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## PRIMARY HEALTH CARE

When India signed the Alma Ata declaration of the World Health Assembly we did not enter into any new commitment. The founding fathers of our Constitution had in their profound wisdom enjoined health care as one of the primary duties of the State. The only new commitment that we made was in respect of the time limit for attainment of this social goal, viz. by the year 2000 A.D.

Whether we can attain this goal before the end of the current century is being debated in the country. As far as primary health care in respect of tuberculosis is concerned, the position today appears to be that if our achievements during the past few years are taken as a yard-stick, it seems impossible to attain the target. However, if a reappraisal of our current status and future requirements is made and available facilities stepped up within the financial resources, the situation does not appear to be impossible though attainment even then will certainly be difficult.

Primary health care in Tuberculosis has three components, viz. case-finding, case-holding and immunisation. With the integration of BCG vaccination in the expanded programme of immunisation, the BCG coverage has already gone up in recent years, and when the programme gets going in full measure as stipulated during the next three years, it is expected that over 90% coverage with BCG vaccination would be possible to achieve. The position regarding case-finding and case-holding is, however, considerably difficult.

It is common knowledge that even in cities where diagnostic facilities are not very inadequate, the percentage of fresh cases diagnosed is considerably less than the estimated incidence. The position in the rural areas is even worse. However, with the change in strategy, whereby a symptomatic need not go to the nearest health centre for diagnosis but the Male multi-purpose health workers are required to collect and fix sputum of the symptomatics on a slide during their routine visits to the village and to send the slides for microscopy to the nearest centre, should considerably step up the case-finding. The main limitations are two. Firstly, can and will the multi-purpose workers take up this additional work along with the other duties assigned to them? Secondly, will the only laboratory technician usually available at the peripheral health centres be able to cope with the increasing number of sputum slides brought in by multi-purpose health workers in addition to their other work (particularly, malaria slides)? While the former is generally considered feasible, no large-scale systematic and organised study seems to have been undertaken to test its possibility and work out its logistics. Is its

implementation at all possible? Such a study should be carried out expeditiously, so that, if proved feasible, the new strategy does not remain merely notional but is implemented fully and effectively. And if that is not found feasible, another strategy will have to be evolved. Regarding the additional laboratory technician, consensus appears to be that it is essential for many centres handling large number of specimens.

There is one aspect of case-finding in large metropolitan cities which requires special mention. Every such city has a number of satellite colonies, mostly slums, inhabited usually by poorer sections of the society. Symptomatics in these colonies who are daily wage workers cannot often find time to attend the specialised tuberculosis clinic for diagnosis. The other general health facilities in the city are usually not involved in tuberculosis case-finding, whatever be the reason thereof. This must change. All health institutions in a city must function as sputum examination centres for the symptomatics. If this is not possible without additional staff, it must be provided. The additional expenditure involved is not likely to be beyond our resources.

Case-holding is a much more difficult and complicated problem. It is common knowledge that even though there is no real shortage of drugs, the number of patients who complete chemotherapy, whether in the cities or at the periphery, is less than 50%. Even short course chemotherapy has not improved the situation significantly in the 18 districts where it was made available as a pilot project. What is required is an efficient system of detecting drug default by the patients, expeditiously, followed by prompt action, repeatedly, if necessary, with a view to retrieve the defaulter. This should not be very difficult and beyond even our existing resources both in the urban and the rural areas. What is required is the recognition of the urgency of the problem and some reorganising of the duties and responsibilities of the para-medicals to evolve a feasible solution

The second impediment pertains to drug delivery. In a disease like tuberculosis with prolonged treatment, patient's compliance is directly linked to convenience or otherwise of drug collection. This can be facilitated in the urban areas by making drugs available not only in the specialised clinics in the city but also other health institutions. In the rural areas at present drugs are available only in PHCs, some of which may even be as far off as 20-25 kms. from some patients' residence. It is understood that in addition to about 12,000 PHCs, there will soon be about 100,000 sub-centres. The latter, too, could serve as drug distribution centres but many of these do not even have a building, nor are fully functional for the present.

In one of the meetings of the Coordination Committee of the Central Ministry of Health, set up to review the progress in respect of tuberculosis under the revised 20-Point Programme of the Government last year, a tentative decision was taken to carry out a pilot study from a few centres in the country to ascertain as to what would be the most acceptable and yet feasible procedure for drug distribution in rural areas situated far off from the existing health centres. Probably, this study has yet not been taken up. If the patient's compliance in chemotherapy has to be improved, and this is a *sine qua non* of Tuberculosis Control, such a study should be undertaken as quickly as possible so that in the next 3-4 years it should be possible to adopt a

convenient and acceptable drug delivery system in the rural areas. The nearer the drug delivery point is to the patient's door-steps, the more will be his compliance in completing the treatment.

There is yet another important factor which hampers case-finding and case-holding. Lack of health consciousness and ignorance about tuberculosis\* in general, in the community is well-known. Attempts at educating the community have been made from time to time but none of these have been sustained and extensive enough. Yet, this important aspect does not brook any further delay. The Tuberculosis Association of India has been devoting considerable attention to this activity during the last five years but precious little could be done because of financial constraints. An ambitious scheme of intensive health education in 250 bigger districts in the country with international assistance has now been cleared by the Government. The main aim of this programme would be to make correct knowledge about tuberculosis available to the community, motivate the community leaders, general practitioners, etc., and thereby bring about full utilization of available facilities and active participation of the community in the implementation of the National Programme. It is believed that when the scheme is fully implemented by the end of 1989, there will be substantial stepping up of case-finding and marked improvement in patients' compliance in respect of treatment.

Lastly, it may also be pointed out that Health in the broad sense of the word does not merely mean absence of disease or provision of diagnostic, curative and preventive services. It includes, as embodied in our Constitution already, a state of social and economic well-being also. Thus, the developmental activities in the country which are aimed at improving the quality of life in general and fostering social well-being are indirectly tuberculosis control measures also. Stepping up of these activities will help in reducing the problem of tuberculosis, even if marginally. And with reduction of problem at one end and improved health care facilities simultaneously at the other end, which, admittedly is difficult, though not impossible, the target set out in Alma Ata Declaration should be attainable before the end of the century.

The XVth Conference of the Eastern Region of the International Union Against Tuberculosis and Respiratory Diseases will be held at Lahore (Pakistan) from 10th to 13th December, 1987. Those who wish to present papers may obtain copies of proforma for sending the Abstracts from Prof. Abdul Aziz, C/o T.B. House, 34/F, Gulberg-2, Lahore-11 Pakistan.

## SENSITISATION PATTERN OF HEALTHY VOLUNTEERS AND TUBERCULOSIS PATIENTS TO VARIOUS MYCOBACTERIAL ANTIGENS BY ELISA

SUJATHA NARAYANAN, CM. PARAMASIVAN, ABDUL RAVOOF, P.R. NARAYANAN AND R. PRABHAKAR

**Summary;** The sensitisation pattern of 39 tuberculosis patients and 21 healthy volunteers to 9 different mycobacterial antigen sonicates was estimated using ELISA. The antibody levels of patients and volunteers were high against *M. tuberculosis*-7219, *M. kansasii* and *M. scrofulaceum* and low against *M. chelonae* and *M. fortuitum*. The tuberculosis patients showed a mean antibody level which was significantly different from that of volunteers to *M. tuberculosis*-7219, *M. kansasii*, *M. scrofulaceum*, *M. tuberculosis* S.I., *M. bovis* and PPD-S. With respect to three antigens, namely, *M. chelonae*, *M. fortuitum* and *M. avium intracellulare*, there was no significant difference between patients and volunteers.

### Introduction

Environmental mycobacteria are highly prevalent in most tropical areas and also exist in some subtropical areas (Nyboe, J., 1960). The majority of these are of either low or no virulence for men but many cause inapparent infections. Theoretically such infections could be expected to alter the immune status of the host not only against the causative organism but also against the classically pathogenic mycobacteria if the two are antigenically related. The most predominant species isolated from Chingleput District and the urban areas adjoining Madras are *M. avium intracellulare* followed by *M. terrae* and *M. scrofulaceum* (Paramasivan *et al*, 1985). The evidence for sensitisation of the individuals living in the endemic area has been established using skin test reactivity to PPD-B (Tuberculosis Prevention Trial, 1980). But this skin test using PPD-B does not indicate the organism to which the individual is exposed. In the present study ELISA was used to identify the sensitisation pattern of volunteers from this endemic area and tuberculosis patients to various mycobacterial antigens.

### Materials and Methods

#### Patients

A total of 39 pulmonary tuberculosis patients whose "sputum were positive by smear and culture for *M. tuberculosis* and who have had no previous chemotherapy were included in the study.

#### Control:

Some of the staff members of the Tuber-

culosis Research Centre and the volunteers attending a blood bank were included as controls. In all, there were 21 controls.

#### Preparation of sonicate extract of mycobacteria:

The mycobacteria were grown on the surface of solid Sauton's agar medium until confluent colonies were just apparent. The cultures were then harvested and sonicated in phosphate buffered saline (Dulbecco 'A') for 15 minutes (in 5 second bursts) using a Rinco model MP ultra sonicator at 70% maximum intensity. After ultracentrifugation of the lysates at 100,000 g for 1 hour the supernatants were sterilized by filtration (0.22 urn Millipore SLGV membrane) and adjusted to a standard protein content by Lowry's method (Lowry *et al*, 1951).

#### Quantitation of specific IgG:

The amount of specific anti-mycobacterial antibodies of class IgG in the sera of patients and controls to various mycobacterial antigens, viz., South Indian variant of *M. tuberculosis*-7219, British strain of *M. tuberculosis*-Si, *M. bovis*, PPD-S, *M. kansasii*, *M. scrofulaceum*, *M. avium intracellulare* serotype-8, *M. fortuitum* and *M. chelonae* were measured by Enzyme linked immuno sorbent assay (ELISA). The assay was done according to the method of Voller *et al.*, (1976) as slightly modified by Narayanan *et al* (1983).

Coating of the microtitre plate (96-well, U-bottom plates from Dynatech Laboratories Inc., VA, USA.) with antigen was carried out by dispensing 0.1 ml of the antigen (5 ug/ml) in bicarbonate buffer, 0.06 M pH 9.6, into

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each well and sealing the plate with nylon sealing tape. The plate was incubated at 37°C for 3 hours and then stored at 4°C until use.

Before using, the plate was washed with three changes of phosphate buffered saline-Tween-20 (PBST). Next, 0.1 ml of 1/20 dilution of serum was dispensed into the first row of the 96-well plate and 50 µl of PBST was dispensed into the other wells. The serum was serially diluted starting from 1/40 dilution upto 1/2560. The plate was again washed as before and 0.1 ml of 1/1000 diluted antibody conjugate (Peroxidase conjugated goat anti-human IgG obtained from Cappel Laboratories Inc., Cochranville, PA, USA) was added per well. Incubation and washings were carried out as mentioned earlier. The substrate stock solution consisted of Ortho-Phenylene diamine (OPD) 2.5 mg in 5.0 ml of distilled water. 0.5 ml. of the above stock solution and 50 µl of 3% H<sub>2</sub>O<sub>2</sub> were added to 49.5ml of distilled water. To each well, 0.1ml of this diluted substrate was added. After 30 minutes of incubation at room temperature in the dark, 50 µl of 8N/H<sub>2</sub>SO<sub>4</sub> was added to each well to arrest the reaction.

The optical density (O.D) of the resultant colour was read at 492 nm, using a Titertek Multiscan vertical photometer (Flow Laboratories, VA, USA). All the serum samples were randomised and coded so their identity

was unknown to the laboratory worker setting up the test.

### Results

Table-1 shows the mean antibody levels of 39 patients and 21 volunteers against 9 different mycobacterial antigens at 1/40 dilution. The antibody titres in both patients and volunteers were highest against South Indian variant of *M. tuberculosis* strain-7219 followed by *M. scrofulaceum*, *M. kansasii*, British strain of *M. tuberculosis-SI*, *M. bovis*, *M. avium intracellulare* serotype-8, *M. chelonae*, PPD-S, and *M. fortuitum*. The patients had significantly higher antibody levels than the volunteers against *M. tuberculosis-1219*, *M. kansasii*, *M. scrofulaceum*, *M. bovis*, PPD-S and British variant SI; the antibody levels between volunteers and tuberculosis patients were not significantly different with respect to *M. chelonae*, *M. fortuitum* and *M. avium intracellulare* serotype-8. The mean antibody level of 39 patients to *M. tuberculosis-7219* was significantly, higher than the mean antibody level to other mycobacterial antigens. But, the mean antibody level of volunteers to *M. tuberculosis-1219* and other mycobacterial antigens did not differ significantly.

The O.D. value in the individual patients and volunteers who showed reactivity at 1/160 dilution is represented in Fig.1 & 2.

TABLE 1

Mean Level of Antibody Binding (O.D.) to various Antigens in Tuberculosis Patients and Healthy Volunteers

S. No.	Antigen	Patients (39)*	Volunteers (21)	P-value
1.	<i>M. tuberculosis-1219</i>	0.345 ± 0.099	0.247 ± 0.087	0.001
2.	<i>M. scrofulaceum</i>	0.299 ± 0.074	0.237 ± 0.071	0.001
3.	<i>M. kansasii</i>	0.290 ± 0.048	0.237 ± 0.052	0.001
4.	<i>M. tuberculosis-SI</i>	0.254 ± 0.049	0.222 ± 0.049	0.020
5.	<i>M. bovis</i>	0.243 ± 0.059	0.211 ± 0.055	0.050
6.	<i>M. avium intracellulare-S8</i>	0.161 ± 0.064	0.184 ± 0.069	0.2 (N.S.)
7.	<i>M. chelonae</i>	0.151 ± 0.083	0.122 ± 0.078	0.2 (N.S.)
8.	PPD-S	0.149 ± 0.047	0.113 ± 0.060	0.02
9.	<i>M. fortuitum</i>	0.124 ± 0.059	0.153 ± 0.054	0.07 (N.S.)

\*No of tuberculosis patients.

