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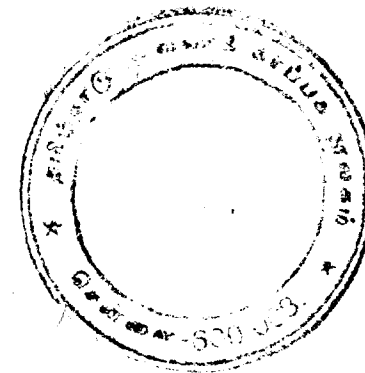
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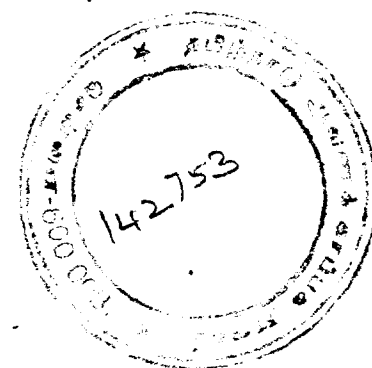
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IMPORTANT NOTICE.

It is imperative that these quarterly Medical Bulletins are published regularly as they are in great demand by the Medical Profession all round, even outside this State. For this purpose sufficient number of articles of scientific interest are absolutely necessary. You are requested to kindly co-operate by regularly contributing any articles of scientific interest. Such articles may be sent in duplicate.



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TREATMENT OF CORONARY THROMBOSIS WITH MYOCARDIAL INFARCTION.

The treatment of Coronary Thrombosis with myocardial infarction aims at reducing the work of the heart to the minimum during the critical phase, immediately after the infarction and increasing the collateral circulation.

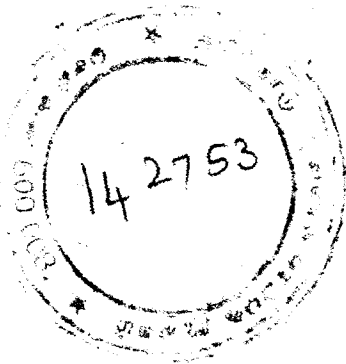
The immediate treatment consists in securing absolute rest in bed and relief of pain, mental anguish and anxiety, by the administration of morphia in a dose of $\frac{1}{4}$ to $\frac{1}{2}$ grain given hypodermically; in cases with severe pain or shock, intravenous injection of $\frac{1}{4}$ gr. dissolved in at least 2 ml. of distilled water or normal saline and given slowly, at least three minutes being taken for the injection gives satisfactory results. Intravenous injection has the advantage of giving rapid relief of pain whereas a hypodermic dose of morphia may not be absorbed sufficiently rapidly in a shocked patient.

As for the amount of morphine to relieve the pain and shock, it may be emphasised that the drug is to be given in adequate doses and as often as required, during the phase of the acute illness.

Pethidine could be used and is a good analgesic and anti-spasmodic but it is not equal to morphine in the treatment of Coronary occlusion. A sedative action is also needed and hence morphia or omnapon (if morphia induces vomiting) should be preferred. If the initial pain had been mild, Pethidine, after the first dose of morphia, combined with Dial may serve the purpose and the combination could be repeated every 4 hours or 6 hours for the first 24 hours. Subsequent dosage is determined by the state of the patient.

Oxygen therapy is instituted when the patient has pain, shock or cyanosis. Having attended to the immediate treatment, the next step is to decide whether the patient is to be kept at home or removed to a hospital.

Treatment in a hospital is better as facilities for treating shock, if it should occur and the frequent laboratory tests for control of anticoagulant therapy would be available in a hospital. Besides these advantages, nursing attention necessary for the cardiac patient would also be there. Treatment at home is done only when the patient is too ill to be moved or the hospital is not easily accessible, transportation being hazardous due to rough roads.



It is wiser to send the patient at the onset of the illness than to move him sometime later when his condition may be more precarious.

The use of anticoagulants in cardiac infarction has been the subject of controversy. Some authorities advocate their use in all cases; others employ them only in cases where the infarct is transmural and where there are special indications like prolonged pain, shock, previous attacks of infarction, cardiac enlargement, arrhythmias, etc. Those who advocate their use as a routine state that in the severe case the risk of thromboembolism is significantly lessened and mild cases may be prevented from becoming severe through further extension of the thrombosis. It has also been claimed that the course of infarction is influenced favourably by anticoagulants possibly also due to earlier recanalisation of the occluded artery. The risk involved in anticoagulant therapy without proper control is haemorrhage which may occur at a vital site and be fatal. The risk has been emphasised by those who were against routine anticoagulant therapy.

Wherever laboratory control of anticoagulant therapy is available, it is advisable to start the patient on anti-coagulant therapy as soon as the diagnosis of coronary thrombosis has been made. Contrariwise, it is wise not to embark on anticoagulant treatment in the absence of laboratory check of the prothrombin time.

Anticoagulant therapy is definitely indicated in severe cases of transmural infarction in which introventricular thrombi are likely to be present and in cases who have had a previous infarction, those having varicose veins and in the obese subjects.

