

## Original Research Article

# Evaluation of the epidemiology of pneumothorax in Bhuj district: a population based survey

Anand Chaudhary, Nishant Pujara\*

Department of Medicine, Gujarat Adani Institute of Medical Science, Bhuj, Gujarat, India

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**\*Correspondence:**

Dr. Nishant Pujara,

E-mail: [researchguide86@gmail.com](mailto:researchguide86@gmail.com)

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### ABSTRACT

**Background:** Pneumothorax is an abnormal collection of air in the pleural space that causes an uncoupling of the lung from the chest wall. It may be spontaneous or traumatic. The spontaneous pneumothorax is usually the result of rupture of superficial emphysematous bullae and may occur in apparently healthy persons or in association with chronic pulmonary disease. It is usually unilateral but may be bilateral. If air reaches the mediastinum and ruptures into both the pleural cavity.

**Methods:** 25 consecutive cases of pneumothorax admitted at the Gujarat Adani institute of medical science Bhuj from December 2011 to April 2012 were studied. Each patient was interrogated and examined in detail according to the attached proforma, with a view to identify the nature of pneumothorax.

**Results:** The incidence of pneumothorax was maximum in the 4th decade of life. The youngest one was a boy aged 14 years, while the oldest case was 75 years. 36 cases were under the age of 50 years, while only 2 cases were more than 70 years of age.

**Conclusions:** The prevalence of pneumothorax was greater in male as compared to female. Most of the cases treated with needle aspiration of air and the intercostal drainage through indwelling polyethylene catheter developed surgical emphysema on the affected side which disappeared within 2-3 days after aspiration of air with needle or after removal of polyethylene tube from intercostal space.

**Keywords:** Bhuj, District, Epidemiology, Pneumothorax

### INTRODUCTION

A pneumothorax is an abnormal collection of air in the pleural space that causes an uncoupling of the lung from the chest wall. The pleural space normally contains no air and only few millimeters of lubricating fluid.<sup>1</sup> When air enters the pleural space, the lung collapses in proportion to the amount of air present. It may be so little as to escape detection or so massive as to threaten life as in tension pneumothorax. Prompt recognition of tension pneumothorax is of utmost importance and it should be treated quickly.<sup>2</sup> Pneumothorax may be spontaneous or traumatic.

The spontaneous pneumothorax is usually the result of rupture of superficial emphysematous bullae and may occur in apparently healthy persons or in association with chronic pulmonary disease. It is usually unilateral but may be bilateral. If air reaches the mediastinum and ruptures into both the pleural cavity.<sup>3</sup> Spontaneous pneumothorax is easily diagnosed clinically but on rare occasion it is diagnosed accidentally on routine X-ray examination. In the present series, a detailed study of 25 cases of spontaneous pneumothorax was undertaken with type, etiology, severity, extent, anatomical location, and mode of presentation, clinical features, recurrences, complications and result of treatment.

## METHODS

50 consecutive cases of pneumothorax who were admitted at the Gujarat Adani institute of medical science Bhuj from December 2011 to April 2012 were studied. Each patient was interrogated and examined in detail according to the attached proforma, with a view to identify the nature of pneumothorax, its etiology, type, severity, extent, anatomical location, mode of presentation, clinical features, complications and the results of treatment.

Each subject was subjected to intra-pleural pressure study to determine the type of pneumothorax i.e. closed, open or tension pneumothorax by artificial pneumothorax apparatus as follows.

## RESULTS

The incidence of pneumothorax was maximum in the 4<sup>th</sup> decade of life. The youngest one was a boy ages 12 year, while the oldest case was 75 years. 36 cases were under the age of 50 years, while only 2 cases were more than 70 years of age. The prevalence of pneumothorax was greater in male as compared to female.

The incidence of pneumothorax was higher in person with sedentary occupation as compared to the manual worker, but since the series is small and so also the difference no definite conclusion can be drawn. In majority cases of pneumothorax, paroxysm of cough was the precipitating factor of spontaneous pneumothorax. Lifting heavy weights precipitated pneumothorax in 2 cases. While in 18 cases there were no apparent precipitating factors.

History of heavy smoking i.e. 25 to 50 bodies per day for more than 20 to 25 years was present in 26 cases, 4 cases were in habit of smoking occasionally for at least for 7 years, 20 cases were nonsmokers. Most of the cases complained of dyspnea, chest pain, cough and restlessness. In present series, pneumothorax was more common on left side of chest. Mediastinum shift was present in 36 cases. Pulmonary tuberculosis was the etiological factor in 24 cases. Whereas chronic bronchitis with emphysema was present in 22 cases. In 2 cases sub pleural bullae was the underlying cause. In 2 cases, no underlying cause was apparent. 32 cases had a closed type of pneumothorax, whereas 16 cases had open pneumothorax, 2 cases had tension pneumothorax.

