



PROFILE OF TRAUMATIC PNEUMOTHORAX AT A TERTIARY CARE CENTER

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ABSTRACT **BACKGROUND:** Pneumothorax is presence of air between parietal and visceral pleura with varied presentation and outcome. It may result following trauma or may be non-traumatic or spontaneous. The study was conducted to observe and evaluate the clinical, etiological and radiological spectrum of traumatic pneumothorax.

MATERIAL AND METHODS: Study included 51 patients of traumatic pneumothorax reporting at our tertiary care teaching hospital over a period of 6 months. All patients with penetrating or blunt trauma and iatrogenic sub-group following procedures were included. For study purpose we took iatrogenic and traumatic cases separately. All data including demographic details, injury event or clinical evaluation and relevant investigations was collected on predesigned proforma and analyzed.

RESULT: Of 51 cases 32 (62.75%) were of traumatic pneumothorax following road traffic accidents (RTA), assault and fall from height. 19 (37.25%) cases were in sub-category of iatrogenic pneumothorax. Mean age of studied patients was 42.812±14.336 in traumatic group and 51.52 ± 19.250 years in iatrogenic group. Male to female ratio was 3.5:1 in traumatic group and 3.7:1 in iatrogenic group.

Most common clinical presentation was chest pain (90.62%) followed by breathlessness (65.62%) in traumatic group and cough (63.16%) followed by breathlessness (57.89%) in iatrogenic group. Predominant etiology of traumatic pneumothorax was road traffic accidents while that of iatrogenic pneumothorax was transthoracic needle aspiration / biopsy. Treatment (conservative/ICTD) was given as per need.

CONCLUSION: Rising incidence of road-traffic accidents in current scenario increases risk of chest trauma and pneumothorax related morbidities. Also, there is rise in diagnostic procedure related pneumothorax. Prompt diagnosis and management improves the outcome.

KEYWORDS : Traumatic pneumothorax, road traffic accidents (RTA), iatrogenic pneumothorax.

INTRODUCTION

Pneumothorax is presence of air between visceral and parietal pleura leading to lung collapse.⁽¹⁾

Traumatic pneumothorax might have been known from fifth century BC from the times of greek physicians.⁽²⁾ It still needs evaluation regarding epidemiology and clinical presentation as very few studies are there from our state of Rajasthan and our country as well. Rising incidence of road traffic accidents (RTA) and chest trauma related morbidities are found world over. Pneumothorax can be classified broadly into traumatic and spontaneous groups (non-traumatic). Spontaneous pneumothorax can be primary and secondary depending on absence or presence of underlying pulmonary pathology while traumatic pneumothorax may be traumatic (as a result of penetrating or blunt trauma) and iatrogenic following transthoracic procedures, biopsies (pleural and lung), thoracentesis, central line insertion and cardio pulmonary resuscitation.^(2,3,4,5,6) Pneumothorax ranks second to rib fracture as the most common sign of chest trauma. Haemothorax may be seen in 20% of cases.^(2,3,6) It may present as occult, simple, open or tension pneumothorax. Management ranges from conservative to chest tube insertion and rarely chest surgeries (open or video assisted).⁽⁷⁾ All patients of chest trauma need careful monitoring as tension pneumothorax may develop with passage of time as a life threatening emergency.^(2,6,7,8) Tension pneumothorax in patients of trauma arises when disruption of pleura or tracheo-bronchial tissue works like one way valve and air under pressure accumulates in pleural cavity.^(2,7,9) It may be diagnosed clinically and one should not wait for radiography unless diagnosis is unclear and patient is stable.^(2,10)