Fig. 1

**Antibody Levels of Patients and Volunteers to various Mycobacterial Antigens**

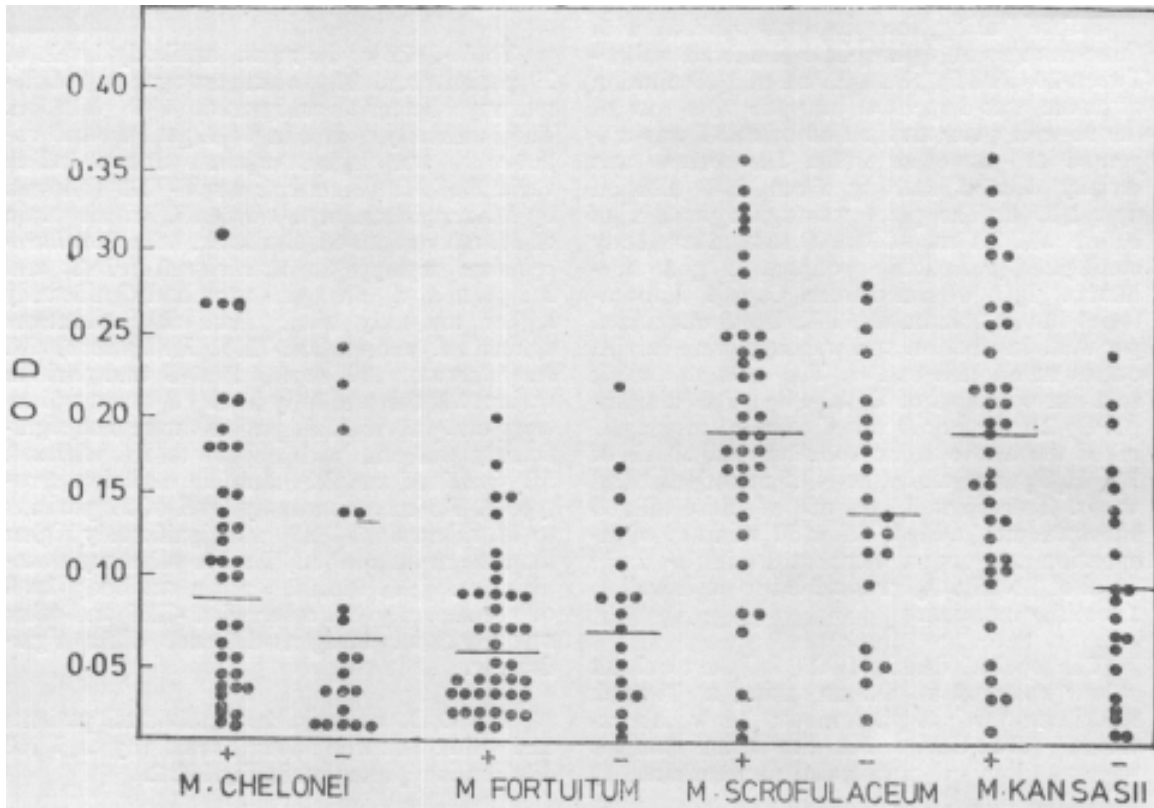
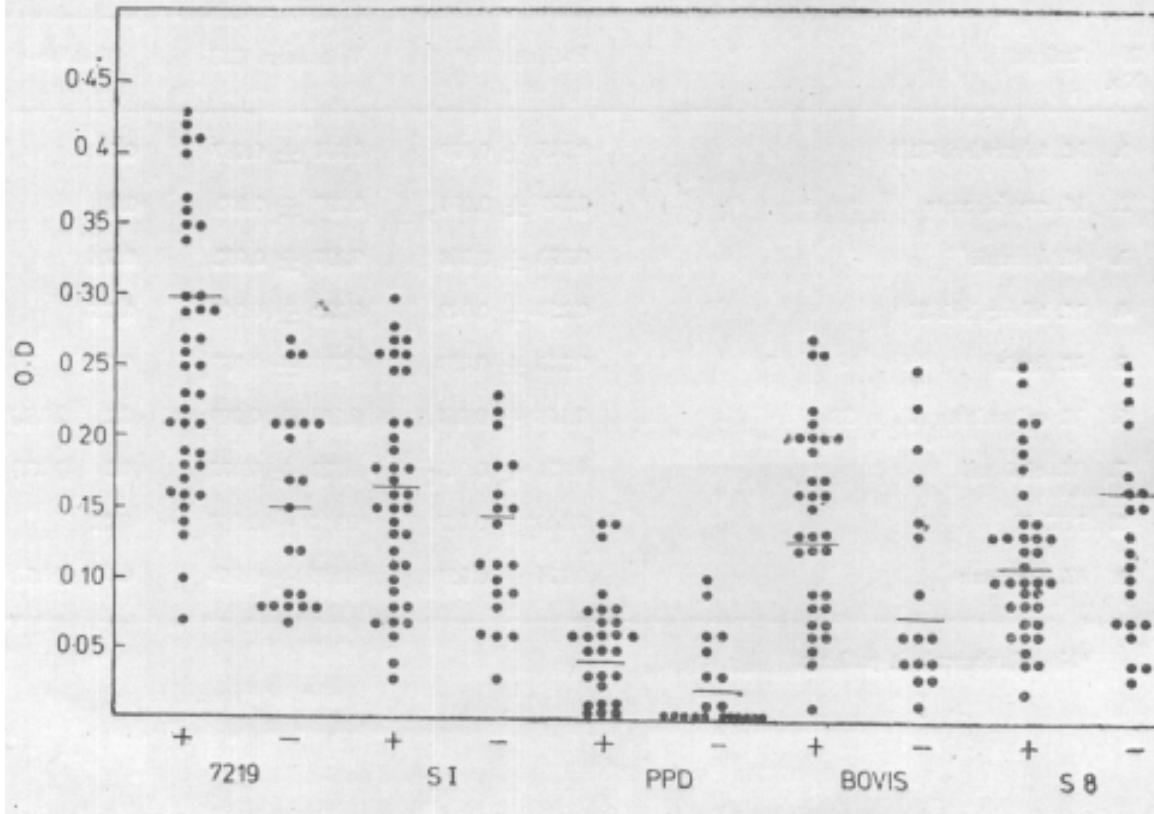


Fig. 2

**Antibody Levels of Patients and Volunteers to Various Mycobacterial Antigens**



There is a similarity in the antibody levels of patients against 7219, *M. kansasii* and *M. scrofulaceum*. *M. chelonae*, PPD-S and *M. fortuitum*, showed very low antibody levels in both patients and volunteers.

### Discussion

The mean antibody level of 39 patients to *M. tuberculosis-1219* was significantly higher than mean antibody levels to other mycobacterial antigens. But, the antibody levels of volunteers to *M. tuberculosis-1219* and other mycobacterial antigens did not differ significantly. This indicates the possibility that antibodies from patients recognise specific antigenic component along with other cross reacting components in *M. tuberculosis-7219* whereas the antibodies from volunteers lack this recognition capacity.

The antibody levels of the tuberculosis patients to the following antigens *M. tuberculosis-1219*, *M. kansasii*, *M. scrofulaceum*, British strain-SI and PPD-S were significantly higher than those of the control subjects. But the limitation of an extensive overlap between the control subjects and patients was observed with all the five antigens. The other mycobacterial antigenic extracts tested also showed binding, but to a lesser extent.

The high levels of antibody of patients and volunteers to *M. kansasii* and *M. scrofulaceum* indicate that these two species share more number of common cross reacting components with *M. tuberculosis-7219* which is the South Indian variant of *M. tuberculosis* or the exposure to these organisms is very common in the area. Previous study on DNA homology employing relative percent binding and thermal stability of bound DNA also showed that *M. kansasii* had high correlation with *M. tuberculosis* (Wendy and Lawrence, 1970).

In spite of the fact that crude sonicate extracts of mycobacteria were tested using a highly sensitive technique like ELISA, only low levels of antibody were consistently observed in patients with tuberculosis. The antibody levels do not seem to correlate with the severity of disease. It is not known whether the low levels of antibody are due to generalised or specific immunosuppression, or is genetically determined. However, the analysis of antibody deserves attention from the point of serodiagnosis though there has not been any convincing role for these antibodies in the protective immunity to tuberculosis.

Exposure to environmental mycobacteria.

may account for some of the antibodies observed. The presence of such organisms in tap water, natural water and soil would facilitate such a continuous and universal exposure (Mollohan *et al*, 1961). Hence, it is likely that sensitisation with environmental mycobacteria could result in weak non-specific reactivity. Kulkarni and Kamath (1986) have shown cross-reactivity in the delayed hypersensitivity response in Swiss white mice immunised with live mycobacteria. All the mycobacterial strains tested gave cross-reactions and generally slow growers gave stronger cross-reactions with other slow growers than with rapid growers and vice versa (Kulkarni and Kamath, 1986).

### Acknowledgement

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## THE POSSIBLE ROLE OF SOLUBLE MATERIAL FROM MACROPHAGES IN CELL MEDIATED IMMUNITY IN PULMONARY TUBERCULOSIS

RAJI SWAMY, R. PRABHAKAR, AND P.R. NARAYANAN

**Summary :** Lymphocytes from pulmonary tuberculosis patients and healthy controls showed identical proliferative responses to mitogen (PHA) and antigen (PPD) on Day '0' (DO), Day-2 (D2) and Day-7 (D7) of culture. Also, there was no suppression of PHA induced lymphocyte proliferation in the presence of culture supernatants of pulmonary tuberculosis patient's mononuclear cells.

### Introduction

Immunosuppression by macrophages has been reported in tuberculosis (Elinor, 1978) and sarcoidosis (Goodwin, 1977, 1979). Though the precise mechanism of the immunosuppression is poorly understood, several macrophage mediators have been identified, such as thymidine (Opitz et al., 1975), Prostaglandins (Morley, 1974), Oxygen metabolites (Grey et al. 1979), Arginase (Kung et al., 1977), Complement components (Allison, 1978). The specificity and in vivo role of these mediators in immunosuppression are yet to be determined.

While investigating the immunosuppression in chronic fungal infection, Stobo (1977) has shown that patients' macrophages liberated, *in vitro*, a soluble material (SM) capable of inhibiting the blastogenic response of normal T-cell to mitogens and antigens. However, not all T-cells were equally susceptible to its suppressive effect. Only the short-lived, low-density T-cells in fresh peripheral blood mononuclear cells (PBMC) could be suppressed by the SM. Hence, incubation of PBMC for seven days in culture fluid could result in a functional deletion of the short lived low density T-cells and yielded high density T-cells whose reactivity could not be suppressed by SM.

In this report, we have looked for the possible existence of a similar suppressive mechanism in pulmonary tuberculosis.

### Material and Methods

**Subjects :** The patient group consisted of 12 pretreatment pulmonary tuberculosis patients admitted to the controlled clinical trial of the Tuberculosis Research Centre. The sputum of all the patients was positive by smear a

Twelve healthy blood bank volunteers served as controls.

Twenty millilitres of blood was drawn from each individual in a heparinised container and PBMC separated on Ficoll hypaque (Boyum, 1968). The cells were washed three times with Hank's balanced salt solution (HBSS) and suspended at a concentration of  $0.75 \times 10^6$  cells per ml. in RPMI-1640, containing 2 mM Glutamine, 80 ug/ml gentamycin and 10% pooled heat-inactivated human AB serum (CRPMI) and placed in plastic tissue culture flasks at 37°C in a humidified atmosphere of 95% air and 5% CO<sub>2</sub>. On 0, 2 and 7 days the cultures were terminated by centrifugation. The cells were washed, resuspended at  $0.5 \times 10^6$  cells per ml in fresh CRPMI and a lymphocyte proliferation test was performed. Triplicates of 0.2 ml of cells were placed in a 96 well microculture plate and the cultures were stimulated with either 5 ug/ml Phytohemagglutinin (PHA) or 50 ug/ml PPD and maintained for 4 and 6 days, respectively. Eighteen hours before harvesting, 1 uCi <sup>3</sup>H-thymidine was added to each well and the cells were harvested in a semi-automated cell harvester on fibre glass filter paper discs. Radioactivity of the discs was measured in a liquid scintillation counter. The results were expressed as stimulation index (S.I.).

$$S.I. = \frac{\text{Mean log count stimulated culture}}{\text{Mean long count control culture}}$$

In addition, the supernatant culture fluid obtained on day-2 and day-7 of the PBMC was added in a final concentration of 25% to 2 normal PBMC suspended in CRPMI and the PHA reactivity of this mixture tested. Stimulation index was calculated as described above.

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**Results and Discussion**

*Stimulation Index for PHA and PPD induced lymphocyte proliferation on day 0, 2 and 7*

PBMC were incubated for seven days in plastic tissue culture flasks and lymphocyte proliferation tests were done on days 0, 2 and 7. The results of these tests are presented in Table 1. Increasing duration of incubation did not result in increased stimulation of the patients' lymphocytes. In Stobo's work (1977) there was an eight-fold rise in the proliferative response of patients' lymphocytes on day 7 which was attributed to the functional deletion of low density, short-lived T-lymphocytes. These lymphocytes which are susceptible to the suppressive SM liberated by the patients' macrophages were responsible for the inhibition of lymphocyte proliferation on day '0'. Since

lymphocytes from tuberculosis patients have not shown any enhancement of stimulation, either by antigen or by mitogen, it may be concluded that tuberculous macrophages do not produce the suppressive material as macrophages from chronic fungal infection do. The results of the second experiment also suggest the same.

*Stimulation Index for normal PBMC in the presence of 25% culture supernatant of control and tuberculous PBMC and 5 ug/ml PHA*

A lymphocyte proliferation test for PHA (5ug/ml) was done on two healthy blood bank volunteers' lymphocytes in the presence of 25 % culture supernatant collected on day 2 and day 7 of control and tuberculous PBMC cultures. The results are shown in Table 2. Tuberculous PBMC supernatant have failed to show any

TABLE 1

*Mean ± S.D. of Stimulation Index of lymphocytes stimulated with 5 ug/ml PHA or 50 ug/ml PPD on Day '0', 2 and 7 of culture*

Days	Control (12)		Patient (12)	
	(PHA)	(PPD)	(PHA)	(PPD)
D—0	1.53 ± 0.09	1.12 ± 0.11	1.53 ± 0.17	1.13 ± 0.12
D—2	1.56 ± 0.12	1.13 ± 0.08	1.51 ± 0.13	1.10 ± 0.11
D—7	1.37 ± 0.13	1.16 ± 0.15	1.37 ± 0.18	1.18 ± 0.18

*N.B. ; Numbers in parantheses indicate number of individuals tested.*

TABLE 2

*Mean ± S.D. of Stimulation Index for PHA (5 ug/ml) induced lymphocyte proliferation in the presence of 25 % culture supernatants on two normal lymphocytes*

No.	Control SN (10)		Patient SN (10)		SN 0%
	Day 2	Day 7	Day 2	Day 7	
1.	1.37 ± 0.05	1.39 ± 0.09	1.33 ± 0.11	1.38 ± 0.06	1.33
2.	1.33 ± 0.09	1.32 ± 0.06	1.26 ± 0.09	1.32 ± 0.09	1.28

*N.B. : Numbers in parantheses indicate number of individuals tested.*

SN = Supernatant.

suppression of the SI of normal lymphocytes. The supernatant from the control group also gave similar results.