Contraindications to anti-coagulant therapy are the presence of active peptic ulcer, haemorrhagic diseases, recent cerebrovascular accidents, cirrhosis of liver, renal disease and severe hypertension. Particular care is to be taken in patients who have congestion of the liver as in cardiac failure and other conditions such as Cachexia, in which the liver function is depressed.

Once anticoagulants are started, daily physical examination, frequent urine and faeces examinations for blood and repeated laboratory determinations of coagulation time and prothrombin time are prerequisites for the therapy.

Heparin increases the clotting time probably by inhibiting the thrombin-fibrinogen, reaction which produces fibrin. The Coumarin derivatives act indirectly and slowly through the liver. They inhibit the formation of prothrombin.

Anticoagulant therapy is started after sending the blood for prothrombin time. Heparin is given in a single dose of 12,000 units intravenously, followed by 10,000 units intramuscularly or intravenously, every 6th hour for the first 24 hours. The patient is also given four tablets of Tromexan (ethyl biscoumacetate) on the first day in one dose.

During the next 24 hours no Tromexan is given and subsequently 2 or 3 tablets on the 3rd day, subsequent doses being regulated according to the prothrombin time which is determined daily for the first few days and alter less frequently. The aim of the treatment is to keep the prothrombin time (Normal by Quick's method is 14 to 18 seconds) at two to two and a half time the normal prothrombin time (i.e.), between 30 to 40 seconds. At this level it is claimed that no further thrombi will form nor will accretions be added to existing thrombi. It is the fresh clots which are friable and liable to become detached. The idea of starting the two drugs at the same time is that heparin acts quickly (2 to 6 hours) whereas Tromexan has a time lag of 24 hours to 36 hours. Anticoagulant therapy is continued for a minimum of 4 to 6 weeks.

Overdosage of anticoagulants may cause bleeding in the skin and subcutaneous tissue, continuous oozing at the site of infections, from the intestines, or kidneys or into the brain. The antidote to overdosage of Coumarin derivatives is Vitamin K₁, 5 to 20 mgms. intravenously. In an emergency 500 ml. of blood will restore the prothrombin time to normal in 8 hours. The antidote to heparin is Protamine Sulphate 50-100 milligrams, given intravenously.

Long term anticoagulant therapy has been advocated by many, in the hope of avoiding recurrence of infarction. The treatment is justified when a patient has had two or three infarcts in rapid succession. The prothrombin time is at first estimated weekly and then at monthly intervals, the prothrombin time being kept around 30 seconds.

Diet.—The diet should be light and nourishing. Fluids in the first 48 hours and if there is no vomiting, may be increased after 48 hours. If vomiting is severe only drinks sweetened

with glucose to combat acidosis should be given for some days. During this time, the patient may be constipated because of the repeated administration of morphia and the fluid diet. Purgatives and enemata are contraindicated. Liquid Paraffin orally or injected into the rectum and mild laxatives like Senna may be used after the acute phase is over.

The patient should be at rest for a minimum period of 3 months, during more of which period he should be either in bed or in arm chair. After the acute phase is over he may be permitted to use a commode within the sick room. Early ambulation and work is likely to result in Post infarction angina or a cardiac aneurysm. The uncomplicated cases are kept in bed for three weeks and encouraged to move their legs in bed as soon as they are free from pain. This lessens the risk of venous thrombosis in the legs. If pulmonary congestion has developed, the pulse rate has exceeded 100 per minute, gallop rhythm has been present, or fever has been high, rest in bed to be prolonged.

When shock supervenes noradrenaline is given intravenously by the drip method in 5 per cent Glucose or Plasma in a concentration of 4 milligram per litre at a rate of 80 microgrammes per minute. The rate of the infusion should be regulated to maintain the blood pressure at 120 mm of Hg (systolic) and continued as long as necessary (up to 72 hours). Noradrenaline has a known marked vasoconstrictor action without the cardiac accelerator and augmentor actions of adrenaline.

After the period of pain is over, morphia is stopped and the patient put on phenobarbitone $\frac{1}{4}$ gr. to $\frac{1}{2}$ gr. twice a day or thrice a day for the first three or four weeks. Vitamin B. Complex is given by injection for a week and then by oral medication.

Aminophylline by mouth will be found useful and may be given along with phenobarbitone. With onset of dyspnoea due to cardiac asthma it may be given parenterally provided the blood pressure is not appreciably lowered.

The use of digitalis in a patient with Coronary Thrombosis.
—Digitalis need not be given in uncomplicated Coronary thrombosis since there is no indication for it. In coronary thrombosis, the indication for digitalis is cardiac failure or disorders of rhythm like auricular fibrillation, paroxysmal tachycardia, etc. If care is taken to avoid overdosage digitalis does not cause ventricular tachycardia or other arrhythmias. The dose that is needed depends on the individual case.

Drugs that are avoided or given with great care.—Adrenaline, Ephedrine and Pituitrin are contraindicated as they produce an increase in the cardiac rate and thereby prevent the heart from getting proper rest.