MATERIAL AND METHODS

This observational study was conducted over a period of 6 months. 51 cases of traumatic pneumothorax were enrolled after ensuring inclusion and exclusion criteria. Patients aged less than 18 years and those who were not willing to participate were excluded from the study. Informed written consent was taken. Demographic details, injury event with thorough history and clinical examination findings followed by chest radiography and relevant investigations (complete haemogram, blood sugar estimation and viral markers) were noted. Computerised tomography/ ultra-sonography was done if needed. Based on the findings patients were categorized in traumatic and iatrogenic groups. The management was guided by etiology (traumatic & iatrogenic), severity of symptoms and size of pneumothorax. Methods to evaluate size on roentgenogram showed variability in

different studies. We considered air rim of <2 cm as small and >2 cm as large pneumothorax in our study.⁽²⁾ Data was collected on predesigned proforma and analyzed. Comparisons were made between traumatic & iatrogenic groups and previous studies. Statistical analysis was done by appropriate method using SPSS software. P-value <0.05 was considered as significant.

OBSERVATIONS AND RESULTS

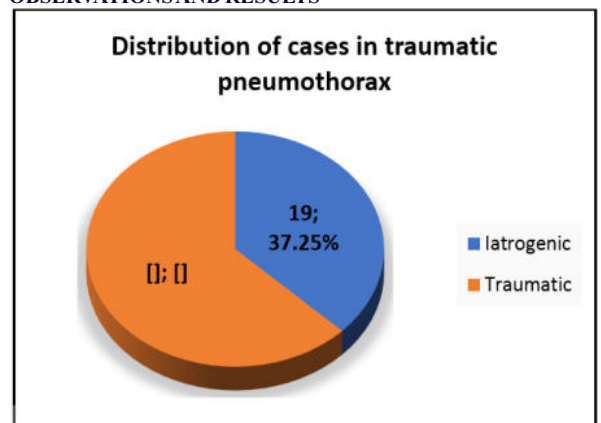


Fig.1: Distribution of cases in traumatic pneumothorax

Of 51 cases of traumatic pneumothorax, 32 (62.75%) were of traumatic category [following road traffic accidents (RTA), assault and fall from height] and 19 (37.25%) cases were in the category of iatrogenic pneumothorax (fig.1). Overall, 40 patients (78.43%) were males and 11 (21.56%) were females. In traumatic group males were 25 (78.12%) and females 7 (21.87%) while in iatrogenic group males were 15 (78.95%) and females 4 (21.05%). Overall male: female ratio was found to be 3.6:1, it was 3.5:1 in traumatic group and 3.7:1 in iatrogenic group showing male predominance. Majority of studied patients were in the age group of 21-50 years with overall mean age of 46.05±16.874 years. Mean age of the patients in traumatic group was 42.812±14.336 years and 51.526±19.250 years in iatrogenic group. Mean height, weight and body mass index for iatrogenic and traumatic groups were 163.15±5.274 cm, 55.68±6.774 kg, 21.05±2.466 kg/m² and 161.468±7.468 cm, 62.843±9.791 kg,

23.735±3.440 kg/m² respectively, as shown in the below table:

Table 1: Anthropometric distribution of patients:

	Mean height	Weight (kg)	Body Mass Index (kg/m ²)
Traumatic	161.46±7.468 cm	62.843±9.791 kg	23.735±3.440 kg/m ²
Iatrogenic	163.15±5.274 cm	55.68±6.774 kg	21.050±2.466 kg/m ²

Overall 54.90% patients were from rural area & 45.09% patients from urban area. 13/19 (68.42%) patients of iatrogenic group were from rural area and 17/32 (53.12%) patients of traumatic pneumothorax from urban area. Majority of patients were from lower class followed by lower middle class.

