

## PREVALENCE OF TUBERCULOSIS IN PEDIATRIC PATIENTS UNDERGOING CHEST INTUBATION

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### ABSTRACT

**Introduction:** This is a prospective cross sectional descriptive observational study. This is designed to see indications and complications of chest intubation and to see prevalence of tuberculosis in chest intubation patients. This study was carried out in the Department of Pediatrics, DHQ Teaching Hospital, Gomal Medical College, Dera Ismail Khan. In a period of two years (Jan 2007 to Dec 2008). **Materials and Methods:** All those patients who underwent chest intubation during the study period were included in the study analysis. After admission, a detailed history was taken and a thorough examination was performed. Investigations included X-ray chest, full blood count, ESR, analysis and culture of pleural fluid, Mantoux test and ultrasonography of chest and abdomen. Later a chest tube was placed in the relevant pleural space under local anaesthesia. Chest tube was removed when pus/fluid drainage was stopped for at least 24-48 hrs. Diagnosis of tuberculosis was based on prolonged illness, history of contact, history of measles, raised ESR, positive Mantoux test (>10mm) and poor response to appropriate antibiotics and chest intubation beyond 10-14 days, all or some in various combinations. **Results:** Data was analysed for age, sex, duration of illness, investigations, diagnosis, duration/complications of chest intubation, mortality during the study period and prevalence of tuberculosis in these patients. A total of 40 patients (n=40) underwent chest intubation during the study period. Twenty six (65%) patients were male and 14 (35%) were female. Four patients (10%) were less than 1 yr of age, 25 (60%) were 1–5 yr of age and 12 (30%) were above 5 yrs of age. Indications for chest intubation included pyothorax in 27 (67.5%), pneumothorax in 11 (27.5%) and pyopneumothorax in 2 (5%) patients. Seventeen patients (42.5%) were suffering from tuberculosis. The criteria for the diagnosis were positive Mantoux test (more than 10mm) in 12 patients, suggestive pleural fluid analysis in 9 patients, history of contact in 8 patients, slow response to standard antibiotic therapy and closed tube thoracostomy in 5 patients, history of measles in preceding weeks in 2 patients and suggested CT scan in 2 patients. Complications included local wound infection in 5 (12.5%), tube blockage in 2 (5%), surgical emphysema in 2 (5%) and no response to conservative measures due to pleural thickening and fibrosis in 1 (2.5%) patients. Mean duration of chest drainage was  $8.1 \pm 2.4$  days. **Conclusion:** Tuberculosis is a common cause of pleural diseases and it must be considered in the differential diagnosis of pleural infections, particularly pyopneumothorax.

**Key Words:** Chest intubation, tuberculosis, pyothorax, pneumothorax, pyopneumothorax.

### INTRODUCTION

Chest intubation (closed tube thoracostomy) is a frequent procedure in pediatric units, usually performed for empyema thoracis, pneumothorax and other fluids in pleural space. These are usually the complications of underlying acute or chronic lung infections including tuberculosis<sup>1</sup>. The procedure is performed by physicians and surgeons alike all over the world. It is simple and life saving but invasive procedure that carries a complication rate of 2-10 percent. It is performed usually under local anaesthesia. A wide bore tube is placed in pleural space and connected to under water seal apparatus. In this way air/fluid/pus/blood in pleural space in

drained and in due course of time, the visceral and parietal surfaces of pleura fuse together<sup>2</sup>.

Common medical causes of these above conditions include pneumonias (viral, bacterial, mycotic), pleurisy, tuberculosis, adjacent abscesses opening into pleural space (lung, sub phrenic), generalised sepsis, isolated infection of pleural space, cystic fibrosis and others.<sup>3-5</sup>

We conducted this present study to see various indications and complications of chest intubation; and the prevalence of tuberculosis in these patients under going chest intubation.

## MATERIAL AND METHODS

This study was carried out in the Department of Paediatrics, Gomal Medical College, Dera Ismail

Khan from Jan 2007 to Dec 2008.

This is a prospective cross sectional descriptive case series observational study. All patients who underwent chest intubation during the study period were included in the study analysis.

After admission, patients were assessed quickly (depending upon the clinical status of the patient), for the need for chest intubation with a brief history, quick examination and an X-ray chest. Later, after chest intubation had been performed and general condition of the patient was stabilised, a detailed history was taken and a thorough clinical examination was performed. Investigations performed included X-ray chest, full blood count, ESR, analysis and culture of pleural fluid, Mantoux test and ultrasonography of chest and abdomen. Other relevant investigations were also performed when indicated (slide for MP, urine examination, ALT, CT scan, other X-rays etc).

Chest tube was placed under local anaesthesia in 7<sup>th</sup> intercostal space in postero-lateral surface of respective chest side. Daily pus/fluid drainage was measured. Chest tube was removed when further drainage was stopped for at least 24-48 hrs.

