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SURGERY IN PULMONARY TUBERCULOSIS

Tuberculous cavity in the lungs has a sinister significance. Being an excellent nidus for the multiplication of bacilli, the persistent cavity portends emergence of drug resistant bacilli with consequent failure of treatment. Since mechanical factors are involved to a very large extent in the formation of cavities in the lungs and their failure to close, it is logical that mechanical factors have to be neutralized if the cavity does not close readily. As early as 1822, James Carson of Liverpool said "if ever this disease is to be cured, it must be accomplished by mechanical means" or in other words by surgical intervention.

In pre-chemotherapy era minor, reversible collapse measures like AP and PP could bring about closure of many cavities. Some cases where the minor measures failed or were not applicable for some reason, were not suitable for major and irreversible surgical procedures too, usually because of the status of the contra-lateral lung. When chemotherapy became available many cavitory cases did not require minor collapse measures because the cavities closed spontaneously under the influence of drugs. Some, where the cavities did not close, became suitable for major surgical procedures like thoracoplasty and resection because of satisfactory regression in the contra-lateral lung lesions. Thus, whereas the need for minor collapse measures went on diminishing steadily, there was, in the earlier years of chemotherapy, a spurt in the number of cases suitable for major surgery. With better understanding of the rationale of chemotherapy, availability of more effective and more acceptable drug combinations and greater compliance on the part of the patient in the treatment regimen, need for major surgery has started going down in western countries. In developing countries however, because of late diagnosis, non-compliance on the part of patient etc. there are many cases where chemotherapy alone fails and arrest of disease becomes impossible without major surgery.

Surgical treatment at an appropriate time can help to make many sputum positive cavitory patients non-infectious (with its immense benefit to the patient's family and the community) and facilitate their early return to normal life and vocation. The significance of persistent cavities with repeatedly negative sputum—'open negative syndrome'—is still not finally settled. Some would like to leave such cavities alone. Others argue that it is not possible to be absolutely certain (without surgery) whether the walls of these cavities have been completely epithelialized and there is no active tuberculous lesion in its walls. Therefore, they advise surgery for these cavities also, more or less as a

prophylactic measure against a possible relapse or subsequent bacterial and/or fungal invasion.

Full collaboration between the physician and the surgeon is imperative and the latter should not be brought into the picture only at the last moment. Every case with persistent cavity should be reviewed jointly by the physician and the surgeon to decide whether surgery is possible and advisable and if so, the most opportune time for this procedure. Failure to advise surgery at the appropriate time or refusal on the part of the patient to accept this advice is usually fraught with serious consequences. It may also be remembered that surgery is not a substitute for chemotherapy but an adjuvant measure without which chemotherapy may fail in some cases.

Since the number of cases where surgery is possible and acceptable to the patient are relatively few in number, say 5% or so of total treatment cases, a statement is often made that surgical treatment does not have any important role in the national tuberculosis programme. This however is not correct. In the absence of facilities for surgery, these patients will continue to spread infection in the community. It is possible that early diagnosis and/or more effective chemotherapy may some time in the future change the entire-perspective and fate of cavities. Till such time however, adequate provision for surgical facilities under the national programme cannot be neglected.

In our country there is an obvious mal-distribution of these facilities at present. Large tracts of the country are without even one thoracic surgery unit whereas many large cities have even 2 or 3 independent units working. It is accepted that all medical colleges do aim at having a thoracic surgery unit of their own for academic reasons, even if not essential as a part of the service programme. While nobody recommends closing down of the existing thoracic surgery units where more than one exist in a city, many more such units are required in the under-served parts of the country on a regional basis.

Further, modern surgical and anaesthesia techniques make it obligatory that thoracic surgery units should be located where ancillary facilities such as blood bank, resuscitation unit and pulmonary function laboratory etc. are available. New units should therefore be located in medical college and/or other big general/chest hospitals rather than in small far-flung tuberculosis hospitals/sanatoria of by-gone days.

REVIEW ARTICLE

PRESENT STATUS OF SURGERY IN PULMONARY TUBERCULOSIS

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The last 25 to 35 years have seen a great revolution in the surgical management of pulmonary tuberculosis. In the earlier days, artificial pneumothorax was considered a surgical treatment, followed by a period, when phrenic nerve interruption, with or without pneumoperitoneum was considered major surgical treatment. Subsequently, adoption of thoracoplasty and its modifications was considered as the radical treatment and later on resection was adopted as the surgical procedure of choice.

Though surgical procedures were being applied in the pre-antibiotic era too, but their application was rather more broad based. The advent of chemotherapeutic drugs has not only radically changed the medical treatment of tuberculosis, but has made the various collapse or resective procedures more definitive. Better surgical technique, improved anaesthesia, studies of pulmonary functions and proper understanding of pre and post-operative care have further provided a satisfactory margin of safety.

At present we are in an era of chemotherapeutic drugs and antibiotics where it is often said that surgery has no place in the treatment of pulmonary tuberculosis, provided drugs are given continuously, uninterruptedly and for long. The two main factors responsible for the decline of the number of patients needing surgical treatment in the Western countries have been the availability of antibiotics and the chemotherapeutic drugs and introduction of compulsory preventive health measures in the community.

It has been shown that if drugs are given continuously, uninterruptedly and for an adequate period, the rate of recovery may be as high as 98 per cent. Many associated factors such as low standard of living, inadequate housing conditions, lack of proper ventilation, imbalanced diet, ignorance about basic principles of hygiene etc. may be responsible for the failures.

In spite of the application of all these measures, experience has shown that a certain percentage of patients even in the advanced countries need and undergo surgical treatment. It has been felt that need for surgical intervention will last as long as the problem of pulmonary tuberculosis exists.

With the above knowledge as our background, let us analyse the conditions in our country. We are in a phase of development on all fronts e.g. industry, agriculture, education, communications, housing etc. Every attempt is being made to evolve a better society with improved standard of living. To attain what has been achieved in the developed countries will no doubt take time. Till then, various problems including that of tuberculosis control will remain with us.

It has been estimated that there are at any point of time, approximately eight to nine million patients of pulmonary tuberculosis of one type or other in the country. Of these, about one-third are infectious. Exact statistics about the number of patients needing surgery are not available but even if the lowest figure is taken as, say one patient in 100 needing surgical treatment, then there are likely to be approximately 5,000 patients every year who will need surgical treatment. Let us not forget that this is the lowest estimate of the problem.

Our own experience of hospital admission for the last 30 years or so has been that anything between 10-15 per cent of our admissions need one or the other type of surgical intervention because most of the patients are chronic and treatment failures.

It is admitted that surgery is not the answer to the problem of pulmonary tuberculosis but it certainly helps in reducing the pool of infection by lessening the number of patients who have positive sputum or a cavity or both in spite of adequate chemotherapy or because of inadequate chemotherapy.

Aim of Surgery

The aim of surgical intervention is to achieve complete cure of the disease which is shown by :-

- (a) Bacteriological conversion *i.e.* complete disappearance of bacilli from the sputum.
- (b) Closure of the cavities.
- (c) Return of the individual back to his/her work.

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The various surgical procedures have been broadly classified into the following categories;

1. Collapse procedures.
2. Resective procedures.
3. Miscellaneous.

1. Collapse Procedures

The term collapse therapy is not correct because it only means reduction in pulmonary volume. It does not signify pulmonary relaxation and rest which is produced by various operative measures and these in turn help in the formation of fibrous tissue which brings about healing of the lesion.

The various collapses procedures have been broadly classified as :

(a) Procedures which achieve the objective without interfering with the integrity of the thoracic cage *e.g.*

- (i) artificial pneumothorax with or without closed or open intrapleural pneumonolysis.
- (ii) pneumoperitoneum.
- (iii) oleothorax.

(b) Procedures by which the objective is achieved by paralysing or resecting the nerves *e.g.*

- (i) Phrenic nerve operations
- (ii) Multiple intercostal neurectomy.

(c) Procedures which act by cutting or sectioning the muscle? *e.g.* scalenotomy or scaleneciomy.

(d) Procedures which produce collapse by modifying the thoracic cage and these are ;

- (i) Thoracoplasty and its modifications
- (ii) Extra pleural procedures with plombage.

These procedures can be applied singly or in combination.

2. Resective Procedures

By the resective procedures, the diseased portion of the pulmonary parenchyma is removed. Whole of one lung may be removed (pneumonectomy) or a lobe (lobectomy or bilobectomy) or a segment (segmentectomy) or a lesion (lesionectomy) may be resected.

3. Miscellaneous Procedures

These are:

- (i) Ligation of the draining bronchus
- (ii) Monaldi's cavity drainage
- (iii) Cavernosolomy
- (iv) Intercostal or intra-pleural drainage
- (v) Diagnostic procedures such as :

Bronchoscopy
Bronchography
Mediastinoscopy
Pleuroscopy
Pleural biopsy
Pulmonary biopsy
Gland biopsy.

Indications for Surgery

With the availability of effective and highly potent drugs for the treatment of pulmonary tuberculosis the indications for surgical intervention have narrowed considerably. Experience has shown that if drugs are given regularly continuously and uninterruptedly, as many as 98% may not require surgery. But if for some reason the objective is not achieved the possibility of surgical intervention should be kept in mind. If inspite of good treatment with drugs the lesions stop regressing, the possibility of further management with surgery should be borne in mind. If there is gradual worsening of the lesion or the general condition, the patient should be reviewed for surgery. Emergencies *e.g.* repeated haemoptysis particularly if it is profuse, spontaneous pneumothorax or recurrent pneumothorax with or without hydro or pyo-pneumothorax or an unexpandable lung are the other indication.

Timing of the Surgery

Application of surgical therapy has to be very carefully planned and timed so that risk to the individual is none or minimal and maximum benefit is achieved as a result of surgical intervention.

(i) Acute Stage

In the acute stage of the disease, it is always better to withhold any surgical intervention. It is always advisable to wait for the phase of intermission. The object of treatment is to help the body to fight the disease. In the phase of intermission the chances of post-operative complications are less, mortality negligible and the results highly successful.

(ii) Chronic Stage

In the chronic stage, the treatment can be

carried out at any time mutually convenient to the patient and the surgeon. The type of surgery which is planned and its pros and cons must be explained very carefully and sympathetically to the patient. Similarly the patient should have absolute confidence in the surgeon. Invariably the patient does not feel the necessity of any surgery in this phase because he/she is apparently free from any associated symptoms. He is very apprehensive of surgery and therefore, proper motivation by the surgeon is a must and he should make all efforts to create confidence in the patient.

(iii) *Gradual Worsening*

If there is gradual or progressive worsening in the general condition of the patient or of the parenchymal lesion, an early decision about supplementing the drug treatment by surgery is necessary. Involvement of the surgeon in this decision is a must.

Pre-requisites for surgical intervention

There are certain pre-requisites which should be thoroughly investigated before doing surgery. These are very variable but can broadly be studied under the following heads:

1. *Economic Status*

This is of extreme importance not only from the point of view of surgical treatment but also general management including chemotherapy. Even if the disease is apparently quiescent or arrested, the patient has to virtually live with the so-called quiescent or arrested pathology, which may reactivate or relapse due to many endogenous or exogenous factors later in life, the prescribed treatment should be within the means of the patient or such as can be made available to the unfortunate sufferer. Surgery at times may avoid unnecessary financial strain for the patient and for the treating unit. The aim has to be least economic strain with maximum benefit.

2. *Social Status*

Persons who if infectious, are more dangerous to the community *e.g.* food handlers, teachers etc. should be given the benefit of a treatment, the results of which are more permanent.

3. *Vocational Status*

The decision about surgery has to be properly appraised by taking into consideration the vocation of the patient as to whether one a skilled or unskilled worker. The post-operative sequelae

of surgery are less likely to pose physical disability in a skilled worker than in an unskilled worker. The type of surgical intervention should in no way interfere with the patient's survival.

4. *Psychological Stains*

Understanding the psychological status of an individual is very important particularly when one has to undergo any irrevocable or irreversible intervention. Secondly, all extroverts have to be so managed or disciplined that they are no longer dangerous to the community. They have to be advised treatment which has long-lasting effects.

5. *Contra-indications for Surgery*

The range of contra-indications for surgery these days has considerably widened because of use" and abuse of drugs. Proper use of drugs may lead to a stage where surgery is of no value as it may cripple a patient or may even lead to cardio-pulmonary dysfunction. On the other hand, abuse of drugs such as administration for periods longer than necessary, or irregularly or in ineffective combinations may lead to a situation when surgical intervention may be associated with considerable surgical risk *e.g.* high mortality or cardio-pulmonary insufficiency or failure to achieve the desired objective.

As such, the contra-indications can be broadly classified as:

- (i) The parenchymal lesion is gradually healing
- (ii) Rapidly progressing bilateral pulmonary disease
- (iii) Associated poor general condition of the patient
- (iv) Inadequate or low cardio-circulatory or cardio-respiratory reserve
- (v) Associated presence of extra-pulmonary tuberculosis or non-tuberculous disease

6. *Outcome of Surgery*

Surgery by itself does not completely eradicate the disease but creates favourable conditions and also increases the resistance of the body by eliminating or controlling the diseased focus and supplementing the body forces by giving the patient benefit of drug treatment. The outcome will be influenced by the site, size, type and extent of the disease prior to surgery.

Artificial Pneumothorax

James Carson of Liverpool suggested collapse therapy. In 1832 Ramadge produced

collapse of the lung by puncturing of the chest wall. Carlo Forlanini in Italy advocate pneumothorax treatment (1893) as extension of rest cure for lung.

With the discovery of X-rays by Roentgen in 1895, artificial pneumothorax treatment gained much popularity. The fundamental purpose of artificial pneumothorax was to give rest to the lungs by splinting the diseased lung with air in the pleural space. Till the early fifties pneumothorax continued to be an important procedure in the treatment.

In the modern therapeutic regimen it does not have much place. Further, it may not be easy to introduce it successfully when it is indicated, because of the fibrosis in the diseased area as a result of administration of streptomycin and other drugs. In addition, a patient needing this type of therapy, may even do better with other procedures. This applies equally well to both unilateral and bilateral A.P. Moreover, the course of this treatment extends over a long period and is inherently associated with complications and sequelae.

Pneumonolysis

The efficacy of artificial pneumothorax treatment was augmented by pneumonolysis of the adhesions which prevented satisfactory collapse of the lung. This procedure was introduced by Jacobaeus.

Pneumoperitoncum

Banyai (1933) in U.S.A. recommended pneumoperitoncum as a treatment for pulmonary tuberculosis. It was used alone or as a supplement to phrenic nerve crush. (4,5,36,37)

This procedure is still being patted though not with the same paternal affection as it used to be for bilateral cases particularly those who are not a suitable risk for major surgical treatment. This may be initiated to prepare cases for surgical treatment or as a last resort for otherwise failures of medical treatment or as a temporary procedure for emergencies like haemoptysis. The procedure is simple, safe, easily reversible and there are not many complications.