To conclude, the present results suggest that tuberculous macrophages may not be producing suppressive soluble material as was reported for chronic fungal infection. According to Ellner (1978), circulating suppressor monocytes are responsible for the diminished response to PPD induced lymphocyte blast transformation in low responders in tuberculosis and was able to show a 24-fold enhancement of lymphocyte proliferation in these patients by depletion of adherent monocytes. Further, it was also observed that this effect could not be mediated through monocyte cell supernatants.

Thus, the results of the experiment described above suggest that the possible approach to the defect in cell mediated immunity in tuberculosis could be studies related to evaluation of microbicidal properties of macrophages stimulated with appropriate lymphokines.

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## DIAGNOSIS OF TUBERCULAR LYMPHADENITIS BY FINE NEEDLE ASPIRATION CYTOLOGY

M.C. DANDAPAT,\* B.K. PANDA\*\* A.K. PATRA\*\*\* AND N. ACHARYA,\*\*\*\*

**Summary :** Diagnostic efficiency of Fine Needle Aspiration Cytology (FNAC) and histopathological examination of the same gland have been determined in 42 lymph nodes suspected to be tuberculous on clinical evidence. Thirty six of these were confirmed as tuberculous by histopathological examination. FNAC gave positive result in 30. There were no false positives.

### Introduction

Clinical diagnosis of tubercular lymphadenitis of the superficial lymph nodes is easy when features like matting, ulceration, sinuses, caseation and liquefaction are present. In the early cases and some of the late cases these features are absent resulting in diagnostic difficulties. Fine Needle Aspiration Cytology (FNAC) is a proven suitable investigation procedure for obtaining authentic diagnosis in such cases. It is a simple, reliable, time conserving and economical technique having practically no complications and has a high patient acceptance (Baily and Love, 1985). This can be performed in the put-Patient Department when the patient is clinically examined for the first time and a report can be obtained within hours. In cases of inadequate aspiration, it can be easily repeated. This diagnostic tool should provide definite benefits over the histopathological studies of the biopsy specimen. Its diagnostic efficacy particularly in cases of tubercular lymphadenitis has been reported to be almost as high as histopathological studies (Editorial, I.J.T. 1985). The purpose of the present study is to evaluate the efficacy of FNAC vis-avis open biopsy in cases of lymphadenopathy, which are clinically suspected to be of tubercular origin.

### Material and Methods

Patients of lymphadenopathies admitted to the surgical wards and attending the cytologic clinic of the M.K.C.G. Medical College, Berhampur were included in this study. In each case a provisional diagnosis was made clinically at the outset. Routine investigations like D.C., T.L.C., E.S.R. and special investigations like Mantoux test, Plain X-ray chest, and sputum for AFB was done. Then each patient was subjected to FNAC study followed by open

biopsy on a subsequent date. The results of FNAC were correlated with those of the histopathological findings of the biopsy specimen.

### Procedure of FNAC

The site and size of the affected lymph node were assessed. In cases of multiple involvement, aspiration was done, preferably, from an affected lymph node of the neck. For aspiration from cervical and axillary regions, the patient was asked to sit comfortably on a chair, and for other groups the patient was made to lie in a supine position on a table. The site was cleaned with rectified spirit. The lymph node was then grasped between the index finger and thumb of the left hand (braced thumb technique). A sterilized 22 gauge needle (external diameter 0.6 to 1.0 mm, length 3-6 cms) firmly fitted to a 20 ml. Sterile glass syringe was delicately inserted into the gland obliquely. Constant suction was then applied by withdrawing the piston with moderate force in order to ensure an adequate yield. With suction in play, the needle was gently passed in 3-4 directions through the gland. When an adequate quantity of cellular material was withdrawn into the syringe, the suction was gently released, the prick site was pressed with cotton wool soaked with rectified spirit, and the needle fitted with the glass syringe was withdrawn from the lesion. In case blood came out into the syringe during aspiration, the process was stopped and the needle was withdrawn. The process was then repeated at another site with another syringe and needle.

After completion of aspiration, the needle containing the aspirated cellular material was detached from the syringe, 2-5 ml. Of air was drawn into the syringe and the needle was refitted. Then the contents of the needle bore was blown out to a dry, clean, grease-free glass

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slide. Another similar glass slide was then kept pressed on it for a while and then these two glass slides were drawn in opposite directions. Thus, two smears of the aspirate were at hand. These two smears, while wet, were dipped into a jar containing 95% ethanol or 100% methanol for the purpose of fixation..

The smears were stained in Papanicolaou stain and examined under DPX view of the microscope. Presence of epithelioid cells, Langhans' giant cells along with caseating material were considered as diagnostic criteria for tubercular lymphadenitis. Z.N. stain was not done because in some cases of tubercular lymphadenitis there is likelihood of missing the organisms by the above stain, though the same cases could be diagnosed by cytological criteria as mentioned above.

### Results

From March 1985 to February 1986, eighty-five cases of lymphadenopathies were seen out of which 42 cases were suspected to be of tubercular origin on the basis of symptomatology, physical findings, and investigations like D.C., ESR, Mantoux test, X-ray chest and sputum examination for AFB.

Of these 42 cases, 36 were proved to be tuberculous by FNAC and/or Biopsy. Majority of the patients were in the second and third decades of life. The youngest patient was 2 years old and the oldest was 62 years old. Nineteen were males and 17 females. In 23 cases, cervical group of glands were involved and in 13 cases other groups of glands. Fourteen patients had matting of the affected lymph nodes and had nonhealing sinuses. Features of tubercular toxæmia such as ill health, emaciation, loss of body weight and evening rise of temperature were present in 25 cases.

There was no evidence of active pulmonary tuberculosis in any of the cases. Mantoux test was positive in 27 cases and lymphocytosis in the peripheral smear was present in 25 cases. X-ray of the chest revealed evidence of healed tuberculosis in 9 cases.

The FNAC findings are shown in table 1. Caseating material (Fig. 1) was found in 12 cases, epithelioid cells (Fig. 2) in 4 cases, mature lymphocytes and Langhans' giant cells (Fig. 3) in 6 cases and a combination of two or more findings was observed in 8 cases.

Histopathological examination of biopsied gland confirmed the diagnosis of tubercular lymphadenitis in 30 cases which were FNAC positive. Moreover, it could diagnose tuberculosis in another 6 cases out of the 12 cases

TABLE 1

*FNAC findings of 30 cases of Tubercular Lymphadenitis*

Findings	No. of cases
1. Caseating material	12
2. Epithelioid cells	4
3. Mature lymphocytes and Langhans' giant cells	6
4. Combination of 2 or more findings out of the above	8
<b>Total</b>	<b>30</b>

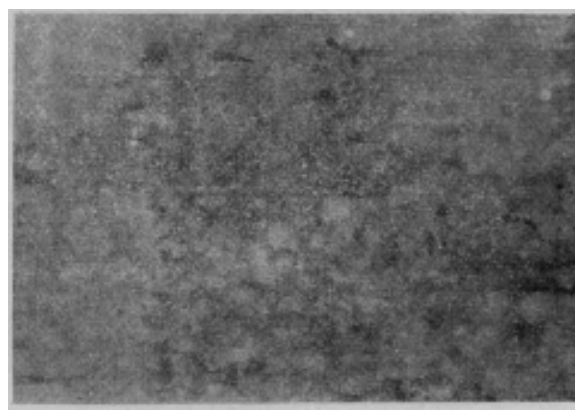


Fig. 1. F.N.A.C. smear showing caseating materials and nuclear fragments in T.B. lymphadenitis (Pap. x 450).

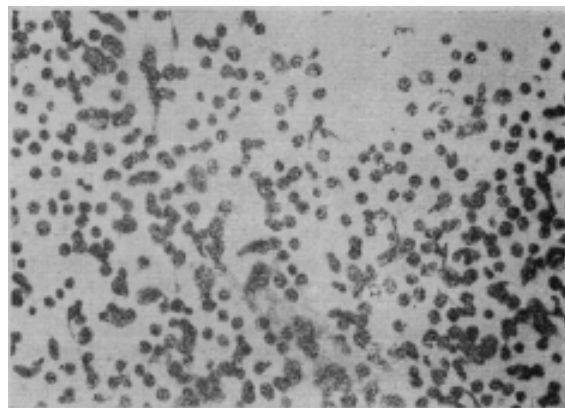


Fig. 2. F.N.A.C. smear showing scattered epithelioid cells in T.B. lymphadenitis (Pap. x 450).

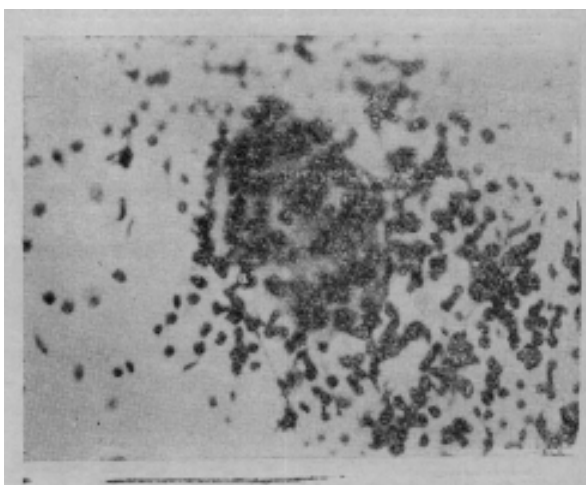


Fig. 3. F.N.A.C. smear showing Langhans' giant cells in TB. lymphadenitis (Pap. x 450).

diagnosed as chronic non-specific lymphadenitis by FNAC. In the remaining 6 cases, tuberculosis was excluded both by FNAC as well as biopsy (Table 2).

In the 6 cases missed by FNAC a mixed population of small and large lymphoid cells, mature lymphocytes, plasma cells and macrophages was seen giving an erroneous diagnosis of chronic nonspecific lymphadenitis. These 6 cases were finally diagnosed to be tubercular by histopathological studies of the biopsy specimen.

**Discussion**

Out of a total 85 cases of lymphadenopathy, 42 were suspected to be tuberculous on the basis of clinical examination. Thirty six of these were found to be tubercular on the basis of histo-

TABLE 2

*FNAC findings vis-a-vis histopathological findings*

	F.N.A.C.		
	Positive	Negative	Total
<i>Histopathological findings</i>			
Positive	30	6	36
Negative	0	6	6
Total	30	12	42

pathological examination of the biopsied gland. Out of these 36 cases, 30 could be correctly diagnosed by FNAC studies, an accuracy of 83.33% in this study which is comparable to other studies as seen in Table 3. FNAC gave a false negative result in 6 out of 36 cases i.e. 16.67%. There were no false positives in this study and in no case was repeat aspiration required. No complications were encountered.

The false negative results obtained in 6 cases might have been due to missing of the affected site by the aspirating needle. Hence, in clinically suspected cases of tubercular lymphadenitis but with negative FNAC results, diagnosis should be confirmed by the histopathological examination of the affected lymph node and other relevant specific investigations. Thus, reliability of FNAC in diagnosing tubercular lymphadenitis is only slightly less than that of histopathological examination of the biopsy specimen.

TABLE 3

*Comparative statement of FNAC accuracy rates in respect of tubercular lymphadenitis*

Authors	Year	No. of Cases*	No. of cases correctly diagnosed by FNAC	Percentage
1. Bloch, M.	1967	10	8	80.00
2. Nagpal, B.L.	1982	22	21	95.45
3. Patra, A.K.	1983	39	34	87.18
4. Current Study	1986	36	30	83.33

\*As confirmed by histopathological studies of the biopsy specimen

The merits of FNAC are:

- (i) It is a time saving procedure for both the patient and the clinician because, a report can be obtained in a few hours.
- (ii) The equipment and technique are simple. No anaesthesia is required.
- (iii) It is safe and has a high patient acceptance. It can be carried out in the O.P.D. just after clinical examination when the patient attends for the first time.
- (iv) It is relatively less expensive.
- (v) This procedure is almost free of complications.
- (vi) In experienced hands, it has a high diagnostic accuracy.

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## THE EFFECT OF STORAGE ON TUBERCLE BACILLI IN A TRANSPORT MEDIUM AND A SIMPLIFIED CULTURE TECHNIQUE\*

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**Summary** : Two hundred and fifty sputum samples were cultured by a simple method using a solution of trisodium phosphate and the results were compared with those of Petroff's method. A statistically significant higher culture positivity and a lower contamination rate were obtained in the new method. To test the efficacy of trisodium phosphate solutions a second study was conducted on 175 positive sputa. Sputum samples were collected in this medium and stored upto six days at room temperature and cultured by the simple method. A significant fall in culture positivity after three days of storage and smear positivity after five days was seen as against two days and more than six days, respectively) with plain sputum.

### Introduction

One of the main methods adopted for detection of pulmonary tuberculosis is sputum specimen examination for AFB. This is achieved either by direct microscopy or by culture technique. Culture examination is a more sensitive and reliable index but at the same time it is a laborious process where precision is required and hence it is unsuitable for simple laboratories. At the Government Hospital for Tuberculosis and Chest Diseases, Tambaram, a simplified technique was introduced to make culturing of tubercle bacilli more efficient, less time consuming and easier to perform in ordinary laboratories with little technical skill.

### Material and Methods

A total of 250 sputum samples from known pulmonary tuberculosis patients, consisting of both newly diagnosed patients as well as those undergoing treatment for various durations as in-patients in the hospital were included in the study. The sputum samples were cultured by both Petroff's modified concentration method and by a simplified method under ordinary laboratory conditions.

All the patients were supplied with two bottles each—one sterile empty McCartney bottle and the other a McCartney bottle with the transport medium and a red ring marked about 1/2" above the upper level of the medium. The patients were asked to give two sputum samples at the same time, one in the empty bottle and the other in the transport medium upto the red ring. Specimens collected in the empty bottles were cultured as per Petroff's

modified method (Allon and Baker 1968) and those collected in the transport medium were cultured as per the simplified technique. The results of the two methods were compared.

In the second study sputum samples were collected from another set of 250 known pulmonary tuberculosis patients on six consecutive days. On each day, the specimens were shaken well with sterile glass beads and divided into two equal parts and labelled as group "A" and group "B". The former were cultured, by Petroff's method and the latter were mixed with double the quantity of transport medium and shaken well. Both the groups were stored and cultured as shown in table 1. Smears were also made from the deposits and stained by Ziehl-Neelsen's method for the presence of acid fast bacilli. Cultures were incubated at 37°C for 8 weeks.

In order to simplify still further the procedure which was tried initially (Vasanthakumari, Jagannath and Rajasekaran 1985), the deposit from the sputum mixed with the transport medium and left overnight at room temperature, was directly inoculated on to the Lowenstein-Jansen medium slopes without centrifugation.