Nitrites should not be used in Coronary thrombosis, as they produce marked vasodilatation and bring down the blood pressure.

Analeptics like Coramine used in cases which show a fall of blood pressure.

Another drug to be used with care is Insulin, in the presence of Coronary occlusion as the state of hypoglycemia is not warranted and heart must get more glucose. If the patient is a diabetic, the usual dose is cut down or stopped for 2 to 3 weeks. But after that if the patient returns gradually to a normal diet, a smaller dose of Insulin should be given.

After-care.—A prolonged convalescence is necessary after infarction to allow healing and the rest of myocardium to adjust itself in maintaining circulation. Even with a small infarct and without complications, patient should wait 3 months before resuming his work. Smoking is best avoided. A phased programme of ambulation and return to work and if necessary changing the profession to a lighter one, is drawn up to suit the patient and his economic status.

CHEST CLINIC.

A Chest Clinic is intended for the diagnosis, Outpatient and Domiciliary Treatment of Pulmonary Tuberculosis. In addition, the Chest Clinic serves the purpose of Control and prevention of Tuberculosis, by employing various measures like B.C.G. Vaccination and 'Case-finding' methods like Mass Miniature Radiography, Tuberculin Testing and Examination of Contacts. Since the majority of patients attending the Chest Clinic are found to be suffering from Non-Tuberculous Chest Diseases, the Clinic serves as a Diagnostic Centre, for the various Chest Diseases. Some non-Tuberculous cases can be treated in the Chest Clinic and the rest transferred to the appropriate hospital departments. In India, where the incidence of Tuberculosis varies from 1 to 2.5 per cent a Chest Clinic should be established, wherever the population is 50,000.

The Chest Clinic should be located in a General Hospital. The Physician to the Chest Clinic should be on the consultant staff of the hospital and have some beds there, so that the Clinic Physician is readily available for consultation. Similarly, the staff of the General Hospital should be available to the Chest Clinic Physician for consultation, in respect of patients under the care of the Clinic Physician.

The Chest Clinic should have independent accommodation.

Organisation.—The Chest Clinic should have the following departments:—

(1) A Registering and Reception Section where all the patients are registered, their records and X-ray are kept.

(2) A Diagnostic Section, consisting of Radiography Department, Tuberculin Testing Department, and a small laboratory for examination of sputum, urine and blood and a Medical Officer's room.

(3) A Nursing Department, serving the patients attending the Clinic as well as those being treated on a Domiciliary Basis, and as inpatients in the clinics.

(4) A Department for Social Work and House Visiting.

(5) A small Dispensary for distributing anti-Tuberculous drugs.

(6) A Treatment Room where injections of Streptomycin are given.

(7) An Inpatient Department with at least twenty beds for the care of acutely ill-patients. Patients suffering from Haemoptysis and Spontaneous Pneumothorax, and for the provisional assessment of patients requiring surgery.

(8) Large Chest Clinics in the big towns and cities should have an Epidemiological Sections, with a Mass Miniature Radiography Unit attached, and a B.C.G. Vaccination Section.

(9) Transport in the form of a jeep, a motor van or an autorickshaw should be provided for Domiciliary Services.

The staff of a Chest Clinic:—

1. Medical Staff.
2. Nursing Staff.
3. Social Service Staff.
4. Radiographers, and Laboratory Technicians.
5. Clerical Staff for registering and filing the records, and administrative work.
6. A Pharmacist.
7. Last-Grade Servants like peons and a thoty.
8. A driver and a cleaner for the jeep or van, etc., for Domiciliary Service.

Persons employed in the Chest Clinic should be Tuberculin Positive preferably. Tuberculin Negative staff, if employed in the Chest Clinic, should have a B.C.G. Vaccination before employment, and should become Tuberculin Positive before employment.

Examination of patients attending the Chest Clinic.—New patients attending the Clinic, should first be directed to the reception and registering section, where they should be provided with a registration card. This card should be given a registration number and the name and address of the patient should be entered in the card.

A Tuberculin Test should be done with 5 Tuberculin Units in the appropriate section of the Chest Clinic and the date of the test should be entered in the registration card.

Collection of sputum.—The patients' sputum should be collected in a sputum bottle with a wide-mouth, one ounce bottle should suffice for the purpose. The patients should be instructed in the proper method of expectorating. If the patient is not able to bring out the sputum, he should be asked to collect the morning sputum, in the bottle and bring it to the Clinic for

examination. The sputum bottle should be marked with the registration number. If sputum is not available a laryngeal swab should be taken and sent for culture.

An X-ray of the chest should be taken then. The X-ray of the chest should be given a number by the X-ray Department and the number on the X-ray film should be entered in the registration card.

