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Results of Lobectomy and Pneumonectomy in Pulmonary TB

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ABSTRACT

***Background**: The results of lobectomy and pneumonectomy in treating various benign and malignant lesions of lung have been reported. The complications and results of such procedures in the presence of pulmonary tuberculosis (TB) have been described in older texts. However these reports have lessened due to the decrease in the number of patients seen over the last decades. Thus, it's not clear that to what extent the advancements seen in surgical and anesthetic procedures were effective in lessening the complications of such procedures.*

***Materials and Methods**: The study group consisted of all referral patients suffering from pulmonary TB or its complications that had undergone lobectomy or pneumonectomy in Massih Daneshvari Hospital from October 1996 to September 2003 (7 years). All the necessary information and data were collected from both medical records of the patients and special questionnaires that were designed by our staff in 1996 for this purpose. Statistical analysis was carried out descriptively by using frequency and percentage. Presence of TB in the patients was confirmed by identifying the microorganism in the tissues detecting pathological changes in favour of TB and/or having past history of pulmonary TB associated with its anatomical complications such as cavitation, bronchiectasis, and bronchial stenosis.*

***Results**: A total number of 172 patients underwent surgical procedures either for diagnosis of TB or managing its complications. Lobectomy was performed in 27 patients while 7 underwent pneumonectomy. The indications for these surgical procedures were: recurrent hemoptysis (24 cases), massive hemoptysis (4 cases), multi drug resistant TB (4 cases), bronchiectasis and recurrent infection (2 cases), and right bronchial stenosis (1 case). In two of the patients the indication for surgery was intra-bronchial carcinoid tumour. Lymph node biopsies obtained during the surgery showed pathological changes of TB. The most important complications observed were severe bleeding occurring after right pneumonectomy, empyema at the site of left superior lobectomy, and stenosis at the distal part of trachea in a patient who had right bronchial stenosis and destruction of superior lobe for which sleeve lobectomy was performed. All the above-mentioned complications were managed with appropriate treatment. The only exception was the patient having distal tracheal stenosis who needed repeated dilatation.*

There were five deaths in this group of patients: 3 in the lobectomy group (3 deaths out of total 27 lobectomies performed i.e. 11.1%) and 2 deaths in pneumonectomy group (2 deaths in total 7 pneumonectomies performed i.e. 28.5%). The causes of death were cardiac complications (2 cases), respiratory failure (2 cases), and unknown cause (1 case). Four out of the five expired cases had undergone emergency thoracotomy despite the fact that they were placed in the high risk group for operation. Surgery in other cases was successful with the aims being reached. Also, out of 4 patients that had been treated for Multi-drug Resistant TB (MDR-TB), one became smear positive showing the relapse of the disease.

***Conclusion**: Performing the surgical procedures of lobectomy and pneumonectomy in patients suffering from pulmonary TB is associated with good results and complications that are "tolerable". However, mortality and morbidity rates' following pneumonectomy are higher than usual cases. In these patients emergency thoracotomy results in high mortality.* **(Tanaffos 2003; 2(7): 33-39)**

***Key Words**: Tuberculosis (TB), Surgical Management, Lobectomy, Pneumonectomy*

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INTRODUCTION

The two surgical procedures of lobectomy and pneumonectomy are carried out in vast number not only in the treatment of bronchogenic carcinoma but also in other benign and malignant diseases of lung. Nowadays, these two procedures are seldom used for the management of pulmonary TB or its complications. Thus, the complications, mortality and morbidity rates of such procedures remain unknown.

The first successful pneumonectomy was carried out by Evart Graham (1) in 1933 in a patient who had lung carcinoma. The method used was "Mass ligature" without any vascular or bronchial dissection. Later on, Churchil and Belsey (2) performed large number of lobectomies and pneumonectomies for benign and malignant lesions of the lung. They performed these procedures by dissecting and ligating the vessels and bronchi of each lobe separately.(3-4) At that time, anti-TB mediations had not been discovered yet. Because the surgeons were content with the outcomes of pneumonectomy and lobectomy in diseases other than TB, decision to use these surgical procedures for treating TB and or its complications such as infectious cavities, hemorrhages, and bronchopleural fistulas was taken. Unfortunately, carrying out such surgical procedures in pulmonary TB patients was associated with high mortality and morbidity rates. This resulted in a feeling of hopelessness and despair in surgeons. An example that can be given in this regard is an analytical report dating back to 1940. In this report out of total 50 pulmonary TB patient that had undergone pneumonectomy (19 cases) and lobectomy (31 cases), the mortality rates were 8(40%) and 6(20%) respectively. In addition, in case of the living ones, the results of the surgery were not satisfactory (5).