Diagnosis of tuberculosis was based on prolonged illness, history of contact, history of measles, raised ESR, positive Mantoux test (> 10 mm) and poor response to appropriate antibiotics and chest intubation beyond 10-14 days, all or some in various combinations. Pleural fluid analysis and CT scan were also performed. Data was analysed for age, sex, duration of illness, investigations, diagnosis, duration / complications of chest intubation, mortality during the study period and prevalence of tuberculosis in these patients.

## RESULTS

A total of 40 patients (n=40) underwent chest intubation procedure during the study period. There was male predominance with males being 26 (65%) and female being 14 (35%) in number. The M:F ratio was 1.9:1. Four patients (10%) were less than 1 year of age, 25 (60%) were 1-5 years of age and 12 (30%) were above 5 years of age (Table 1).

Mean duration of illness prior to presentation was 11.3 days ( $\pm$  5.4 days). It was longer in those

**Table 1:** Age and sex distribution (n = 40).

Sex Age	Male (%)	Female (%)	Total (%)
< 1yr	4 (10%)	0 (0%)	4 (10%)
1-5 yrs	13 (32.5%)	11 (27.5%)	24 (60%)
>5 yrs	9 (22.5%)	3 (7.5%)	12 (30%)
Total	26 (65%)	14 (35%)	40 (100%)

< 1yr	4 (10%)	0 (0%)	4 (10%)
1-5 yrs	13 (32.5%)	11 (27.5%)	24 (60%)
>5 yrs	9 (22.5%)	3 (7.5%)	12 (30%)
Total	26 (65%)	14 (35%)	40 (100%)

who were later diagnosed as having tuberculosis.

Indications for chest intubation included pyothorax in 27 patients (67.5%), pneumothorax in 11 patients (27.5%) and pyopneumothorax in 2 patients (5%). It was on right side in 22 patients (55%) and on left side in 18 patients (45%) (Table 2).

**Table 2:** Indications for chest intubation (n = 40).

Indication	Right	Left	Total
Pyothorax	17 (42.5%)	10 (25.0%)	27 (67.5%)
Pneumothorax	4 (10.0%)	7 (17.5%)	11 (27.5%)
Pyopneumothorax	1 (2.5%)	1 (2.5%)	2 (5.0%)
Total	22 (55.0%)	18 (45.0%)	40 (100%)

ESR was raised in all patients (30-120 mm at first hour; mean  $73 \pm 23$  mm), more so in those who were later diagnosed as tuberculosis. Several and serial X-ray chest were performed in all cases for an initial diagnosis and then later for progress/ resolution of disease and for assessment of complications, if any. Mantoux test was performed in all cases but it was positive in 12 patients. Pleural fluid analysis was performed in all cases; it was suggestive of pyothorax in 31 and of tuberculosis in 9 cases. Cultures of pleural fluid were performed in 16 patients. They yielded no growth in 9 patients and was positive in only 7 patients. Causative organisms isolated were Staph aureus in 6 patients and H. influenzae in one patient only. CT scan was performed in 2 patients with history of illness longer than 4 weeks, and in both these patients it was suggestive of tuberculosis (Table 3).

A total of 17 patients (42.5%) were diagnosed having tuberculosis. The criteria for the diagnosis were positive Mantoux test (more than 10mm) in 12 patients, suggestive pleural fluid analysis in 9 patients, history of contact in 8 patients, slow response to standard antibiotic therapy and closed tube thoracostomy in 5 patients, history of measles in preceding weeks in 2 patients and suggestive CT scan in 2 patients (Table 4). In many patients more than one criteria were suggestive of tuberculosis. Among these 17 tuberculous patients, 10 presented with pyothorax, 5 with pneumothorax and 2 with pyopneumothorax.

Complications observed during the study period included local wound infection in 5 (12.5%) patients, tube blockage in 2 (5%), surgical emphysema

in 2 (5%) and no response to conservative measures due to pleural thickening and fibrosis in 1 (2.5%) patients. This last patient was referred to thoracic surgeon for decortication and later he recovered completely after surgery and anti tuberculosis therapy (Table 5). Over all complication rate was 20%,

with some overlap.

Mean duration of chest drainage was  $8.1 \pm 2.4$  days. Mean hospitalisation period was  $14.2 \pm 3.2$  days. It was significantly longer in patients with tuberculosis ( $18.2 \pm 2.2$  days vs.  $10.4 \pm 1.8$  days;  $p < 0.01$ ).

Two patients, suffering from pyothorax, died during the study period due to cardiac temponade and shock.

Coincident and associated findings during the study period included falciparum malaria in 2 patients, acute viral hepatitis in one patient and rickets in one patient. The significance of these conditions for pleural diseases and chest intubation, if any, is not known.