Phrenic Operation

Phrenic evulsion was the logical outcome of artificial pneumothorax for the closure of cavities of the lower lobe. Phrenic evulsion was first carried out by Willi Felix in 1922. A word about phrenic operation, which used to be a blue eyed baby of the TB workers. It has a very very

limited place these days. It may be done to obliterate or close the residual pleural space after rupture of the lung or after resective procedure.

Multiple Intercostal Neurcctomy

John Alexander (1930) advocated the division of intercostal nerves as a supplementary procedure to phrenic nerve evulsion.

Thoracoplasty

The word thoracoplasty was introduced by Eastlander in 1879. In cases of empyema, Eastlander operation was performed to assist the closure of the pleural pocket. In 1890 Carl Spengler of Davos discontinued the extra pleural thoracoplasty operation. In 1905 Brauer and Friedrich introduced more extensive operation. Morrision Davies (1913) modified the two stage operation of Maxwilms and Heidelberg. Saurbruch (1909) devised the extra pleural thoracoplasty to be done in stages commencing from below. (3, 7, 8, 9).

Thoracoplasty operation is a good and time-honoured procedure and it has a definite place. In a developing country like ours where the problems of tuberculosis are many, and sometimes peculiar, this method has a more definite place.

In the Western countries, more and more stress is laid on resective procedures and thoracoplasty operation is going into oblivion. However, our experience under our own home conditions justifies its application considerably and we are not sorry for it. It has paid us good dividends. Any patient who may be suitable for thoracoplasty, may be a good risk for resective procedure also, but a patient who has bilateral involvement, where the contralateral disease is apparently inactive, we would prefer thoracoplasty.

The tuberculous pathology quite at times is like a "sleeping dog" and it is always better that the sleeping dog is not disturbed and is allowed to sleep, because if disturbed it may start barking and create so much noise that it becomes a source of nuisance to the whole body.

The question which arises is as to which is the type and site of disease for which thoracoplasty should be preferred over resection. Thoracoplasty should be preferred if disease is bilateral. As for site, disease in the upper /one is ideal for thoracoplasty. For the disease in the mid /one, thoracoplasty has to be done with reservation and for disease in the lower zone, thoracoplasty has no

place. The draw-backs of thoracoplasty in comparison with resection are:

1. Multiple stage operations.
2. Paradoxical movement and mediastinal flutter.
3. Impairment of cardio-respiratory functions.

Extra Pleural Pneumonolysis

Extra pleural pneumonolysis was sporadically used at the close of the 19th century without space filling substances. Theodore Tuffier of Paris (1895) described apicolysis operation. He performed his first pneumonolysis operation in 1911 and filled the space with body fat. Beer (1913) employed semisolid Paraffin. Wilson (1948) used plastic (Lucile) spheres. O. Neil (1949) suggested fiberglass. Plombage operations with different plastic materials were performed in cases which would not stand thoracoplasty operations. All these operations are now obsolete (18,19).

The advantage of this procedure over thoracoplasty lies in its being a single stage procedure with no risk of paradoxical movement and practically no impairment of pulmonary function. Though rather easier to perform and with safe post-operative management, both immediate and ultimate, the inherent indifference of the body to the introduction of foreign material is a disadvantage. Infection of the wound space, expulsion of the material introduced through the path of least resistance and chances of caries and necrosis of the ribs are important complications.

Resection

Ruggi (1884) was the first to attempt resection for tuberculosis. Tuffier performed pulmonary resection successfully in 1891, but the procedure was associated with greater frequency of complications like broncho-pleural fistula, spread of infection, empyema etc. and high mortality. However, improvement in the individual ligation technique of hilar structures, advancement in the anaesthetic technique and availability of very potent antibiotics and drugs have considerably lessened these complications. Friedlander (1935) did lobectomy for large tuberculous cavities. Jones and Dolley (1939) reported lobectomy and pneumonectomy operations. Thorn tan and Adams in 1947, Churchil and Kopotock in 1943 also advocated resection surgery. Overholt, Sweet, Barley (1949) and others also advocated resection surgery in preference to thoracoplasty. (21-35).

The clinical benefits of removing the diseased tissue have no comparison with any other procedure. All efforts must be made to resect or excise as little of the healthy pulmonary tissue as possible. Depending upon the extent of the disease, this intervention may be called as lesionectomy (10—17).

The classical indications for resection are:

1. Lower lobe or lower zone disease.
2. Middle lobe or mid zone disease.
3. Totally destroyed lungs,
4. Tuberculomas.
5. Residual cavities after thoracoplasty operation.
6. Inexpandable lung.

For upper lobe or upper zone disease, if strictly unilateral, a resective procedure is to be preferred. If there is any doubt about the stability of the contra-lateral lung, thoracoplasty should be preferred.

The dreaded complications of resection *e.g.* empyema and broncho-pleural fistula can be successfully overcome by doing a routine bronchoscopy in each patient and proper post-operative management.

Jones and Dolley (1939) compared the result of their resection series before and after 1947 and there was striking improvement in the post-1947 series. The year 1947 is the year when Streptomycin came in general use. Even in the period 1944-46, (the procedure of individual ligation of hilar structures and improved anaesthesia techniques had already been adopted. So the improvement in the result of pulmonary resection in tuberculosis after 1947 was mainly due to introduction of antibiotics.

Since 1947, many more drugs have been introduced and as a result the need for not only the surgical treatment has diminished but even the post surgical complication and sequelae are also less.

	Mortality	B.P. F.	Spread of Disease
1944-46(23)	28.6%	25.7%	20.0%
1947-49	5.7%	2.3%	4.5%
1976-79(51)	2.3%	2.0%	1.8%

During the last two decades the choice of surgical procedures in pulmonary tuberculosis have crystallised into the following three categories:

1. Pulmonary Resection.

2. Thoracoplasty.
3. Resection combined with thoracoplasty.

It has been claimed that bacteriological arrest can be achieved with adequate chemotherapy, provided drugs are taken in optimal regimens regularly and for as long as indicated, but if for some reasons the above criteria are not fulfilled in the initial phase of disease, drug resistance develops and permanent pathological changes appear in the lungs.

As a result, management of drug failures becomes a very serious problem because the available reserve drugs are not likely to be effective and are associated with serious side effects. Availability of rifampicin, however, readily and at a cheaper price may change the over-all picture.

The drug failure cases may be

1. Sputum positive cases — mostly excreting drug resistant bacilli.
2. Sputum negative cases with the following pathological changes in the pulmonary parenchyma:
 - (a) persistent cavitation.
 - (b) destroyed lobe or lung.
 - (c) gross tuberculous bronchiectasis.

1. Some of these sputum positive cases excreting drug resistant bacilli have poor cardio-respiratory reserve and surgical intervention is not possible. Further, now-a-days, more and more patients in older age groups are admitted in whom extensive pulmonary surgery is not possible. It is only where the disease is localized enough that good results of thoracoplasty or pulmonary resection can be achieved. Even in this group pre- and post-operative cover with reserve drugs is of great importance to prevent complications.

2. Sputum negative cases with permanent pathological changes in the pulmonary parenchyma.

(a) *Persistent Cavitation* : According to some workers no treatment may be required for the so-called open negative cases. But if the cavitation is limited to a lobe or lung, it is better to subject these cavities to surgical treatment; otherwise this may lead to bacteriological relapse or may be the cause of haemoptysis or repeated pyogenic infection or the cavities may increase in size leading to respiratory dysfunction and progressive dyspnoea or occasionally may be secondarily infected with aspergillosis or rarely may become carcinogenic.

(b) *Destroyed Lobe or Lung* : These do better with surgical treatment.

(c) *Gross Tuberculous Bronchiectasis* : If there is gross tuberculous bronchiectasis after prolonged chemotherapy in the middle and the lower lobe, this is associated with imperfect drainage and the patient is likely to benefit from surgery. For the bronchiectatic changes in the upper lobe and with apparently a quiescent tubercular pathology, surgical intervention may not be indicated because the risk of relapse or reactivation is less likely.

Causes of drug failure are very many, but may be grouped broadly under two main head tags;

1. Failure on the part of the patient to take drugs regularly and for as long as indicated due to:
 - (a) unpleasant side effects.
 - (b) forgetfulness.
 - (c) indolence.
 - (d) failure to understand the instructions.
2. Failure to prescribe optimal regimen, by the treating physician.

An important question which arises these days is about the type of patients who may need surgery in this area of chemotherapy. There are firstly those patients who fail to get their sputum converted after judicious and efficient chemotherapy for 6-9 months. These may be associated with cavities. The risk of resistance developing against drugs is more, if the drugs are continued for a longer period in spite of the failure to convert bacteriological positively. Before resistance develops, it is better to do surgery in such patients after both the surgeon and the physician have jointly discussed and agreed.

The second group of patients are those who are above 40 years of age and with a solitary pulmonary mass, the so-called tuberculoma. The possibility of cancer, tuberculosis or hamartoma has to be kept in mind. Earlier the diagnosis is made and treatment is planned, better is the result.

The third group of patients are those with emergencies, *i.e.* repeated uncontrolled haemoptysis or patients with bronchostenosis and its associated sequelae *e.g.* atelectasis, bronchiectasis, spontaneous pneumothorax and its associated complications etc.

The fourth group of patients are those who are having associated diseases *e.g.* diabetes, congenital heart disease, cancer etc.

The fifth group are those who are likely to be community dangers *e.g.* drug defaulters.

The sixth group of patients who need surgery are those with the undesirable sequelae of artificial pneumothorax *e.g.* inexpandable lung, empyema etc.

Regarding the type of surgical procedure to be advised, resection is the treatment of choice except in those where the integrity of the opposite lung is suspected. If there is any doubt about the condition of the opposite lung, thoracoplasty is preferable and particularly for the upper lobe disease. For mid zonal or lower lobe disease, resection is the only way out of difficulty. Similarly, in the case of destroyed lung or a tuberculoma, resection is better. While resection is being done, all attempts will have to be made to preserve as much as possible of the healthy lung tissue.

Bronchoscopy is an essential procedure before any surgical intervention. For children with sequelae of post primary disease and associated with irreversible lung damage, pulmonary resection is very safe and results are excellent. Proper pre-operative assessment of the patient regarding his clinical condition and determination of cardio-pulmonary functions are very important pre-requisites.

Tuberculosis is one disease in which timely consultation and collaboration between the surgeon and the physician are essential at three points:

(a) At initial diagnosis when provisional prognosis makes one think that there is no reasonable chance of recovery without surgery *e.g.* a localised fibrotic disease with thick walled cavity. No doubt some such patients do recover with drugs alone, but they have to be followed up jointly for proper timing of surgery. This group is likely to be small.

(b) During the course of treatment when cure by chemotherapy does not appear to be reasonably expected. Such an assessment should be made preferably within 6-12 months of chemotherapy when the bacilli are likely to be sensitive to some of the major drugs. This will be the largest group.

(c) Even though the residual lesion may be quiescent and the cavity may close at the end of chemotherapy, the possibility of relapse or reactivation may be high as in large tuberculomas due to filled in cavity or open negative syndrome.

Emphasis should always be laid on proper

timing of surgery which is most important and a physician must not place a surgeon in difficulty by allowing the right time to pass. A good treatment at a wrong time may be as bad as wrong treatment.

Caveraostomy

This procedure does not have much place in the present day management of pulmonary tuberculosis because better surgical procedures are now available.

Ligation of Bronchus

A modified approach of ligating the bronchi as a means of closure of cavities in bilateral cases has also been practised.

Miscellaneous Procedures

Of the various surgical procedures grouped as miscellaneous, intra pleural or intercostal drainage is the most frequently applied procedure. The procedures may be applied independently or as a supplementary to other major surgical intervention.

Intra Pleural or Intercostal Drainage

This may be indicated as a treatment of choice in pathological conditions of the pleural cavity such as pleural effusions, empyema, hydro-pneumothorax or pyopneumothorax.

Secondly, it may be a supplementary treatment to pulmonary resection which may be complicated by occurrence of pyothorax or pyopneumothorax with or without broncho-pleural fistula.

The main pathological conditions of the pleura where intervention may be indicated are:

1. If there is progressive dyspnoea.
2. If there is no relief of constitutional symptoms particularly temperature for six to eight weeks inspite of adequate treatment with antibiotics.

The intercostal aspiration may be by a simple syringe, or by the use of a biway (Delafouy's method) or by a three way channel when the pleural cavity is simultaneously disinfected (Middlesex's method) or by Potain's aspirator (46, 47, 48).

In case of recurrent or chronic collections, continuous intercostal drainage may be required. Under such condition; the drainage tube can be

introduced through the intercostal muscular strata or by rib resection. The use of self retaining catheter (Malecot) is preferable to the ordinary rubber tube which is kept in site by a stitch. Elosseur's method by making a U-shaped flap with skin and muscle has also been recommended (49, 50).

In chronic empyema, the use of fibrinolytic enzymes, such as streptokinase and streptodornase has also been recommended. If the underlying lung fails to expand, decortication is also one of the recommended procedures when the underlying lung is healthy. A space reduction thoracoplasty also called "tailoring thoracoplasty" is the treatment of choice when the underlying lung is diseased.

Bronchoscopy

The indications for bronchoscopy are both therapeutic as well as diagnostic. Therapeutic indications are absolute and relative. The absolute indication is a foreign body which has to be extricated. The relative indication is topical application of coagulants to the ulcers or erosion in the tracheobronchial tract. The indications for the latter group are not very many because of effective drugs which are available these days. (46)

The principle diagnostic indications cover a wide range from visualization of the endobronchial mucosa, to collection of secretions for bacteriological examination or biopsy and for introduction of dye for contrast examination.

Mediastinoscopy

This procedure is mainly used for biopsy examination for undiagnosed or suspected malignant pathology of the mediastinum and lungs (42, 43, 44).

Pleural Biopsy

In undiagnosed conditions of the pleura or involvement of pleura secondary to the parenchymal pathology, biopsy of the pleura is usually of great help. Coope's, Silvermann's or Gahun's needles are recommended for this purpose.

Pulmonary Biopsy

In undiagnosed parenchymal pathology, pulmonary biopsy may be of great value in diagnosis. This can be a needle biopsy or open biopsy by thoracotomy. Needle biopsy is more useful if the pathology is peripheral and its usefulness becomes more and more limited as

the location of pathology shifts towards the hilum.

If the pathology is diffuse a piece of the pulmonary parenchyma may be taken by inflating the lung by the anaesthetist through an incision in the intercostal space or in the bed of the rib, where a portion of the rib has been resected. When the parenchymal pathology is deeply situated, open thoracotomy may have to be the required approach.

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ATYPICAL MYCOBACTERIOSIS

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Summary : Species of atypical mycobacteria pathogenic to man and/or oilier hosts are described. Apart from cultural and morphological characteristics of some of these important pathogens, epidemiology, clinical features and management of the disease caused by them are also discussed briefly.

There are about fifty mycobacterial species recognized so far and the list is expanding every day. Fortunately, only a few of these species contain strains which are of pathological importance to humans and animals. Table 1 lists the recognized mycobacterial pathogens as of today. It should be emphasized, however, that this list may not be exhaustive though it serves as a starting point for the present discussion.