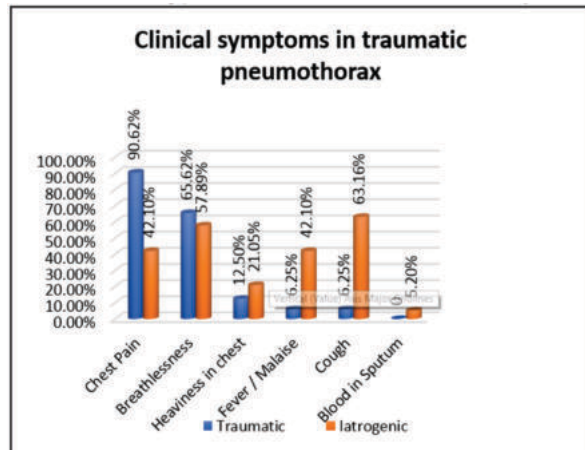


Fig.2: Clinical symptoms in traumatic pneumothorax

Most common clinical symptom in traumatic group was chest pain 29 (90.62%) followed by breathlessness 21 (65.62%), while in iatrogenic group it was cough 12 (63.16%) followed by breathlessness 11 (57.89%). Other symptoms were heaviness in the chest 12.50% in traumatic, 21.05% in iatrogenic, malaise in 42.10% iatrogenic and 6.25% in traumatic group. Blood in sputum was found in one case of iatrogenic group (5.28%) patients. One case with previous history of one episode of pneumothorax was present in each group (fig.2).

Findings on clinical examination were decreased chest movements, hyper resonance and decreased breath sounds on affected side. Other findings were subcutaneous emphysema in four patients, neck chest swelling in two patients, flail chest in three patients, oesophageal tear in one patient and splenic tear in one patient. Two patients in traumatic group came in respiratory distress, had tracheal shift, responded well to ICU support and emergency needle aspiration/ICTD (as per need).

Table 3: Chest roentgenography showing radiological findings

Findings	Traumatic	Iatrogenic
Large Pneumothorax	39.21%	13.72%
Small Pneumothorax	21.56%	25.49%
Air fluid level with pleural line	17.64%	7.84%
Air fluid levels with translucency	49.01%	21.56%
Fractures (Scapula 1, Clavical 3, Radius 1, Vertebral 1, Multiple Rib fracture 3)	17%	NA

Most common etiological factor for traumatic pneumothorax was road traffic accident (62.50%) followed by assault (21.87%), fall from height (15.63%) while, that for iatrogenic group was transthoracic aspiration/biopsy (42.10%) followed by thoracocentesis (36.84%), cardiopulmonary resuscitation (10.53%), tracheostomy (5.26%) and central line insertion (5.26%) as shown in table:

Etiology of Traumatic Pneumothorax		
Traumatic (n=32)		
	No.	%
Road traffic accidents	20	62.50
Assaults	7	21.87
Fall from height	5	15.63
Iatrogenic (n=19)		
Transthoracic needle aspiration/ biopsy	8	42.10

Thoracocentesis	7	36.84
Cardiopulmonary resuscitation	2	10.53
Tracheostomy	1	5.26
Central line insertion	1	5.26

Majority of patients were symptomatic and managed by intercostal tube drainage (ICTD). Those with minimal symptoms were offered conservative management with close observation and responded well. Only one patient of polytrauma with septic shock was referred case from outside with multi-organ failure and expired in intensive care unit. None of the patients under observation developed features of tension pneumothorax.

DISCUSSION

Traumatic pneumothorax resulting from blunt or penetrating trauma or procedures disrupting the parietal and visceral pleura is managed similarly to non-traumatic or spontaneous but with much more close observation and proper evaluation for tension Pneumothorax as described by Anita Sharm et al⁽²⁾, Noppen et al⁽⁵⁾ and Haramati et al⁽⁷⁾.

Of 51 cases of traumatic pneumothorax and its subtype iatrogenic pneumothorax, majority of the patients were in age group of 21 to 50 years. Mean age in traumatic group was 42.47±14.545 years, while Kong V et al⁽¹¹⁾ observed mean age of traumatic group to be younger 26±6 years. Younger age group involvement in motor vehicle driving may be responsible for it. Iatrogenic group had comparatively higher age group 52.35±20.832 years. Higher number of older patients needing procedures for diagnostic purposes may explain our observation.