The patient is then asked to return on the third day, for reading the Tuberculin Test. By this time, the report of the sputum examination and the X-ray should be available. If the X-ray shows an abnormality, the Tuberculin Test is strongly positive and the sputum also is positive for Acid Fast Bacilli, the patient is diagnosed to be suffering from Pulmonary Tuberculosis. If the sputum is negative for Acid Fast Bacilli and the X-ray chest shows an abnormality, the sputum is repeatedly examined for Acid Fast Bacilli and if practicable, the sputum should be sent for culture for Acid Fast Bacilli. The diagnosis of pulmonary Tuberculosis should not be made solely on the basis of X-ray chest. Acid Fast Bacilli should be demonstrated in the sputum before commencing treatment. But in the case of infants and children, who have little or no sputum, the diagnosis should be made on the result of Tuberculin Test, X-ray chest and a history of contact with an infectious case of pulmonary Tuberculosis. Acutely ill patients suffering from Haemoptysis, or spontaneous pneumothorax, should be attended to immediately by the Medical Officer, and should be admitted into the inpatient ward attached to the Chest Clinic and appropriate treatment given, as detailed in the following paragraphs:—

When a patient is diagnosed to be suffering from pulmonary Tuberculosis it is imperative that:—

- (1) Adequate treatment be commenced immediately.
- (2) Preventive measures be adopted for preventing the spread of infection to other members of the family.

Treatment of Tuberculosis patient.—The patient should be assured that Pulmonary Tuberculosis is largely curable with the modern anti-tuberculous drugs and his anxiety be allayed.

As the tuberculosis patient may have to abstain from work for some months, in most cases he should be given financial assistance, to maintain himself and his family. The social worker plays an important role in such matters and her advice and help is essential; when the patient is free from financial worry, he is likely to be more co-operative and the patients' co-operation is essential for his recovery.

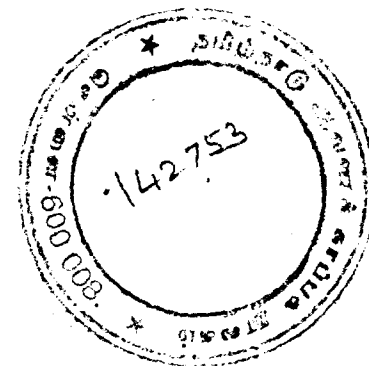
Since there is shortage of institutional beds for the Tuberculous patients, treatment has to be undertaken on a domiciliary or ambulatory basis.

The following classes of Tuberculous patients can be treated on a domiciliary basis:—

1. Primary Tuberculosis without parenchymal disease.
2. Symptomless disease in which there has been no radiological change indicating activity.
3. Advanced cases that can be treated without undue risk of spread of infection.
4. Lesions that have been brought under control by a short term of institutional treatment.
5. Slowly progressive chronic Tuberculosis with good home conditions.
6. Cases that fail to improve with institutional treatment.

The following cases of Tuberculous patients, need Institutional treatment in a Chest Hospital or Sanatorium:—

1. Early Progressive Tuberculosis.
2. Miliary or Meningeal Tuberculosis.
3. Infectious cases that cannot be controlled at home.
4. Cases that have relapsed and failed to respond to domiciliary treatment.
5. Cases requiring Surgery.



DOMICILIARY TREATMENT OF THE TUBERCULOUS PATIENTS.

The treatment of certain classes of Tuberculous patients as noted above in their own homes, has to be undertaken by the Chest Clinic, owing to lack of Institutional beds and also owing to the fact that home treatment with the modern anti-Tuberculosis Drugs has yielded results comparable to the treatment in Sanatoria provided the patients are co-operative and there is adequate supervision of the patients by the staff of the Chest Clinic, viz., the Medical Staff, the Health Visitors and Social Workers.

It is absolutely essential that patients being treated on a Domiciliary basis, should be segregated in their own homes. The patient should have a room for himself if that is feasible. The room should be adequately lighted and ventilated. A cot and a small bed side table and a chair to be provided or something similar should be improvised where feasible.

The Tuberculous patient should have separate linen which should be distinctly marked and should never be used by other members of the household. The pillow-cases, bed cover and sheets, etc., should be soaked in 1:20 carbolic lotion for twenty minutes and boiled in water and allowed to dry. The handkerchiefs and towels should be similarly disinfected. The Tuberculous patients should have their own utensils which should not be used by other members of the household. The utensils should be boiled for about twenty minutes after use, washed and dried.

Disposal of Sputum.—The Tuberculous patients should not be allowed to spit indiscriminately on the walls and the floor. His sputum should be collected in a sputum cup, preferably made of metal and covered with a lid. The sputum should be mixed with 2 per cent Lysol. The sputum should be thrown into the burning fire and the sputum cup boiled in water for half an hour and then washed and dried. Preferably the patient should be provided with two sputum cups, and adequate care should be exercised by the Health Visitor in collection and disposal of sputum.

Where water-closet facilities exist in the house, the sputum cup can be emptied carefully into the water closet and the sputum cup boiled.

Disposal of Excreta.—The urine and motion of Tuberculous patient should preferably be burnt, where there are no flushout latrine arrangements. But where a flushout latrine is available, no special precautions need be taken.