### Preparation of Transport medium:

Trisodium phosphate (Na <sub>3</sub> PO <sub>4</sub> 12 H <sub>2</sub> O)	200 gms-20 % - Decontaminant
Magnesium sulphate	250 mgs.
Ferric ammonium citrate	250 mgs. 0.025 % - Growth promoters
Ammonium sulphate	5 gms - 0.5% Homogeniser
Distilled water	1000 ml.

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TABLE 1

Allocation of Sputum Samples on Six Storage Days

Days of sputum collection	Days of culturing sputum specimens after storage at room temperature	
	Petroff's method (after days) Gr. A	Simplified method (after days) Gr. B.
1	6	6
2	5	5
3	4	4
4	3	3
5	2	2
6	same day	Next day

First, all the chemicals were dissolved by heating and then the solution was filtered and autoclaved at 121°C for 15 minutes. 100 units/ml. benzyl penicillin was added to complete the transport medium. 10ml. of the medium was distributed into sterile McCartney bottles and stored at room temperature.

### Results

Bacilli in the Petroff's method where 4% sodium hydroxide was used as a decontaminant took the usual time to stain red by Ziehl-Neelsen's method, whereas in the simplified technique, the bacilli took a longer time (15 minutes) to stain. The reason for this delay was not known. However, there were no differences in counterstaining and in the bacillary morphology. Similarly, there were no differences in the colony morphology and in the growth rate in both the methods when cultured.

Of the 250 sputum samples, cultured by both the methods (Table 2) 109 were smear positive and 141 smear negative. Smear positive culture positives were 34.8% by the simplified method and 25.2% by the Petroff's method. Smear positive culture negatives were 2% by the new method and\* 3.2% by the conventional method. By the simplified method, 8.8% of the smear negative culture positives were obtained, as against only 4.8% by the Petroff's method. Smear negative culture negatives were 46.9% and 48.4% respectively. Contamination rate was 7.7% in the

simplified method and 18.4% in the Petroff's method under identical laboratory conditions.

TABLE 2

Bacteriological Comparison of Two Methods  
Total patients : 250

Smear and culture status of sputum samples	Simplified method %	Petroff's method %
Smear + Smear + Culture+ (109)	34.3	25.2
Smear + Culture÷	2.0	3.2
Smear — Smear ÷ culture + (141)	8.8	4.8
Smear ÷ culture ÷	46.8	48.4
Contamination	7.6	18.4

Of the 250 sputum samples studied to find the transport medium, 175 revealed the presence of acid fast bacilli in their concentrated smears on all the six days. For the sake of uniformity the rest were excluded from the study.

Earlier studies on the effect of storage on plain sputum at room temperature on smear and culture results have yielded conflicting results (Padmabha Rao, Nair, Cobbald and Naganathan 1966, Pollack, Webancik, and Quinvones, 1970, Sula, Sundaresan and Langerona, 1960, and Paramasivam, Narayana, Prabhakar, Rajagopal, Somasundara and Tripathy 1983). With a view to finding out the value of the transport medium in field conditions for control programme, the second stage of the study was conducted on these 175 positive sputa.

In this study, the smear results were not affected in group 'A' even after six days of storage at room temperature. But in the case of group 'B', smear positivity was 100% before storage, 99.4%, 98.3%, 88%, and 80% and 53.1% after 2, 3, 4, 5 and 6 days of storage at room temperature (Table 3). The reduction in smear positivity in the transport medium attained significance at the 5th day (P<0.01).

As far as the culture results were concerned, in group 'B' culture positivity was 87.4% before storage and 82.8%, 79.4%, 65.1%, 40% and 25% after 2, 3, 4, 5 and 6 days of storage in the transport medium at room temperature (Table 4) Reduction in culture positivity attained

TABLE 3

*Effect of Storage on M. Tuberculosis Smear Results (175 Specimens)*

No. of days	Simplified method %	Petroff's method %
1	100	100
2	99.4	100
3	98.3	100
4	88.0	100
5	80.0	100
6	53.1	100

significance after 3 days of storage ( $P < 0.01$ ) There was a corresponding increase in the contamination rate from 8% before storage to 10.8%, 13.7%, 17.7%, 9.4% and 20.5% after storage. In group "A" culture positivity was 74.8% before storage and 62.8%, 48%, 29%, 22% and 6.2% after 2, 3, 4, 5 and 6 days of storage respectively at room temperature. Loss of viability attained significance on the 22nd day ( $P < 0.01$ ). Contamination rate was 17.1% before storage and 28%, 36%, 49.7%, 53.7% and 66.2% respectively after storage.

**Discussion**

Culture examination is technically superior to direct smear microscopy. Though Petroff's concentration method is the well known method for the growth of tubercle bacilli, it cannot be implemented in laboratories where technical skill and financial resources are limited. One of the major drawbacks of Petroff's method is the use of sodium hydroxide as a decontaminant which has a deleterious effect on the viability of tubercle bacilli when exposed for long periods. Further, as this technique involves addition of sodium hydroxide to specimens, centrifugation and washing of sputum deposits with distilled water leading to opening and closing of the bottles many times, results in a high contamination rate.

The present simplified technique uses trisodium phosphate as a decontaminant which has no adverse effect on the viability of tubercle bacilli even after long exposure. As this method does not require centrifugation and uses a slow decontaminant, it becomes suitable for application in any ordinary laboratory with no centrifuge and with little technical skill.

In this simplified method, as the time taken for processing is very much reduced, a laboratory technician of average calibre can put up as many as 60-65 cultures a day. Unlike sodium hydroxide, all the chemicals used here are non-corrosive and stable and so can be handled safely and stored at room temperature. Since the samples are cultured the next morning, they can be received till the evening which is an adminis-

TABLE 4

*Effect of Storage on M. Tuberculosis culture results (175 specimens)*

No. of days stored	Simplified method			Petroff's method		
	Positive %	Contamination %	Negative %	Positive %	Contamination %	Negative %
1.	87.4	8	4.6	74.8	17.1	8.0
2.	82.8	10.8	6.3	62.8	28.0	9.1
3.	79.4	13.7	6.9	48.0	36.0	16.0
4.	65.1	17.7	17.1	29.0	49.7	21.2
5.	40.0	19.4	40.6	22.0	53.7	24.0
6.	25.0	20.5	54.3	6.2	66.2	27.4

trative advantage. In the national tuberculosis programme in India, diagnosis and assessment of progress is made mainly by bacteriological examination. Sputum samples can be collected in this transport medium from Peripheral areas and transported to a central laboratory without any cold storage facilities. As there is very little risk of loss of viability upto three days the safe transit time may be extended upto a maximum of three days.

#### Acknowledgement

We are highly thankful to Dr. S.P. Pamra for his keen interest and encouragement. We are also thankful to all our Laboratory staff for their excellent co-operation and to the nursing staff of our hospital for collecting the sputum specimens in conducting this study.

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## MANAGEMENT OF TUBERCULOUS EMPYEMA

B.K. KHANNA

**Summary** : A study of 40 cases of tuberculous empyema managed with chemotherapy and closed intercostal drainage is presented. The lung expanded in 25 cases. Eight cases expired, 3 of these within a few days of admission. Five cases needed surgical intervention. Factors adversely affecting the outcome of therapy were the presence of broncho-pleura 1 fistula, chronicity of the lesion and presence of disease in the underlying and/or contralateral lung.

Tuberculous empyema is still very frequently encountered in India and is one of the most difficult problems to treat. Surgeon's cooperation in its management is of utmost importance. All these cases need hospitalisation, which, by present day standards, may be prolonged. The outcome of therapy depends on a number of variables, the most important of which are the chronicity of the lesion and the condition of the underlying and opposite lung (Emerson et al 1971).

The results of management of 40 cases of tuberculous empyema admitted during the last 5 years are presented.

### Material and Methods

Forty cases of tuberculous empyema admitted to Kasturba TB Hospital under the care of the author during the last 5 years have been analysed. Of these cases, 32 were males and 8 females. The range of age was 15 years to 60 years (mean: 25.4 years). The duration of illness varied from 15 days to 2 years (mean: 3.6 months). As a rule, the patients had had at least 2 months of antituberculosis chemotherapy, in various combinations, before seeking admission to the hospital. Almost all of them had no response to the therapy.

In the hospital, the patients were thoroughly investigated. This included chest X-ray, P.A. and lateral view, if needed, chest X-ray in special positions (for loculated empyema), sputum smear examination for A.F.B., fasting and post-prandial blood sugar and investigations to rule out any other complicating disorders including bronchopleural fistula (instillation of 2 % solution of gentian violet in the empyema cavity and examination of sputum for the next 24 hours for any evidence of the dye or instillation of dionosil oily in the pleural cavity and looking for appearance of reverse bronchogram, radiographically). Tuberculous lesions in the underlying lung or in the opposite lung were seen in 23 cases. Sputum smear was positive for A.F.B. in 18 cases.

After the investigations were completed, diagnostic aspiration of the affected pleural cavity was carried out and the fluid examined biochemically, bacteriologically and for cytology. Once the clinical picture appeared to fit in with clinical diagnosis of tuberculous empyema, a closed intercostal drainage tube (Malecot's catheter) was inserted in the 6th or 7th intercostal space in mid-axillary line and all the pus drained out. The dressing was carried out every day. The patency of the drainage tube was ensured, at least 3 times a day. In loculated empyema, the tube was inserted in an area immediately overlying the loculation in the most dependent position.

Repeat insertion of drainage tube due to unsatisfactory working (too low or too high insertion) or to loculations developing subsequently in the empyema cavity, was done in 8 cases.

Anti-tuberculosis chemotherapy, which was considered to be most effective (in view of the history of past treatment) was administered. As a rule, it consisted of streptomycin (I.g. I.M. O.D.), Isoniazid (300 mg. O.D.), Rifampicin (450 mg. O.D.) before breakfast, in patients weighing less than 50 kg. and 600 mg. per day, in those weighing over 50 kg.) and ethambutol (20 mg/kg. body weight). Some patients received Pyrazinamide (1.5g/day) or PAS (10g/day) in place of ethambutol.

The amount of pus in the draining bottle was measured every day with special reference to the deposit. Initially, in most of the cases, it was around 150-300 ml/day, but later the amount diminished. When the total amount of deposit was reduced to 30-40 ml/24 hours, the pus was sent for culture and sensitivity for secondary pathogens. Suitable antibiotic therapy to cover up the secondary infection was added. When the amount of pus discharge, in a freely communicating empyema cavity, was found to be approximately 10 ml/24 hours, a chest X-ray was taken and, if there was no fluid level, the tube was withdrawn and corrugated rubber

drain inserted. It took approximately 7 days for the wound to heal completely.

The tube was connected to low pressure suction every day for at least 15 minutes to clear out the pleural cavity of all the pus. In some instances, normal saline or chlorine-water lavage of the pleural cavity was carried out but it did not offer any advantage.

The overall results of treatment are shown in Table 1.

### Discussion

Tuberculous empyema usually follows rupture of a cavity or subpleural caseous focus in the pleural cavity. Consequently, all these cases do have a lesion in the underlying lung,

although its radiographic demonstration may not always be possible. It may be too small to be visible radiographically or may be tucked behind a thickened pleura or concealed in the collapsed lung. In our series of cases, a demonstrable tuberculous lesion was seen in the collapsed lung in 16 cases and in the opposite lung in 7 cases and in both the lungs in 6 cases. Table 2 shows that the demonstrable radiographic lesion had its impact on the outcome of therapy. Six out of 8 cases who left the hospital against medical advice and only 1 out of 5 cases transferred for thoracic surgery had a demonstrable lesion in the lungs. Furthermore, demonstrable lesion in the opposite lung renders a case poor risk for surgical therapy such as pneumonectomy, pleuro-pneumectomy, decortication or decortication coupled with pulmonary resection. The

TABLE 1

*Average Duration of Stay in the Hospital in months*

	1	1-2	2-3	3-4	4
1. Empyema cavity obliterated (25 cases)	5	2	5	10	3
2. Left Against Medical Advice (2 cases)	1	—	1	—	—
3. Transferred for Thoracic Surgery (5 cases)	—	1	—	2	2
4. Expired (8 cases)	3	2	3	—	—
Total	9	5	9	12	5

TABLE 2

*Overall Results of Therapy*

	Total	Cases with Lung lesion	Sputum containing A.F.B.	Cases with Bronchopleural fistula	Cases without Bronchopleural fistula
1. Empyema Cavity Obliterated	< 25(62.5%)	14 Cases	9 Cases	10 Cases	15 Cases
2. Left Against Medical Advice	2(5%)	2 Cases	2 Cases	2 Cases	—
3. Transferred for Thoracic Surgery	5(12.5%)	1 Case	1 Case	5 Cases	—
4. Expired	8(20%)	6 Cases	6 Cases	5 Cases	3 Cases
Total	40(100%)	23(58%)	18(45%)	22(55%)	18(45%)

same was found to be true, in this series, for patients excreting A.F.B. in the sputum.

Out of 8 cases who had expired, 3 died within 10 days of their admission. Obviously, these cases had come to us in very poor general condition. If these 3 cases are excluded from the analysis, our mortality rate would be only 8 %. The remaining patients stayed in the hospital for 2-3 months before their death. One case, who left against medical advice, did so within 15 days of admission and the other after 2½ months of treatment. Four of the 5 cases, who were transferred for surgery (when it was ensured that medical treatment had not succeeded in expanding the collapsed lungs) had stayed in the hospital for 3-5 months before being transferred. One of the cases had persistent bronchopleural fistula and the other 4 had thickened pleura and associated bronchopleural fistula (Table 2).

Obviously the best response to medical therapy (including closed intercostal drainage), was obtained in patients with history of recent illness, who did not have radiographically visible lesion and whose sputum did not have acid fast bacilli. Once an intercostal tube has been inserted, infection of the pleural cavity with secondary pathogens is inevitable. This infection is likely to persist as long as the tube is inside the pleural cavity. No amount of antibiotics can control it. That is why, only at the fag end of our therapy, when we found that the total amount of pus collected in the bottle during the preceding 24 hours, was less than 40 ml. and the bronchopleural fistula was healed, we attempted to control the infection by administration of intensive antibiotic therapy and, simultaneously, by taking out the tube and replacing it with corrugated rubber drain. This has resulted in reduction in the total duration of intubation, and rapid reexpansion of collapsed lung in 5 cases (out of 15 cases) within 1 month of initiation of the therapy, two within 2 months, 5 within 3 months, 10 within 4 months and the remaining 3 cases by the end of 5 months of therapy.

Tuberculous empyema is still seen by those

of us working in tuberculosis hospital in florid form. Large number of these cases are unsuitable for surgical therapy because of involvement of both or contralateral lung with tuberculous pathology. Furthermore, co-existence of broncho-pleural fistula delays the expansion of the lung and is, indeed, a dreaded complication although good results despite this complication have been reported by some workers (Jain et al 1975 and Chaudhry 1984). In this series, the fistula was present in 22 cases. The lung expanded in only 10 of these as against 15 out of 18 cases without fistula (Table 2).

