Role of surgery in multi-drug-resistant tuberculosis: results of 27 cases

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Abstract

Objective: To evaluate the results of resectional surgery as an adjuvant therapy in multi-drug resistant tuberculosis. Methods: A total of 27 human immunodeficiency virus (HIV)-negative patients with multi-drug resistant tuberculosis underwent resectional surgery between 1993 and 1996. The lesions were bilateral in 16 cases, with a preponderance of cavities on one side. Out of 27 cases, 5 patients had unilaterally destroyed lung; 20 patients underwent pneumonectomy (15 left, 5 right). Lobectomy operations included bilobectomy superior (n = 1), right lower lobectomy (n = 2), right upper lobectomy (n = 3), and left upper lobectomy with superior segmentectomy (n = 1). Results: Because of haemorrhage, 2 cases who underwent a right and left pneumonectomy, respectively, required revision on the first day. Bronchopleural fistula was found in 2 cases with left pneumonectomy. Apical residual space was left in one of the 3 patients who underwent right upper lobectomy. Retreatment protocols resulted in negative cultures and smears in all patients with an average duration of 4 months (1–6 months). A total of 4 patients (16%) completed a retreatment period of 18–24 months with negative cultures. Only 1 patient (3.7%) developed relapse in the 17th month of retreatment. Patients with negative cultures numbered 22 and continued receiving retreatment.

Conclusions: Our results indicate that surgical management of multi-drug resistant tuberculosis, combined with chemotherapy, provides a more favourable outcome than that obtained with medical therapy alone. © 1997 Elsevier Science B.V.

Keywords: Multi-drug-resistant tuberculosis; Surgery

1. Introduction

Surgical management of tuberculosis emerged in the 19th century. Most of the interventions were of collapse therapies such as thoracoplasty, plombage, artificial pneumothorax, pneumoperitoneum and phrenic nerve crush and aimed at depriving aerobic mycobacteria in lung cavities of oxygen. However, resectional surgical approaches only resulted in failures until the 1940s. With the advent of chemotherapeutic agents, resectional surgical procedures became safer and increased in number. Reliance on surgery in the management of tuberculosis did not last long. Use of appropriate chemotherapeutic agents outweighed surgery and a cure was achieved in almost all tuberculosis patients [1]. This success with chemotherapy placed tuberculosis off the agenda, even to the extent that sanatoriums were closed in many countries. After the 1980s, epidemics of AIDS, immigrations, intravenous drug abuse, deterioration in health care systems, delay in diagnosis, and inappropriate therapies led to an increase both in tuberculosis cases and in multi-drug-resistant disease [2]. This trend has caused resectional procedures to gain in popularity as an adjuvant therapy [3]. However, there are limited number of studies in the available literature concerning resectional surgery as an adjuvant therapy in multi-drug-resistant tuberculosis [2–5].

2. Materials and methods

This study included 27 human immunodeficiency virus (HIV)-negative patients with multi-drug-resistant tuberculosis.
typical Mycobacterium tuberculosis, who underwent adjuvant resective surgery between 1993 and 1996 in the Süreyyapaşa Center for Chest Diseases and Thoracic Surgery, the major referral chest hospital in Turkey. Of these patients, 21 were male and 6 were female, the average age being 34 years (range 15–51 years).

Chest radiographs revealed bilateral lesions in 16 cases, with a preponderance of cavities on one side. Out of 27 cases, 5 patients had unilaterally destroyed lung, in the remaining 22 patients the average cavity size was 7 cm (range 2–12 cm). CT scans confirmed these findings of destruction and cavitation and revealed bronchiectatic changes of various localizations in 8 cases. Resistance to at least isoniazid and rifampin was regarded as multi-drug resistance. All the patients had been receiving anti-tuberculosis therapy with various drugs for a duration ranging from 1 to 19 years.

Retreatment protocols for all patients were designed using at least four active drugs (average 5 drugs, range 4–7 drugs). In all patients one parenteral drug was used, either amikacin or kanamycin, or, if resistance was found to these, capreomycin. In all patients but one, negative cultures and smears were obtained preoperatively. One patient required operation in the fifth month of retreatment, with positive smear and culture. Preoperative average retreatment duration was 5.8 months (range 4–8 months). Preoperative evaluations were carried out using computerized thorax tomography, respiratory function tests, fiberoptic bronchoscopy, and quantitative perfusion scintigraphy. Bronchoscopic biopsies performed ruled out tuberculous bronchitis. None of the patients were cachectic and all exhibited an appropriate nutritional status.

Selection of patients for operation were made according to the criteria recommended by Iseman et al. [3] which included (i) drug-resistance with a high probability of failure or relapse; (ii) sufficiently localized disease providing the resection of great preponderance of radiographically visible disease, leaving an adequate cardiopulmonary capacity; (iii) availability of adequate drug efficacy to provide rapid healing of the bronchial stump.

During operation a posterolateral thoracotomy incision was employed. Either intrapleural or extrapleural dissection was performed depending upon the extent of pleural adhesions. In one case, intrapericardial left pneumonectomy was performed because of dense hilar adhesions. A total of 20 patients underwent pneumonectomy (15 left, 5 right). Lobectomy operations included bilobectomy superior (n = 1), right lower lobectomy (n = 2), right upper lobectomy (n = 3), and left upper lobectomy with superior (Table 1) segmentectomy (n = 1) (Table 1). Special attention was given not to enter the cavity and not to cause any damage to the parenchyma. Patients undergoing pneumonectomy were randomly divided into two groups with regard to bronchial closure. In 10 patients bronchia were closed using stapling device, while in the remaining patients the closure was performed using horizontal mattress 2/0 Ethibond sutures and then over-and-over sutures. In all pneumonectomies (except for 2 patients who required revision because of bleeding) the drains were removed in the first 24 h.