The Tuberculous patient should be prohibited from smoking. But if the patient is not co-operative, precaution should be taken to collect the beedi, or cigarette stumps and burn them. Books, newspapers, etc., used by the Tuberculous patient, should be burnt, as these may spread the infection. Costly books should be exposed to strong sunlight each page being exposed to sunlight for a few minutes. Children and adolescents should be removed from the house of the patients and sent to the house of his relatives as far as possible, since children and adolescents are very susceptible to tuberculous infections.

Contacts.—All the contacts of the Tuberculous patients should be thoroughly examined by the Tuberculin test and X-ray chest and adequate treatment given wherever necessary as described elsewhere.

Drug treatment for the Adult Patient.—Para-Amino-Salicylic Acid 5 grammes twice a day after meals and Isonicotinic Acid Hydrazide 200 mgm. once a day suffices in most cases. Treatment has to be continued with P.A.S. and I.N.A.H. for at least one year. Where the lesions have healed by such treatment, the patient can be advised to continue treatment with I.N.A.H. alone for a year or two.

Patients who are gravely ill should be given streptomycin 1 gramme daily in addition to P.A.S. and I.N.A.H. The streptomycin can be discontinued after two or three months, when improvement has set in.

Patients suffering from Military, Meningeal and acute progressive forms of Tuberculosis should be treated in a Sanatorium where such patients have to be treated on a domiciliary basis due to lack of beds in a Sanatorium, they should preferably be given Streptomycin, P.A.S. and I.N.A.H. for a year or more. In addition, Cortico-steroids like prednisolone, etc., 5 mgm. three times a day should be given at the commencement of treatment for 6—8 weeks, provided the patient has no complications like Diabetes Mellitus and Peptic Ulcer. Children should be given treatment as above, but the dosage should be reduced proportionate to their age.

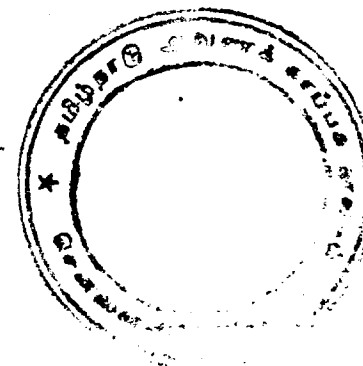
While on Domiciliary Drug Regimen, the patient should be visited by the Health Visitor as far as possible two or three times a week. The Medical Officer should visit the patients at least once a week. In addition to routine visits, surprise visits should be made by the Health Visitors and the Medical Officer, to ensure adequate intake of P.A.S. and I.N.A.H. by the patient. On such surprise visits, checks should be made of the quantity of

Ambulatory treatment in a Chest Clinic.—Where it is impracticable to institute domiciliary treatment, the patient has to be treated on an ambulatory basis in the Chest Clinic. Provided, the patient is able to attend the clinic regularly and is not gravely ill, the response to such treatment is fairly good in most cases. The patient is given injections of Dihydrostreptomycin, 1 gramme daily and Isoniazid 200 mgm. once a day, or in the alternative, the patient can be given a week's supply of P.A.S. and I.N.A.H. tablets to be taken at home daily in the dosage mentioned above, and asked to attend the Clinic once a week for the issue of P.A.S. and I.N.A.H. tablets. Treatment has to be continued for at least a year in most cases, to be followed by Isoniazid alone for another year or two to prevent relapses.

Toxic Reactions to Streptomycin, P.A.S. and I.N.A.H.— Streptomycin is very toxic to the vestibular nerve, giving rise to giddiness, inco-ordination, etc., whereas Dihydrostreptomycin is toxic to auditory nerve giving rise to deafness. Where such complications develop it is advisable to stop the offending drug and change over to P.A.S. and I.N.A.H. Drug rashes are not uncommon with Streptomycin therapy; when drug rashes develop, the patients can be desensitised by giving the patients small doses of Streptomycin or Dihydrostreptomycin in doses of 50 mgm. or less daily and gradually increasing the dosage. Corticosteroids can be given in addition to desensitize the patient.

P.A.S.—Gives rise to abdominal pain, diarrhoea and vomiting. If such complications are not severe, the drug can be omitted for a few days and then started again in a reduced dosage. But where diarrhoea, etc., is severe it is imperative to stop the drug. Jaundice occasionally develops with P.A.S. In such cases, the P.A.S. should be stopped for ever. Skin rashes develop with P.A.S. Therapy. In such cases, the patients can be desensitised by giving P.A.S. in doses of 0.1 gramme and gradually increasing to full doses, combined with Corticosteroids.

I.N.A.H.—Should not be given to known epileptics, as it might aggravate epilepsy being a cerebral stimulant. **I.N.A.H.** rarely gives rise to peripheral neuritis which can be easily controlled by administering pyridoxine in doses of 20–40 mgm. per day.



TREATMENT OF CERTAIN CATEGORIES OF TUBERCULOUS PATIENTS ATTENDING THE CLINIC.