In the end, it may again be emphasised that all cases of tuberculous empyema need hospitalisation. Closed intercostal drainage must be done immediately thereafter. Potent anti-tuberculosis drugs should be administered. The amount of pus collected in the bottle should be monitored every day. Once the amount is below 40 ml./24 hours suitable antibiotic therapy to control secondary infection should be started and the tube withdrawn and replaced by a corrugated rubber drain. The overall recovery rate, in this series, with conservative medical treatment was 62.5%, which was profoundly affected by the presence of broncho-pleural fistula (Mittal et al 1971).

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## UNILATERAL VOCAL CHORD PARALYSIS-UNUSUAL SEQUELAE OF HEALED PULMONARY TUBERCULOSIS

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**Summary** : Four cases of left recurrent laryngeal nerve paralysis occurring as a late complication of healed pulmonary tuberculosis are presented. Patients were thoroughly investigated and other conditions causing left vocal chord paralysis were excluded.

### Introduction

Vocal chord paralysis commonly results from disease affecting the vagus nerve or its recurrent laryngeal branch somewhere between the jugular foramen and its entrance into the larynx. It is rarely caused by an intralaryngeal lesion. In the thorax the left recurrent laryngeal nerve is more vulnerable than the right, since it pursues a longer intrathoracic course, comes in contact with mediastinal lymph nodes and loops around the arch of the aorta.

Tubercular laryngitis as a complication of pulmonary tuberculosis presenting most commonly as hoarseness of voice was reported in 4.25% of cases suffering from active pulmonary tuberculosis (Scot & Heaf, 1940; Thompson and Negus, 1948 etc.). Many conditions like open negative syndrome, bronchiectasis, obstructive airway disease, respiratory insufficiency, corpulmonale, amyloidosis, disseminated calcification of lung, emphysema and peptic ulcer have been described in literature as sequelae of pulmonary tuberculosis.

Important causes of hoarseness of voice in tuberculous involvement of the larynx include inflammation of the vocal chord of ventricular fold or crico-arytenoid joint and lesions in the recurrent laryngeal nerve following fibrosis at the apex of the lung or pressure from mediastinal lymphnodes (Ormerod, 1939). With the advent of effective anti-tuberculosis chemotherapy, more and more tubercular patients continue to live with extensive fibrosis of the lung or mediastinum. Vocal chord palsy consequent upon fibrosis of the lung is presented as a late complication of healed pulmonary tuberculosis.

Paralysis of recurrent laryngeal nerve due to tuberculous involvement of mediastinum

is a rare although accepted entity; however there is a paucity of clinical reports of this condition in literature as a sequela of healed pulmonary tuberculosis. Infrequency of clinical reports referring to cause of unilateral vocal cord paralysis as a sequela of healed pulmonary tuberculosis prompted us to present this series of 4 cases for publication.

### Materials and Methods and Results

Four old healed cases of pulmonary tuberculosis presented to us with chief complaint of hoarseness of voice varying from 1 month's to 6 months' duration. Out of the four patients, two were males and two females. Their ages varied from 50 years to 60 years. All had taken adequate treatment for pulmonary tuberculosis about 10-30 years earlier. These patients were asymptomatic in between till onset of hoarseness of voice.

*Investigations* (i) Sputum was repeatedly negative for A.F.B. by direct smear, concentration smear and culture in all patients.

(ii) Complete haemograms of all patients were within normal limits.

(iii) Sputum culture and sensitivity for pyogenic organism revealed normal flora in all patients.

(iv) Sputum for malignant cells was negative in all patients.

(v) Central nervous system examination, blood sugar estimation and serological test for syphilis were within normal limits and negative.

(vi) Radiological examination showed evidence of left upper lobe fibrosis in all patients. Fig. 1 shows the skiagram of one of the patients. One patient had right upper lobe fibrosis also.

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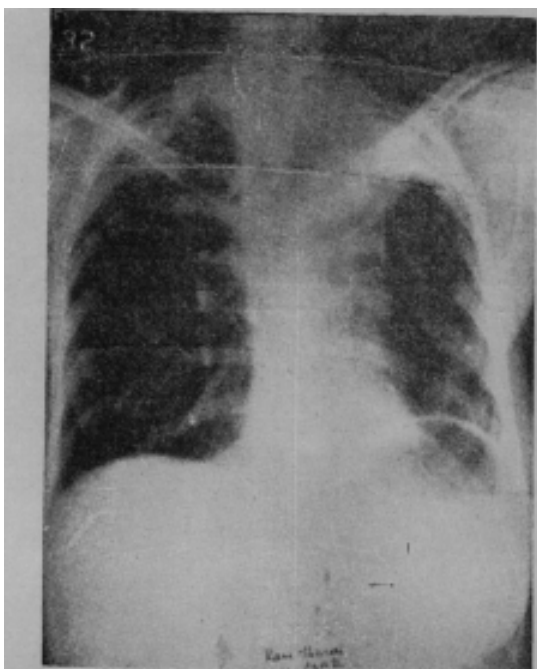


Fig. 1. Showing massive fibrosis left lung upper zone with shifting of the mediastium to the left. Scattered fibrotic lesions are seen in the upper zone of the right lung also.

*Skiagram chest:* When the latest skiagrams were compared with the original skiagrams (available in only three cases), radiological extent of fibrosis seemed to have increased with passage of time at the same site and around it.

(vii) Ear, nose and throat examination showed left vocal cord paralysis without any evidence of malignancy.

(viii) Flexible fibroptic bronchoscopy was done in every patient. This revealed diminished or no movement of left vocal chord, distortion of the lumen of the main bronchus and marked narrowing of the upper lobe opening with cicatrization of the bronchial mucosa. No evidence of haemorrhage, congestion or growth was seen.

(ix) Post-bronchoscopic sputum specimens were repeatedly negative for A.F.B., malignant cells and pyogenic organisms.

### Discussion

Vocal chord paralysis when associated with chest disease is usually secondary to involvement of the recurrent laryngeal nerve with bronchial neoplasm or with the mediastinal scarring due to old tuberculosis lesions (Titcher, 1976).

In the present series, 4 cases presented with hoarseness of voice as the main complaint, an unusual sequela to healed pulmonary tuberculosis. In chronic pulmonary disease the paralysis may be caused by three possible mechanisms (a) the nerve passing through or adjacent to a mass of caseating nodes (b) the nerve being trapped in dense fibrosed pleural thickening or in the chronic fibrosing mediastinitis (c) the nerve being stretched owing to retraction of the left upper lobe bronchus towards the apex. Intrathoracic disease usually affects only the left nerve. Specific anti-TB drugs lead to healing of the tuberculous lesions and increased longevity of the patients. The healing by fibrosis may present with the late complication even 10-30 years after treatment by involvement of the recurrent laryngeal nerve. Fibrosis around left recurrent laryngeal nerve may lead to left vocal chord frequently.

Most authors have recognized mediastinal tumors and enlarged mediastinal paratracheal and bronchial nodes as a cause for left recurrent laryngeal nerve paralysis. Despite the frequency with which the mediastinal and tracheobroncheal nodes are involved in tuberculous disease, paralysis of the recurrent nerve is relatively uncommon. The same nodes involve the nerve much more frequently in malignancy. It has been noted that abscess formation in the lymphnodes adjacent to the nerve leads to paralysis.

As mentioned by Gupta (1959), recurrent laryngeal nerve palsy is not a rarity in tuberculosis. In the five cases reported by Gupta (1959) and the two cases reported by Farmer et al (1975) only the left recurrent laryngeal nerve was involved. The cause of the left recurrent laryngeal nerve palsy in our series was probably due to fibrosis of the mediastinum associated with healed pulmonary tuberculosis (Perry, 1952).

### Acknowledgement

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## TUBERCULOSIS OF THE BREAST

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Summary : Sixteen cases (15 females and 1 male) of tuberculous mastitis (TM) constituted 2.05% of all the lesions of breast biopsied during a period of 16 years. Thirteen of these were of child bearing age. It was associated with infiltrating duct carcinoma in 1 case. It is felt that tuberculosis should still be considered in the differential diagnoses of the breast lumps, particularly in this geographic region.

### Introduction

Tuberculosis of the breast was first described by Sir Astley Cooper (1829). Over 500 cases have since been described, most of them from past generations when tuberculosis of all forms was more prevalent (Hamit and Ragsdale, 1982). Even in those days the breast seemed to have had a peculiar resistance to tuberculosis. We encountered 16 cases of mammary tuberculosis during a period of 16 years out of 780 breast lesions. In view of its rarity in the west, and relatively higher frequency in this region, we wish to report these cases.

### Material and Methods

Sixteen cases of mammary tuberculosis (TM) collected in the department of Pathology of L.L.R.M. Medical College, Meerut from 1969 to 1984 were studied. These cases had undergone surgery at the S.V.B.P. Hospital attached to this college. The clinical history forms were re-examined by us. Paraffin sections were stained with hematoxylin and eosin and in a few cases sections were stained to demonstrate mycobacterium tuberculosis by Ziehl-Neelsen's and Fite-Faracco techniques.

### Results

Tuberculous mastitis accounted for 2.05% of all lesions of the breast (16/780). Out of 16 cases, 15 were females and 1 was male and their ages ranged from 20 to 70 years. All the females were married and the majority were of child-bearing age. The presenting symptoms were lump (14/16 cases) and a discharging sinus (2/16). Right breast was involved more often (10/16) than the left. Axillary lymphnodes were enlarged on the same side in 2 cases. The duration of symptoms varied from 1 to 16 months.

The diagnosis was confirmed on histopatho-

logical evidence of a typical tubercle. Microscopically, typical tuberculoid granulomas consisting of Langhan's giant cells, epithelioid cells, lymphocytes, plasma cells in varying numbers and caseous necrosis were seen. In some cases (4) extensive caseous necrosis and in 2 cases abscess formation was also seen. The nipple was involved in only 1 case, it was ulcerated and there was extensive infiltration by polymorphonuclear leukocytes. Despite meticulous search, AFB could be detected in the tissue sections in 1 case only. Lymphnodes present in 2 resected specimens showed tuberculoid granulomas with extensive caseous necrosis.

Breast lobules, in the surrounding tissue were infiltrated by lymphocytes and plasma cells. One case was associated with infiltrating duct carcinoma of the medullary variety; focal ductal epitheliosis was encountered in 6 cases; lactating adenoma in 3 and cystic mastitis in 2.

### Discussion

Tuberculosis occurs far less frequently in the breast than in other organs of the body. Mammary tissue appears to be an inhospitable site for survival and multiplication of tubercle bacilli, as is skeletal muscle and the spleen (Mukerjee et al 1974). Nagashima (1925) found no case of breast involvement in 34 autopsies performed upon patients who had died of miliary tuberculosis. In a study of 10,000 necropsies performed upon patients who died in a tuberculosis sanatorium, mammary tuberculosis was found in only 7 patients (Raw, 1924). In over 7,60,000 admissions to Charlotte Memorial Hospital and Medical Centre, Hamit and Ragsdale (1982) found only 1 case of tuberculous mastitis from 1940 to 1982. In India, it represents 0.63 to 5.38% of surgically treated breast disease (Dharkar et al., 1968; Mukerjee, Cohen and Niden, 1971; Pratap, Saxena and Samuel, 1971; Mukerjee et al, 1974; Gupta,

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Gupta and Duggal, 1982; Sarin et al., 1984, and Kedar, Bobhate and Kherdekar, 1985). In the present series, it accounted for 2.05% of all the breast lesions during the period under review. Table 1 shows the relative frequency of tuberculous lesions elsewhere as seen in biopsies during the same period.

Tuberculosis of the breast is primarily a disease of women in the age group of 20 to 50 years (Goldman, 1978). It is rare in males, prepubescent females and elderly women. In the present series also 14/16 (87.5%) of the patients were in this age group and except

one, all were females. As in other series (Mukerjee et al, 1974; Goldman, 1978, and Gupta, Gupta and Duggal, 1982) it was more common in women of childbearing age (81.2%) and lactating rather than nulliparous women. Trauma and pregnancy frequently have been mentioned as predisposing factors (Ikard and Perkins, 1977).

As in the report of Pratap, Saxena and Samuel (1971), the disease involved right breast in majority of patients (62.5%). The clinical presentation (position, size, consistency and mobility of the lesion) is variable rendering

TABLE I

*Frequency distribution of tubercular lesions at various sites*

S. No.	Site	Total Biopsies	Tuberculous Lesions	Per Cent
1.	Subcutaneous tissue	270	157	58.15
2.	Lymph nodes	1185	533	44.98
3.	Peritoneum	35	11	31.43
4.	Lung	40	11	27.50
5.	Bones and Joints	326	59	18.10
6.	Synovial membrane	197	35	17.77
7.	Omentum	35	06	17.14
8.	Pleura	39	06	15.38
9.	Skin	723	39	5.39
10.	Gastrointestinal tract	1,711	64	3.74
11.	Urinary bladder	36	01	2.78
12.	Male genital tract	448	11	2.45
13.	Lacrymal sac	41	01	2.44
14.	Breast	780	16	2.05
15.	Female genital tract	6,119	121	1.98
16.	Kidney	270	04	1.48
17.	Prostate	560	04	0.71
18.	Gall bladder	495	02	0.43
19.	Thyroid	397	01	0.25

diagnosis difficult. The picture is even more confusing in the elderly patients if it presents simultaneously with carcinoma (Crausman and Goldman, 1945; and Tabor, Kett and Nemeth, 1976).

The most difficult and yet the most important aspects of the diagnosis of tuberculosis of the breast are the differentiation of this disease from a simple pyogenic abscess in a young woman or from a carcinoma in the elderly women. Clinical signs are unreliable in these. Where the clinical and X-ray findings are not specific, histology is necessary. The tendency of mammary tuberculosis to mimic breast cancer re-emphasises the absolute necessity of histological confirmation. The main types of TM include the nodular form, the disseminated, and the sclerosing form (Hamit and Ragsdale, 1982). In the present series, all the cases were of the nodular type.

Morgan (1931) observed that breast involvement was always secondary to tuberculosis elsewhere in the body. In up to 60 % of reported cases, acid fast bacilli have not been isolated from any site other than the breast (Hamit and Ragsdale, 1982). Mukerjee et al (1974) stated that TM should not be divided into primary and secondary types until the origin and the route of spread of the infection have been established. In the present study, tuberculous lesions were detected elsewhere in only 6 cases (2 had involvement of axillary lymph nodes and 4 pulmonary tuberculosis).

