

The place of surgery in the treatment of re-emerging pulmonary tuberculosis



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D. Weissberg and Y. Refaely

From the Department of Thoracic Surgery,
Tel Aviv University Sackler School of Medicine,
Tel Aviv, and E. Wolfson Medical Center, Holon, Israel

Over the past 15 years, a significant worldwide increase in the prevalence of tuberculosis has occurred. Israel has been affected mostly due to several waves of immigration from countries in which the disease was never under control.

Patients and methods

Between 1984 and 1995, we treated 57 patients with pulmonary tuberculosis or its sequelae (Tab. I). These patients were referred from various hospitals and from numerous ambulatory clinics, therefore it was impossible to determine the total number of patients with tuberculosis in that time frame or the percentage of patients requiring surgical intervention; thus, the true incidence of drug resistance is not known. There were 35 male and 22 female patients, ranging in age from 37 to 81 years. In 42 patients the disease was active at the time of operation, as defined by positive sputum. The drug regimen included isoniazid, rifampin and pyrazinamide. In patients with drug-resistant organisms, this regimen was supplemented with other drugs, usually ethambutol and ciprofloxacin. Preoperative workup included three sputum cultures, bronchoscopy and pulmonary function tests.

Tab. I – INDICATIONS FOR OPERATION IN 57 PATIENTS

Drug resistance with various parenchymal lesions	32
Neoplasm in tuberculoma	8
Mycetoma in tuberculous cavity	5
Destroyed lung	5
Life-threatening hemorrhage	5
Bronchial stenosis	2

Thirty-two patients were operated on because of active

Abstract

Background: A marked worldwide increase in prevalence of pulmonary tuberculosis occurred during the past 15 years. The reasons for this change include the worldwide epidemic of AIDS, poverty and unprecedented migration of people.
Methods: During the past 12 years, we operated on 57 patients with pulmonary tuberculosis or its sequelae. In 42 patients the disease was active at the time of operation.

Results: Two patients died of operative complications; one, of unrelated causes. There were three major non-fatal complications. In 49 patients tuberculosis was eradicated; five patients still have active disease and remain under drug therapy.

Conclusions: High level of clinical awareness is the most important factor in disclosure and early treatment of pulmonary tuberculosis. Indications for operation are strengthened by alcoholism, drug abuse, poverty and other social factors. BCG vaccination of tuberculin-negative children should be considered as a preventive measure.

Key words: Pulmonary tuberculosis, surgery for pulmonary tuberculosis, re-emerging pulmonary tuberculosis.

Riassunto

LA CHIRURGIA NEL TRATTAMENTO DELLA RIE-MERGENTE TUBERCOLOSI POLMONARE

Negli ultimi 15 anni si è registrato un aumento considerevole della tubercolosi polmonare. Le cause di questo fenomeno vanno ricercate nella diffusione dell'AIDS, nella povertà e nella massiccia migrazione di popoli.

Per questo motivo negli ultimi 12 anni, abbiamo sottoposto ad intervento 57 pazienti con tubercolosi polmonare. In 42 pazienti, al momento dell'intervento, la malattia era allo stadio attivo.

Due pazienti morirono per complicazioni post-operatorie, per cause non correlate. Ci furono tre importanti complicazioni non fatali. In 49 pazienti la tubercolosi fu eliminata; 5 pazienti, invece, sono ancora sotto trattamento farmacologico perché la malattia risulta ancora attiva.

Un elevato grado di conoscenza clinica è il fattore più importante per la diagnosi ed il trattamento precoce della tubercolosi polmonare. Fattori determinanti per l'intervento sono l'alcolismo, l'abuso di farmaci, la povertà ed altri fattori sociali.

Parole chiave: Tubercolosi polmonare, chirurgia della tubercolosi polmonare, riemergente tubercolosi polmonare.



Fig. 1: Severe bronchiectatic changes secondary to tuberculosis, involving the entire left lung in a 24-year-old man.

tuberculosis with multiple drug resistance (positive sputum) and radiographic abnormalities; all were failures of medical therapy, and surgery was required for elimination of residual foci. This group included 15 patients with residual cavity, 6 with nodular disease and 11 instances of bronchiectasis (Fig. 1). There were no immunocompromised patients, nor patients with atypical strains. The resections in this group included 2 extrapleural pneumonectomies, 3 bilobectomies, 9 lobectomies, 15 segmentectomies and 3 wedge resections. Malignant neoplasm was found in eight patients with pulmonary tuberculosis and recent roentgenographic appearance of "tuberculoma": in six instances recent growth of a residual lesion was observed, while two others appeared *de novo* in patients treated for active tuberculosis. There were five instances of squamous cell carcinoma (all in smokers) and three of scar adenocarcinoma (two in smokers). Other complications that required surgery, included mycetoma in an old tuberculous cavity, tuberculosis-generated bronchiectasis, and bronchial stenosis.

