

Surgical outcome of pleuro-pulmonary Tuberculosis complications

A five year retrospective study

Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia



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Abstract

Background Tuberculosis is one of the top ten causes of mortality in the world. It is more concerning for African countries as most of the young productive age group is the target of the disease. In the older days surgery was the main mode of management for pulmonary tuberculosis. Since the invention of anti-tuberculosis chemotherapy the role of surgery has reduced. But due to the emergence of drug resistant TB and post TB complications, surgical management is growing again. The current indications of surgery for pulmonary tuberculosis are post TB sequelae and drug resistant Tuberculosis. The commonest post TB complications demanding surgery are Empyema, hemoptysis, destroyed lung, bronchiectasis, fistulas, and tuberculoma. After all medical evolutions, surgical management of TB is still one of the challenges for thoracic surgeons. Here we will see the trends of surgical interventions and outcome in terms of post-operative complication in our hospitals.

Methods – It is a retrospective cross sectional case study done in Ethiopia, Addis Ababa University, college of health science, School of Medicine Tikur Anbessa Hospital, Department of surgery, cardiothoracic and vascular surgery unit on patients who underwent surgery for pathologies secondary to pulmonary Tuberculosis from January1, 2015-December31, 2019.

Result – 88 patients were participants of the study. There were 59 men and 29 women. Mean age is 33.5, Maximum 65 years and

Minimum 16 years with the range of 21-45. More than 90% of the patients had productive cough and 53.4% had hemoptysis. Eight patients had history of comorbidity. Only two patients were smokers. All patients had chest X-ray and 97.7% had CT scan of the chest. Out of the 88 patients 56 of them had pathology on the left side. 13.4% of patients had anemia up on presentation. Albumin level was measured in 43.1% of the patients. Out of these patients 73.6% had normal albumin level, 13.1% had mild hypoalbuminemia 10.5% moderate hypoalbuminemia, and 2.5% had severe hypoalbuminemia. Only 20% of the patients were screened for HIV infection. The mean operation time was-186 min/ (minimum 40 min, Maximum 440min). Mean total Hospital Stay was 27 days (minimum 7days, Maximum 86 days). For 57% of the patients Post op hospital stay was <14 days and 42% had stayed >14 days. The most common indication for surgery was empyema followed by Aspergilloma. The most common procedure performed is decortication followed by pneumonectomy and wedge resection. We observed a complication rate of 20% with mortality rate of 1.1%. The most common complication detected was atelectasis followed by BPF and pneumonia.

Conclusion- In general Outcome of surgical management for pulmonary tuberculosis is good with relatively low morbidity and mortality. We recommend offering patients surgery on the appropriate time when having proper indication.

Background

The world has been fighting tuberculosis for ages. It is one of the commonest infectious diseases costing too many lives worldwide. [1] As it is a disease of poverty and overcrowding, Africa suffers the greatest. Until the pathology was clearly understood there was no standard treatment modality. [2] Trying to treat pulmonary tuberculosis by surgical procedures was not uncommon. Therefore tuberculosis come to be the main reason thoracic surgery flourished. It is without exaggeration to say it is the history of thoracic surgery. After Hippocrates the first ever performed thoracic procedure was drainage of post tuberculosis empyema thoracis. [2] Even in recent days the transformation of thoracic surgery to minimal invasive procedure is started with pulmonary tuberculosis, the first thoracoscopic surgery was done for post TB pleural biopsy and adhesionolysis. [1, 2]

Since the innovation of antitubercules chemotherapy the role of surgery has reduced. [2] But due to the emergence of drug resistant TB and post TB complications surgical management is gaining acceptance again. [1]

The current indications of surgery in pulmonary tuberculosis are post TB squelae and drug resistant Tuberculosis. The commonest post TB complications requiring surgery are Empyema, hemoptysis, destroyed lung, bronchiectasis, fistulas, and tuberculoma. [1, 2]

A study done in our country about six years ago showed the prevalence of TB to be 211 and incidence 214 per 100,000 populations. [3] It also showed increment in the pattern of drug resistant tuberculosis (2% 2006 vs. 4.5% among new cases in 2016) [3]. In 2019 WHO TB report, Ethiopia is considered as one of the top 30 high disease burdened

countries with the incidence of 151 per 100,000. [6, 7]

There is coverage of anti-tuberculosis medications and follow up service in majority of the health facilities in our country. Despite that, there is a struggle in drug adherence and follow-up of patients. Due to a poor health care seeking behavior of the society.[4] Despite the successful antibiotic management some patients will continue to have respiratory symptoms and affected quality of life.[5] At a point when a patient faces permanently damaged lung with symptoms and even life threatening complications, surgical management will be the only way out. Different thoracic procedures are evolving to address these complications. After all the advancements, surgical management of TB is still one of the challenges for thoracic surgeons. In our paper we will see the trends of surgical interventions and outcome of patients in terms of post-operative complications.