With the discovery of Streptomycin in 1945 as the first anti-TB medication, many patients were managed without undergoing surgery. Nevertheless, with early emergence of resistance to streptomycin, there was an inclination to surgical management of TB once more. This time, surgery was conducted using streptomycin and temporary sterilizing sputum and tuberculous cavity. This resulted in lower mortality and morbidity rates. Despite the presence of fibrous adhesions and fibrosis (as a result of TB) making surgery difficult, fewer complications with lower mortality and morbidity rates were observed; the complication being very similar to that of pulmonary resections performed for other non-TB diseases. Once again, with the appearance of more effective anti-TB medications, the surgical management of TB was nearly put aside. With the temporary resolving of drug resistant issue, surgical management of TB during the sixties was totally forgotten. However, after the eighties, re-appearance of resistant microorganisms, presence of immunosuppressed patients, and emergence of cases that were infected with atypical microorganism resulted in reversion to surgical management of TB (6-10).

Once again, surgery came to help by saving the lives of MDR-TB patients. A study was conducted by Pomerantz and coworkers (11) on the surgical management of MDR-TB in the United States of America. They reported satisfactory results in this regard. However, the situation was different in the developing countries. Tuberculosis was never eradicated completely from these countries and at all times, cases suffering either from active TB or its complications such as lung destruction, active cavities, resistant pleurisy and hemorrhages existed, that needed surgical treatment. In these circumstances surgeons offered valuable services to patients. Some of the patients undergo lobectomy while in some pneumonectomy is performed. In these cases the complications of lobectomy and pneumonectomy are rarely reported separately, with the results being unknown to some extent. Even reports that recount more complications and higher mortality/morbidity rates have been published in

this matter. Thus we decided to evaluate the results of such surgical procedures in our patients.

MATERIALS AND METHODS

Our study group consisted of all those patients that were suffering from pulmonary TB and/or its complications and had undergone pneumonectomy or lobectomy in Massih Daneshvari Hospital during Oct. 1996 and Sep. 2003. The surgical procedures and outcomes were evaluated by studying both the medical records of the patients and the special TB questionnaire which was prepared by our staff in 1996. Statistical analysis was performed descriptively using frequency and percentage.

In patients having past history of TB the presence of TB in the samples were confirmed by detecting the microorganism in the tissues, observing pathological changes and/or complications of TB in lungs such as bronchiectasis and bronchial stenosis (Table 1).

All surgical procedures were conducted by the surgery team of our center under the leadership of one of the three senior surgeons. Clinical follow-up was carried out accurately. In addition to the routine "follow-up" attendances in the surgery clinic, patients or their families would be contacted by telephone whenever needed. The follow-up period ranged from 7-180 days. The physicians of the infectious and/or pulmonary units would administer the necessary anti-TB treatment to the patients under study. The pathology department of the hospital conducted the necessary bacteriological and pathological investigations.

RESULTS

Out of total 172 patients that were candidates for surgery either for diagnosis of TB or management of its complications, 34 underwent either lobectomy or pneumonectomy and were considered as our "study group". In gender issue; 15 were female and 19 were male. The mean age of the patients was 45. (range of 15-74 yrs). In total, 27 lobectomies and 7 pneumonectomies were performed. The indications of surgery were recurrent hemoptysis (24 cases) massive hemoptysis (4 cases), MDR-TB (4 cases), bronchiectasis and recurrent infection (2 cases) and main right bronchial stenosis (1 case). In some of the patients, more than one indication existed. In two of the patients, the indication of surgery was intrabronchial carinoid tumour. After surgery, lymph node biopsies showed pathological changes that confirmed TB. The main complications that were observed after the surgeries included: severe hemorrhage after right pneumoectomy (1 case), empyema at the site of left superior lobectomy (1 case), and distal tracheal stenosis (in a patient who had undergone sleeve lobectomy because of right bronchial stenosis and superior lobe destruction). However, all the complications were managed with appropriate treatment. The only exception was the patient who had distal tracheal stenosis requiring recurrent dilatation at the site of stenosis. Table 2 shows the complications and their management.

A total of 5 patients expired, 3 from lobectomy group (3 out of 27 patients, 11.1%) and 2 from the pneumonectomy group (2 out of 7 patients-28.5%). The causes of death were severe cardiac complications (2 cases), respiratory failure (2 cases) and unknown (1 case). In the rest of the patients the therapeutic results were satisfactory. The clinical symptoms were carefully controlled. Also, out of four patients with MDR-TB that had undergone surgery, one became smear positive 4 months after surgery. However, with appropriate medical treatment the above-mentioned case becomes smear negative once again. Table 3 shows the details of expired cases.