Table 1

Mycobaeterial Pathogens

Typical	<i>M. Tuberculosis</i> <i>M. Bovis</i> <i>M. Avium</i> * <i>M. Leprae</i> <i>M. Africanum</i> <i>M. Simiae</i>
Atypical	Group I (Photochromogens) <i>M. Kansasii</i> <i>M. Marinum</i>
	Group II (Sciochromogens) <i>M.</i> <i>Scrofulaceum</i> <i>M. Szulgai</i> (<i>M.</i> <i>Marianum</i>)
	Group III (Non-Chromogens) <i>M.</i> <i>Iniracellulare</i> * <i>M. Xenopei</i> <i>M.</i> <i>Ulcerans</i>
	Group IV (Rapid Growers) <i>M.</i> <i>Fortuitum</i> <i>M Chelonei</i>
* <i>M. Avium</i> and <i>M. Intracellulare</i> are grouped as a complex.	

The list divides the organisms broadly into two categories, typical and atypical. This division is arbitrary, and many of the organisms, which are now grouped as atypical can soon be given a species name and described individually. In fact, there is a strong objection to this dichotomy even today, and experts have been suggesting that all the known mycobacteria be grouped into clusters or complexes (Runyon 1979; Wayne 1979).

The name atypical itself also is under strong criticism. Runyon, who originally suggested the name in 1959, has been voicing strong objection to it (Runyon 1979). Other names, like anonymous, unclassified, opportunistic, MOTT (myco-

bacteria other than tubercle bacilli), have been suggested from time to time: and discuss ton still continues on the validity of any particular name since none is finally accepted. In this presentation, the name atypical is used, recognising its limitations and the objections of several people.

The subdivision of atypical pathogens into four groups is based on the original, but tentative, classification of Runyon (1959). It should stressed, however, that this classification, based mainly on two primary characteristics (optimal speed of growth and chromogenicity), has been criticized by others. On the other hand, since Runyon's classification is familiar worldwide. it is used in ibis preservation as well,

Several of these pathogens cause pulmonary disease in a wide variety of hosts, including man; and some can only cause disease in certain organs If, skin, eye, bones etc.). This limitation is perhaps due to their temperature optima and other growth conditions. The readers are referred to the excellent reviews for more detailed discussions these aspects (Chapman 1977; Wolinsky 1979; Davidson 1979).

Similarly, no detailed discussion is presented on the various laboratory methods used in the identification and classification. Again, reference is made to the excellent reviews of Kubica and Dye (1967) and Vestal (1973). This review presents brief outlines of the organism-, particular emphasis on their clinical manifestations and treatment programmes.

Mycobaeterial Pathogens : Typical Grorp

Besides *Mycobacterium tuberculosis*, *M. bovis leprac* and *M. aviuni*. this lists contains *M. africanum* and *M. simiae*. Only *M. africanum* and *M. simiae* need to be discussed further since the others in this group it re well known. *M. africanum*, discovered a decade back, has been shown by a series of biochemical and bacteriological tests 10 be iniermediale between *M. tuberculosis* and *M. bovis* (Castets and others, 1969). As the name implies, this organism was originally isolated from several parts of Africa. The clinical picture is similar to that of tuber-

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culosis and the treatment regimens consist of isoniazid, streptomycin and PAS or ethambutol. *M. simiae* is grouped here because it is niacin positive though it is considered as an atypical pathogen as well. Although the name indicates that it is primarily a pathogen of monkeys, no evidence is available on the incidence of the disease in countries with large primate operations. However, some recent studies from Texas have isolated this organism from persons handling the monkeys (Krasnow and Gross 1975). The few reports on treatment of this disease indicated the use of isoniazid, ethambutol and rifampin.

Group I : Atypical Mycobacterial Pathogens: Photochromogens

M. kansasii and *M. marinum* are the two recognized pathogens in this group, though some workers group *M. marinum* as a rapid grower by virtue of its speed of growth. By definition, these organisms produce pigment only after exposure to light. Morphological examination of the colonies show that the pigment formation is usually seen in the outer layers of the colony. Biochemical studies have shown that the pigment production is related to some carotenoid synthesis. The colonies also usually have a rough texture similar to those of *M. tuberculosis*, a phenomenon which creates difficulty in serotyping. A feature unique to these organisms is the appearance of cross-banding as seen on Ziehl-Neelsen staining of young cultures (Fig. 1). Epidemiologically, *M. kansasii* disease is more common in certain states in the U.S. (Texas, Louisiana and South Central States, some parts of Illinois, etc.). In the vast majority of cases, this disease normally causes only pulmonary manifestations though extrapulmonary lesions are also reported. Clinically and radiologically, *M. kansasii* disease is indistinguishable from that of *M. tuberculosis*. Clinical management of *M. kansasii* disease is quite satisfactory resulting in almost the same degree of success as with *M. tuberculosis* (Table II). After the introduction of rifampin into the chemotherapy of tuberculosis, it is included in regimens for *M. kansasii*, mainly because of its *in vitro* susceptibility, resulting in nearly 100% success. On the whole, treatment of *M. kansasii* disease is not considered a problem by clinicians the world over.

The other pathogen in this group, *M. marinum*, causes swimming pool granulomatous disease (Fig. 2) and so far no systemic involvement with this organism has been reported. Its optimal temperature growth, which is around 30 may limit its survival inside the body. Epidemiologically it has been reported from



Fig. 1. Cross-banding of *Mycobacterium kansasii*. Ziehl-Neelsen stain of one day old rotary tube culture in 7H9 broth.



Fig. 2. Granulomatous lesions on the fingers and hand of a patient caused by *Mycobacterium marinum*.

some domestic aquariums (Kelly 1976) and from several part of the world, particularly from Colorado, U.S.A., and from some beaches of Hawaii and Australia. Treatment of this disease has been controversial. Some believe that these infections are by and large benign and self-limiting and therefore no treatment need be

Table 11

Response of *M. Kansasii* disease to chemotherapy

Authors	Year	No. of patients	Bacteriologic response at	
			6 months	12 months
Jenkins Medical only Medical+Surgical	1960	59	52	60
			61	75
Pfeutze et al	1965	152	78	60
Bates	1967	121	55	61
Johanson & Nicholson	1969	99	77	85
Harris, Jobanson & Nicholson	1975	59	89	92
Raleigh and Others Medical Only Rifampin Series	1972	107	80	90
	1972	79	92	91
	1975	16	100	100
Lockhart, Gangadharam and Others	1975	98	90	98

considered. On the other hand, several others recommend treatment with isoniazid and PAS or isoniazid, PAS and streptomycin.

Group II : Atypical Mycobacterial Pathogens: Scotochromogens

Until recently the only recognized pathogen in this group was *M. scrofulaceum* but *M. szulgai* is also included in this group now. By definition, these organisms produce pigment without exposure to light. The colonies are more strongly pigmented, more orange than yellow, and smoother than those of *M. kansasii*. Clinically, the common manifestation of the infection by *M. scrofulaceum* is the occurrence of scrofula and lymphadenitis, similar to those caused by tuberculosis and other pyogenic infections, though it is possible to have a different diagnosis. For instance, almost all cases of lymphadenitis caused by *M. scrofulaceum* occur in children below the age of 5 years. In the involved areas, nodes are usually high in the neck, just under or not far away from the mandible and are usually unilateral, apparently consisting of one lump. Chemotherapy offers very little towards the management of this disease (Wolinsky 1979),

and the treatment of choice seems to be the total excision of the involved nodes. It should be pointed out that children with cervical adenitis to *M. scrofulaceum*: may be tuberculin positive for many years after the removal of the node but may not be prescribed for any prophylactic treatment like isoniazid because of this positive reaction.

The other recognized pathogen in this group is *M. szulgai*. The discovery of this pathogen has been facilitated by the thin layer chromatography of mycobacterial lipids and the initial studies were made by Dr. Marks' laboratory in Cardiff, Wales, (Marks and others 1972). The world literature shows that the most less than 20 cases. The disease character are not distinguishable from those of *M. tuberculosis*, and the occurrence of lymphadenitis quite unique with *M. scrofulaceum* is not noted with *M. szulgai*. The treatment schedule seems to be the administration of triple drugs (isoniazid, PAS and streptomycin) with reasonably good success (Davidson 1976).

Group III ; Atypical Mycobacterial Pathogens : Non-Chromogens

M. intracellulare, *M. xenopi* and *M. ulcerans* are the three recognised pathogens in this group. Recent studies have shown the close similarity between *M. avium* and *M. intracellulare* and further studies in the taxonomic criteria have suggested that the *M. intracellulare*, *M. avium* and *M. scrofulaceum* organisms should be grouped together (the so-called MAIS complex). These individual pathogens are dealt with separately with respect to their disease process and the chemotherapeutic management, without going into the reasons in favour of this complex nomenclature.

By all criteria, the *M. intracellulare* group of organisms poses one of the most serious problems in the management of patients with mycobacterial disease. Most of our current research activities are centering on these group of organisms because of the urgent necessity to understand the disease and to find some useful regimens of chemotherapy

By definition, these organisms are niacin negative, slow growing, no-pigment forming, mycobacterial pathogens. There are occasionally some pigment formers in this group, mostly as scotochromogens. Two types of colonies are noted in the cultures especially in the agar type of media; one the opaque and the other the transparent type.

All the available drugs are unfortunately not useful in inhibiting this organism. More recently we have shown that clofazimine is active in inhibiting this organism at very low concentrations (Gangadharam and Candler 1977). Similarly, another synthetic drug, CQQ (6-cyclo-octylamino-5, 8-quinoline quinone) has been shown to have *in vitro* bactericidal activity against *M. intracellulare* (Gangadharam and others 1978 b). Apart from this, clinical management with the available drugs results in only a poor outcome (Table 111). Only the findings from National Jewish Hospital and Research Center have shown a moderate response, while others have shown much poorer results. Thus, even with this administration of 5 to 6 drugs, with their potential danger of increasing the toxicity due to the drug administration for more than two to three years, the response is, at the best, marginal. Some authorities even believe that the chemotherapeutic management of this disease is as poor and as disappointing as with tuberculosis in the pre-chemotherapy era. Following our laboratory findings, inclusion of clofazimine with the other drugs has shown some benefit at least in disseminated forms of *M. intracellulare* disease (Davidson and others 1979).

The other two pathogens in this group (*M. xenopi* and *M. ulcerans*) show some diverse temperature requirements. While the former is a

thermophile, growing optimally at 40°, the other (*M. ulcerans*) has very restricted optimal temperature range of 32° to 33° C. Earlier, Runyon (1965) and Gangadharam (1976) suggested that *M. ulcerans* should be grouped with *M. leprae* and *M. marinum* in a group of cooler body mycobacterial pathogens. Surprisingly, two among these (*M. ulcerans* and *M. leprae*) occur predominantly in tropical countries while *M. marinum* predominates in temperate and milder climates.

M. xenopi is grouped in this nonchromogenic classification because of its biochemical characteristics. Colonies of *M. xenopi* always show filaments on agar medium. One peculiar and perhaps fortunate feature is its increased susceptibility to isoniazid. Epidemiologically, it is not clear how this organism occurs in nature, though the original name suggested its origin from a load. Recent evidence has shown that this organism occurs widely in hot water sources (Bullin and others 1970), and extrapulmonary lesions with this disease are not reported nor are the disseminated types of disease. The treatment consists of a triple drug regimen including isoniazid, rifampin and ethambutol with favourable results.

M. ulcerans grows very slowly, often taking up to twelve weeks of incubation at 32°-33° C. Occasionally, these colonies are niacin positive. Epidemiologically, this disease occurs widely in Africa, especially in the Nile Delta area and in certain regions in Australia. Certain types of grasses growing in only some seasons near the Nile Delta are supposed to be involved in the transport of this organism. Because of the optimal temperature conditions, the organism can only proceed perpendicularly into certain levels of the body and then spreads laterally. Fig. 3 shows clinical pictures of this disease process. Treatment of this disease is not clear-cut, Lunn and Rees (1954) and Revill and others (1973) have investigated the usefulness of clofazimine (B663), to which the organism is susceptible *in vitro*. On the other hand, the general approach to the management of this disease is to surgically remove the skin and have skin grafts whenever feasible.

Group IV : Rapid Growing Pathogens

As of today, two main species, namely *M. fortuitum* and *M. chelonae* are recognized in this group. *M. fortuitum* is predominantly a pulmonary pathogen, and patients with this disease expectorate large numbers of organism. *In vitro*, the colonies appear buff colored and quite rough, sometimes giving the picture of *M. tuberculosis*, especially if the cultures are read

Table 111

Response of Mycobacterium intracellulare disease to multiple drug therapy

Authors	Year	Number of patients	Favourable Response
Lewis, <i>et al</i>	1960	68	48
Corpe	1964	330	35
Justice and Schwartz	1966	63	60
Lester*	1972	100	80
Yeager and Raleigh	1973	45	50
Tsukamura <i>et al</i>	1974	64	31
Rosenzweig	197f.	82	34
Davidson*	1976	107	77

*National Jewish Hospital and Research Centre.



Fig. 3. Massive spreading of the lesions due to *Mycobacterium ulcerans* in a 7 year old boy.

after two weeks. These organisms are also capable of growing in non-specialized medium like McConkey's. In the mouse this organism causes what is called a spinning or rolling disease, suggesting involvement of the nervous system. Just like *M. intracellulare*, *M. fortuitum* is resistant to most of the available drugs, at least at the usual concentrations. Very recently, amikacin has been shown to be active against this disease. Clinically, even though this organism causes severe disease, sometimes resulting in fatal outcome, chemotherapeutic management is controversial. Thus, while many authorities believe that conventional treatment with at least three drugs (isoniazid, rifampin and ethambutol) should be given, some others, especially out-group in Houston (Awe and others 1973), have not found any difference between the treated and untreated groups. More recently, Dalovisio and Pankey (1978) have indicated the usefulness of amikacin in the treatment of this disease. Even though this disease occurs predominantly as a lung infection, certain extrapulmonary lesions are also noted. Unless the clinician and the laboratory are alert in looking for the acid-fast pathogens, chances of missing them are high.

M. chelonae, the other recognized pathogen in this group, has been recognized in greater frequency only recently. Earlier publications were using the name *M. abscessus* until the new offi-

cial name of *M. chelonae* was adopted. This organism can cause disease with equal frequency of both pulmonary and extrapulmonary lesions. By far the largest group of cases with *M. chelonae*, which occurred in an epidemic form, was from a series of patients infected by means of a contaminated source of histamine (Inman and others 1969). Similar large series were reported by Tsukamura and associates (1973) from Japan, and several other reports dealt with the use of prosthetic valves (Repath and others 1976 and Levy and others 1977). We have also studied two cases with this organism (Gangadharam and Hsu, 1972; Gangadharam and others 1978a). The first one occurred as a consequence of the injection by a contaminated iron spike in a 17 year old boy resulting in a big lesion (Fig. 4). Treatment with isoniazid and PAS for one year cured this disease (Gangadharam and Hsu 1972). The other case of keratitis in a young woman was shown to be caused by this organism (Gangadharam and others 1978a). This patient was treated with kanamycin both by systemic administration as well as by local ointment.