Methods and patients

The participants of the study are 88 patients admitted to the chest ward with complications of post-pulmonary TB for surgical treatment. It was done in Addis Ababa University, college of health science, School of Medicine, Tikur Anbessa Hospital, Department of surgery, cardiothoracic and vascular surgery unit. It is a retrospective cross sectional case study done on patients who underwent surgery for pathologies attributed to Tuberculosis from January 2015-December 2019. A structured Questioner Was used to collect the data. The data was extracted from patients' medical records then filled by the principal investigator. The collected data was checked for completeness and consistency by the investigators. Data entry, cleaning and analysis was done using SPSS version 20. Convenient sampling technique was used

and patients who had history of previous pulmonary TB management or on current medical treatment of pulmonary TB, who finished intensive phase of their therapy, who developed post TB complication requiring surgical management are included in the study. Non pulmonary tuberculosis or disseminated TB is excluded from the study. Pediatrics patients and patients operated on emergency bases are also not included in this study. The Surgical outcome was measured and compared based on the age, sex, associated comorbidity, post-operative complications and duration of hospital stay.

Result

Out of the 88 patients, there were 59 men and 29 women. Mean age was 33.5, Maximum 65 years and Minimum 16 years with the range of 21-45. Amongst these, 34% of them were from oromia region followed by Addis Ababa 33%, Amhara region 22% and SNNPR 6.8%. There were no patients from Tigray, Benshangulgumuz, Gambela, and Afar region. More than 90% of the patients had productive cough and 53.4% had hemoptysis. Seven patients had history of comorbidity. Only two patients were smokers. Fifty Five patients were treated once, thirty three patients were treated more than once, 7 patients were treated for pulmonary TB three or more times. Almost 40% of the patients were diagnosed to have pulmonary tuberculosis based on history and physical examination. Sputum test and gene expert are not consistently done for these patients up on current presentation but all patients had chest X-Ray and 97% had CT scan of the chest. Out of the 88 patients 56 of them had pathology on the left side. Majority of the patients had no anemia, only 13.4% of

patients had anemia up on presentation. Albumin level was measured in 43.1% of the patients. Out of these patients 73.6% had normal albumin level, 13.1% had mild hypoalbuminemia, 10.5% moderate hypoalbuminemia, and 2.5% had severe hypoalbuminemia. Only 20% of the patients were screened for HIV infection, out of which 27% were HIV positive. The most common indication for surgery were empyema thoracis and Aspergilloma. More than ten types of procedures are performed for these patients; the commonest procedure performed was decortication. Pneumonectomy, wedge resection and lobectomy hold the next common procedures consecutively. 4.5% of the procedure is VATS and the rest are open thoracotomies. The mean operation time was 186 min (minimum 40min and Maximum 440min). Mean total Hospital Stay was 27 days (minimum 7days, Maximum 86 days). For 57% of the patients Post op hospital stay was <14 days and the rest had stayed >14 days. In this study we have observed that there is 20 % rate of complication with mortality rate of 1.1%. Even though atelectasis is the most commonly observed complication, the rate of BPF is also high. Out of the eighteen patients who developed complication 8 of them had atelectasis, 5 of them had BPF. There were two intra op cardiac arrests recorded. one was due to intraop hypotension and one was due to anesthesia related complication. In both cases patients were revived on table, transferred to ICU, and finally discharged improved. one patient died due to intractable sepsis with chest focus after pneumonectomy, later developing post pneumonectomy empyema and BPF.

Table 1: Profile of patient who underwent surgery for the management of post tuberculosis complication in Tikur Anbessa Specialized Hospital , from Jan 2015-Feb 2019 (n=88)

| Variables | Frequency | Percent (%) |
|-----------------------|-----------|-------------|
| Sex | | |
| Male | 59 | 67 |
| Female | 29 | 33 |
| Address | | |
| Oromia | 30 | 34.1 |
| Addis Ababa | 29 | 33 |
| Amhara | 20 | 22.7 |
| SNNPR | 6 | 6.8 |
| Somali | 1 | 1.1 |
| Harare | 1 | 1.1 |
| Dire dawa | 1 | 1.1 |
| Marital status | | |
| Married | 55 | 62.5 |
| Single | 29 | 33.0 |
| Widow | 1 | 1.1 |
| Divorced | 3 | 3.4 |

