

## Original Research Article

# Study of the pattern and management of blunt chest injuries in rural setup

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### ABSTRACT

**Background:** Trauma is recognized as a serious public health problem. In fact, it is the leading cause of death and disability in the first four decades of life and is the third most common cause of death overall. Trauma may lead to short or long-term disability. Objective was to study the pattern of chest injuries with resultant underlying damage, in rural set up.

**Methods:** The present study was carried out among 500 cases of age group 15 to 75 years, all religions and both sexes. All patients received in the Emergency Room (ER/Casualty) were immediately attended and history, primary survey and resuscitation were done simultaneously. X ray chest-erect position was taken and subsequent management either operative or non-operative was done according to clinic-radiological findings. After discharge, patients were followed on OPD basis till the time they return to the normal activity.

**Results:** Majority of patients (31%) were from 55 to 65 years of age group and were male (64.2%). Vehicular accident was the commonest (56.8 %) cause of injury. Vehicular accidents were the most common cause of chest injuries. In vehicular accidents two-wheeler riders were the common victims (55.28%). Assault was 2<sup>nd</sup> most common mode of injury. Among those patients who sustained chest trauma had average VAS 6 (49.2%) followed by 4 (45%). Majority of patient were treated conservatively (93.6%).

**Conclusions:** The most active age group and males were affected with commonly vehicular accidents. They mainly suffered chest injuries.

**Keywords:** Chest injuries, Management, Rural area

### INTRODUCTION

Trauma is an important and serious problem of public health concern. It leads to disability and mortality especially among most active and productive age group of 0-40 years. Trauma is the third most leading cause of death globally. It can lead to any kind of disability ranging from short term to long term. Trauma to chest can lead to damage to internal organs like heart, lungs and other tissues of chest thereby threatening and endangering the life of injured person. Most commonly affected body part in any type of accident is chest.<sup>1,2</sup> Chest injuries most commonly are blunt in nature. These blunt injuries can damage airway and harm the

circulation. This affects the outcome in such patients. These injuries are common and increasing in India.

In rural areas, also such type of injuries is more frequently found than commonly thought. Urbanization and industrialization are important reasons for these increasing numbers of accidents and especially blunt chest injuries. Commonly the young are affected as they are more adventurous. They are the most productive group of the population. In rural areas, people mainly depend on agriculture. There is increasing use of machinery in farming. Due to this, the accidents and cases of polytrauma are increasing in the rural areas.

Moreover, 20-25% of deaths in polytrauma patients are attributed to chest injury.<sup>3</sup>

Blunt chest injuries can lead to fracture of ribs, fracture of sternum and even fracture of thoracic vertebrae. It can also lead to various types of injuries like contusions, lacerations and sometimes causing hemothorax, pneumothorax. Hence the presence of intra-thoracic involvement may be overlooked Rib fracture acts as the factor that presents the severity of trauma patients. It is common for trauma patients to experience other organ injuries; only 6% to 12% of trauma patients complain only of rib fracture.<sup>4</sup>

This study was designed to find out this particular aspect of injury pattern where different modes of chest injuries occurring in the rural area, scale of pain and their management done.

**METHODS**

The present study was carried out in the Department of Surgery, during the period of July 2016 to April 2017 among 500 cases of age group 15 to 75 years, all religions and both sexes. All patients received in the Emergency Room (ER/Casualty) were immediately attended and history, primary survey and resuscitation were done simultaneously. X ray chest-erect position was taken and subsequent management either operative or non-operative was done according to clinic-radiological findings. Rests of the investigations were done as per the mandate of the clinical condition, either immediately or in routine hours.

Pain management of 1st 24 hrs was met by injectable/oral analgesics and or with local anesthetics (inter-costal blocks). Subsequently analgesics or inter-costal blocks were given as per the need of the patient by using pain scale. These patients were monitored closely till they were hemodynamically stable and respiration was settled. After discharge, patients were followed on OPD basis till the time they return to the normal activity.