This brief review shows the worldwide occurrence of the atypical mycobacteria and the pathogenic potential of many of them. Many-cause disease in the lungs, wherein it is indistinguishable from that of tuberculosis on radiological and clinical pictures. In addition, many of

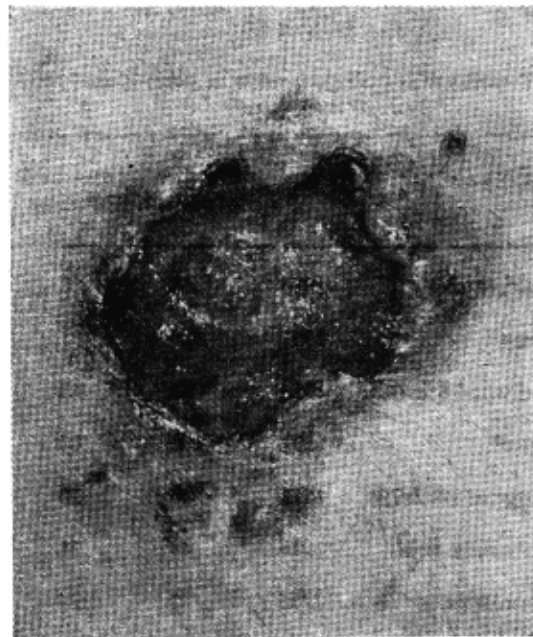


Fig. 4. Puncture wound on the thigh of a 17 years old boy stuck with an iron spike. *Mycobacterium chelonae* was shown to be the causative agent.

them cause extrapulmonary disease, some causing disease in the skin while many others in bones or elsewhere. Knowledge in this area is fast developing; and the recent International Conference held in Denver (Davidson and Gangadharam 1980) and other earlier conferences (Weizsfeiler 1973) have shown the seriousness of the problem.

Epidemiologically, it has been shown that direct transmission from person to person by the aerosolization route, which is well established for *M. tuberculosis*, has not been shown to operate with atypical mycobacteria. On the other hand, vast reservoirs of these organisms have been reported in soil, water, milk, old leaves, wood shavings and other environmental sources. Very recently, some suggestions on the mode of transmission of this disease from environment to humans via aerosolized sea water bubbles (Gruft and associates 1979) have been forthcoming.

Finally, the question which is always raised viz. why do atypical mycobacteria occur in a lesser frequency in countries like India, but in greater frequencies in countries like the U.S.A. There are many reasons. Firstly, as tuberculosis is getting under control in many developed countries, including the U.S.A., the proportion of the atypical mycobacteria to the typical gets higher giving greater chances for their recognition. Secondly, many of the developing countries are overwhelmed with their tuberculosis problem allowing much less opportunity and time to study the atypical mycobacterial pathogens in their patient population. Thirdly, there is also a possible immunological reason in which cross immunogenicity exists between atypical mycobacteria and tuberculosis. As many of us in India are infected with tuberculosis as indicated by the tuberculin positive reactions, these atypical pathogens, which are less virulent to start with, are unable to cause infection and disease. Similar explanations are also offered for the diminished effectiveness of BCG vaccination. Finally, I may say that while atypical mycobacteria pose serious problems in the U.S. and developed countries today, they will be a problem for developing countries like India tomorrow.

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EFFECT OF NUTRITIONAL STATUS ON DELAYED HYPERSENSITIVITY DUE TO TUBERCULIN TEST IN CHILDREN OF AN URBAN SLUM COMMUNITY

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Summary : Prevalence of tuberculous infection in young children is an important surveillance measure. However, the hypersensitivity may be depressed by malnutrition and thus interfere with the interpretation of tuberculin test leading to underestimation of the infection rate.

Introduction

Prevalence of tuberculous infection in younger children is an important index of the total tuberculosis situation in a country. However, in the developing countries, depressive action of under-nutrition on the delayed hypersensitivity reaction to tuberculin¹ may be presumed to influence the estimate of prevalence rate of infection in children, possibly resulting in an under-estimation. Prevalence of protein caloric malnutrition (PCM) is high in the developing countries, clinically recognisable severe forms like Kwashiorkor and marasmus being prevalent in 2-5% of pre-school children and the mild and moderate forms of PCM, as judged by the anthropometric standards in 60-70% children.² It is, therefore, necessary to study the effect of undernutrition on tuberculin test indurations. Diagnosis of the condition in community surveys is no doubt a problem. Clinical judgement and evaluation of growth standards like height, weight, chest, arm and head circumferences are part of the information made use of in assessment of nutritional state, weight and height being particularly useful.^{3,5} The ratio of weight (kg):height (cm) has also been found independent of age upto 5 years^{3,5} and is therefore valuable for use in surveys for classifying pre-school children PCM or otherwise, since the effect of errors in age estimates in surveys in rural areas would not vitiate the classification. Nevertheless, the problem still remains, as age-sex-wise anthropometric standards applicable to normal Indian children aged 5 years and over, whether urban or rural, are difficult to obtain. Some data applicable to Indian children as available from the Indian Council of Medical Research Nutrition Survey,⁴ and from work carried out at the National Institute of Nutrition at Hyderabad^{3,5} have been made use of for the present analysis. Objective of this investigation is to study the relation between delayed hypersensitivity reactions on tuberculin testing of children and their nutrition status.

Material and Methods

Data collected in 1974 in respect of 1-9 years old children from the entire slum population of Sheriff Garden area was taken up for the analysis.

This slum area was under the comprehensive health care of the Church of South India Hospital of Bangalore (CSI Hospital). The original study was carried out by this institute (NTI) with their collaboration in order to obtain information on prevalence of all forms of chest diseases and to study the problems in diagnosing these in the community at large.⁷

All the residents of the slum, 3313 in number,⁷ were registered by visiting them in their houses. The registered persons were requested to present themselves, at a centre in the slum and were interviewed there by a Medical Officer for symptoms. Children aged between 0-9 years were examined for the presence of nutritional deficiencies and the findings were recorded by the medical officer. They were classified by him as normal and undernourished, only on symptoms and clinical signs. Specific vitamin deficiency conditions, if noted, were also entered as such by him on the cards. Measurement of height/length and weight of the children were then taken by the CSI Hospital nurses and recorded separately on these cards.

Those who were between 0-9 years of age and did not have a scar in evidence of previous BCG vaccination were given tuberculin test on the left fore arm with 1 TU RT 23 with tween 80. Between 72-06 hours of the test, tuberculin reactions were read by tuberculin readers of the NTI by paying visits to the houses. Nature of the investigations carried out and their results were entered in the forms and cards designed for the purpose.

The children were classified as normals or undernourished on the IWMS of

(a) Clinical evaluation by the Medical Officer and

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2 Junior Statistical Officer.

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(b) anthropometric index (Quetlet's Index). For working out the standard values for normals under this Index, two methods were followed :

- (i) Age and Sex independent Index of height and weight in children aged 1-4 years.⁵

$$\text{In Normal children, } \frac{Wt(kg)}{Ht^2 (cm)} \times 100 = 0.15 \pm 0.001$$

$$\text{For PCM, } \frac{Wt}{Ht^2} \times 100 = 0.12 \pm 0.004 = 0.14 \pm 0.009$$

- (ii) Comparison of ratio of $\frac{Wt(kg)}{Ht^2(C_m)} \times 100$ for children of age group 1-9 years in the study with similar ratio worked out on the basis of mean age sex wise height and weight of the South Indian children of the same age group. For this purpose data on rural children of Andhra Pradesh, Madras, Kerala obtained from the ICMR Nutrition Survey 6 were combined as Karnataka was not covered

by it. The Indices of normal $\frac{Wt}{Ht^2} \times 100$ were worked out for children of either sex in each single year age on the basis of the age sex wise mean values \pm S.D. of height and weight for South Indian Children. The Indices are presented as Appendix. Children who were below the Wt/Ht^2 Index for the respective age and sex were considered as undernourished (PCM).

Results

Coverage of examination : Of the 1151 registered children aged 0-9 years, 482 in the age group 1-4 and 526 in 5-9 years formed the study population (Table 1).

Table 1

Registered population by Age and Sex

Age group in years	Males	Females	Total
0—4	329	296	625*
5—9	257	269	526

*482 in age group 1-4 years

Of these 1008 children, 967 were tuberculin test read, 984 had clinical evaluation by the Medical Officer and 980 had their height and weight recorded. Of the total children in 1-9 year age group, 980 had both clinical evaluation and anthropometric measurements, and 963 had both tuberculin test readings and anthropometric measurements carried out for them (not on table).

Evaluation of different methods for classification : Of the 482 children aged 1-4 years, 230 were classified as undernourished by either clinical evaluation or on applying age sex independent Quetlet's Index, though only 38 (16.5 %) were classified as such by both methods (Table 2).

Of the 352 considered normal by clinical evaluation, 100 were additionally classified as undernourished by the Quetlet's Index; and of 344 classified as normal by Quetlet's Index, 92 were classified additionally as undernourished by clinical evaluation. Thus agreement was poor between the two methods.

Of 162 children classified as undernourished by any of the methods, namely, age sex independent Quetlet's Index as well as by the same Index derived from age sex specific normal values of height and weight of South Indian children, there was agreement in 92 (56.8%) of them. Of the 344 classified as normal by the former, only 24 were classified as undernourished by applying the latter Index. Also of 366 classified as normal by applying the Quetlet's Index derived from the South Indian standards, only 46 were classified as undernourished by age sex independent constant value of Quetlet's Index. Agreement between the two was highly significant.

Since the value of age sex independent Quetlet's Index is not constant for the whole age group of 5-9 years, children in this age group could not be classified as per a constant Index. Hence age sex specific values of Quetlet's Index were worked out on the basis of height and weight for each single year age and either sex. These values were applied for classifying the children in either sex and in each age individually. Results of such classification are compared with clinical evaluation in Table 3.

Of the 498 children, 261 were classified as undernourished by any of the methods and in 47 (18.0%) the classification as undernourished was common to both, large proportion of Normals classified by any of the methods, were labelled as undernourished by the other indepen-

Table 2

Correlation of nutritional status as judged by differed methods

Age sex Independent* values of (Wt/Ht ² x 100)	Clinical examination		Individual age and sexwise values of Wt/Ht ² x 100 based on South Indian standard**		Total
	Normal	P.C.M.@	Normal	P.C.M.	
Normal	252	92	320	24	344
P. C.M.	100	38	46	92	138
Total	352	130	366	116	482

* Swaminathan M.C., Observation on growth and development of undernourished children of Andhra Pradesh (1971)⁵

** Ref: Appendix Table I.

@P.C.M.: Protein Calorie Malnourished.

Table 3

*The relationship between clinical examination and standard estimated on the basis of mean age specific height and weight in South Indian states for children Aged 5—9 years**

Clinical Examination	By South Indian standard		Total
	Normal	P.C.M.	
Normal	237	180	417
P.C.M.	14	47	81
Total	271	227	498

*Age sex independent value of Wt/Ht² x 100 has not been used in classification, as it is not applicable to the entire 0-9 year age group.

•Based on Appendix table.

dently. The correlation was thus poor and falls short at 1% level.

Tuberculin test indurations among the Normals and the undernourished : Distribution of tuberculin test indurations in mm and their mean size among children in 1-4 year age group are presented in Fig. a, b and c-1. In Fig. a. the

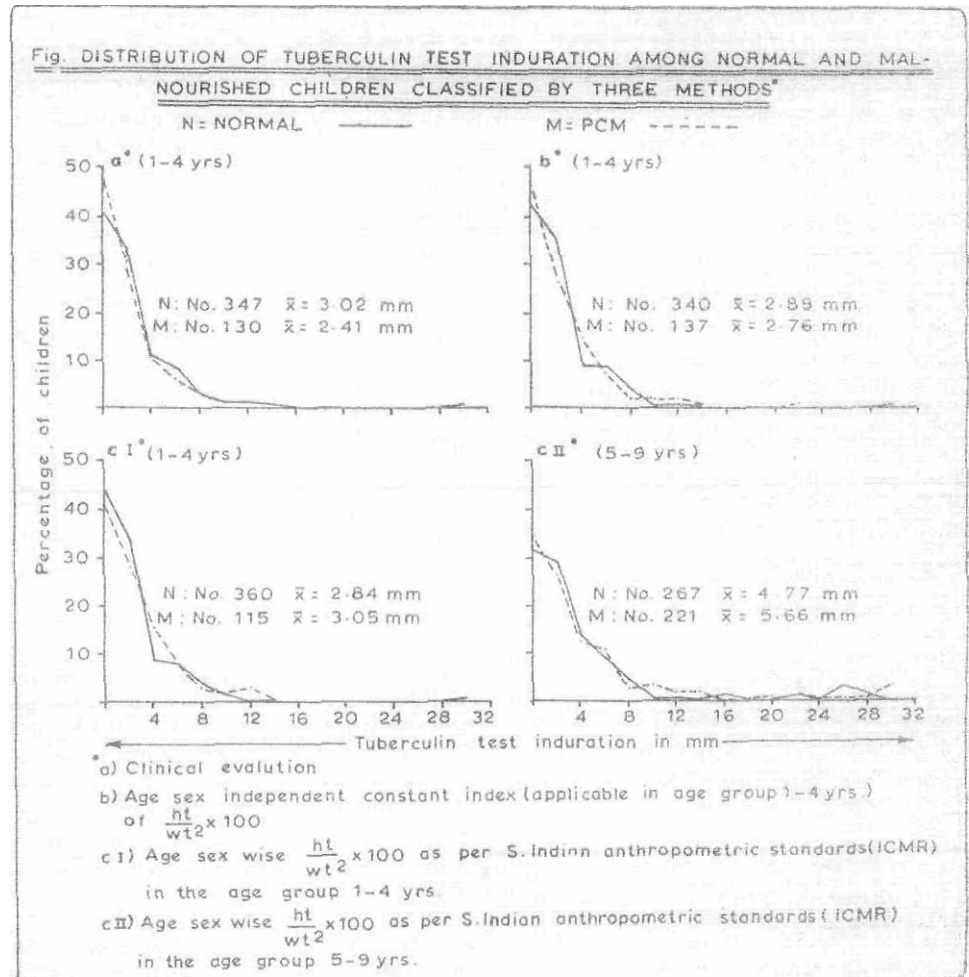
distribution and mean size among normal children are compared with those among the undernourished, classified on the basis of clinical evaluation. The distributions and the mean size of indurations are compared between the Normals and the undernourished classified on the basis of age sex independent Quetlet's Index in Fig. 6, and on the basis of S. Indian age sex specific standards in Fig. c-1.

In Fig. c-11, the distribution of tuberculin induration sizes in children aged 5-9 years and their mean size are presented. The comparison of distributions and the mean values has been done among Normal and the undernourished children classified only on the basis of Quetlet's Index derived from age sex specific S. Indian standards.