(a) *Chronic Tuberculous patient.*—Such patients usually are found to be suffering from advanced Bilateral Pulmonary Tuberculosis and are not fit for treatment in the Sanatoria and do not respond to ambulatory or domiciliary treatment being drug resistant. They play a very important role in the spread of infection. Such patients should be segregated in Sanatoria or in Institutions solely meant for their segregation. Segregation of such obvious and very potent source of infection plays a very important part in the campaign against Tuberculosis.

(b) *Emergencies in Chest Clinic practice.*—Patients suffering from hæmoptysis and spontaneous pneumothorax reporting to the Chest Clinic should be immediately attended to.

Hæmoptysis.—Should be promptly controlled by admitting the patient in the beds provided in the Chest Clinic. The patient should be reassured and his anxiety allayed by promptly giving a small dose of Morphia 1½ grain with atropine 1/100 grain, or by administering Phenobarbitone. Administration of Vitamin K and Calcium Gluconate parenterally might be tried. Profuse Hæmoptysis calls for a blood transfusion, as a life saving measure. For recurrent Hæmoptysis, the patient should preferably be admitted into a Sanatorium for emergency thoracotomy and resection in suitable cases.

Spontaneous Pneumothorax.—Such patients are in very great respiratory distress and are likely to die due to cardiac failure, if prompt treatment is not given. Such patients should be immediately admitted into the Ward. Deflation should be done with Pneumothorax apparatus immediately. In cases of so called Tension Pneumothorax continuous deflation, by introducing a needle in the chest wall, and connecting it to a under-water seal, should be done. In some cases emergency thoracotomy and re-section may have to be performed as a life saving measures where there are facilities.

(c) *Treatment of Tuberculous Diabetic patient.*—Uncontrolled diabetes mellitus predisposes to Pulmonary Tuberculosis. The urine of the patient should be examined for Glycosuria where Pulmonary Tuberculosis complicates Diabetes Mellitus the diabetes should be brought under control by Insulin, Sulphonyl urea compounds like Tolbutamide, etc., and simultaneously anti-Tuberculous drug treatment should be given.

(d) *Treatment of Tuberculous pregnant woman attending the Chest Clinic.*—Every pregnant woman should have a routine X-ray of the chest preferably in the beginning of the second Triameter to exclude Pulmonary Tuberculosis. If the X-ray of the chest of the pregnant woman reveals healed and inactive Pulmonary Tuberculosis no special precautions are required, except to re-X-ray her about two months after confinement to be on the lookout for possible reactivation after confinement. When such reactivation occurs adequate treatment should be given and precautions taken to prevent spread of infection to the new born-child.

When a pregnant woman is found to be suffering from Active Pulmonary Tuberculosis, she should be admitted in the Sanatorium and adequate treatment with anti-Tuberculous drugs given. She should be rendered non-infective before confinement. Arrangements should be made for her confinement in the Sanatorium in a separate room, meant for the purpose or she can be transferred to a Maternity Hospital for confinement and later sent back to the Sanatorium for continuing treatment. There is no danger to the new-born infant, if the mother has been rendered non-infective by adequate treatment prior to confinement. The mother can nurse the infant and need not be separated from the infant.

But if the woman is infectious with the Tubercle bacilli in the sputum, the infant when born, should be immediately isolated. Otherwise the infant will be infected by the mother and the infant will die of meningitis, etc. The treatment of the mother has to be continued in the Sanatorium, and the mother should never be allowed to nurse the infant. The infant should be nursed in the house of relatives who are free from tuberculosis. Four to six weeks after the birth, the infant born of an infectious mother should be vaccinated with B.C.G. by the intra-derman route, oral vaccination with B.C.G. vaccination is not commonly practiced, though it is possible.

In most cases, it is found in practice that the pregnant woman suffering from active Pulmonary Tuberculosis is not willing for admission into a Sanatorium. Treatment has to be undertaken on a Domiciliary or ambulatory basis, as detailed above and adequate precautions taken to prevent the spread of infection to the infant when born under the above circumstances.

(e) *Surgical Treatment of Tuberculosis.*—All Tuberculous patients cannot be adequately treated by Chemotherapy alone. Some patients still require surgery for the eradication of their

disease. Obviously surgery can be undertaken only in a thoracic Surgical Unit of a Chest Hospital or a Sanatorium. Cases requiring surgery have to be admitted in a Sanatorium. Modern surgical procedure consists mostly of radical excisional surgery like lobectomy, segmental resection and Pneumonectomy. Lobectomy means removal of a lobe of a lung. Segmental resection means removal of broncho-pulmonary segment, commonly the second, first and sixth broncho-pulmonary segments, and Pneumonectomy means removal of an entire lung.

Before advising surgery, the patient should be given a course of Chemotherapy with P.A.S. and I.N.H. or Streptomycin and I.N.A.H. for atleast a year before operation. The patient should have a unilateral disease, the opposite lung should be free from active pulmonary Tuberculosis. The patient should be free from toxemia; like fever and a raised pulse rate. His E.S.R. should be normal. The patient should be free from cardiac and other respiratory diseases like Asthma, Emphysema, Chronic bronchitis, etc. He should have a good cardio-respiratory reserve, and a good vital capacity of at least 2,000. If the patient satisfies the above criteria, he can be advised to undergo operation provided it is indicated.