## DISCUSSION

In present study, the cases of spontaneous pneumothorax reported for treatment with duration of illness ranging from 2 days to two and half months. 8 cases of pneumothorax gave history suggestive of pneumothorax more than month. These 8 cases had bronchial asthma, chronic bronchitis with emphysema and pulmonary tuberculosis as the underlying etiology of pneumothorax.

40 cases had duration of illness less than 1 month. Out of these 40 cases, 16 cases had duration of illness less than 1 week. All these cases except the female cases and cases falling in the age group of 11-20 years were in the habit of smoking.

The highest incidences of spontaneous pneumothorax in the present series were found in age of 31-40 years which tallies with observation of William Bernhard. Next to this age group the incidence of spontaneous pneumothorax was common in age group of 41-50 years.

In short, spontaneous pneumothorax is commonly forced in 3rd, 4th, 5th decade of life. Higher incidence is found in this age group is due to the effect of mechanical stresses on less compliant lung. Mechanical stress would affect the apices of the lung. Most high apical stresses are associated with large alveoli at the apex of lung and more negative intra-pleural pressure at the apex than elsewhere in lungs.<sup>4</sup>

From the above study, it is obvious that incidence of pneumothorax is exceedingly common in male as compared to the female in present series as also in the series reported by other authors. In present series, 48 cases were males and only 2 cases in female. Males are more exposed to mechanical stresses due to strenuous work. Their smoking habit may also make them more prone to the production of chronic bronchitis and emphysematous changes in lungs.

In the present series in 30 cases, the precipitating factor for spontaneous pneumothorax was paroxysms of cough while it is not report as a precipitating factor by Lercy Hyde and Wiliam Smith and only in 1% cases in the study of reported by Levy. This gross difference in the incidence of paroxysm cough as precipitating factor in the present study and those reported by other authors is difficult to explain. Rarely pneumothorax is precipitated on rising from bed in early morning. Decreased in ventilation and inactivity during sleep allows retention of secretions in the terminal bronchioles leading to local atelectasis with over distention of adjacent areas of early emphysematous lung, terminating in rupture of bleb.<sup>5</sup>

The results show that dyspnea and chest pain were commonest symptoms, in cases of pneumothorax in all except William Bernhald series in which dyspnea was present in only 26% of cases. Symptoms of dyspnea are produced when collapse of lung is more than 40%. Dyspnea is caused by massive collapse of lung aggravated by associated chronic respiratory diseases. Chest pain is due to partial pleura by the air aggravated by pleural inflammation and adhesions.<sup>6</sup>

In the present the commonest etiology of spontaneous pneumothorax was tuberculosis 24 cases, while in wiliam's series it accounts for 20% of the cases. Present study reveals that pulmonary tuberculosis stills account for nearly half the cases of spontaneous pneumothorax,

unlike the series reported by western authors probably due to the higher incidence of pulmonary tuberculosis in India.

In present series, second common cause of spontaneous pneumothorax was chronic bronchitis with emphysema, whereas in series reported by William, it accounted for 18.2% of cases, in Levy series 30.2% of cases and William smith series 32% of cases.<sup>7</sup> The observation in the present series showed that spontaneous pneumothorax occurred more on left side while in other series incidence was more common on right side. In the present series only 32% cases had spontaneous pneumothorax on the right side.

In the present series, common complication of pneumothorax was emphysema in 4 cases and hydro pneumothorax in 4 cases. Levy in his series did not come across empyema in any of their cases. However, hydro pneumothorax was reported in 4.5% in cases reported by Laroy.<sup>8</sup> Recurrences of pneumothorax were reported in 27% and 18.5% of cases in the series reported by Leroy and Levy respectively, while there was not a single case recurrence in the present series. In the present series 10 cases of pneumothorax were treated with conservative treatment. In these cases, collapses of lung were less than 20% and were treated with complete bed rest, analgesics, and antibiotics to prevent pleural infection, bronchodilator drugs in cases where chronic bronchitis with emphysema was the underlying etiology. All of them showed complete re expansion of lung within 3 weeks without aspiration of air.

In 20 cases, where collapse of the lung was less than 30% but more than 20% were treated with needle aspiration of air on one or more occasion with complete re-expansion of lung in two weeks' time. In 20 cases of pneumothorax where the collapse of lung was more than 30%, were treated with insertion on intercostal polyethylene tube in the second intercostal space and connected with under water seal drainage bottle. Most of the cases treated with needle aspiration of air and the intercostal drainage through indwelling polyethylene catheter developed surgical emphysema on the affected side which disappeared within 2-3 days after aspiration if air with needle or after removal of polyethylene tube from intercostal space.<sup>9</sup> In present series, 24 cases having pulmonary tuberculosis as an underlying etiology of spontaneous pneumothorax were treated with anti-tuberculous drugs.

## CONCLUSION

The prevalence of pneumothorax was greater in male as compared to female. Most of the cases treated with

needle aspiration of air and the intercostal drainage through indwelling polyethylene catheter developed surgical emphysema on the affected side which disappeared within 2-3 days after aspiration if air with needle or after removal of polyethylene tube from intercostal space.

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