It is seen from all the figures that there was no significant difference in the mean size of tuberculin indurations as well as in the distributions of these indurations between Normal children and children with PCM, regardless of the method used for arriving at the classification.

Discussion

Study of rates of prevalence of tuberculous infection obtained on tuberculin testing of young children from time to time and area to area is considered a valuable method of tuberculosis surveillance. It is all the more valuable for developing countries,⁸ where case prevalence rates cannot be used for surveillance as the



absence of obligatory notification of tuberculosis cases makes it difficult to obtain data on prevalence of cases. Such data have to be obtained in these countries only by carrying out time consuming and expensive case prevalence surveys in large population groups. However, in the presence of rampant undernutrition among children,^{2,7} and its presumed effect on estimates of prevalence of infection obtained on measurement of tuberculin indurations, it is possible that infection prevalence estimates could be underestimated as compared to areas where undernutrition does not play a role. The results of the present study do not support such a hypothesis, and are in conformity with similar observations from studies carried out elsewhere in India.⁹

It is, however, still possible that severe grades of undernutrition states may result in depression of tuberculin hypersensitivity and a prevalence of a higher proportion of such conditions may

be presumed to result in underestimate of infection prevalence. Analysis of a separate study is currently on hand to relate different grades of nutritional status to tuberculin induration sizes, and the results will be reported in due course.

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The authors are grateful to Dr. G.D. Gothi and Mr. S.S. Nair formerly of the NTI; to Dr. Benjamin Issac, Director, CSI Hospital Bangalore and Sukant Singh in charge of Public Health Department of CSI Hospital for their encouragement and help and to several technicians of the Field Team, Team Leaders, Field Workers and Nurses of the NTI and the CSI Hospital, but for whose participation the study would not have materialised. A sense of gratitude is expressed for Dr. K. Visweswara Rao and Dr. M.C. Swaminathan of the National Institute of Nutrition, Hyderabad for technical guidance.

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Appendix Table

Age and Sex wise standard Ratio $Wt/Ht^2 \times 100$ for Normal derived from the Mean and S.D. of age and sex height and weight of S. Indian children.

Age	Boys	Girls
1	0.1377	0.1341
2	0.140	0.1372
3	0.1402	0.1253
4	0.1403	0.1355
5	0.1137	0.1311
6	0.1314	0.1260
7	0.1265	0.1233
8	0.1265	0.1207
9	0.1253	0.1186

Note :-Standard Quetlet's Index ($Wt/Ht^2 \times 100$) for children of three South Indian states combined: Estimated on the basis of the mean and S.D. of height and weight for each sex and age. Indian Council of Medical Research Technical Report Series No. 18.⁶

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CASE REPORT

ACUTE SEVERE GASTRIC INTOLERANCE TO RIFAMPICIN

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Summary : A case of acute, severe gastric intolerance to rifampicin is reported. Such type of reaction to this drug in usual daily dosage (450-600 mg.) is rarely encountered.

Introduction

The most common side reactions to rifampicin are cutaneous, 'flu' syndrome, respiratory syndrome, hepatic and abdominal reactions (Aquinas *et al* 1972, Girling 1973, Hong Kong Tuberculosis Treatment Services/Brompton Hospital/British Medical Research Council 1974). Amongst less commonly encountered reactions are acute renal failure, (Cordonnier & Muller 1972) and haemolysis (Hasse and other 1971).

With 450 mgm/day, severe type of abdominal reaction to rifampicin is practically nil. (Aquinas and others 1971; Lees *et al* 1971, Gyselen *et al* 1968). Other mild forms of abdominal reactions are persistent nausea (Poole 1971), mild dyspepsia (Pines *et al*, 1971) and mild abdominal discomfort (Rae *et al* 1971). In their series, Rae *et al* (1971) have reported that out of 175 who developed adverse reactions only four had abdominal discomfort to rifampicin. The symptoms do not appear before the second week of starting the therapy.

In the present case severe nausea and intractable vomiting occurred within three days of starting rifampicin, which is a rare feature.

Case Report

R.K. 30 year Hindu Male suffering from moderately advanced pulmonary tuberculosis, receiving streptomycin, isoniazid, ethambutol and pyrazinamide, was operated for left sided thoracoplasty on 27-7-78. He was put on the same drugs which he was receiving during preoperative period.

Six weeks after operation his sputum was positive for A.F.B. by smear examination. His treatment was changed to kanamycin 0.5 gm., rifampicin 450 mg., pyrazinamide 1.5 gm. and isoniazid 300 mg. daily.

On the third day, patient complained of severe nausea two hours after the administration of rifampicin. This was followed by intractable vomiting and pain in epigastrium. Examination of abdomen revealed tenderness in the epigastric region, liver was not palpable. All the anti-

tubercular drugs were stopped and patient was managed with intravenous fluid, antacids and anti-emetic drugs.

At this time haematological examinations revealed, blood urea — 27 mg. per cent, serum electrolyte sodium 130 m. equ. per litre, K — 4.8 m. equ. per litre (Cl — 91 m. equ. per litre. Liver function tests revealed thymol turbidity — 2 units, Thymol flocculation — 3 units, SGOT — 33 units, SGPT 13 units, icteric index — 6 units and Vandenberg reaction negative. Barium study showed no abnormality pertaining to stomach and duodenum. Gastric juice analysis revealed free hydrochloric acid 10 m. equ. N/10 NaOH, total acidity 30 m. equ./N/10 NaOH and abundance of mucus.

Patient completely recovered in a week. Thereafter, he was started on 150 mg. of rifampicin alone before breakfast which he tolerated well. Next morning, the dose was doubled which led to appearance of severe nausea, followed by vomiting and extreme nausea 15 minutes after administration of the drug. This time symptoms were more intense in nature. Rifampicin was withdrawn once again. Patient was managed on the I.V. fluid antacid, anti-emetic drugs. Rest of the drugs *i.e.* ethambutol, pyrazinamide, isoniazid and kanamycin were started, one by one, initially with small dosage and increasing the dose till the optimal dose was achieved. These drugs were well tolerated, thus proving rifampicin to be the offending drug.

Discussion

Although there is evidence of association of adverse reaction with the higher dose of rifampicin, particularly in the dosage used in intermittent therapy (Eule *et al* 1974), the reactions are practically nil with the daily dosage of 450/600 mg. (Aquinas *et al* 1972). With the usual daily dose of rifampicin the abdominal symptoms occur after 2-8 weeks, and in very low percentage (Rae *et al* 1971). In contrast to this, the symptoms in present case started on the third day of therapy.

Rifampicin, pyrazinamide and isoniazid, are hepato-toxic drugs but in this case liver

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functions and acid content of stomach were within normal limits. Therefore the symptoms of gastric irritation cannot be attributed to the liver dysfunction caused by these drugs or to the presence of hyper-acidity. The drugs pyrazinamide, isoniazid, kanamycin were well tolerated when rifampicin was withdrawn. Intolerance to daily optimal therapeutic dose of rifampicin is quite unusual and should be kept in view when treating a case with regimens containing rifampicin.

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TUBERCULOSIS OF GINGIVA

D.K. SAMANTA RAY

Summary : A case of Tuberculosis of gingiva affecting a girl aged 18 without any pulmonary lesion is reported. The diagnosis was based on positive biopsy report and hyperreactive tuberculin test. The literature on tuberculosis of oral mucosa reveals such presentation to be extremely rare.

Tuberculosis of oral cavity is relatively rare and tuberculosis of gingiva (gum) is still rarer. But as the incidence of tuberculosis in our country is quite high, all atypical manifestations of tuberculosis are likely to be seen occasionally. There are few recorded cases of gingival tuberculosis by foreign workers.

Case Report

S.R. a newly married girl aged about 18 presented in November 1976 with complaints of low grade fever of 45 days duration, occasional dry cough and a red indurated area of 1.5 cm x 0.5 cm on the overlying gingiva covering upper canine tooth on Right side - 30 days duration. There was no history of injury to gum or known history of contact with a tuberculous patient. She was treated by local doctors with antibiotics and vitamins but without any improvement before she attended this hospital,

On examination, she was of good build; pulse temperature and respiration rates were normal. She was not anaemic and there was no lymphadenopathy. The indurated area over the gingiva was red, non-tender- without ulceration or discharge. The chest was clinically clear.

Mantoux Test with 1 T.U. P.P.D. was 30mm. after 72 hours with subsequent necrosis at the site of the test. X ray of chest reveled no abnormality. Blood E.S.R. was 38 mm. in first hour (Westergren Method), Total leucocyte count was 8,900 per cmm, with Polymorphs 60%, Lymphocytes 36%. Eosinophils 2%, Monocyte nil and Bosophils Nil, B.T. was 1.5 in. and C.T. 3ft. 3in. V.D.R.L. was non-reactive. Biopsy of the gingival tissue revealed tuberculosis on histopathological examination.

She was given anti-tuberculosis treatment with standard drugs, Streptomycin Sulfate 0.75 gm. T.M. daily with Isoniazid 400 mg. daily and P.A.S. 6 gms. twice daily for a period of sixty days after which the regimen was changed to Isoniazid 400 mg. daily and P.A.S. 6 gms. twice daily as she could not tolerate streptomycin sulfate further. On examination of the patient after sixty days it was seen that the induration over the gum had reduced

by 80%. there was no redness as before; she became completely afebrile and her E.S.R. came down to 15 mm. in first hour, After 90 days she was examined again when there was no evidence of any abnormality over the a fleeted site. However, she was advised to continue the drugs for 18 months which she completed.

Discussion

Extrapulmonary tuberculosis like tuberculosis of gingiva is an uncommon condition. Even in our country where tuberculosis is very common, involvement of gingiva with tuberculosis has probably not been reported. But some foreign workers have reported about gingival tuberculosis.

Primary tuberculosis of the oral mucosal is very rare. Schmuziger (1945) and Hotz (1949), found that it is associated with drinking raw milk of tuberculous cows. Schmuziger stated that it usually develops when the deciduous tooth is being shed or extracted. Boyes (1950) reported three cases and Galloway and Home (1953) one case.

Oral tuberculosis is usually post-primary and occurs in patients affected with advanced pulmonary tuberculosis. Oral tuberculous lesion, may lake the form of nodules, ulcers or elevated fissures. Weinberger (1943) reported oral involvement in about 1.5 per cent from among 5000 cases of Tuberculosis. The sites most frequently affected are tongue, hard and soft palate, tonsils and pharynx. It may occur in the buccal mucosa and at the Commissures of lips. Read (1956) reported two cases of gingival ulcerations secondary to previously unsuspected pulmonary tuberculosis.

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INFLUENCE OF INITIAL MOTIVATION ON TREATMENT OF TUBERCULOSIS PATIENTS

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Summary : The effect of initial motivation in terms of regularity of drug collection and pattern of default for three months was studied in an urban clinic by adopting three different schedules of motivation (i) motivation as per routine procedures of District Tuberculosis Programme (ii) issue of simple brief instructions only and (iii) motivation with reduced contents and with change in sequence of points. On the whole different schedules of motivation did not significantly affect the behaviour of the patients in making all the three collections. However, patients in group (ii) were more regular and made less number of defaults. There was also a suggestion that sputum negative patients required more than mere instructions. The best response in such cases was in group (iii) wherein motivation was neither very elaborate nor very brief and in which sequence of points was so arranged that stress on important points was laid early enough to remain within the recalling memory of the patients.

Introduction

Motivation of Tuberculosis patients at the time of initiation of treatment is considered to be an important element in case holding. Frequently, however, it has been found that motivational communication fails to produce the desired effect. Periodic reports of District Tuberculosis Programmes¹ have shown that only about 30% of the patients complete their treatment.

It is logical to expect the influence of motivation on case holding at least in the early part of the treatment. Seetha *et al* (1976)² however, have shown that more than 30% of the patients do not return for their second collection and amongst the group which is lost to treatment, more than half do so at the first default itself which occurs within a month after an obligatory initial collection. Similar pattern of defaulting in the early period of treatment under programme conditions has also been brought out by Bhatia *et al* (1968)³ and Pande R.V. (196S).⁴ Such behaviour of TB patients raises doubts on the adequacy of the methodology of motivation.

For the communication to be successful, the message it contains must be understood, remembered and acted upon. Ley and Spellman (as quoted by Ley, 1972)⁵ have suggested that the patients recall best what they are told first and what they consider as most important. The effect of the motivation therefore seems to be the net result of proper delivery of understandable motivational content, presented in a rational sequence.

To understand more about the points raised.

a study was carried out to assess the effect of motivation by adopting three different schedules of motivation having varied contents and sequence of points, in terms of regularity of drug collection and default pattern of the patients in the first 3 months after initial motivation.

Study Design & Methods

Patients

The patients admitted to the study were drawn from amongst those attending Lady Willingdon TB Demonstration & Training Centre, Bangalore. They were diagnosed to be suffering from pulmonary tuberculosis, were aged 14 years or more, had not received anti-TB chemotherapy for more than 2 weeks and were considered to be physically fit to attend the clinic for out-patient treatment.

The patients taken in for the study were divided into 3 groups:

- (i) Those who were motivated as per routine procedures of District Tuberculosis Programme.
- (ii) Those who were given simple instructions regarding collection and consumption of drugs.
- (iii) Those who were motivated as per the motivational contents and their sequence prepared for the purpose of this study.

The total number of patients admitted to the study were 407 and on random basis, 139 were allocated to group I, 126 to group II and 142 to group III.

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2 Assistant Training Officer.

3 Statistician.

4 Formerly Medical Officer, Lady Willingdon TB Demonstration & Training Centre, Bangalore.

Motivation Schedules

Three motivation schedules (See Annexure) were prepared on the lines of the group structures stated above which were also translated into local languages. Group I schedule comprised of standard motivation as is advocated in the manual of DTP. Group II contained bare minimum information and instructions regarding regularity and duration of treatment whereas motivation group III was an effort not only to shorten the contents as compared to standard motivation group I but also the sequence of points had been arranged in such a manner so as to lay more stress on regularity and duration of treatment.

Initial motivation was done first by the medical officer of the centre and then by the health visitor deputed for the study, as per the schedules of motivation supplied to them for the 3 groups. Motivation was done in the language best understood by the patient, point by point and in the same order in which the points were given. No additions or deletions were permitted and the Medical Officer and the Health Visitors were thoroughly briefed beforehand.

Findings

Group Characteristics

All the 3 groups were similar in respect of age and sex composition, sputum status, extent of disease, duration of symptoms, educational level and the distances that the patients had to travel for collection of drugs (table not given). There were however, more house wives in group II.

Drug Collection

The distribution of the patients in each group by the number of collections made by them is given in Table 1.

In all 69 of the 139 patients (49.6 %) in group I, 60 of the 126(47.6%) in group II and 67 of the 142 (47.2%) in group III had made all the 3 collections. Of those who did not make any collection other than the first obligatory one 25.2% were in group I, 35.7% in group II and 28.9% in group III. There were proportionate!) more patients in group II who did not make any collection. This difference, however, did not attain statistical significance.