## DISCUSSION

Pleural diseases are relatively less common in Paediatric patients. These include pyothorax, pneumothorax, pyopneumothorax and others. While these may be primary pleural conditions however most commonly these occur as extension or complication of underlying lung diseases or those of other nearby organs/structures<sup>1</sup>. Common causes leading to these conditions are pneumonias, pleurisy, tuberculosis and others.<sup>1,6</sup>. The basic principals of treatment of these conditions are evacuation of pus/fluid/air from pleural space and obliteration of empyema cavity through tube thoracostomy along with appropriate antibiotic or anti tuberculous therapy.<sup>3,7</sup>

In the present study, commonest indication for tube thoracotomy was pyothorax (27, 67.5%), whereas Khaliq and Lakhani reported pneumothorax to be the commonest indication (41.4%)<sup>1</sup>; Khanzada and Samad reported the commonest indication was tuberculous effusion (36.1%)<sup>2</sup>; and in another study the commonest indication is tuberculosis related complications (37.7%).<sup>7</sup> The cause for these differences in various indications for tube thoracotomy is not clear but it may be geographical or seasonal.

Complication rate in this study was 20%, that is higher than 15.2% reported from Hyderabad, but even higher rates of 25-30% have also been reported.<sup>2,7</sup> Rare and late complications like perforation of esophagus and contra lateral pneumothorax did not occur in our study. Mortality rate in this present study is 5%. This is comparable to 4% reported from Peshawar<sup>7</sup> and 6% from Bahawalpur.<sup>8</sup>

**Table 3:** Investigations carried out.

S. No.	Investigations	Results
1.	ESR	Raised in all the patients. Mean 73mm $\pm$ 23mm
2.	X-ray Chest / CT scan	Suggestive of the condition (pyothorax, pneumothorax, pyopneumothorax) in all the cases
3.	Mantoux Test	Positive (> 10 mm) in 12 patients
4.	Analysis of pleural fluid	Suggestive of pyothorax (pus) – 31 Suggestive of tuberculosis – 9
5.	Culture of pleural fluid (performed in 16 patients – n = 16)	No growth – 9 Positive – 7, Staph aureus – 6, H. influenzae – 1.

Pleural tuberculosis may present as pneumothorax, pyothorax, pyopneumothorax, or pleural effusion. Tuberculous empyema thoracis represents a chronic active infection of the pleural space that contains a large number of tubercle bacilli. It is less common as compared to tuberculous pleural effusion that results from an exaggerated inflammatory

**Table 4:** Patients Diagnosed As Tuberculosis (n = 17): (Several patients had more than one criterion).

S. No.	Criteria	No.
1.	Positive Mantoux Test	12
2.	Suggestive pleural fluid analysis	9
3.	H/O Contact	8
4.	Slow response to treatment	5
5.	H/O Measles	2
6.	CT scan	2

**Table 5:** Complications observed.

S. No	Complications	No (%)
1.	Local wound infection	5 (12.5%)
2.	Tube blockage	2 (5.0%)
3.	Surgical emphysema	2 (5.0%)
4.	No response (failure of lung expansion)	1 (2.5%)

response to a localized pauci bacillary pleural infection. This later condition usually does not need chest intubation and resolves with standard anti tuberculous therapy with or without steroids.<sup>19</sup> Another possibility is acute on chronic phenomenon. Tuberculosis is a chronic disease and acute pyogenic bacteria infect the tuberculous pleura, leading to pyothorax, pneumothorax or pyopneumothorax.<sup>9,10</sup>

Despite the advancement in medical technologies, the diagnosis of tuberculosis in children is still a challenge.<sup>6</sup> This situation is further complicated by the lack of facilities like culture, CT scan, biopsy and histopathology. Therefore in the present study, the diagnosis of tuberculosis is based more on discretion of the attending physician supported by

history of contact and investigation reports.

In the present study, 17 (42.5%) patients were suffering from pleural tuberculosis. Similar figures of 41.4% and 37.7% have been reported in similar studies from Karachi<sup>1</sup> and Peshawar<sup>7</sup> respectively. In another study from Peshawar, lower figure of 8% has been reported for tuberculous empyema<sup>10</sup>. However, figures as high as 66% have also been reported from Hyderabad<sup>11</sup>, but this included both tuberculous empyema as well as cases tuberculous pleural effusion. A study from Rawalpindi has reported 53% to suffering from tuberculous empyema.<sup>12</sup> Therefore, over all incidence of tuberculosis in empyema patients may be considered to 30-50%, but further studies are needed.

In this study 2 patients (5%) presented with pyopneumothorax and both were later diagnosed as tuberculosis. It is possible that pleural tuberculosis more commonly presents as pyopneumothorax than pyothorax or pneumothorax alone. However this is a small series and such conclusion can not be drawn. Further studies are recommended.

These higher figures for pleural tuberculosis should not be surprising because incidence of tuberculosis is increasing. WHO has declared tuberculosis as global emergency in 1993. Pakistan ranks 8<sup>th</sup> on the list of 22 high burden tuberculosis countries in the world.<sup>6</sup> One cause is poor coverage and failure of DOTS Programme.<sup>13</sup> The disease affects children as well, who comprise 3-13% of all TB cases.<sup>6</sup> Tuberculous empyema is no exception to this and cases of tuberculosis and tuberculous empyema may increase in future.

It is **concluded** that although pleural diseases are less common in paediatric patients, they are

more serious conditions with high morbidity and mortality. Their common cause is tuberculosis that may be considered in the differential diagnosis of any pleural infection particularly pyopneumothorax.

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