**Inclusion criteria**

- Patients of age group 15 to 75 years
- All patients of polytrauma
- Patients of vehicular accidents who has sustained chest injury
- Patients of accidental chest injury due to fall from a vehicle, height or in the well
- Patients of chest injuries other than the causes mentioned in 2 and 3.

**Exclusion criteria**

- Patients who are < 15 years and > 75 years of age
- Patients with associated head injury with altered level of consciousness

- Patients with associated abdominal injury requiring surgery
- Patients having pulmonary TB
- Patients having respiratory tract infection
- Patients having malignant or non-malignant space occupying lesion of chest or lung.

The data was recorded in pre-designed, pre-tested and semi-structured questionnaire. Then it was entered in Microsoft Excel Worksheet and analyzed using proportions.

**RESULTS**

From above it is clear that Vehicular accident was the commonest (56.8 %) cause of injury followed by injury by blunt object (30.8%), bull horn injuries (10.2 %), and fall from height (2.2 %).

**Table 1: Distribution of study subjects as per mode of injury.**

Mode of injury	No. of cases	(%)
Vehicular accidents	284	56.8
Fall from height	11	2.2
Bull horn injury	51	10.2
Injury by blunt object (assault)	154	30.8
Total	500	100

As above stated that vehicular accidents are the most common pattern of chest injuries (56.8%) and 55-65 years of age group is more encountered with this, among them males are 37.4% affected and females were 19.4% as males are mobile and more vulnerable to vehicular accidents.

Majority sustained chest trauma up to chest wall and beyond that fracture ribs were the most common damage (355,71%), among them 93 patients (18.6%;64.1%) sustained fracture ribs only, 20 patients (4%;13.8%) had Lung contusion (with fracture rib were 14 and without were 6), 38 patients (7.6%;26.2%) had fracture ribs with subcutaneous emphysema.

No case was found to have isolated subcutaneous emphysema (without fracture rib). Some of them were associated with hemothorax (n=8,1.6%;5.5%); pneumothorax (n=9,1.8%;6.2%); Hemo-pneumothorax (n=6,1.2%;4.1%); Flail chest (n=3,0.6%;2.1%); Sucking wound (n=1,0.2%). Patients (n=2) with Rupture of Diaphragm were found to have associated Hemo-pneumothorax.

Majority of patient treated were conservatively (93.6%) with adequate analgesia and breathing exercises. 6.1 % patient needed Inter-costal tube drainage.

Among 500 patients no patient presented with VAS 0 or 10. Majority of patients either had VAS score 6 (n=246,

49.2%). All patients with VAS score 8 (n=19) were treated with IV opioids, IM NSAIDS along with inter-costal nerve block with bupivacaine for achieving a level of analgesia on day-1. Patients with VAS 6

(n=246,100%) were given IV opioids and among them 68.2% required inter-costal nerve block for achieving adequate analgesia.

**Table 2: Distribution of different types of chest injury among age groups and sexes.**

Mode of injury	Age groups	Sex		Total no. of pts	Relative % in each age group	Relative % of chest trauma pts. in each mode of injury.		
		M	F			M	F	Total
Vehicular accidents	15-25	3	2	5	1.8	37.4	19.4	56.8
	25-35	19	7	26	9.2			
	35-45	25	8	33	11.6			
	45-55	38	21	59	20.8			
	55-65	63	36	99	34.8			
	65-75	39	23	62	21.8			
	Total	187	97	284	100			
Fall from height	15-25	0	0	0	0	1.6	0.6	2.2
	25-35	2	1	3	27.3			
	35-45	2	0	2	18.2			
	45-55	2	0	2	18.2			
	55-65	1	2	3	27.3			
	65-75	1	0	1	9.0			
	Total	8	3	11	100			
Bull horn injury	15-25	1	0	1	2.0	6.8	3.4	10.2
	25-35	2	0	2	3.9			
	35-45	6	2	8	15.7			
	45-55	13	7	20	39.2			
	55-65	9	7	16	31.4			
	65-75	3	1	4	7.8			
	Total	34	17	51	100			
Blunt object (Assault)	15-25	2	1	3	1.9	18.4	12.4	30.8
	25-35	11	7	18	11.7			
	35-45	16	10	26	16.9			
	45-55	25	17	42	27.3			
	55-65	22	18	40	26.0			
	65-75	16	9	25	16.2			
	Total	92	62	154	100			