Table 1

Distribution of patients by number of drug collections

No. of drug collections made	I		Group		III	
	No.	%	No,	%	No.	%
0	35	25.2	45	35.7	41	28.9
1	15	10.8	11	8.7	17	12.0
2	20	14.4	10	7.9	17	12.0
3	69	49.6	60	47.6	67	47.2
Total	139	100.0	126	100.0	142	100.0

Table 2

Distribution of patients by sputum status and number of drug collections

No. of drug collections made		Sputum Positive			Sputum Negative		
		Motivation Groups					
		I	II	III	I	II	III
1		2	3	4	5	6	7
0	No. %	28 25.9	36 34.6	40 33.3	7 24.1	9 42.9	1 4.6
1	No. %	3 12.0	10 9.6	12 10.0	1 3.4	1 4.8	5 22.7
2	No. %	15 13.9	8 7.7	13 10.8	5 17.2	2 9.5	4 18.2
3	No. %	52 48.2	50 48.1	55 45.8	16 55.2	9 42.9	12 54.6
Total	No. %	108 100.0	104 100.0	120 100.0	29 100.0	21 100.0	22 100.0

Sputum not produced. Group I, 2 patients and Group II, 1 patient.

Considering the results for sputum negative patients separately (Table 2), 7 of 29 patients (24.1 %) in group I, 9 of 21 (42.9%) in group II and 1 of 22(4.6%) in group III did not make any collection. The difference between group II and III and between group I and III was statistically significant. Thus, group III emerged to be the best followed by groups I and II.

Drug Regularity

The patient was considered to be regular if he had made a collection on due date/within 3 days of the due date. Of the patients who had made all the 3 collections, 58 of 69 (84.1%) in group I, 57 of 60 (95%) in group II and 57 of 67

(85.1 %) in group III were regular for the first collection. Regularity was significantly higher in the patients in group II as compared to group I and III. The same was true for the second collection. There was however no significant difference between the groups in the 3rd collection. Possibly the effect of motivation does not last for more than two months.

Default Pattern

Any patient who did not collect the monthly drugs within 3 days of his due date was considered to be a defaulter. 40 of the 69 patients (58%) in group I, 47 of the 60 (78.3 %) in group II, and 40 of 67 (59.7%) in group III made no default.

Table 3

Distribution of the patients who made all the three collections

Collection	Type of Motivation					
	I		II		III	
	No.	%	No.	%	No.	%
1	2	3	4	5	6	7
First						85.1
Due date/within 3 days	58	84.1	57	95.0	57	
4—7 days	8	11.6	2	3.3	3	4.5
8+ days	3	4.3	1	1.7	7	10.4
Second						77.6
Due date/within 3 days	54	78.3	54	90.0	52	
4—7 days	10	14.5	2	3.3		13.4
8+ days	5	7.2	4	6.6	6	9.0
Third						
Due date/within 3 days	53	76.8	51	85.0	58	86.5
4—7 days	9	13.1	6	10.0	5	7.5
8+ days	7	10.1	3	5.0	4	6.0

Thus, compliance in three collections, was significantly more in group II as compared to group C and III.

Discussion

With short course chemotherapy round the corner, 'drop out' of patients in the early part of their treatment is a matter of major concern. Studies regarding motivation which is an important element of case holding have therefore

assumed greater importance. Putting across a message in an effective manner is not easy. Even more difficult are the studies related to it, on account of the variables which cannot be easily dissociated from the single factor of motivation e.g. the personality and the image of the medical officer, the feelings and the warmth that he puts behind the motivational effort, the psychological frame work of the patient, the environments in which motivation is given (Annik Rouillon. 1969).⁶ In this study an effort was made to

Table 4

Distribution of patients who made all the three collections by number of defaults

Number of Defaults	Type of Motivation					
	I		II		III	
	No.	%	No.	%	No.	%
1	2	3	4	5	6	7
0	40	58.0	47	78.3	40	59.7
1	17	24.6	9	15.0	21	31.3
2	11	15.9	3	5.0	5	7.5
3	1	1.5	1	1.7	1	1.5
Total	69	100.0	60	100.0	67	100.0

control some of the variables which could be managed. Despite this, there are limitations to the interpretation of the findings.

Even so it appears that on the whole, so long as the essential points were conveyed to the patients, different schedules of motivation with variable quantity of contents and changed sequence of points did not appreciably affect the behaviour of the patients attending a District Tuberculosis Centre. It may be that the patients attending a specialised tuberculosis clinic come prepared for their diagnosis, are self-motivated and do not require very elaborate type of motivation. The findings further reveal that once the patients make the decision to continue the treatment, they are more regular and defaultless with brief motivation containing only essential points which are better assimilated by the patients.

However, significantly more of sputum negative patients in group II did not make any collection after the initial obligatory one. Despite the small numbers, there was a suggestion that sputum negative patients do require more than mere instructions. The best response in such cases was in group II wherein motivation

was neither very elaborate nor very brief and in which sequence of points was so arranged that stress on important points was laid early enough to remain within the recalling capacity of the patient. Nevertheless these reflections may not hold good for the patients who attend the peripheral health institutions where they do not go in the stage of self-motivation. More of such studies have to be undertaken in different situations before reasonable standardisation of motivation both in District Tuberculosis Centre and Peripheral Health Institutions could be attempted.

Acknowledgements

The authors are grateful to Dr. N.K. Menon, Ex-Director, NTI Bangalore for valuable guidance; Mrs. R. Narayan for helpful comments; Kumari V.N. Saroja and Mrs. A. Korah for careful field work; Kumari T.J. Alamelu and Mrs. Kamala Ratnaswamy for secretarial help.

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ANNEXURE

Group I**CONTENTS AND SEQUENCE OF MOTIVATION***Medical Officer*

(i) You are suffering from tuberculosis and your disease can take a serious turn if not treated properly. It is infectious and runs a chronic course.

(ii) This is the drug regimen prescribed and it is most suitable for you.

(iii) The chances of recovery are good only if you take the treatment as per instructions and that if treatment is taken irregularly and or stopped before minimum treatment period is over, the chances of recovery are poor.

(iv) Do not stop the treatment when symptoms disappear because this does not mean cure of disease.

(v) In the event of new or unexplained symptoms, you should not stop treatment but report immediately to us for advice.

Treatment Organiser

(i) Explain the quantity of each drug to be taken, when, how, how often and for how long.

(ii) Drugs have to be collected once a month by you or by your representative (friend, neighbour, relative) with this Identity Card.

(iii) Appearance of new or unexplained symptoms does not mean that these are due to drugs. When they occur, you should consult the Medical Officer, You should not stop treatment yourself.

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(iv) Continuation of treatment beyond the minimum period will depend upon your condition at that time. For this you have to undergo follow-up examinations and clinical examinations by DTO. On the results of these examinations, the Medical Officer will decide how long the treatment has to be continued.

(v) Keep the identity card carefully and produce it at each visit. Loss of Identity Card should not be considered a very serious matter as a new one will be issued when this happens.

(vi) Bring the relatives and friends who have cough or other suggestive symptoms for examination. ("The TB patient must not be confused by too many points or too detailed explanations. At the same time, motivation should not be so brief that the TB patient is not convinced about the value of adequate and regular treatment. The TB patient should be encouraged to ask questions and to get his doubts cleared. It is important to make the TB patient repeat what has already been told, in order to ensure that he has understood clearly).

(vii) Answer any question or doubts expressed by the patient.

Group II**ESSENTIAL INSTRUCTIONS***Medical Officer*

We have found that you are suffering from tuberculosis. Please take the treatment regularly for at least one year.

Treatment Organiser

(i) Explain the quantity of each drug to be taken how often and when to take.

(ii) Collect the drugs every month on due date.

(iii) You can come personally or send anyone with this card (Identity Card) to collect the drugs.

(iv) Answer any question spontaneously asked by the patient.

Group III**CONTENTS & SEQUENCE OF MOTIVATION***Medical Officer*

(i) We have found that you are suffering from tuberculosis. You will be cured provided you take the treatment regularly for at least one year.

(ii) You will feel better within 2 to 3 months. But you should not stop the treatment at that stage, as you will not be fully cured by then. If you stop the treatment, your disease will reappear soon and it will be difficult to cure you later.

(iii) If any new symptom appears or present symptoms worsen, please come to us immediately. We will examine and advise you.

Treatment Organiser

(i) Demonstrate and explain the quantity of the medicines to be taken, when and how to be taken.

(ii) Collect the drugs every month on due date.

(iii) You can come personally or send anyone with this card (Identity Card) to collect the drugs.

(iv) Keep this card (Identity Card) safe. But even if it is lost by chance, do not stop the treatment. New card can be issued.

(v) Answer any question spontaneously asked by the patient.



B.C.G. LUPUS

HARBANS LAL

Summary : Two brothers aged 4 and 8 years developed Lupus Vulgaris after B.C.G. vaccination. No other child vaccinated in the same village with the same vaccine lot developed this complication.

B.C.G. Vaccination was first tried orally by Weil Halle in July, 1921, to a 3 days, old child with favourable results. The child was born of a tuberculous mother. With further developments, Intradermal technique came to be recognised, internationally. Since then millions have been vaccinated with B.C.G. all over the world. Mass B.C.G. vaccination was launched as a measure against tuberculosis in the community in India in 1950. Over 200 million vaccinations have been carried out by the B.C.G. teams throughout the country since then, with no serious side effects reported.

The usual complications, though uncommon, are axillary lymphadenitis, persistent ulcer, local eczema, keloid formation. Disfiguring cicatrix and scrofuloderma. Lupus Vulgaris is a rare complication of B.C.G. vaccination. All over the world just about fifty cases have been reported so far. No such case has so far been reported from India to the best of my knowledge. Two cases of lupus vulgaris which occurred as a result of B.C.G. Vaccination during the mass direct B.C.G. Vaccination Campaign in Ambala District (Haryana State) are reported here.

Case Reports

The two children reported are brothers aged 3 and 4 years. They were vaccinated in the village Mullana (Ambala Distt.) in the month of June, 1974, during the direct vaccination campaign in that village. The B.C.G., vaccine used was from lot No. 05254. "None of the other children in this village who were vaccinated with the same lot suffered from this complication.

These two children were brought to the Local P.H.C. in July, 1975 *i.e.* one year after they were vaccinated, for treatment of an ulcerated lesion which had appeared at the site of vaccination and was now spreading. Medical Officer of the P.H.C. put them on Anti T.B. Drugs which they took irregularly for about 6 months without any significant relief. Then they were brought to the District T.B. Centre at Ambala in March, 1976, by their father who was an old treated case of pulmonary tuberculosis. He had completed his treatment in 1973. At that time when the children were bronchi to District T.B. Centre (March,

1976), the father's chest skiagram did not reveal any active lesion and sputum was negative for A.F.R. (by direct smear repeatedly). These children were given tuberculin test with P.P.D. I.T.U., a postero-anterior skiagram of the chest, and skin biopsy for histopathological examination.

Case No. I

R.K., 4 years male child, general physical and systemic examination did not reveal any abnormality. No lymphadenopathy was detected. Mantoux test with I TU. P.P.D. gave a reaction of 15 m.m. and X-ray Chest showed an abnormality.

Local examination revealed a large oval shaped ulcerated area in the upper half of left Deltoid region measuring 70 mm x 46 mm in size as a raised plaque above the surface with irregular but well defined margins with depression in the centre which showed granulating plaques brownish red in colour. It was surrounded by a raised border zone showing scattered pustules and nodules. The Biopsy report of the margin of the lesion revealed on histopathological examination a granulomatous lesion together with acute inflammation affecting the dermis and epidermis. No tubercles were seen.

Case No. II

N.K., 8 years old child, elder brother of Case No. I. General physical and systemic clinical examination was normal. No Lymphadenopathy was present. Mantoux test with P.P.D.I. TU gave a reaction of 16 mm and X-ray chest showed no abnormality.

An ulcerated lesion of the size of 60 mm x 50 mm was seen on the left shoulder in the upper half of Deltoid region. It was similar in appearance to the one described above. Histopathological examination revealed a granulomatous inflammation containing typical tubercles. Granulomatous lymphangitis was also seen. No A.F.B.s were present (Fig. I).

These children were treated with Streptomycin 1/2 cm alongwith 150 mg. INH and 75 mgm, Thiacetazone daily and local application

*District Tuberculosis Officer, Distt. T.B. Centre, Gurgaon (Haryana).

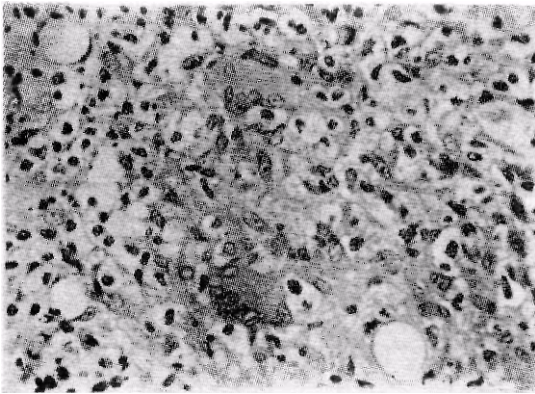


Fig. 1. Photomicrograph of the Biopsy from the Ulcerated Lesion showing typical tubercles and granulomatous lymphangitis

of steroids with favourable results. These children were followed at monthly intervals and the lesion showed marked improvement within 3 months of treatment and disappeared almost completely after 9 months of treatment.

Discussion

Lupus Vulgaris is one of the rare but noteworthy complications of R.C.G. vaccination. Krist Jensen *et al* (1945) reported the first case. The latent period between B.C.G. vaccination and occurrence of Lupus Vulgaris is variable. It may vary from a few weeks to 3 year? In some cases it may accompany the local lesion. It must be conceded that the primary skin lesion resulting from vaccination is, in effect, a benign skin tuberculosis which may some time manifest the characteristics of Lupus Vulgaris. When such reactions do not heal within 6 months of the first appearance, they may merit the diagnosis of B.C.G. Lupus. These lesions are indistinguishable from the ordinary Lupus but the appearance at the site of vaccination suggests it to be of B.C.G. origin. Pathogenesis of lupus and other complications following B.C.G. is obscure. Lowered resistance of the host, dose of B.C.G. and virulence of organisms and existence of allergic state have been blamed. In the present case no history of any serious illness was forthcoming immediately prior to vaccination. As to dose and virulence of the B.C.G. organisms, no other case of lupus was reported from among the children of the same village who were vaccinated by the same technician from the same ampoule of vaccine. A similar instance has been reported during the BMRC trials (1956) wherein large number of children were vaccinated from the same ampoule and by the same technician but only one child developed lupus.

Allergy is supposed to be a factor of great importance in the development of Lupus. We cannot definitely exclude this possibility in these children. As B.C.G. Vaccination was done without previous tuberculin test, the children could have been tuberculin reactors as their father had been an active case of pulmonary tuberculosis. Imersland *et al* (1955) have reported a case of BCG Lupus in a child whose father was active patient of tuberculosis but the child was tuberculin negative at the time of B.C.G. vaccination.

