reliable diagnosis in majority of the cases without recourse to investigations like lung biopsy and inhalation test.

S.P.P.