The following are the indications for surgery:—

- (1) Bronchial Stricture, leading to atelectasis and Bronchiectasis.
- (2) Circumscribed nodular lesion called Tuberculoma, with a diameter not less than 2 cm.
- (3) Destroyed lung containing multiple cavities or atelectatic with Bronchiectatic changes.
- (4) A thick walled cavity in the upper, or in the lower lobe, not responding to treatment.
- (5) Patients who underwent thoraco-plasty, but in whom the disease is not controlled, as revealed by a sputum positive for A.F.B., etc.
- (6) Emergencies like, hæmoptysis, and spontaneous pneumothorax and respiratory obstruction in children due to enlarged mediastinal glands.
- (7) Chronic Tuberculous empyemata with active Pulmonary Tuberculosis.

PREVENTIVE MEASURES.

(a) *The Examination of Home Contacts.*—Examination of Home Contacts of Tuberculous patients is a very important function of Chest Clinic. All persons who live in close proximity to a Tuberculous patient, his relations, co-tenants, those who have visited the patient frequently and those who have worked with the tuberculous patients are called 'Contacts'. All the contacts should be thoroughly investigated by a Tuberculin test, by X-ray chest, and sputum examination where necessary. The Health Visitor is the person who plays a decisive role in the examination of contacts by visiting the house and persuading the contacts to attend the clinic for examination.

Children should have a Mantoux Test done. All Tuberculin positive children below three years should be given a full course of Chemotherapy with Streptomycin and Isoniazid. Streptomycin in dozens of 40 mgm. per Kilogramme of weight and 5 mgm. of I.N.A.H. per Kilogramme of body weight should be given daily for a year to prevent complication like Military and Meningeal Tuberculosis. Tuberculin negative contacts below three years should be retested with Tuberculin at intervals of six weeks. If they become positive, they should be given a full course of Chemotherapy as above. 'Contacts' below three who are persistently negative to Tuberculin Test should be vaccinated with B.C.G. In the alternative, they should be given I.N.A.H. as Chemoprophylaxis, in doses of 5—10 mgm. per Kilogramme of body weight daily for one year to prevent a primary infection. Children above three years who are Tuberculin negative can be given a B.C.G. Vaccination, or Chemoprophylaxis as above but those who are Tuberculin positive must have an X-ray chest. If there is evidence of progressive primary Tuberculosis they should have Chemotherapy for one year. Tuberculin positive contacts above three who have a normal X-ray chest, should be given Chemoprophylaxis with I.N.A.H. as above to prevent complications developing, like meningitis, etc. In all cases the contact should be broken and the children segregated.

Adolescents, and young adult contacts who are Tuberculin negative should be vaccinated with B.C.G. or given Isoniazid as Chemoprophylaxis. Tuberculin positive adolescent and young adult contacts should have an X-ray chest, and adequate treatment if there is active Tuberculosis. Tuberculin positive young adults and adolescent contacts without active Tuberculosis should be given Chemoprophylaxis with Isoniazid. Old contacts above thirty years should be X-rayed. If the X-ray chest is normal, they should be re-examined after three months. If the X-ray chest continues to be normal, no further re-examination is necessary unless cough, etc., develop.

Old people amongst the contacts should be investigated thoroughly by X-ray chest, and sputum examination. Old people are frequently found to be suffering from active Pulmonary Tuberculosis, and they are the source of infection with Tubercle bacilli to other members of the household. Old people suffering from active pulmonary Tuberculosis should be adequately treated.

B.C.G. Vaccination.—B.C.G. Vaccination is one of the powerful weapons in the campaign against Tuberculosis, but it should not be taken for granted that it is the only procedure for the prevention of Tuberculous infection. It should be used in conjunction with other procedures, (a) like raising the resistance of the individual or the community, by providing adequate living conditions, adequate diet and accommodation, (b) adequate treatment of infectious cases so that they are rendered non-infective and rehabilitation of ex-patients to prevent relapse and make them self-supporting, (c) case finding methods like Tuberculin testing and Mass Miniature Radiography for the detection of early symptomatic cases of Pulmonary Tuberculosis and adequate treatment of such cases, so that they cease to be ineffective.

In backward countries, whose socio-economic conditions are low, B.C.G. Vaccination is advised on a Mass Scale, but in countries whose socio-economic conditions are good, B.C.G. Vaccination is advised only to selected groups of population, like contacts Medical personnel, school-going children, factory workers, etc. This object of B.C.G. Vaccination is to substitute a controlled benign primary infection, for a casually acquired, virulent and potentially malignant infection as occurs after natural infection. The safety and efficacy of B.C.G. Vaccination has been established beyond a shadow of doubt by several millions of inoculations all over the world. By controlled trial extending over a period of ten years, the Medical Research Council of Britain has proved that the incidence of Pulmonary Tuberculosis in those not vaccinated is four to five times higher than those who have been vaccinated with B.C.G.