B.C.G. is a strain of bovine tubercle bacillus with attenuated virulence. Nevertheless, it is a living vaccine and its eventual eradication depends upon the host resistance. Jansen *et al* (1945) have demonstrated by inhalation experiments in guinea pigs that the lower the virulence of bacilli the greater is the tendency to chronic inflammation. Virulence of B.C.G. organisms is lower than the tubercle bacillus. Jansen and Frimodt-Moller (Quoted by Davis 1955) have found that in the naturally occurring cases of Lupus the isolated bacilli show a varying degree of attenuation with virulence slightly higher than that of B.C.G. strain. So it is not surprising that a few cases of Lupus have appeared amongst the millions vaccinated.

Thus the reason why these particular subjects have reacted to B.C.G. inoculation with the formation of Lupus nodules remains obscure. Genetic host factors, temporarily diminished resistance due to intercurrent infections, possibly secondary infection of skin and hypersensitivity may well be the causative factors.

Acknowledgement

I am thankful to Dr. Kul Bhushan and Dr. S.P. Pamra for their valuable suggestions and criticism and Pathology Deptt. of P.G.I., Chandigarh for the histopathological examination in the preparation of this paper. Grateful thanks are also due to Mr. R.D. Bhargava and R.V. Booth for their help.

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REFRESHER COURSE IN TB FOR GENERAL PRACTITIONERS

The Alumni Association of M.G.M. Medical College, Indore, M.P., will organise a refresher training course in Tuberculosis for general medical practitioners from 20th to 24th of August (both days inclusive). Applications from general practitioners should reach the Secretary of the above Association latest by the 1st of August, 1980.

GUIDELINES FOR CONTRIBUTORS

The Indian Journal of Tuberculosis is the official organ of the Tuberculosis Association of India and is published in January, April, July and October each year. It publishes original papers on all aspects of tuberculosis and non-tuberculous respiratory diseases. Reports on rare cases or conditions and cases of unusual interest are also published. Papers and case reports for publication should be sent, in duplicate, to the following address :-

The Editor,
Indian Journal of Tuberculosis,
Tuberculosis Association of India,
3, Red Cross Road,
New Delhi-110001.

Material submitted is accepted on the understanding that it will be subject to editorial revision and that it has not been published elsewhere and, if accepted, will not be published anywhere else.

Manuscripts should be typed written with double spacing and wide margin. Summary should be typed on a separate sheet. Tables and figures should have descriptive legends and should be numbered. They should be typed on separate sheets and attached at the end of the text. Diagrams and drawings, preferably larger than the desired reproduction size, should be in black ink on stout white paper or blue-lined

graph paper. Photographs should be printed on glossy paper and submitted unmounted. Legends for photographs should be typed on separate sheets.

References should be cited in the text in the following pattern:-

Kakar, Aranya and Nair. 1979

All references should be listed in alphabetical order at the end of the article in the following sequence :-

Name(s) of the author(s); full title of the paper; name of the Journal; year of publication, volume and first page number of the article,

Example : Kakar, A., Aranya, R.C., Nair, S.K.; Isolated gastric tuberculosis; Ind. J. Tuber.; 1979, 26, 205.

Twenty five reprints of the article are supplied free. If more reprints are required, the author must specify the number required while submitting the paper for publication. Reprints in excess of 25 will have to be paid for.

Full address of the author to whom correspondence is to be addressed in this connection may also be intimated.

NEWS AND NOTES

ANNUAL GENERAL MEETING

The Fortyfirst Annual General Meeting of the Tuberculosis Association of India was held on Saturday, the 19th April 1980 in the Conference Hall of the Association 3, Red Cross Road, New Delhi. Shri S. Ranganathan, TCS (Retd.), M.P., President of the Association, presided. Dr. B. Sankaran, Director General of Health Services and Chairman of the Association presented the Report of the Association for the year 1979 and Shri S. Ratnam, the Honorary Treasurer, presented the audited accounts for 1979. While presenting the Report Dr. Sankaran appreciated the efforts made by the Association to educate the public and involve the community in implementing the National TB Control Programme and stressed the need for mobilising all available resources to build up an indomitable public opinion in favour of modern methods to control tuberculosis. He regretted that while tuberculosis continued to be a major public health problem claiming annually a toll of six lakhs lives, the attention given to problems of tuberculosis in medical education had been decreasing, leading to difficulties in getting specialists in the field. He pleaded with the State Associations to organise Seminars, State level Conferences and Refresher Courses which helped in creating enthusiasm among the local workers to keep the problem of tuberculosis in the eyes of the public.

Shri S. Ranganathan in his address reiterated the need for a second sample survey to determine the present epidemiological status of Tuberculosis and regretted that this suggestion had not yet found favour with the Government. He strongly felt that for proper planning of control measures in any epidemiological situation recent and reliable basic data on the prevalence, incidence, trends, etc. of a disease are absolutely essential and pleaded that the Government should re-consider their decision and agree to conduct this survey early. He advised the State TB Associations to broad-base their organisational set-up by including influential persons in their committees and by setting up suitable offices, preferably in their own buildings, with full-time paid staff. He also emphasised the importance of health education and asked the State Associations to give it the highest priority it deserved.

SECRETARIES CONFERENCES

The 31st Conference of Secretaries of State TB Associations and Seal Sale Organisations was held in New Delhi on Saturday, the 19th

April, 1980. The Conference was presided over by Dr. M.S. Chadha, Vice-Chairman, T.A.I., and it was attended by representatives from Andhra Pradesh, Bengal, Delhi, Jammu and Kashmir, Goa, Daman and Diu, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh and Nagaland, members of the Technical Committee and other invitees. Shri P.N. Raman, Secretary-General, T.A.I., extended a cordial welcome to the delegates and invitees to the Conference. Dr. M.S. Chadha in his opening remarks referred to the immensity of the tuberculosis problem in our country and expressed the hope that the deliberations of the Conference will help in working out programmes which will substantially contribute towards the control of tuberculosis in our country. The Conference reviewed the activities of State Associations and emphasised the need for strengthening the organisational set-up at State and District levels so that the various activities of the Associations may be properly planned, implemented and followed up. It was resolved that every effort should be made to enrol more members, organise District and local Associations where these do not exist at present and keep the tuberculosis problem constantly before the public by organising group discussions, seminars, conferences, etc. It was also decided to intensify the health education activities, organise Refresher Courses for General Practitioners on a regular basis and train volunteers to assist in case-finding, preventing drug default and to generally assist Government in the implementation of the TB Control Programme.

TECHNICAL COMMITTEE

A meeting of the Technical Committee of the Association was held on 18.4.1980. The Committee discussed the various suggestions made by Dr. M. L. Mehrotra in his Presidential Address at the 34th National Conference on TB & Chest Diseases held in Jaipur in October 1979 and recommended the appointment of a high power Committee to go into the question of training programmes and their monitoring particularly with a view to bring about coordinated and meaningful training programme with multi-stage monitoring. The Committee also suggested that the Association may address the Government to step up the anti-TB programme in India and also request the WHO, through the IUAT, to take up TB as a global problem, so that appropriate steps may be taken to bring down the prevalence of TB in India and other developing countries within the next 20 years. The Committee discussed the Report of the Trial on BCG

Vaccination in South India for TB prevention and expressed the opinion that BCG Vaccination of infants and young children should continue as before. The meeting also considered the main subjects to be discussed at the 35th National Conference on T B & Chest Diseases to be held in Bombay from 19th to 22nd November, 1980 and decided that the Local Advisory Committee may consider the various papers received and chalk out a suitable programme for the Conference.

AWARD FOR STATE ASSOCIATIONS

The Khushi Ram Shield instituted by the T.A.I. for best overall performance by State TB Associations was won by the Andhra Pradesh TB Association for its outstanding activities during 1979. The Tamil Nadu and Maharashtra State Anti-TB Associations were awarded certificates of merit for their good performances.

The Tamil Nadu Association was awarded the coveted TB Seal Trophy for making the highest collections in the 29th TB Seal Campaign and the Kerala Association was awarded the Runner-up Cup. The Silver Cup for smaller States was won by the TB Association of Goa, Daman and Diu, for the eighth year in succession. The Orissa and Tripura State TB Associations were awarded merit certificates for having improved their Seal Sale Collections

35TH NATIONAL CONFERENCE — BOMBAY

The 35th National Conference on Tuberculosis and Chest Diseases will be held in Bombay from 19th to 22nd November, 1980. under the joint auspices of the Tuberculosis Association of India and the Maharashtra State Anti-TB Association. The subjects selected for discussion at this Conference are :

1. Panel discussion on "Place of TB in primary health care" (Moderator: Dr. K.N. Rao).
2. Panel discussion on "Involvement of General Practitioners in diagnosis, case-detection, treatment and prevention of TB". (Moderator : Dr. R. Viswanathan)
3. Chemotherapy including Drug toxicity and interaction.
4. Epidemiology.
5. Bronchogenic Carcinoma.
6. Extra-pulmonary tuberculosis.

7. Role of hospitalisation in the Management of pulmonary tuberculosis.
8. Status of immunology.
9. Assorted papers.

Those who wish to attend the Conference may kindly contact the Secretary-General, Tuberculosis Association of India, 3. Red Cross Road, New Delhi-110001.

STATE CONFERENCE

The 8th Andhra Pradesh TB & Chest Diseases Workers Conference was organised by Andhra Pradesh TB Association on 8th and 9th March, 1980 at Hyderabad. Shri K.C. Abraham, Governor of Andhra Pradesh, inaugurated the Conference. The Governor presented the Dr. P.V. Benjamin Oration award to Dr. S. Sivaraman. Director, TB Centre, Trivandrum, and the Wander-T.A.A.P. Oration award to Shri V.R. Reddy, Dean, Faculty of Medicine, Osmania Medical College. The Governor also presented awards instituted by the Association to the D.T.C.D. Students. The Scientific sessions included discussions on important subjects like Chemotherapy. Childhood Tuberculosis. Role of National TB Programme. Surgical aspects of Tuberculosis, etc. The State Association brought out an attractive Souvenir on the occasion

TECHNICAL ADVISER TO T.A.I.

Dr. S.P. Pamra, who recently retired from the post of Director, New Delhi Tuberculosis Centre, New Delhi, has been appointed as Honorary Technical Adviser to the Tuberculosis Association of India with effect from 1.7.1980.

DIRECTOR, NEW DELHI TB CENTRE

Dr. G.D. Gothi, who retired as Epidemiologist from the National Tuberculosis Institute, Bangalore, has been appointed as Director of the New Delhi Tuberculosis Centre with effect from 2nd June. 1980.

REFRESHER COURSE

Under the auspices of the District TB Association of Hyderabad an intensive Refresher Course on TB & Chest Diseases was organised on 7.6.1980 at the State TB Centre, Irramnuma, Hyderabad. The course was attended by about 75 doctors from TB Hospitals, State TB Centre, Domiciliary TB Services, post-graduate students and general practitioners. The course was inaugurated by Dr. D. Bhaskar Reddy, Director of Medical Education, Andhra Pradesh. Dr. D.

Umapathy Rao, Honorary General Secretary, Andhra Pradesh TB Association, welcomed the chief guests and the doctors who had come to attend the course. Drs. C.R. Rajagopal, Thoracic Surgeon and Retired Superintendent, Gandhi Hospital and C. Srinivasa Rao, Honorary Secretary, Ranga Reddy District TB Association, chaired the morning and afternoon sessions respectively, during which important papers on TB & Chest Diseases were presented for the benefit of the doctors.

ANTI-TB CAMPS

The Maharashtra State Anti-TB Association organised a Health Education and Medical Check-up camp at Anjuman Khairul Islam High School from 17th to 24th February, 1980, in cooperation with the Lions Club of Kurla, Anasagar Welfare Association and Indian Medical Association. Daily medical check-ups were done and there was a question-answer Brain Trust Programme. Drugs worth Rs. 20,000 were distributed free of cost on the occasion. The Association also held a BCG vaccination Drive and Anti-TB Camp at Retwal on 10th March and at Shriwardhan on 10th to 12th March, 1980 in cooperation with the Local Camp Committee and the District TB Officer and his staff at Alibag, during which 25 villages were covered. The Association also cooperated with the I.M.A. Rotary Club of Bombay, Yusuf Mehralli Centre and Local Camp Committee in a drive to immunise the children of Pen Town

and also of the villages in Pen Taluka in Kolaba District.

CHANCHAL SINGH MEMORIAL AWARD-1980

The Tuberculosis Association of India will award a cash prize of Rs. 500/- to a TB worker, preferably below 45 years of age, for an original article not exceeding 30 double-spaced full-scrap typed pages (approximately 6,000 words, excluding charts and diagrams) on a subject relating to tuberculosis. Papers may be sent, in quadruplicate, to reach the Secretary-General, Tuberculosis Association of India, 3, Red Cross Road, New Delhi-110 001, latest by 31st August, 1980.

ESSAY COMPETITION-1980

The Tuberculosis Association of India award a cash prize of Rs. 300 to a final year medical student in India for an original essay on Tuberculosis, adjudged best by a special committee of this Association. The subject selected for the 1980 competition is "B.C.G.". The essay should be written in English, typed in full-scrap size, double-spaced and should not exceed 75 pages (approximately 3,000 words excluding tables, diagrams, etc). Four copies of the manuscript should reach the Secretary-General, Tuberculosis Association of India, 3, Red Cross Road, New Delhi-110 001, not later than 31st August 1980 and should be forwarded through the Dean or Principal of College/University.

The Indian Journal of Tuberculosis

ABSTRACTS

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Pulmonary Histiocytosis

Francoisse Basset et. al., Amer. Rev. Resp. Dis.; 1978, 118, 811.

Seventy-eight cases of histologically verified pulmonary histiocytosis X (HX) were analysed retrospectively. The patients, although predominantly young adults, ranged from one to 69 years of age, and males outnumbered females by 4 to 1. Some of the patients were asymptomatic and were only discovered after routine chest radiography, whereas others presented with pneumothorax, dyspnea, cough, constitutional disturbances, or symptoms attributable to extrapulmonary HX lesions. Physical signs of lung disease were often Jacking but widespread reticular and micronodular radiographic opacities were present, most apparent in the midzones and bases but often sparing the costophrenic angles. Restrictive defects and low diffusion capacity were often found, and changes consistent with airway obstruction were also recorded. In nearly one half of the patients the disease stabilized or improved. The remaining cases deteriorated with the appearance of radiographic "honeycombing" or bullous change, and one half of these patients died. Poor prognostic features included extremes of age, multiple pneumothoraces, multisystem generalized disease, prolonged constitutional disturbance, extensive initial pulmonary radiologic involvement with formation of cysts and a low CO diffusing capacity. No form of treatment affected the course of the disease. The lesions consisted of focal interstitial infiltrate of characteristic HX cells, pigment-laden macrophages, lymphocytes and eosinophils, centered on airways and pulmonary arteries and veins, initially, the lesions were very cellular and mitotically active, but later became increasingly fibrotic which resulted in stellate scars, emphysema and bronchiolectasis. Ultra-structurally, pentalaminar X bodies were found in the HX cells, and it was possible to identify these structures in cells obtained by bronchial lavage, thus establishing the diagnosis without recourse to open lung biopsy. Electron microscopy is considered an important diagnostic procedure in the confirmation of the disease.