Results

Follow-up was maintained on all patients and lasted from 2 to

12 years. Two patients died from complications. One of the two underwent extrapleural left pneumonectomy for severe tuberculous bronchiectasis with drug resistance; his postoperative course was complicated by empyema with sepsis, and he died from multiple organ failure. The other patient had cavitary tuberculosis of the right upper lobe (positive sputum) and mild congestive heart failure. He died from exacerbation of his heart failure with pulmonary edema. In addition, one patient died at home on the thirtieth postoperative day of acute myocardial infarction after an apparent successful recovery from left upper lobectomy. There were three major complications: one instance of postoperative bleeding followed extrapleural left pneumonectomy for a destroyed lung complicated by empyema; hemostasis was achieved at repeat thoracotomy. Postoperative respiratory failure developed in two patients who had positive sputum with multiple drug resistance (MDR) and underwent right upper lobectomy, and right upper and middle bilobectomy. Both had preoperative borderline pulmonary function with FEV₁ 950 ml and 1000 ml, respectively. Both were treated with temporary respiratory support. Forty-nine patients are free of tuberculosis with negative sputum. In five patients who underwent resection of various parenchymal lesions with MDR (three with nodular disease, two with bronchiectasis), the sputum is still positive, and they remain under drug treatment.

Discussion

Tuberculosis is the oldest documented infectious disease, affecting mankind for at least 5,000 years (1). Its statistics have undergone major changes over the past 100 years. In the nineteenth century, the disease used to be a major killer and a leading cause of death (2). The discovery of drugs effective against *Mycobacterium tuberculosis* and development of techniques of pulmonary resection in the 1940s and 1950s brought great decline in the prevalence and severity of tuberculosis, and with the emergence of ethambutol in 1961 and rifampin in 1963, the disease seemed to have been conquered (3). Over the past 15 years a reverse trend occurred. A significant and steady worldwide increase in the prevalence of tuberculosis has been noted, including MDR organisms of *Mycobacterium tuberculosis* and atypical strains. The reasons for this change are many, and include the worldwide epidemic of AIDS, poverty and unprecedented migration of people from underdeveloped countries where tuberculosis was never under control, to the Western World where it had been nearly eradicated. In 1989, 24% of new cases of tuberculosis reported in the United States occurred in people born in another country (4, 5). On parallel with the Western World, the incidence of tuberculosis in Israel has been declining steadily. In 1982, when the number of new cases dropped to 6 per 100,000 population, the obligatory BCG vaccination of children had been discontinued. However, during the last 10 years, in a reverse trend, the incidence of tuberculosis rose again, reaching 17 new patients per 100,000 in 1996, with 17%



Fig. 2: Roentgenogram of a 40-year-old man with bilateral pulmonary tuberculosis and long-lasting hemoptysis. While his bleeding suddenly increased, the roentgenogram gave no clue as to the site of bleeding. Rigid bronchoscopy cleared the airway of blood clots and kept it open. The source of bleeding was localized in the apico-posterior segment of the left upper lobe, which was resected at an emergency operation.

of multiple drug resistant (MDR) cases. Israel has very low incidence of AIDS, but the nation thrives on immigration. During the past decade, there have been several waves of population influx, notably from the republics of the former Soviet Union and from Ethiopia. Among the immigrants, there was a large number of patients with neglected, far advanced pulmonary tuberculosis. It is interesting to note that all the MDR cases occurred among the new immigrants; none among patients who were born in Israel.

Pulmonary hemorrhage is the most common indication for an emergency operation in tuberculosis. Usually it is due to bronchiectasis, erosion of a calcified node into a bronchus, a fungal ball superinfecting a cavity, or a Rasmussen's aneurysm – an exposed dilated blood vessel within a cavity (6). Massive bleeding is usually defined as 600 ml in 24 hours (7-10); however, the amount of blood loss and rapidity of bleeding are not the only factors to be considered, because as little as 200 ml of blood obstructing major bronchi can cause death by suffocation (9,10). Management of a bleeding patient should include lavaging of the bronchial tree with ice cold saline, endobronchial balloon tamponade and embolization of bleeding vessels (9, 11); however, these measures are often insufficient, and then resection becomes necessary. Two of our bleeding patients had positive sputum with MDR organisms. However, this was not relevant to the treatment of bleeding itself, which must be seen as an emergency.