Male preponderance was there with male to female ratio of 3.5:1 in traumatic and 3.7:1 in iatrogenic groups similar to 4.5:1 by Imamoglu et al⁽¹²⁾ and 3.5:1 by A ince et al⁽¹³⁾ in traumatic pneumothorax. Higher incidence in male maybe on account of different body habits, higher smoking rate and different body mechanics.⁽¹⁴⁾ More involvement of men in driving may also be another reason.

Majority of patients in our study belonged to urban areas in traumatic group (53.12%) making them more vulnerable to road traffic accidents and those in iatrogenic group (68.42%) were from rural area. Although our hospital is located in urban area but it also caters majority of rural population as patients receive better access to health facilities provided by skilled and experienced health professionals.⁽¹⁵⁾

Most common clinical presentation in traumatic group was chest pain 90.62% followed by breathlessness 65.62% (p<0.05) while in iatrogenic group it was cough 63.16% followed by breathlessness 57.89% (p<.05). This was in accordance to the description by Anita Sharma et al,⁽²⁾ Corrina et al⁽³⁾ and Noppen et al.⁽⁵⁾ Size of pneumothorax was also calculated but did not correlate well with severity of symptoms also stated by SS Chan et al.⁽¹⁶⁾

Most common etiological factor in traumatic group was road traffic accident with fractured rib, scapula, polytrauma in 20 (62.50%) followed by assault in 7 (21.87%) and fall from height 5 (15.63%). while in the study of Kong V et al⁽¹¹⁾ in 112 cases of traumatic pneumothorax penetrating injuries were seen in 82 (71%) and blunt injury in 33 (29%). Of these 33, majority 31 (26.8%) were road traffic accidents and least were assault 2 (1.73%). Our results may be due to the influence of high population density leading to higher burden of motor vehicles hence higher road traffic accidents in addition personal habits of alcohol abuse and drunk driving. It may also be due to improper driving roads, inadequate traffic control and non-compliance of traffic rules among public. In our study, iatrogenic group showed transthoracic closed aspiration biopsy as most common cause 8 (42.10%) followed by thoracocentesis 7 (36.84%), cardiopulmonary resuscitation 2 (10.53%) tracheostomy and central line insertion in 1 (5.26%) each. This was similar to studies by Sassoon et al⁽¹⁷⁾ who found trans-thoracic needle aspiration as most common cause and by Anita Sharma et al⁽²⁾ who found trans-thoracic needle aspiration/biopsy in 24% as commonest cause followed by thoracocentesis 20% positive pressure ventilation 7% and closed pleural biopsy is 8%.^(2,17)

Management of traumatic pneumothorax is similar to non-traumatic (spontaneous) pneumothorax although one requires more careful observation as describe by Anital sharma et al⁽²⁾, Corina ludwig et al⁽³⁾, Shields TW et al⁽⁸⁾, Jonathan B et al⁽⁸⁾. Majority of patients with symptomatic and large pneumothorax were managed by tube thoracostomy while minimally symptomatic and haemodynamically

stable ones were offered conservative management and closed aspiration if required. Majority of the pneumothoraces resolved in 5 to 15 days. One patient of polytrauma was referred to us in septic shock with multi-organ failure and expired after 11 days of hospital stay. None of the patients under observation developed tension pneumothorax due to prompt diagnosis, close observation and timely management.

ACKNOWLEDGEMENT

I would like to express my deep sense of gratitude and reverence to my guide Dr. Mahesh Mishra, and other authors for their constant guidance, encouragement and support. I also thank all the patients who became a part of this research.

CONCLUSION

Traumatic pneumothorax is common emergency seen in cases of chest trauma and warrants prompt recognition, supervision and simultaneous management. It can be diagnosed clinically in most of the cases by well-aware and alert physicians. Although radiography is helpful but delay in treatment and waiting for report is avoided as it may prove lethal to patient except those clinically doubtful and hemodynamically stable.

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