One case was associated with infiltrating duct carcinoma of the medullary variety. This was an incidental finding. This patient had pulmonary tuberculosis also. Co-existence of proved tuberculosis and cancer in a breast is very rare (Symmers and McKeown, 1984). Even though breast is one of the commonest sites of cancers in Indian women and tuberculosis prevalence is also high, the co-existence of the two is rather uncommon.

Thus TM though uncommon in India, but much more common than in the West, should be considered in the differential diagnosis of breast lumps.

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**TUBERCULOSIS OF STOMACH—AN UNUSUAL CAUSE OF PYLORIC OBSTRUCTION  
(A CASE REPORT)**

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**Summary** : An unusual cause of pyloric obstruction due to gastric tuberculosis in a 40 year old male is presented.

**Introduction**

In developing countries tuberculosis of the intestinal tract is still a common problem. It affects intestinal tract having abundant lymphoid tissues such as terminal part of ileum and ileocaecal junction. Involvement of other parts of gastro-intestinal tract is rare. A few isolated cases of tuberculosis of stomach without involving other parts of the gut have been described (Strik, 1968.) Rarity of the lesion prompted this report.

**Case Report**

A 40-year-old male presented with dull pain in the epigastric region for one year and loss of appetite and vomiting for three to four months. There was no history of fever, cough, jaundice, haemoptysis, haematemesis or melaena. There was no palpable lymphadenopathy or hepatosplenomegaly. There was no history of tuberculosis or malignancy in the family.

Routine Haematological investigations showed haemoglobin of 11 gms%, Total leucocyte count 8,500/cu mm with Neutrophils-62%. Lymphocytes-35 %, Eosinophils-2 %, and Monocyte-1%. E.S.R. (Westergren) was 95mm at the end of one hour. No occult blood was detected in the stool. No abnormality was detected in X-ray chest. Barium meal X-ray showed gastric outlet obstruction. A provisional diagnosis of carcinoma of pyloric antrum was made and the patient was referred for surgery.

Exploration of the abdomen revealed an obstructing indurated area at the pylorus. A few enlarged lymph nodes, only in coeliac group, were seen. No other lymph nodes or lesion were detected in the peritoneal cavity. Partial gastrectomy was done on the strong suspicion of carcinoma stomach. Two lymph nodes were removed for histopathological examination. Postoperatively there was no complication.

Smears from the caseous matter removed

from the lymphnodes showed A.F.B. by Z.N. staining. Pathological examination of the gastrectomy specimen showed an indurated area in the pyloric region of the stomach. No ulcer was seen on gross inspection. Multiple sections taken from the indurated area of the stomach showed a tiny ulcer. In the submucosa there were granulomas composed of early ca seat ion surrounded by epithelioid cells, Langhans' giant cells, lymphocytes, plasma cells and fibroblasts, (Fig 1 & 2). Sections taken from the lymph nodes showed caseating granu-



Fig. 1. Photomicrograph showing a lining of gastric mucosa with a granuloma seen in the submucosa along with Langhans' giant cell. (Haematoxylin & Eosin X 100).

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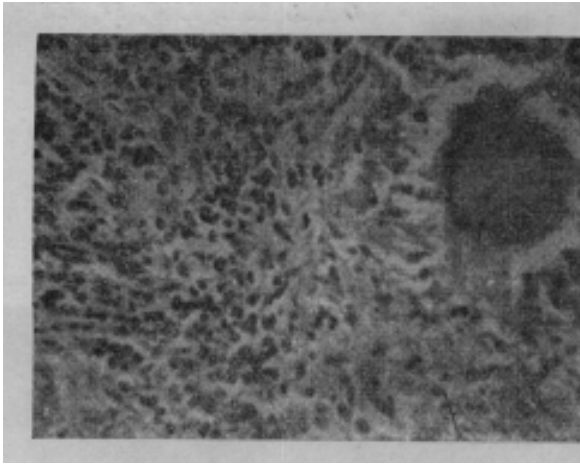


Fig. 2. Photomicrograph showing, in higher magnification, a Langhans' giant cell and lymphocytes. (Haematoxylin & Eosin X 400).

lomas. No evidence of malignancy was seen in any of the sections. A histopathological diagnosis of tuberculosis of stomach with tuberculous lymphadenitis was made. The patient was put on anti-tuberculous treatment. He was followed up for six months without any problem.

#### Discussion

Tuberculosis of stomach is rare due to sparsity of lymphoid tissue in gastric mucosa, high acidity of its contents and rapid passage of ingested material, (Balikian, Yeni Komshoian and Jidejian, 1967). The possible suggested routes of entry of tubercle bacilli into submucosa are either direct infection through the mucosa, invasion through a pre-existing ulcer (Kossick, 1969), spread from adjacent lymph nodes or haematogenous spread from distant primary focus (Gahukamble and Asokan, 1984). The presentations of tuberculosis of stomach vary widely. It may present as an ulcer, either single or multiple (Sengupta, Ghosh and Mukherjee, 1978), fistula formation or pyloric stenosis (Ratnakar, 1971). Gastric outlet obstruction may be either due to fibrosis in the pyloric antrum or by pressure from outside by a lymph nodal mass (Balikian, Yeni Komshoian and Jidejian, 1967).

Clinically and radiologically, it is impossible

to distinguish from carcinoma (Gains, Steinback and Lowenhaust, 1952.) Furthermore at times both the lesions may be associated. (Abernathy and Goose, 1977). It is therefore mandatory to take biopsy from the site of lesion to exclude malignancy.

Partial gastrectomy is the treatment of choice (Strik, 1968) which was performed in this case. Sometimes it becomes a hazardous undertaking when fibrosis in the region of the pylorus and adjoining duodenum become intense.

Although gastric tuberculosis is rare, the possibility should be considered in an apparently healthy individual with features of pyloric obstruction (Gahukamble and Asokan, 1984).

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## OE SOPHAGOPLEURAL FISTULA—A CAUSE OF HYDROPNEUMOTHORAX

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**Summary :** The case of an oesophagopleural fistula presenting as hydropneumothorax is reported. Fistula was suspected by appearance of food particles in pleural fluid and the diagnosis was established by barium swallow and endoscopy.

### Introduction

Spontaneous rupture of oesophagus, a rare emergency, occurs mostly after prolonged or forceful vomiting. It is postulated that the rupture is caused by a sudden rise in the intraluminal oesophageal pressure during the act of vomiting leading to splitting apart of the wall of an apparently normal oesophagus. With the rupture, the gastric contents escape into the mediastinal space and then into the pleural cavity as the mediastinal pleura gives way, finally presenting as hydropneumothorax-

This condition was first described in 1724 by Boerhaave (Derbes and Mitchell, 1955) as Boerhaave's syndrome. According to Mackler (1952) the classical triad of vomiting, low thoracic pain and subcutaneous emphysema in the neck was diagnostic of the condition and constituted sufficient evidence to warrant a left thoracotomy. Review of the literature reveals high mortality ranging upto 50% (Abbott et al 1970; Wilson et al 1971) largely due to delay in diagnosis.

### Case Report

A 17 year old female attended the out-patients department of Kasturba T.B. Hospital, G.M. and Associated Hospitals, Lucknow with history of right sided chest pain, fever and breathlessness for 30 days. The onset of these symptoms was preceded by several bouts of forceful vomiting for a couple of days. Physical examination revealed a shocked, tachypnoeic patient with signs of right sided hydropneumothorax. A postero-anterior chest radiograph (Fig. 1) demonstrated an air fluid level in right hemithorax with signs of mediastinal shift towards left side. An intercostal drain was inserted in the right pleural cavity and about 2500 ml. of yellowish brown fluid was evacuated leaving an empty pleural cavity. The patient was put on intravenous fluid, injection ampicillin and gentamycin after sending the pleural fluid for culture and antibiotic sensitivity.

After 20 hours the tube got blocked and on squeezing it about 2000 ml. of fluid gushed

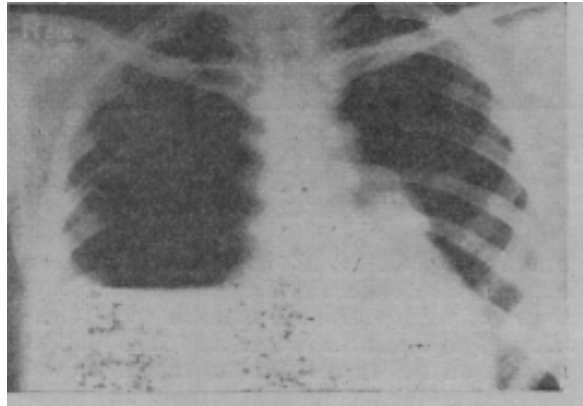


Fig. 1 Plain X-ray of Chest showing

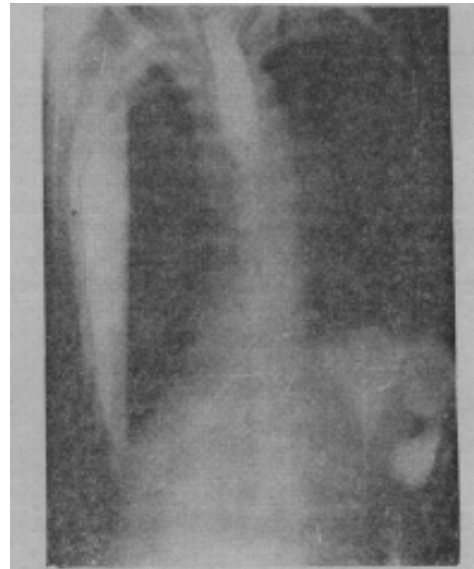


Fig. 2 Barium swallow in right lateral decubitus shows barium leaking into pleural cavity from the oesophagus

into the bottle. This fluid showed several small pieces of mango, which the patient had consumed in the morning. When the patient was given only milk to drink, a curd-like material was obtained from the pleural cavity. These

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findings indicated a communication between the pleural cavity and the gastrointestinal tract. An oesophago-pleural fistula was demonstrated by barium swallow study (Fig. 2). Oesophagoscopy revealed a tear in the wall of oesophagus which was grossly inflamed and ulcerated around this gap. A diagnosis of spontaneous rupture of the oesophagus was made. Patient was put on conservative treatment viz. a nil orally regimen, nasogastric suction, intravenous fluids and broad spectrum antibiotics. After 20 days the patient was transferred, to thoracic surgery unit from where she left against medical advice.

### Discussion

In almost all cases of spontaneous perforation of oesophagus, an episode of forceful vomiting, due to alcoholism, heavy meals or a neurological disorder, is the probable cause of rupture (Samson, 1951; Mackler, 1952, Wilson et al 1971; and Bradley et al 1981) Hiatal hernia, Schatzter ring, achalasia (Michel et al 1981), child birth (Kennard 1950) and bronchial asthma (Mitchell et al 1955 and Raffle 1958) have also been reported to produce this condition. Whatever be the cause there has to be an increase in the intraluminal oesophageal pressure. Studies on cadavers have shown that a pressure of about 5 lb/in<sup>2</sup> is sufficient to cause rupture of a normal oesophagus (Mackler 1952 and Derrick et al 1958). In the present case since there is a definite history of repeated vomiting such a mechanism seems to have caused the rupture. The rupture is said to be more common in the lower 1/3rd of oesophagus on left side because of the alleged weakness of muscle coat (Keighley et al 1972 and Abbott et al 1970). In the present case the rupture occurred on the right side probably because the left side has better support due to presence of aorta.

In the present case only vomiting and chest pain were seen out of the three classical symptoms of oesophago-pleural fistula (Mackler, 1952). Probably rupture occurred directly into the pleural cavity and therefore subcutaneous emphysema did not develop or whatever air had leaked into mediastinal space had been completely absorbed before the first radiograph was taken. Walker et al (1985) also report subcutaneous emphysema in only 4 cases at presentation and radiographically detected pneumo-mediastinum in only 7 of their 14 cases. Hydrothorax was the most common finding in cases of spontaneous rupture of oesophagus (Michel et al 1981). Walker et al (1985) also report that more than half of their cases of Boerhaave's syndrome had fluid, air or both in the pleural cavity. Because of its high specificity from the management point of view, spontaneous rupture

of esophagus should be suspected as the likely cause if pleural cavity shows air, fluid or both following forceful and repeated vomiting and the patient presents with severe chest pain, shock and subcutaneous emphysema. The diagnosis should be confirmed immediately by barium swallow. If diagnosed later than 24 hours of rupture, the patient responds better to a conservative treatment. A surgical repair after 24 hours entails a high mortality ranging between 28.6% (Michel 1981) and 50% (Lyons et al 1978 and Sandrasagra et al 1978), whereas conservative management reduces the mortality to 9% only (Lyons 1978). The present case was managed on conservative lines and showed a favourable response. After about 20 days of stay in the hospital the patient was transferred to Surgical side for further treatment but she left the hospital against medical advice.

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## HAEMOPTYSIS WITH ORAL ANTICOAGULANTS

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**Summary :** A patient with old pulmonary tuberculous lesions who developed recurrent haemoptysis while on oral anticoagulant therapy is reported and clinical implications are discussed.

### Introduction

Anticoagulants have been widely used in the management of a variety of diseases ever since their clinical introduction in 1930's. Patients who have undergone cardiac surgery or valve replacement are also administered anticoagulants to prevent embolic complications. The chief danger in patients receiving anticoagulant therapy is the occurrence of haemorrhage and virtually all haemorrhagic manifestations have been reported (Macon et al., 1970). Such haemorrhages can occur even with therapeutic doses of oral anticoagulants and even with a prothrombin time within the usual "therapeutic range" (Levine, 1970). It is a matter of great clinical importance, though it is often not taken note of.

A case is reported of a patient who was on prophylactic anticoagulant therapy following double valve replacement surgery, and presented with recurrent bleeding from old tuberculous foci, even though she had prothrombin time within the usual therapeutic range, i.e., from 1.6 to 2.5 times the control value (Wintrobe, 1975).

### Case Report

M.D., a 37 year old female presented with 3 days' history of haemoptysis, during which she had lost nearly half a litre of blood. Her past history revealed that she had mitral and aortic stenosis for which both valves were replaced in June, 1983 and she was on maintenance dose of oral anticoagulant Sintrom (Nicoumatone) since then. The dose of Sintrom varied from 1 to 4 mg per day depending upon prothrombin time values. At the time of reporting she was taking 2 mg Sintrom daily for the preceding one year. She had pulmonary tuberculosis 12 years ago, for which she had regular anti-TB treatment for two years.