Bronchoscopy during the bleeding episode is mandatory, both to localize the source of bleeding and for bronchial toilet. The exact site of bleeding must be determined before attempting a resection. This is particularly important in patients with bilateral disease, as roentgenograms alone may be misleading (Fig. 2). For emergency bronchoscopy, we always use the rigid bronchoscope. While the flexible instrument has its advocates

(7), the use of the rigid open-tube bronchoscope is safer. It enables rapid and efficient removal of blood clots, while maintaining satisfactory open airway (10, 12).

During the operation for bleeding, usually resection, spillage of blood to the contralateral side is prevented most effectively by the use of a double-lumen tracheal tube. In an emergency situation its insertion is sometimes difficult. Alternative measures for prevention of spillage include gauze plugs, Fogarty balloon catheter (13) and endotracheal tube with movable blocker (14). All have been used quite effectively.

Pulmonary nodule in a patient with tuberculosis should always be suspected of harboring cancer. Steinitz reported a five-fold risk of cancer in male patients with tuberculosis and a ten-fold risk in females (15). According to Campbell and Hughes, bronchogenic carcinoma was twenty times more frequent in patients with pulmonary tuberculosis than in the general population (16). Similar experience was reported by McLaughlin and Hankins. In their experience with 7,986 patients treated between 1960 and 1970, pulmonary tuberculosis and bronchogenic carcinoma coexisted in 72 instances (17). These patients were in the older age group and usually smoked. Tumour and tuberculosis were present in the same area of the lung 80 percent of the time. Therefore, in a patient with tuberculosis, a small space-occupying lesion must not be taken lightly. Every such lesion should be resected and examined histologically. By following this policy, we detected eight patients with bronchogenic carcinoma; all lesions have been resected.

Alcoholism, drug abuse and other social problems are strongly associated with noncompliance to antibacterial therapy, leading to drug resistance and failure of treatment. Accordingly, presence of these factors enforces indications for resection (18). Contraindications for operation include inadequate pulmonary or cardiac reserve, unstable extensive bilateral pulmonary tuberculosis, active endobronchial disease and intercurrent life-endangering diseases, such as bronchogenic carcinoma that cannot be controlled by operation (3).

In view of increasing worldwide prevalence of tuberculosis, is there any justification to reintroduce BCG vaccination of children with negative tuberculin skin test? We are not aware of such recent initiatives in any part of the world. Such a policy would have broad public health implications, depending on socio-economic demographics that differ between various geographic areas. Therefore, it cannot be supported for universal, worldwide acceptance. However, BCG vaccination once fulfilled an important role in prevention of tuberculosis, and some thought ought to be given to its reintroduction.

In conclusion, because of AIDS, widespread poverty and unrestrained travel, acute clinical awareness is the most important factor in disclosure and early treatment of tuberculosis. Surgery for pulmonary tuberculosis can be performed with low risk and with gratifying results*.

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Commento

Commentary

Prof. Vanni BELTRAMI

Ordinario Chirurgia Generale
Università degli Studi di Roma La Sapienza

I lavori sull'argomento che viene proposto sono la logica conseguenza di un fenomeno che qualche decennio fa si considerava impensabile, almeno nei paesi più sviluppati e non superiori condizioni socio-sanitarie: la ricomparsa della tubercolosi. L'abuso di alcolici e di droghe, l'AIDS e la scarsa alimentazione – la povertà essendo tuttora presente anche nei paesi considerati – si sono in anni recenti associati alle antibiotico-resistenze nel riproporre questa patologia, apparsa per molto tempo sommersa ma non debellata radicalmente. Le indicazioni alla terapia chirurgica rimangono peraltro le stesse che erano codificate a suo tempo: malattia localizzata od almeno monopolmonare, adeguate riserve funzionali cardiache e respiratorie, possibilità di controllo delle malattie. La casistica proposta – e le premesse epidemiologiche sul fenomeno della tubercolosi riemergente in Israele – illustrano l'argomento in modo esauriente.

The recent literature on this subject in the logical consequence of a phenomenon which would have been inconceivable only a few decades ago, at least in the developed countries with a high standard of health care and social services: the return of tuberculosis. In recent years alcohol and drug abuse, AIDS and malnutrition (poverty still exists also in the wealthier countries) in association with resistance to antibiotics have led to the reappearance of this disease, which for a long time seemed to be submerged but not eradicated. The indications for surgery have remained basically the same: localized or at least unilateral disease, adequate reserve of cardiac and respiratory function, and the possibility to control comorbid conditions. The presented case series, together with the epidemiological observations on the reappearance of tuberculosis in Israel, provide a comprehensive review of the subject.

Address for correspondence and reprints:

DOV WEISSBERG, M.D.
Department of Thoracic Surgery
E. Wolfson Medical Center
Holon 58100 - ISRAEL
Telephone: 972 - 8 - 946-6194
Fax: 972 - 3 - 503-6408
Email: dov@ccsg.tau.ac.il