Table 2 Presenting features and numbers of TB treatment of patient who underwent surgery for the management of post tuberculosis complication in Tikur Anbessa Specialized Hospital, from Jan 2015-Feb 2019 (n=88)

| Variables | | Frequency | Percent (%) |
|------------------------|------------------------|-----------|-------------|
| Cough | Yes | 82 | 93.2 |
| | No | 6 | 6.8 |
| Hemoptysis | Yes | 47 | 53.4 |
| | No | 41 | 46.6 |
| Symptom complex | Yes | 61 | 69.3 |
| | No | 27 | 30.7 |
| Number of TB treatment | Once | 55 | 62.5 |
| | Twice | 22 | 25 |
| | Three or more | 7 | 8 |
| Mode of diagnosis | based on history | 35 | 39.8 |
| | Sputum | 19 | 21.6 |
| | X-ray and sputum | 18 | 20.5 |
| | X-ray | 11 | 12.5 |
| | Pleural fluid analysis | 3 | 3.4 |
| | Biopsy | 2 | 2.3 |

Table 3: *Complication rate and type of patient who underwent surgery for the management of post tuberculosis Complication in Tikur Anbessa Specialized Hospital, from Jan 2015-Feb 2019 (n=88)*

| Variables | Frequency | Percent (%) | |
|-------------------|------------------------------------|-------------|------|
| | Decortication | 28 | 31.8 |
| | Pneumonectomy | 16 | 18.2 |
| Type of procedure | Wedge resection | 15 | 17 |
| | Lobectomy | 12 | 13.6 |
| | Drainage | 4 | 4.5 |
| | VATS decortication | 3 | 3.4 |
| | Segmentectomy | 1 | 1.1 |
| | VATS wedge resection | 1 | 1.1 |
| | Marcipulization | 2 | 2.3 |
| | Lobectomy with wedge resection | 2 | 2.3 |
| | Lobectomy with Segmentectomy | 1 | 1.1 |
| | Decortication with lobectomy | 1 | 1.1 |
| | lobectomy with wedge resection | 1 | 1.1 |
| | wedge resection with Segmentectomy | 1 | 1.1 |

Table 4: *Complication rate and type of patient who underwent surgery for the management of post tuberculosis complication in Tikur Anbessa Specialized Hospital, from Jan 2015-Feb 2019 (n=88)*

| Variables | | Frequency | Percent (%) |
|----------------------|-----------------------------|-----------|-------------|
| Complication | No | 70 | 79.5 |
| | Yes | 18 | 20.5 |
| Type of complication | | | |
| | Atelectasis | 7 | 8.0 |
| | BPF(bronco pleura fistula) | 5 | 5.7 |
| | Post-operative empyema | 1 | 1.1 |
| | Hospital acquired pneumonia | 2 | 2.3 |

Discussion

Tuberculosis is a very rampant disease in our country. It is generally considered the disease of the poor and areas of over population. Our weak health care system and our populations' poor health seeking behavior are the major factors for this infectious disease and development of complication post tuberculosis. Our hospital is the major referral Hospital in the country. It is estimated that 14% of the admission to the thoracic unit is associated with TB and its complications [13]. Majority of the patients admitted are male. The affected age group is relatively younger (33.5 years was the mean age) in our set up compared to the age groups in Asia and Europe which are middle age groups. Studies done in Asia and South Africa showed mean age of presentation 46 years and 34 years [7, 9]. Considering the young age population we don't anticipate our patients to have much comorbidity. Around 7.9 % of them had comorbid illnesses at the time of their presentation, out of which 4 had hypertension, one had Asthma, and One chronic DVT, one patient with cardiac illness and one was a known psychiatric patient. We did not find any correlation between comorbidities and post-operative outcome. Age, sex, type of surgery, and duration of surgery has shown no correlation to out of patients in our paper.

There have been some controversies on the effect of HIV on post-operative outcome for some time now. But most studies support that there is no difference in post-operative out come from HIV negative patients as long as they have good CD4 count [17]. A paper from South Africa stated that there has been increment in post TB complications and put HIV as one of the factors for poor outcome. It is really difficult for us to make any recommendation from our study

because only 20% of the patients were screened for HIV/AIDS up on admission. It is a very low number to find any statistically significant association. Out of the 18 patients screened five were found to be HIV positive. And none of these patients developed any complication.