Patients were monitored with regard to drug toxicity. Sputum smears and cultures were obtained and standard graphics were taken each month.

3. Results

No operative deaths occurred, however 2 cases who underwent a right and left pneumonectomy, respectively, required revision on the first day because of hemorrhage. Although nearly 1.5 l of hematoma was removed during exploration, the exact source of hemorrhage could not be detected.

Bronchopleural fistula developed in 2 patients who underwent left pneumonectomy and who were subjected to mechanical and manual bronchial closure, respectively. Of these, 1 patient did not accept the open window procedure and was discharged with an open tube drainage. He died in the postoperative third month because of respiratory failure. The latter developed hemoptysis in the right lateral decubitus position in the postoperative first month. Fiberoptic bronchoscopy performed revealed a fistula 2 mm in diameter. The patient further developed empyema. The modified Clagett method used resulted in a favourable outcome.

Apical residual space was left in 1 of the 3 patients who underwent right upper lobectomy.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Operations performed</th>
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<tbody>
<tr>
<td>Operation</td>
<td>No. of operations</td>
</tr>
<tr>
<td>Pneumonectomy</td>
<td>20</td>
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<tr>
<td>Right</td>
<td>5</td>
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<tr>
<td>Left</td>
<td>15</td>
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<tr>
<td>Lobectomy</td>
<td>6</td>
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<tr>
<td>Bilobectomy superior</td>
<td>1</td>
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<tr>
<td>Right lower lobectomy</td>
<td>2</td>
</tr>
<tr>
<td>Right upper lobectomy</td>
<td>3</td>
</tr>
<tr>
<td>Left upper lobectomy+superior segmentectomy</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
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</table>
Retreatment protocols resulted in negative cultures and smears in all patients with an average duration of 4 months (1–6 months). In 1 patient who underwent operation with a positive culture in the fifth month, culture negativity was obtained in the postoperative first month. Patients (4, 16%) completed a retreatment period of 18–24 months with negative cultures. They were taken under follow-up programme, without being given any medications. Out of 27 patients, only 1 patient (3.7%) developed relapse in the 17th month of retreatment. A total of 22 patients with negative cultures have been receiving retreatment.

4. Discussion

Even the best medical management failed to eradicate tuberculosis [6]. Furthermore, the results of medical treatment in multi-drug-resistant tuberculosis are catastrophic. The most common indication of surgery in tuberculosis is the development of multi-drug resistance [2,5]. In the US, 10% of M. tuberculosis bacilli has been reported to be resistant to two or more drugs [6]. Medical therapy alone has been associated with a mortality rate of 50% in this group of patients [3,7]. However, when adjuvant surgery is combined with a medical treatment of 18–24 months, cultures yield negative results in nearly 90% of patients [2,3,5].

A study carried out at our center in 1992 revealed high initial and acquired drug-resistance rates in pulmonary tuberculosis. The initial resistance to isoniazid + rifampin was reported as 0.7%, isoniazid + rifampin + streptomycin as 1%, and isoniazid + rifampin + streptomycin + ethambutol as 1.3%. The acquired resistance rates were 8.1, 6.5 and 5.8%, respectively. In addition, acquired resistance rate for isoniazid + rifampin + ethambutol was 1.2% [8].

Obtaining negative cultures preoperatively in multi-drug-resistant tuberculosis is somewhat helpful in reducing morbidity and mortality, though it cannot be regarded as a prerequisite. However, medical treatment with active drugs has been recommended for at least 3 months prior to surgery [4].

Profiles of tuberculosis patients who are candidates for surgery have undergone considerable changes. Pneumonectomy rates in previous series were about 10%, whereas in recent series this rate being about 50% [4,9]. In this study, our pneumonectomy rate was 70%, which was attributed to the greater number of patients with destroyed lung or with multicavitary disease in more than one lobe.

In previous series complications of bronchopleural fistula were reported between 25 and 40% [10–13]. In a study by Pomerantz, bronchopleural fistula has been reported in only one case among 108 patients [6]. In our study bronchopleural fistula was found in two cases (7.4%). From our experience with these two patients, we feel that the most significant cause of bronchopleural fistula was extensive bronchial dissection required in these patients.

Mortality rates vary between 0.9 and 11% [6,14–17]. Mortality in this study was seen in only one patient (3.7%).

We did not find it necessary to perform a limited thoracoplasty because of the lack of residual space in all patients but one. In this patient there was minimal, but aseptic, residual space following upper lobectomy, which did not mandate limited thoracoplasty.

It is recommended that extrapleural pneumonectomy be performed regardless of the presence or absence of pleural adhesions [6]. In our study, either intrapleural or extrapleural dissection was performed depending upon the extent of pleural adhesions. We believe that local extrapleural dissection may be reserved for cases with apical or other pleural adhesions.

Our results indicate that surgical management of multi-drug-resistant tuberculosis, combined with chemotherapy, provides a more favourable outcome than that obtained with medical therapy alone. Our fight against multi-drug-resistant tuberculosis will bring success with a competent collaboration between departments of surgery and pulmonary diseases.

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References