In July, 1984, she developed haemoptysis which persisted for four weeks. At that time, she was taking 4 mg Sintrom daily. Haema-

logical investigations, including prothrombin time, were within normal limits. X-ray chest showed fibrotic lesions in left upper zone and her sputum was negative for acid fast bacilli. She was put on anti-TB therapy with rifampicin, isoniazid and ethambutol in a general hospital, but the drugs were stopped when the case was reviewed after 2 months. In March, 1985, she was admitted with recurrent haemoptysis in All India Institute of Medical Sciences, Delhi and was diagnosed as presumably a case of post-tubercular bronchiectasis left upper lobe. Bronchography was not done. She was taking 2 mg Yintrom daily and had prothrombin ratio within normal range (24/16 Sec). She was advised rifampicin and isoniazid in conventional doses, which the patient took regularly for 9 months. Haemoptysis stopped completely within 8 weeks of starting anti-TB drugs.

During her present admission on 30-12-85, general physical examination was normal except for pallor and a pulse rate of 104/minute. She was normotensive and there was no clinical evidence of pulmonary hypertension. Cardio-respiratory examination revealed no abnormality but for a soft systolic murmur. Her haemoglobin was 10 gm% and ESR, total and differential counts were within normal range. Platelet count was 2,00,000 per cumm. She had a prothrombin ratio of 32/16 sees. Chest skiagram (P.A. view and apicogram) showed a few fibrotic streaks with some calcified areas in the upper zone of the left lung. Sputum was repeatedly negative for acid fast bacilli and fungi. Sputum culture for pyogenic organisms was sterile.

Although skiagram chest taken at the time of completion of treatment 12 years ago was not available, skigrams taken at the time of earlier episodes of haemoptysis in 1983 and 1985 showed no change as compared to the latest one. There was nothing to suggest reactivation of old healed lesions which were stable.

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Despite reassurance, fresh blood transfusions and symptomatic treatment, patient continued to have recurrent bouts of haemoptysis for one week.

In the absence of any other precipitating factor, Sintrom was suspected to be the underlying cause for haemoptysis and its dose was reduced to 1 mg on alternate days. The haemoptysis decreased from 3rd day onwards and ceased completely after eight days. She was discharged on 1 mg daily maintenance dose of Sintrom. There was no recurrence of haemoptysis till end of May 1986.

### Discussion

This case had three episodes of pulmonary haemorrhage during nearly three years of anticoagulant therapy. As the prothrombin time was within the "therapeutic range" every time, Sintrom was not suspected as the underlying cause for haemoptysis. As a result, she was overtreated with anti-T.B. drugs on first two occasions, whereas only slight adjustments in dosage of the anticoagulant would have been sufficient to control her symptoms, as was achieved during the third episode.

Rifampicin, is a potent inducer of hepatic microsomal enzymes and hence reduces the serum half-lives and clinical efficacy of coumarin anticoagulants (Girling, 1984). As the patient was given rifampicin on first two occasions, which might have reduced the hypoprothrombinaemic effect of anticoagulant thereby reducing its side effects also. Consequently, she did not present with haemoptysis during rifampicin therapy which was misinterpreted as evidence of efficacy of anti-TB therapy, and hence the therapy was continued. This underlines the already known fact that the dose of anticoagulants needs careful adjustment over a period of 5-7 days when rifampicin is introduced or withdrawn in such cases (O' Reilly, 1974).

The incidence of major and minor haemorrhage from oral anticoagulants is about 2 % and 4% respectively (Nichol, 1950). The so-called "spontaneous" haemorrhages from multiple sites are known to occur only in cases with markedly elevated prothrombin times. Mosley et al. (1963), in their study of long-term anticoagulant therapy in 978 patients, found an incidence of severe haemorrhage in 1.5% cases. Of these, nearly half bled from a pre-existing site such as old tuberculous lesion, polycystic renal disease and nasal polyp, etc. In all these cases, the prothrombin time at the onset of the haemorrhages was within

therapeutic range. In patients on anticoagulants who cough up blood, the possibility of a pulmonary or bronchial lesion should always be kept in mind, as nearly half of these will have an underlying organic lesion (Mosley, et al., 1963). Stern and Dreskin (1957) found a bronchial carcinoma on bronchoscopy in a patient on anticoagulants with normal prothrombin time, who presented with haemoptysis and a normal chest X-ray.

In patients with healed tuberculosis, haemoptysis can result from rupture of aneurysmal dilatations due to the pressure of a forceful cough or strenuous exercise. However, in patients on anticoagulants, bleeding from these sites may occur even in the absence of any apparent stress. In addition, healed tuberculous areas also contain atrophied vessels (Fishberg, 1932), from where there might be more chances of leakage of blood and haemoptysis in patients receiving anticoagulants. Such cases should be managed symptomatically and there is hardly any necessity for active anti-tuberculosis chemotherapy.

Bleeding during the course of anti-coagulant therapy can often be controlled by careful dose adjustment or temporary withdrawal of anti-coagulants coupled with supportive treatment. If bleeding is alarming, Vitamin K may be necessary; however, the use of Vitamin K complicates subsequent anticoagulant therapy and the delay in re-establishing a proper dose may prove dangerous for the patient. A hypercoagulable state, resulting from a too rapid anti-coagulant withdrawal coupled with administration of Vitamin K, has been reported (Levine, 1970).

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The Indian Health-Care Exhibition and Conference, supported by the Indian Medical Association and the Trade Fair Authority of India and approved by the Ministry of Health and Family Welfare, Government of India, will take place at Pragati Maidan in New Delhi from 22nd to 26th March, 1988. The organisers invite papers for presentation at the Conference. Papers are invited in the following topic areas : (1) Immunisation, (2) Mother and child programme, (3) Training and information management; and (4) Advances in clinical technology and medical care- Full details of the Exhibition and a call for papers submission form are available from the Organisers : Delta Group Exhibitions, 22 Community Centre, Friends Colony, New Delhi-110 065-

## DEVELOPMENT OF CONTRALATERAL PLEURAL EFFUSION DURING TUBERCULOSIS CHEMOTHERAPY

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**Summary :** A 22 year old woman developed a left sided pleural effusion seven months after standard chemotherapy for tuberculous pleurisy on the right side.

### Introduction

Bilateral tuberculous pleurisy, either simultaneous or successive, is a relatively uncommon finding. We report a patient who presented with a right sided pleural effusion and after seven months of tuberculosis chemotherapy, developed pleural effusion on the left side.

### Case Report

A 22 year old woman was admitted in the Chest and Tuberculosis Department, Medical College and Hospital, Rohtak in August, 1984, with complaints of pain on the right side of the chest, cough with expectoration, nocturnal sweating and fever of 15 days' duration. Physical examination revealed signs of a right sided pleural effusion which was confirmed by the chest skiagram. There was no obvious parenchymal lesion in either lung. ESR was 90 mm 1st hour and reaction to 5 units of PPD was 20 mm. At thoracocentesis, a straw coloured fluid was aspirated which was an exudate and showed a lymphocytic predominance. Pleural biopsy showed multiple epithelioid cellular granulomas with giant cells and central caseation.

During her stay in the hospital, she was treated with Injection Streptomycin 1 gm, Isoniazid 300 mgm and Thiacetazone 150 mgm daily and repeated pleural aspirations were done. Within five weeks of treatment, patient improved clinically and radiologically. She was discharged on the same regimen which was continued for 3 months & thereafter Isoniazid & Thiacetazone were continued. She was very regular in attending the O.P.D. and collecting the drugs. It was presumed that the therapy prescribed was regularly taken by the patient. Seven months after the start of treatment the patient complained of pleuritic pain on the left side of the chest with fever. Clinical and radiological examination revealed a left sided pleural effusion.

Thoracocentesis on the left side also showed straw coloured fluid and pleural biopsy showed caseous granulomatous lesions. Microscopy and culture of sputum and pleural fluid were negative for *M. tuberculosis*. Treatment with Isoniazid and Thiacetazone was continued. There was both clinical and radiological improvement. Patient had no evidence of any active disease after chemotherapy for 1 year.

### Discussion

Specific chemotherapeutic regimens for the treatment of tuberculosis have a low rate of failure. The development of pleural effusion during the course of tuberculosis chemotherapy as seen in our patient is very rare. Matthay and others (1974) reported 2 cases of tuberculous pleural effusion appearing 15 and 26 days after the start of treatment for pulmonary tuberculosis. Vilaseca et al (1984) reported a case developing contralateral pleural effusion during chemotherapy for tuberculous pleurisy. There was nothing to suggest a therapeutic failure and there was complete recovery following treatment.

In our case the cause of contralateral effusion could not be found. Tuberculous involvement of the pleura can occur:

- (1) In the earlier post primary period the bacilli reach the pleura through the lymphatics or through the blood stream from either of the two components of the primary complex.
- (2) In the late post primary or so called chronic pulmonary tuberculosis, the bacilli reach the pleura by contiguity from a parenchymal lesion or due to rupture of small subpleural abscess into the pleural cavity.
- (3) Involvement of pleura from extrapulmonary lesions is extremely rare. It may

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be due to rupture of caseous lymph node into the pleural space (Crofton & Douglas 1975) or from caries rib.

Development of pleural effusion on the contralateral side, and that too during chemotherapy, may be due to: premature discontinuation of treatment; associated mismanaged diabetic mellitus; injudicious use of corticosteroids; trauma to the contralateral side leading to reactivation of arrested subpleural focus; organisms developing resistance to the prescribed chemotherapy; introduction of fresh exogenous infection or, possibly, due to trauma to vessels of involved side during recurrent pleural aspiration or during pleural biopsy procedure. In this case, pleural fluid was aspirated five times during her stay in the hospital and a pleural biopsy was also performed. These two procedures might have caused trauma to the vessels and simultaneously led to discharge of some organism into the blood stream. These organisms might have led to fresh seedling in the contralateral pleura which manifested as pleural effusion at a later date. These are only speculations but none could be proved.

Thousands of cases of pleural effusion due to tuberculosis have been treated in this department. Relapses on the same or opposite side have been noted only in the patients who discontinued treatment prematurely. In the present case it is assumed that the patient took treatment as prescribed i.e. triple drug regimen for three months followed by two

drugs (Isoniazid and Thiacetazone). In the seventh month, patient developed pleural effusion on the left side) This could indicate failure of chemotherapy but ordinarily we would expect any manifest or occult lesion, if present on the left side, to have healed or at least become quiescent after seven months of good chemotherapy. Furthermore, previous treatment could not be considered a failure because the patient responded with complete recovery to the same drug regimen. Another possible explanation may be a fresh exogenous infection involving the left lung but this is impossible to prove or disprove.

#### Acknowledgement

We are grateful to Dr. C. Prakash, Director-Principal, Medical College and Hospital, Rohtak for permitting us to publish this case report.

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## DIAPHRAGMATIC PLEURAL CALCIFICATION FOLLOWING TUBERCULOSIS

V.K. ARORA\* AND R.S. BEDI\*\*

**Summary** : Bilateral diaphragmatic pleural calcification is usually considered to be indicative of exposure to asbestos dust. A case which developed this roentgenological finding following pleuro-pulmonary tuberculosis is reported.

### Introduction

Pleural calcification, though a rarely encountered radiological entity, is an important parameter of pulmonary disease. Only 0.15 to 2% of all routine chest skiagrams show evidence of pleural calcification (Kleinfeld, 1966). A number of conditions like haemothorax, empyema, tuberculous effusion, rheumatoid pleurisy, talcosis and asbestosis can result in pleural calcification.

The distribution and character of pleural calcification does carry a diagnostic significance. Chest trauma and infections usually lead to unilateral calcification in the form of a broad continuous sheet or multiple discrete plaques, often over the entire lung surface. On the other hand, bilateral diaphragmatic pleural calcification is mostly due to asbestos exposure. (Sargent et al, 1972; Crofton and Douglas 1975; Fraser and Pare, 1977; Hinshaw and Murray, 1980; Grainger and Pierce, 1980), though Simon (1971) does mention tuberculous pleurisy as an uncommon cause of diaphragmatic pleural calcification.

We report a patient who developed bilateral diaphragmatic pleural calcifications following pleuro-pulmonary tuberculosis, because of its extreme rarity.

### Case Report

M.D., 25 year old non-smoker housewife from a rural area of Himachal Pradesh presented with vague epigastric pain of two months duration. She had suffered from bacteriologically confirmed pleuro-pulmonary tuberculosis 12 years ago and was treated with conventional anti-T.B. drugs for two years. In addition, right-sided pleural aspiration was done and straw coloured exudative fluid aspirated. For initial 2 months of therapy, oral corticosteroids were also given in tapering doses. Except for mild pallor, no abnormality was detected on general physical and systemic examination.

Her routine haematological and urinalysis revealed no abnormality except that Hb was 10 Gms%. Her sputum was negative for acid fast bacilli. Chest skiagram (Fig. 1) showed bilateral pulmonary parenchymal and mediastinal calcification. In addition, bilateral interrupted linear calcifications, involving whole of right diaphragmatic pleura and medial third of left diaphragmatic pleura were seen. Plain X-ray abdomen showed calcification of retroperitoneal glands.

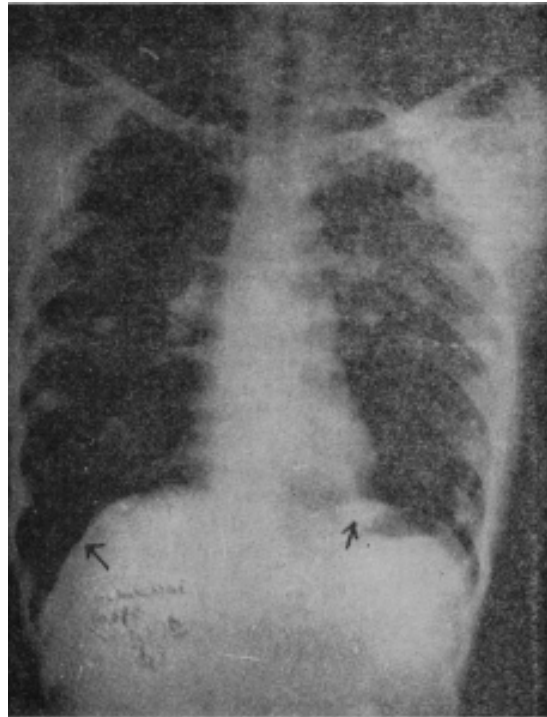


Fig. 1. X-ray chest showing bilateral diaphragmatic pleural calcification. (Arrows). In addition, pulmonary and mediastinal calcification is also seen.

In view of the fact that diaphragmatic

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pleural calcification is usually taken as evidence of asbestos exposure, a detailed personal, occupational, familial and environmental history was taken. She belonged to a poor rural family and had never worked as a labourer in a factory or for building construction. Specific questions were asked about those occupations in which contact with asbestos was possible. There was no past history of chest trauma, rheumatoid arthritis, empyema or exposure to talc, silica or asbestos.