Technique.—All Tuberculin negative persons should be inoculated with B.C.G. Fresh liquid vaccine not more than 14 days old should be used. Freeze-dried vaccine which maintain its potency for about a year is under preparation in India.

This vaccine is administered by the intra-dermal route in the deltoid region. The dose is 0.1 c.c. of the liquid vaccine containing 0.75 mgm. bacilli by weight per c.c. of the vaccine. This vaccine consists of living attenuated bovine Tubercle bacilli,

losing its potency within a few minutes if exposed to sunlight, and high atmospheric temperature. Hence adequate precautions have to be taken for the storage of the vaccine, etc.

Pre and Post-vaccination segregation for six weeks, though ideal is impracticable in the Mass vaccination programmes.

After intra-dermal inoculation of the vaccine, there should be a wheal formation of at least 8-10 m.m. lasting for several minutes. About three weeks after B.C.G. Vaccination an area of induration and erythema develops at the site of injection. A small pustule may develop which may occasionally proceed to ulceration, the axillary lymph glands may get enlarged. This ulcer commonly heals within three months without any other complication developing.

Six to eight weeks after B.C.G. Vaccination the Tuberculin test should be performed again. If the Tuberculin test is positive, it is taken for granted that the vaccination has been successful. If the Tuberculin test is negative after B.C.G. Vaccination, the vaccination has been a failure, and re-vaccination should be done. Preferably all those who have been successfully vaccinated with B.C.G. Vaccine should be tested with a Tuberculin test annually. If the successfully vaccinated person becomes Tuberculin negative, he should be revaccinated. B.C.G. Vaccination produces protection against natural Tuberculous infection for a period varying from two to seven years. It should be borne in mind, the protection is not absolute. Persons who have been successfully vaccinated with B.C.G. can develop Pulmonary Tuberculosis due to natural infection, if their resistance is lowered due to malnutrition, etc.

(b) *Case-finding methods.*—Like Tuberculin testing Mass Miniature Radiography plays an important part in the campaign against Tuberculosis. The object is to find the incidence of Tuberculosis in the area of operation and to detect cases of Pulmonary Tuberculosis in the early and a symptomatic stage, and to treat them thoroughly so that they are rendered non-infective and cease to spread the infection unwittingly. Theoretically, these should be done on a nation-wide basis, but as yet these procedures on such a large scale are impracticable in any country or nation.

Short of this, Mass Miniature Radiography can be undertaken by individual Chest Clinic, situated in large cities with big industries on a limited scale. The Mass Miniature Radiographic units should preferably be a mobile one with a trailer and generator and capable of taking miniature radiographs 70 m.m. by 70 m.m. so that there is no need of a projector for

further enlarging the image. But if 35 m.m. by 35 m.m. films are taken, they have to be enlarged by a projector to convenient size before reading. Mass Miniature Radiography Unit otherwise called Photo-fluorography in principle consists of a powerful 100 m.a. X-ray plant, a fluorescent screen, and an automatic photographic device. Immediately the image of the person radiographed falls on the fluorescent screen, it is automatically photographed on a miniature film 70 m.m. by 70 m.m. or 35 m.m. by 35 m.m.

Mass Radiography is employed only on selected groups of population, like school and college students, and teachers, the staff of Hospitals, factory workers, Service Personnel of the Defence Service, Police and allied personnel, inmates of special institutions like the Jails, and Mental Hospitals, etc.

By means of Mass Radiography about 100 persons can be radiographed in one hour and about three hundred persons can be radiographed per day. About 20,000 to 30,000 persons can be radiographed per year.

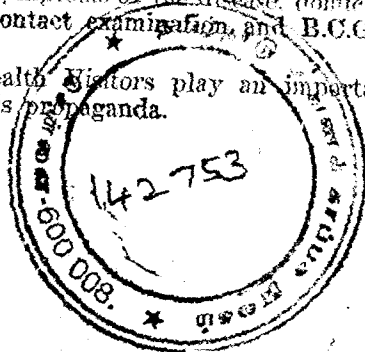
Persons found to be having suspicious lesions on Mass Miniature Radiography should be recalled and should be thoroughly investigated by large X-ray of the chest, and sputum examination for Acid Fast Bacilli to establish the diagnosis of Pulmonary Tuberculosis.

By means of Mass Miniature Radiograph not only Pulmonary Tuberculosis, but other respiratory and cardiac abnormalities can be detected.

About two per cent of the population, Mass Radiographed is found to be suffering from active Pulmonary Tuberculosis.

(d) *Propaganda*.—The public should be educated by means of posters, pamphlets, cinematographic films, wherever possible about the symptoms of the disease, domiciliary management, the value of contact examination, and B.C.G. Vaccination.

The Health Visitors play an important role in the Anti-Tuberculosis propaganda.



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