Ethiopia is reported to be one of the few countries to have low success rate in the treatment of pulmonary tuberculosis, around 84 %. [12] Many factors may contribute for this unfortunate experience but mainly the poor drug adherence rate is well described in other studies. [3,18] This in turn will lead to failed treatment, emergence of drug resistant tuberculosis, and increased rate of complication [12]. Thirty three percent of our patients had history of TB treatment more than once. We are not able to analyze the reason behind this and the drug adherence rate of these patients as it is a retrospective study, it will be one area of future research. Nonetheless there was no association found between the number of treatments and morbidity rate. We found that the most common indication for surgery was empyema followed by Aspergilloma. More than ten types of procedures were performed for these patients. The commonest procedure performed were decortication, Pneumonectomy, and wedge resection in that order. One study done in Japan on 35 patients showed that the indications for surgery were MDR-TB in 26 patients, hemoptysis in 7, destroyed lung in 1 and drug allergy in 1 patient [7]. They performed 22 lobectomies, 7 pneumonectomies, 5 lobectomy plus segmentectomy, and 1 segmentectomy. Mortality rate was described to be 2.9% with morbidity of 14.3%.[7] One paper published from South Africa on 106 patients, presented indications for surgery to be multidrug-resistant tuberculosis in 27 patients, hemoptysis in 44, bronchiectasis in 27, and those where cancer can't be ruled

out in 8 patients. They had mortality rate of 1.9% and morbidity rate was 16.9 %. [10] Another paper from South Africa presented mortality rate of 1.6% and overall morbidity of 23%. So they recommend Surgery as an important adjunct of the control and treatment. [9] Other indications for surgery also include drug failure, localized pulmonary lesions with good pulmonary reserve [11]. Surgery is better to be done in higher specialized centers which has better instruments, man power and assisted with other disciplines. It should be noted that it is a multidisciplinary management. In our study we have observed that there is 20 % rate of complication and mortality rate of 1.1%. Even though atelectasis is most commonly seen, the rate of BPF is also high. Out of the eighteen patients who developed complication 8 of them had atelectasis, 5 of them had BPF and two had hospital acquired pneumonia.

We did not include patients with MDR TB because they are admitted and treated at a separate hospital dedicated to drug resistant tuberculosis. Usually patients come to our hospital with late referrals and after exhausting other medical and cultural treatments. Despite the late presentation and poor patients' condition, the outcome of surgery for post TB complications in our hospital is comparable with other countries' experience.

The first report of surgically managed pulmonary tuberculosis from our institution was put forward around 12 years back. They did a retrospective study on 26 patients with similar demographic distribution to our patient population. [18] The majority of patients had cough and hemoptysis (100% and 92.3% vs. 93% and 54% in our study). Compared to their report (27.6 months) our patients had early visit to the hospital, the mean duration of illness before presenting to

the hospital being 10.2 months. There is a big change in duration of illness prior to seeking medical attention. Twelve years ago most patients stay over two years before visiting our hospital. Nowadays they come in less than a year time after illness. Even though this is still a long time, it shows a change in the trend of health seeking behavior with good health education and a better referral system. Left side of the lung was involved commonly in both observations. The most frequent indications for surgery were severe hemoptysis, destroyed lung, and Aspergilloma, which is a bit different in our scenario where empyema thoracis and aspergilloma are the leading indications. The commonest complication they encountered was postoperative pneumonia in 15.4% of the cases with a mortality rate of 7.7%. The most common complications we found were Atelectasis in 8%, BPF in 5.7%, and HAP-2.3%. Our mortality rate is comparably low (1.1%) The rate of post-operative pneumonia has significantly decreased from 15% to 2% in twelve years. We believe better hospital care including early ambulation and good chest physiotherapy has positively influenced our patients' outcome. The other transformation is that recently we have started to perform minimal invasive procedures. More than ten types of procedures were performed, most of them being lung conserving surgeries like lobectomies, segmentectomies and wedge resections. We started to properly practice VATS in 2017 G.C and it has contributed to the 4 % of the procedures in our observation even though it is still a work in progress. Overall we consider the early hospital presentation, better hospital care, and well developed surgical techniques have improved the overall mortality and morbidity.

Conclusion

In our set up where we lag behind in the health care system, surgery still has an important role in addition to chemotherapy. Even though the complication rate of patients is different with the performed procedures and the diagnosis, in general Outcome of surgical management for pulmonary tuberculosis is good with relatively low morbidity and mortality. Not only the patient's condition and our surgical skill but also other ancillary managements like anesthesia care, nursing care and good patient preparation with close post op follow up should be given due attention. We recommend offering patients surgery on the appropriate time when having proper indication.

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