Table 1. Basis of diagnosing TB in the patients

Methods	Number
Positive TB pathology	11
Detecting the microorganism in the samples	5
Positive TB pathology + detecting the microorganism in the samples	8
Past history of TB + pulmonary complication of TB	10

Table 2. Complications of surgery

Surgical indication	Surgical procedure	Complication seen after surgery	Management of complication
Abscess and cavity in left upper lobe	Left upper lobectomy	Empyema at the surgical site	Drainage by chest tube
Right bronchial stenosis and distal tracheal stenosis	Right upper sleeve lobectomy	Persistence of distal tracheal stenosis	Repeated dilatation
MDR-TB	Left upper lobectomy	Reappearance of positive smear 4 months after surgery	Continuation of medical treatment
Carcinoid tumour and concomitant TB in hilar lymph nodes	Right Pneumonectomy	Hemorrhage and clot formation at the site of surgery	Drainage by thoracoscopy

Table 3. The details of mortalities

Disease	Age (yr.) Sex	Surgical procedure	Probable cause of death and its explanation
Bronchiectasis and recurrent hemoptysis in the presence of pulmonary TB	70 F	Right upper lobectomy	She died during operation due to severe arrhythmia. Despite her unstable cardiovascular condition and being placed in the high risk group, surgery was performed in order to control hemoptysis.
MDR-TB and recurrent hemoptysis	59 M	Right upper lobectomy	The patient died on 8th post-op day due to cardiac failure. The reason for cardiac failure was high pulmonary arterial pressure in the presence of diffuse pulmonary fibrosis.
Cavitation in the apices of both lungs with recurrent hemoptysis	44 M	Left upper lobectomy, removal of right cavernous wall	Death occurred because of respiratory failure. Respiratory capacities were not satisfactory before operation.
MDR-TB and destruction of left lung	15 M	Left pneumonectomy	Sudden death on the 4th post-op day due to unknown reason.
Recurrent massive hemoptysis, MDR-TB, bronchiectasis in the presence of pulmonary TB	57 M	Right pneumonectomy	The patient was kept on ventilator due to respiratory failure and oedema; died after 12 days.

DISCUSSION

Complications of lobectomy vary not only in the hands of surgeons but also at centers in which they are performed. For example in a report given by Ginsberg et al. in 1983, the total mortality and morbidity rate for surgical management of lung carcinoma was 3.3% (12).

Recently carried out retrospective studies have shown mortality and morbidity rates of 6-7% for pneumonectomies, while that of lobectomies should not exceed 2% (13). Surgical management of TB is usually associated with higher mortality and morbidity rates as well as complications.

Although our mortality and morbidity rates are high, looking at the information listed in table 3 clarifies the issue. The first patient was a 70-year-old female that had severe myocardial dysfunction. After being examined by the cardiologist, she was placed in the "very high risk group" of surgery. However, life threatening recurrent hemoptysis and absence of response to other therapies such as embolization of bronchial arteries by angiography left us no choice but surgery. The patient expired because of cardiac complications that appeared during the operation. In the second patient, the pulmonary arterial pressure was high before the surgery. The third patient suffered from complete destruction of both the apices of lungs. His pulmonary capacities were also below normal values before the start of the operation. However, they became surgical candidates because of life threatening recurrent hemoptysis. The fifth patient had decreased pulmonary capacities. Surgery was essential in this case since he had massive hemoptysis. Despite the unstable and critical condition of the above-mentioned patients, they had to undergo surgery. Overall, emergency operations for managing massive hemoptysis are associated with high mortality and morbidity rates; especially if pneumonectomy is performed for treating TB (14).

Although the mortality and morbidity rate reported by Pomerantz and coworkers was 2.4%, more than 12% of the deaths were due to non-surgical causes. As seen in our research, most of the patients died due to non-surgical causes such as cardiac dysfunction decreased respiratory capacities and life threatening situation that made surgery essential. The only exception was patient no.4, who had MDR-TB and became candidate for surgery. In his case the risk of surgery was not high. His condition was stable until the fourth post-op day, when he died suddenly and unexpectedly. In regard to the cause of death in this patient, we assumed different reasons including vasovagal shock and sudden cardiorespiratory arrest.

In spite of the five deaths that occurred, the therapeutic results in the rest of the patients were satisfactory. Most of the patients had critical conditions and were operated under difficult surgical circumstances. Fewer complications would have been observed if they had been treated in appropriate condition (15,16).

CONCLUSION

Performing lobectomy and pneumonectomy as a therapeutic procedure in patients suffering from pulmonary TB is associated with good results and complications that are "tolerable". However, pneumonectomy carries higher mortality and morbidity rates as compared to usual cases.

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