Her serum calcium was 9.4 mg%, serum phosphates 3.7% serum alkaline phosphatase 10 K.A. Units, blood urea 24 mg%, serum creatinine 0.6 mg% and blood sugar 70 mgs%. Pulmonary functions showed mild restrictive pattern as her F.V.C. was 1800 ml (predicted 2260 ml) and FEV<sub>1</sub>/FVC % was 78%. Diaphragm movements were normal and X-ray skull showed no evidence of calcification. Barium meal study for stomach and duodenum was normal. No asbestos bodies were detected in sputum.

As the patient was asymptomatic, she refused open lung biopsy. Patient responded to antacids and no active treatment for pleuropulmonary calcification was advised.

### Discussion

Exposure to asbestos was excluded in the present case by taking detailed history not only from the patient but from her relatives too. There was no clinical, radiological or functional evidence of associated pulmonary asbestosis, though pleural calcification without radiologically demonstrable evidence of interstitial disease or fibrosis is known to occur in nearly one fourth of patients exposed to asbestos dust (Selikoff, 1965). The widespread intra-pulmonary, mediastinal and abdominal calcifications seen in present case are not a feature of asbestosis and are commonly seen in tubercular pathology. Other rare causes of pleural calcification like rheumatoid pleurisy, talcosis and hypercalcaemia were excluded by history and relevant investigations. Past history of pleuropulmonary tuberculosis, widespread intrathoracic and abdominal calcifications and exclusion of other causes of diaphragmatic

pleural calcification strongly favoured tuberculosis being the underlying cause for diaphragmatic pleural calcification in the present case, though skiagrams taken before, during and at the end of previous treatment for tuberculosis 12 years ago were not available.

Pleural calcification following tuberculous effusion is mostly found in visceral pleura and calcium is usually deposited on its inner surface (Grainger & Pierce, 1980) in contrast to asbestosis, where parietal pleura is involved and adhesions are lacking. Absence of thickened pleura, obliteration of costophrenic angle or tenting of diaphragm (usually seen in tuberculosis but absent in asbestosis) in this case could have been due to prolonged treatment with corticosteroids at start of therapy, which might have led to rapid clearance of fluid with no residual thickening.

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## NEWS AND NOTES

### ANNUAL GENERAL MEETING

The 48th Annual General Meeting of the Tuberculosis Association of India was held in New Delhi on 22nd April, 1987 with Shri S. Ranganathan, ICS (Retd.), President of the Association, in the chair. In the absence of Dr. O.K. Vishwakarma, Chairman of the Association, his address presenting the Report of the Association for 1986 was taken as read.

In his address, Dr. Vishwakarma referred to tuberculosis as one of the biggest health problems in our country and said that it was a matter of great concern that inspite of the National TB Programme being scientifically sound and economically and operationally feasible, our expectations had not been fully realised. And this is inspite of the fact that we have at our disposal potent and effective anti-tuberculous drugs with which practically every tuberculous patient can be treated successfully. He pleaded that the disease should be detected early, treatment should be prompt, judicious and adequate and expressed the hope that in view of the various developments, viz. implementation of the programme in 366 districts, improvement in the methods of case-finding and case-holding, inclusion of tuberculosis in the revised 20-Point Programme, increased budget allocations for expansion of case-finding activities and provision of anti-TB drugs, introduction of short-course regimen with Rifampicin and Pyrazinamide in a phased manner, etc., there will now be an appreciable improvement in the performance under the programme.

In the unavoidable absence of Shri S. Ratnam, the Honorary Treasurer of the Association, Shri P.N. Raman, Secretary-General, presented the audited accounts of the Association for the year 1986 which were duly recommended by the general body for adoption by the Central Committee.

Shri S. Ranganathan, President of the Association in his address, commended the good work being carried out by the Association and its affiliates in promoting anti-TB measures in the country. He was happy with the phenomenal developments that had taken place in regard to the treatment of tuberculosis and measures to control its spread and said that while the disease was dreaded even a few years ago as something

frightful, today it can safely be regarded as a preventable and curable disease if diagnosed early and treated promptly and adequately. The methods of treatment had undergone a spectacular and almost revolutionary change and costly hospital treatment was no longer necessary and most of the patients can be treated safely in their own homes with potent and specific drugs. He, however, pointed out that much more remains to be done in respect of promotion of health and social well-being which had a direct bearing on the control of a disease like tuberculosis which is both a medical as well as a social malady. Developmental projects aimed at the quality of life and raising the standard of living. These, he said, were very relevant to tuberculosis control, though indirectly. These will help to reduce appreciably the incidence of tuberculosis as well as improve the cure rate. Shri Ranganathan said that the performance under the programme will improve only when the community as a whole gets involved in it. In this connection, he referred to the project drawn up by the Association for expansion of health education activities and for organising refresher courses and orientation courses throughout the country and said that it was high time the government accorded its approval to this project which will give a big boost to the National Programme and improve the performance under it. He felt confident that if the project is implemented diligently, wholeheartedly and with conviction as a crusade, it will certainly help to mobilise the community for active involvement in the National Programme and to bring about full utilisation of available facilities.

Shri Ranganathan gave away the awards for outstanding activities by the State Associations during 1986 and also for highest collections made by them during the 36th TB Seal Campaign and congratulated the winners of these awards.

The General Body elected Drs. M.S. Agnihotri, C.M. Brahma, M.D. Deshmukh, K. Jagannath, S. Sivaraman, D.P. Tripathi and S.B. Trivedi as members of the Central Committee of the Association for the year 1987-88.

The meeting terminated with a Vote of Thanks proposed by Dr. C. Srinivasa Rao, the Honorary General Secretary, TB Associa-

tion of Andhra Pradesh.

### SECRETARIES' CONFERENCE

The 38th Conference of Secretaries of TB Associations was held in New Delhi on Tuesday, the 21st April, 1987 with Dr. M.S. Chadha, Vice-Chairman of the Association, in the chair. The Conference was attended by representatives of State TB Associations of Andhra Pradesh, Bengal, Delhi, Goa, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Tripura and Uttar Pradesh, members of the Technical Committee and other special invitees.

In his welcome address, Dr. M.S. Chadha extended a cordial welcome to the representatives of State Associations and other invitees to the Conference and complimented them on the good work they were doing to promote anti-TB measures in the country. He advised them to concentrate their main efforts on creating awareness and interest in the community for taking appropriate measures to help the poor and needy sufferers and see that they were uplifted. The meeting was thereafter conducted by Dr. S.P. Pamra, Honorary Technical Adviser of the Association.

Dr. S.P. Pamra, in his introductory remarks, referred to the reports received from the State Associations and reiterated his earlier request to make these reports more explicit and detailed, so that others may have a clear idea about the various activities carried out by them during the year. He also requested the State Secretaries to see that the limited resources available to them, including the seal sale collections, were utilised only for promoting anti-TB activities and not for any other purpose.

The Conference reviewed the activities of State Associations with special reference to utilisation of TB Seal collections, organisation of refresher courses, case-finding programmes, membership of State and District Associations, health education drives, etc.

The Conference noted with concern that the sale proceeds of TB seals had been more or less static for the last three campaigns inspite of the price of the TB seal having been raised from 25 to 50 paise and some of the States were selling only 20 to 30% of the seals taken by them. Unless a concerted effort is made to sell all the seals and there is a substantial improvement in the collections, the advantage of taking more seals will be lost. The Conference, therefore, urged

those States where the collections were poor, to review their arrangements for the distribution and sale of seals, identify the causes for the poor performance and take effective measures to sell all the seals taken by them and improve their collections.

The Conference noted with regret that during the year 1986, only 53 refresher courses were conducted in different parts of the country. As the number of courses held has been going down year by year, it was felt necessary to examine the question again and satisfy whether the pattern of the refresher courses which is recommended at present meets our requirements or whether there is need for a change in that pattern, the subjects discussed, etc. The State Secretaries were, therefore, requested to send in their suggestions, if any, for modification of the present pattern of the course with a view to improve the standard of these courses.

The Conference noted with dismay that the response from the State Associations to the new scheme of subsidising research proposals from individual workers offered by the Central Association had been very poor and only three out of six proposals were found suitable for subsidy. The Conference further noted that only two more proposals had so far been received during 1987. The State Secretaries were, therefore, requested to give wide publicity to the scheme and see that competent workers from their States submit suitable research proposals for subsidy in future. It was also noted that the Research Committee will be glad to arrange, on receipt of a specific request from prospective research workers, for the statistician's help in deciding the size of the sample, design of the study, etc.

The Conference discussed in detail the logistics of implementation of the project for expansion of health education activities, organisation of refresher courses/orientation courses, etc. with financial support from the USAID through the Ministry of Health and Family Welfare. The Conference noted that Government's approval of the project was still awaited. It was, however, decided that the States should go ahead with the selection of the districts where the project will be implemented and work out a time bound programme for carrying out the various activities included in it. The Conference also decided that a small Committee consisting of technical and management experts be constituted at the Centre to lay down guidelines for the benefit of the State Associations in working out a detailed programme for implementing the project.

### TECHNICAL COMMITTEE'S RECOMMENDATIONS

A meeting of the Standing Technical Committee of the Association was held on 20th April, 1987, with Dr. P.A. Deshmukh in the chair. Some of the important decisions and recommendations of the Committee at this meeting are :

1. The Committee discussed the various points raised in the Presidential Address of Dr. S.P. Gupta at the 41st National Conference and decided that the following recommendations may be forwarded to the Government :

- (i) The para-medical staff of the primary health centres be trained properly and effective supervision of their work be provided to improve the quality of sputum examination. Vehicle should be placed at the disposal of the staff of the District Tuberculosis Centre for visits to the P.H.I.s
- (ii) The radiological examinations should be used as a screening procedure to identify the patients with abnormal shadows in their lungs, wherever possible. Such patients can then be subjected to bacteriological investigations to clinch the diagnosis.
- (iii) In large towns and cities, where a large number of patients suffering from cough visit the General Hospitals, it will immensely help the case-finding programme under the NTP if photofluorography facilities are made available. Adequate diagnostic facilities including examination for sputum must also be made available at all the general hospitals.
- (iv) One additional District TB Centre should be provided in bigger districts.
- (v) An additional multi-purpose laboratory technician, should be posted, especially in primary health centres with a heavy work-load. It would not only considerably augment TB case detection activity, but also help to improve the quality of general health services. Similarly, if all the multi-purpose health workers are actively involved in motivation of patients, their families and the community to take regular treatment for the prescribed period the defaulter

rate may also be substantially reduced. What is actually required is the strengthening of general health services and their exercising effective supervision to ensure that the medical and para-medical personnel perform the task assigned to them under the DTP properly, diligently and with commitment.

- (vi) Tuberculosis Programme officers in the State Directorates have to play a very active role and must have the requisite dynamism and drive to push up the facilities and activities and exercise necessary technical and administrative supervision on the functioning of the programme in the field. Every State should have a whole-time State Tuberculosis Officer.
- (vii) Steps be taken to create interest among the general practitioners in the implementation of the National Programme and to update their knowledge about the present philosophy of diagnosis and treatment of tuberculosis through Refresher Courses and "clinical meetings" at regular intervals in the DTC in close collaboration with the local IMA branch.
- (viii) Health education campaign in the community should develop along with the growth and proper functioning of health and medical institutions. Personal contact by the health educators with the community and its leaders would be the most profitable to change the attitude and behaviour of the people. Aids like 'flip charts' brought out by the TB Association of India will be more useful than posters etc. Highest priority be accorded to the audio-visual methods and mass media like Radio and Television.

The Committee also discussed in depth Dr. Gupta's recommendation about multi-drug formulations. The Committee felt that many aspects like bio-availability of constituent drugs, their quantity in such formulations, acceptability etc. have to be taken into consideration before taking a stand on this issue. The Committee noted that the Tuberculosis Association of India is already conducting a chemotherapy trial involving such formulations and agreed to wait for the result of this trial regarding acceptability.

2. The Committee noted that the 42nd National Conference on Tuberculosis and Chest Diseases would be held at Lucknow

from the 2nd to 5th December, 1987 and appointed a Committee to scrutinise the papers offered for presentation and finalise the programme for the scientific sessions of the Conference. The Committee also decided that Dr. D.R. Nagpaul should moderate the Symposium on "Strategy to reduce the tuberculosis problem by the year 1995" and requested Dr. K.C. Mohanty to get some papers for a special session on 'Influence of environment on Chest Diseases'. The Committee further noted that in future nobody should be allowed to present a paper if two copies of the presentation were not made available before the presentation.

3. The Committee received a report on the progress made in regard to the various research studies organised by the TB Association of India and noted that :

- (a) The results of the two studies on 'Cervical Lymphadenitis and Diabetes' which were presented at the Hyderabad Conference have been published in the April 1987 issue of the Indian Journal of Tuberculosis.
- (b) All cases included in the IVth Short-course Chemotherapy trial will complete the follow-up period in August/September and that the results will be available for presentation in time for the Lucknow Conference.
- (c) The Vth Short-Course Chemotherapy trial has already been started in four centres and that this study is also likely to be completed shortly and the results will be available for presentation in time for the Lucknow Conference.
- (d) Three studies for which grant was sanctioned last year have already been started and three more applications for grants for research projects have been received recently and these are under scrutiny by the Research Committee. The Committee noted with dismay the poor response from the research workers for this facility. The Committee made a plea to the members of the Committee that they may take up this question at individual level with research workers/medical colleges in their respective States with a view to make this facility better known to the workers and thus improve the response further.

4. The Committee noted that only 53 refresher courses were conducted during 1986

in different parts of the country, of which seven were subsidised by the National Academy of Medical Sciences and one each from funds placed at the disposal of the Association by M/s Themis Chemicals Limited and M/s Lupin Laboratories Pvt. Ltd., Bombay. The Committee also noted that the National Academy of Medical Sciences had sanctioned a grant of Rs. 30,000/- for holding 15 courses in different parts of the country, of which four courses had already been completed and the remaining courses were expected to be held within the next 2/3 months. The Committee noted with dismay that the response from State Associations in this respect was still very poor and it was felt that it would be worthwhile changing the pattern of these courses to make them more attractive to general practitioners. The Committee, therefore, decided to elicit the views of the Secretaries of State Associations and their comments along with comments from the members of the Standing Technical Committee would be considered to recommend a modified pattern, if necessary.

5. The Committee noted that the following action had been taken by the Government on the recommendations of the Standing Technical Committee meeting held on 17th April, 1986 for improving the performance under the National TB Programme :

- (a) The Government has fully endorsed the recommendation that priority should be given to detecting sputum positive cases among the chest symptoms attending the various health institutions in the country.
- (b) The Directorate General of Health Services has already taken necessary action for regular and continuous supply of drugs and X-ray films.
- (c) Multi-purpose workers and Health Guides are being involved in drug distribution, surveillance, detection and retrieval of drug default for improving the patients' compliance in domiciliary treatment.