S.P.P.

A prospective study of Plasma DNA in the diagnosis of Pulmonary Embolism

James N. Sipes et. al. Amer. Rev. Resp. Dis.; 1978, 118,475.

To assess the usefulness of plasma deoxyribonucleic acid (DNA) detection in the diagnosis of pulmonary embolism (PE), the frequency and duration of the occurrence of free plasma DNA in 23 patients with PE and in 49 patients with pneumonia, myocardial infarction, thrombophlebitis or normal lung scans were studied prospectively. Plasma DNA was detected in 19 of the 23 patients (83 per cent) with PE and in none of the 49 patients with other diagnosis. Eighteen of the 19 PE patients with free DNA had persistence of DNA on all subsequent sampling for up to 5 days. Plasma DNA had a sensitivity of 83 per cent in the diagnosis of PE and was extremely specific for PE. Thus detection of free plasma DNA maybe useful as a rapid test to aid in the diagnosis of PE.

S.P.P.

Anaerobic Bacterial Pneumonitis

John G. Bartlett. Amer. Rev. Rbsp. Dis.: 1979, 119, 19.

Clinical features of 46 patients with anaerobic bacterial pneumonitis were compared with those of patients with pneumococcal pneumonia. The presenting features in these 2 group were comparable in terms of fever, leukocyte count and radiographic abnormalities. Only 2 patients with anaerobic bacterial pneumonitis had putrid sputum initially. None of the patients with anaerobic bacterial pneumonitis had chills, although this was reported by nearly one half of those with pneumococcal pneumonia. The response to treatment with antimicrobial drugs was comparable in the 2 groups, except that 20 per cent of patients with anaerobic bacterial pneumonitis subsequently developed pulmonary abscesses, despite the use of antimicrobial agents presumed to be active against the infecting flora. There was also a high incidence of bronchogenic neoplasma among patients who had anaerobic bacterial pneumonitis in the absence of

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an associated condition that would predispose to aspiration. The findings suggest that anaerobic bacterial pneumonitis may be difficult to distinguish from pneumococcal pneumonia on the basis of clinical presentation.

S.P.P.

Clinical trial of six-month and four-month regimens of chemotherapy in the treatment of pulmonary tuberculosis

Singapore Tuberculosis Service/British Medical Research Council.; Amer. Rev. Resp. Dis.: 1979, 119, 579.

In a study in Singapore, Chinese, Malay and Indian patients with pulmonary tuberculosis received 2 months of daily treatment with streptomycin, isoniazid, rifampicin and pyrazinamide followed either by daily treatment with isoniazid, rifampicin and pyrazinamide (SHRZ/HRZ regimen) or by daily administration of isoniazid and rifampicin (SHRZ/HR regimen; allocated at random. Both regimens were given for either 6 or 4 months by random allocation.

All 330 patients with drug sensitive tubercle bacilli before treatment had a favourable bacteriological response during chemotherapy. During the first 6 months after the end of chemotherapy, there was only a single bacteriologic relapse among 84 SHRZ/HRZ and 80 SHRZ/HR patients treated for 6 months, but 8 (10%) of 80 SHRZ/HRZ and 4 (5%) of 74 SHRZ/HR patients treated for 4 months relapsed. Of a total of 33 patients with bacilli resistant to isoniazid, streptomycin, or both drugs before treatment, only one had an unfavourable response during chemotherapy, and none of 31 patients relapsed during the first 6 months after stopping chemotherapy. The incidence of adverse reactions was low; 11(3%) of 397 patients had hepatitis, but not all episodes were attributable to drug toxicity and one patient had thrombocytopenic purpura.

S.P.P.

The booster phenomenon in serial tuberculin testing

Nancy J. Thompson et al. Amer. Rev. Resp. Dis.: 1979, 119, 587.

To determine the frequency, magnitude and causes of the booster phenomenon in tuberculin testing, a total of 1,478 employees from 10 hospitals throughout the United States received sequential intradermal tests using PPD-T (containing Tween 80). In addition, approximately 70 per cent were initially tested with PPD-G.

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Boosting was found in all age groups tested, but increased with age. It occurred as soon as one week after an initial tuberculin test, but rarely before that time. The boosted reactions were apparently caused either by remote tuberculous infection or recent or remote sensitization by one or more of the non-tuberculous mycobacteria. In areas endemic for non-tuberculous mycobacteria, they are the most likely cause of the sensitivity that may be boosted.

On the basis of these findings, it is recommended that when repeated tuberculin testing is required as part of a hospital control programme, a second identical tuberculin test be given one week after the first. When subsequent tests are given, this should permit separation of boosted reactions from reactions caused by new infections. Persons who do not boost when given repeat tests at one week, but whose tuberculin reactions change to positive after one year, should be considered to have newly acquired tuberculous infection and managed accordingly.

S.P.P.

Re-evaluation of sputum staining for the diagnosis of pulmonary tuberculosis

Ira Jeffrey Strumpf et al., Amer. Rev. Resp. Dis.: 1979, 119, 599.

Data were collected at 2 teaching institutions. University Hospital, University of Michigan (UMH) and University of California at Los Angeles (UCLA) Hospital, to evaluate the usefulness of the auramine-rhodamine fluorochrome stain in the diagnosis of pulmonary tuberculosis in hospitalized patients. The patients studied had received no prior therapy and their sputum specimens were positive for a pathogenic Mycobacterium by microscopy or culture or both. The true positive smear rate was 0.88 at UMH and 0.83 at UCLA; the relative false positive smear rate was 0.12 at UMH and 0.17 at UCLA. The sensitivities at UMH and UCLA were 0.78 and 0.51 respectively and the specificity was greater than 0.99 at both. The data suggest that sputum stained by the fluorochrome method is useful and reliable for the diagnosis of pulmonary tuberculosis, because the false positive rates are acceptably low in hospitalized patients.

S.P.P.

Establishing priority during investigation of tuberculosis contacts

C.E. Rose, Jr. et al., Amer. Rev. Resp. Dis.: 1979, 119, 603.

Persons coming into contact with patients

who have active pulmonary tuberculosis are at risk of tuberculous infection. There is a need for a simple way to identify contacts who have the greatest risk, so that they can be investigated with least delay. In addition, if resources and manpower limit investigation of contacts, then the lower risk contacts can be omitted. By using 2 characteristics of the exposure, local health department personnel in Birmingham and New Orleans categorized 1,590 contacts into 4 groups with differing risks of infection. The 2 characteristics used were the relative concentration of tubercle bacilli in the sputum of the source case (evaluated by Ziehl-Neelsen smear; high = smear-positive, low = smear-negative) and the intimacy of exposure of the contact to the source case (household or non-household). Household contacts of smear-positive patients were at highest risk of infection (infection rate of 46 percent). At lower risk were non-household contacts of smear-positive patients (34%) followed by household contacts of smear-negative patients (28 %) and non-household contacts of smear-negative patients (24%). It is concluded that local health departments can assign priority to contacts simply and reliably on the basis of the sputum smear of the source case and the intimacy of exposure of the contact to the source case.

S.P.P.

Non-pulmonary tuberculosis with special reference to pathological aspects

P.K. Chatterjee & C.H. Sundar Rao. Jour. Ind. Med. Asso: 1979, 72, 245.

A total of 7,000 histopathological examinations were performed in (the reference hospital of South Eastern Railway, Calcutta from 1966 to 1975. One hundred and eighty four of these showed evidence of extra-pulmonary tuberculosis. Lymphnodes were involved in 70%, abdomen 15%, female genitals 9%, and miscellaneous including bones and joints 6%. Nearly 2/3rd of the glandular cases were amongst women and majority of the cases in both sexes were in the 2nd, 3rd and 4th decade of life. Abdominal tuberculosis was seen almost evenly in men and women and 85% of the cases were in the 3rd and 4th decades of life. Granulomatous changes without caseation in the intestines were seen in 4 cases. In the case of genital tuberculosis, 9 had endometritis, 4 had involvement of cervix. 4 fallopian tube and I had involvement of the vulva. AFB were seen in 80% of the sections in gland cases, 25% of the abdominal cases, 50% of endometrium and cervical cases and 25% of the others. Nearly 3/4th of the total cases came from low economic groups.

S.P.P.

Tuberculosis in immunosuppressed patients

J.W. Millar and N.W. Horne, Lancet; 1979, 1, 1176.

Eleven patients who developed tuberculosis while on long-term immunosuppressive drug therapy are described. The indications for immunosuppressive therapy were systemic lupus erythematosus, temporal arteritis, polymyalgia rheumatica, chronic active hepatitis, lymphoma renal transplantation, asthma, rheumatoid arthritis and a suspected cerebral tumour. All patients received high doses of corticosteroids with azathioprine in addition in 2 cases and ehlorambucil in a third. The duration of immunosuppressive therapy ranged from 6 weeks to 10 years (mean: 13 months). The additional risk factors in 3 patients were a strong family history of tuberculosis, partial gastrectomy and diabetes respectively. The ages ranged from 34 to 84 years. Chest x-ray was suggestive of tuberculosis in all patients excepting one where the chest v-ray was clear and tuberculous meningitis was discovered at necropsy. Four had advanced cavitory disease. Sputum was strongly positive by direct smear in 7 cases, direct smear negative and culture positive in 2 cases. One patient had miliary tuberculosis and the diagnosis was proved at necropsy. Mycobacterium tuberculosis, fully sensitive to all drugs was isolated in 8 patients and mycobacterium avium resistant to INH, PAS and Pyrazinamide was isolated in one patient. The diagnosis was delayed in all cases because of suppression of symptoms. Four patients died, 3 directly as a result of tuberculosis. The remaining patients, including the three who were critically ill at the time of diagnosis. A high index of suspicion for tuberculosis must be maintained in all cases on long-term immunosuppressive therapy.

S.P.P.

U.S. Public Health Service Cooperative Trial of Three Rifampicin-Isoniazid Regimens in treatment of Pulmonary Tuberculosis

Marv W. Long et al. Amer. Rev. Resp. Dis.; 1979, 119, 879.

A total of 822 patients with newly diagnosed pulmonary tuberculosis were assigned randomly to one of 3 daily Rifampicin-Isoniazid (RIF-INH) regimens: 450, 600 or 750 mg of RIF in combination with 300 mg of INH. After an initial 20 weeks of therapy with RIF-TNH, patients received 300 mg of INH and 15 mg of Ethambutol (EMB) per kg. of body weight for either 12 or 18 months after their sputum cultures became negative. The rate of bacteriologic conversion of sputum among the 3 RIF-INH regimens was

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compared for 552 patients who completed the 20 weeks of RIF-INH therapy. Approximately 60 per cent of these patients also completed their assigned INH-EMB therapy and were examined for relapse for at least one year after therapy was stopped. There was no significant difference in the rate of sputum conversion or rate of relapse between the group of patients who received 600 mg of RIF and those who received 750 mg of RIF. However the 450 mg RIF regimen was significantly less effective than the other 2 regimens, as manifested by a lower rate of sputum conversion and a higher rate of treatment failures. Further analysis showed that RIF dosage of less than 9 mg per kg. of body weight per day may be inadequate for treatment of pulmonary tuberculosis. The acceptability of these regimens was high, and the incidence of adverse reactions requiring discontinuation of RIF-INH therapy was quite low (3.3 per cent). A large proportion of patients (44 per cent) developed increased concentrations of transaminase during therapy with RIF-INH. These abnormalities were usually transient and in most cases, of no clinical significance. In the relapse analysis, 12 months of chemotherapy after sputum conversion were shown to be as effective as 18 months of therapy after conversion of these RIF-containing regimens.

S.P.P.

Controlled Trial of 6 Months and 8 Months Regimens in the Treatment of Pulmonary Tuberculosis : The Results up to 24 months

Hong Kong Chest Service/British Medical Research Council; Tubercle, 1979, 60, 201-210.

The following four short course anti-tuberculosis regimens were studied:

1. Streptomycin, Isoniazid and Rifampicin daily for 6 months.
2. Above 3 drugs plus Pyrazinamide daily for two months followed by twice weekly Streptomycin, Isoniazid and Pyrazinamide.
3. Ethambutol in place of Pyrazinamide in regimen 2.
4. Streptomycin, Isoniazid, Rifampicin and Pyrazinamide 3 times a week for 4 months, followed by Streptomycin, Isoniazid and Pyrazinamide twice a week.

The total duration in the last 3 regimens was 6 or 8 months by random allocation. All except 1 of the 680 patients had sensitive bacilli. The relapse rates during the period from the end of chemotherapy upto 24 months in the non-Ethambutol series were 6-7% in six months'

regimens and 1-3 % in 8 months' regimens. However in the Ethambutol series, 23 % of 84 patients had a bacteriological relapse after 6 months of chemotherapy and 10% of 84 patients after 8 months' therapy.

H.B.D.

The Treatment of Tuberculous Meningitis in Children with a combination of Isoniazid, Rifampicin and Streptomycin—Preliminary Report

Nastiti N. Rahjoc, Neonoeng Rahjoo, I. Bocdiman Mardjanis Said and S. Lazuardi; Tubercle; 1979, 60, 245-250.

Twenty-two children with tuberculous meningitis were treated with isoniazid, streptomycin and rifampicin and 19 were treated with isoniazid, PAS and streptomycin for at least 18 months. Both groups received corticosteroids at the beginning of the treatment.

The rate of recovery in the first 2 months of treatment was slightly more rapid in group-I than in group-II and neurological sequelae were less frequent in group-I than in group-II, but the differences were not statistically significant. There was very little difference in the death rate in both groups. A high incidence of jaundice was found amongst the children who received rifampicin.

H.B.D.

The Protective Effect of B.C.G. Vaccination as indicated by autopsy studies

Ian Sutherland; Tubercle; 1979, 60, 225-231.

Tuberculous foci were found at autopsy in 61 of the 67 non-vaccinated subjects and in 35 of the 83 B.C.G. vaccinated subjects all of whom died between the ages of 1 and 45 years. The cause of death was other than tuberculosis except in two cases. It was further estimated that 63 or 64 of the non-vaccinated subjects had been infected during their life time and that between 25 and 31 of the B.C.G. vaccinated subjects were expected to have been naturally infected between the time of vaccination and death. It is concluded that virtually all tuberculosis infections in unvaccinated subjects lead to pulmonary foci which are demonstrable at autopsy. The same appears to be so in vaccinated subjects; there is no evidence to support the suggestion that in man, B.C.G. vaccine can prevent the establishment of infection in an exposed subject. The effect of B.C.G. appears to be confined to limiting the multiplication and dissemination of the bacilli and the development of lesions following infection.

H.B.D.