**Table 3: Extent of underlying damage.**

Extent of underlying damage	No. of patients	(%) among all patients	(%) among # rib patient (n=145)
Chest wall contusion only	355	71	.....
Lung contusion (with or without # rib)	20	4	13.8
#ribs only	93	18.6	64.1
With Subcutaneous emphysema only	38	7.6	26.2
With Flail chest	3	0.6	2.1
(Or) Hemothorax	8	1.6	5.5
(Or) Pneumothorax	9	1.8	6.2
(Or) Hemo-pneumothorax	6	1.2	4.1
(Or) Sucking wound	1	0.2	0.7
(Or) Rupture of diaphragm	2	0.4	1.4

**Table 4: Management protocol followed among the cases.**

Management	No.	%
Conservative	468	93.6
ICD	31	6.2
Thoracostomy	0	0
Thoracotomy	0	0
Pleural tapping	1	0.2
Total	500	100

From above it is clearly stated that the average duration of need of IV analgesia in patient with VAS Score 8 was 5.1±0.4 days and their average duration of hospital stay was 7.6±1.4 days. The average duration of need of IV analgesia in patient with VAS Score 6 was 4.3±0.8 days and their average duration of hospital stay was 5.2±1.8 days. While it was almost equal in patients of VAS Score 4 and 2 which was (1.7±0.5; 2.5±0.5) and (1.2±0.3; 2.2±0.7) because of difference in modality of analgesia. VAS score 4 patients were treated with IV opioids while patients were VAS score 2 patients were treated with IM NSAIDS.

**Table 5: VAS and pain management among the cases.**

VAS score	No. of cases	Type of pain management	No. of patient needed block	(%)
0	0	.....	0	0
2	10	IM	0	0
4	225	IM +/- block	22	9.8
6	246	IV +/- block	168	68.2
8	19	IM + IV + block	19	100
10	0	.....	0	0

**Table 6: Average duration of need of analgesia and hospital stay depending upon VAS score (severity).**

VAS score	No. of cases	Average duration of analgesia in days (Mean±SD)	Average duration of hospital stay in days (Mean±SD)
0	0	0	0
2	10	1.2±0.3	2.2±0.7
4	225	1.7±0.5	2.5±0.5
6	246	4.3±0.8	5.2±1.8
8	19	5.1±0.4	7.6±1.4
10	0	0	0

**DISCUSSION**

In the present study, it was observed that majority of the patients (31%) were from 55 to 65 years of age group (59.6±1.5). Similar findings were also reported by Lu MS et al.<sup>5</sup>

In the present study, it was observed that majority of cases were male (64.2 %). This dominance of the males has also been reported by various workers like Saaiq M et al, Mohan Atri et al observed that majority (78.7%) were males.<sup>6,7</sup>

Vehicular accident was the commonest (56.8 %) cause of injury. Saaiq M et al has observed that Road Traffic Accidents (RTAs) were the commonest cause of trauma (72%).<sup>6</sup> Lu MS et al also reported that vehicle accident was seen in 207 patients, falls in 66, pedestrian injury in 10, and assaults in 14.<sup>5</sup> Mohan Atri et al also observed that motor vehicle accident is the most common mode of injury.<sup>7</sup>

Chest pain was the most common (100%) presenting symptom in this study followed by breathlessness (27.2%). Gregory PL et al also found that chest pain was the most common complaint after chest injury and supports the current study.<sup>8</sup>

The commonest sign of presentation in this study was restricted chest movement (chest tenderness) due to pain (38%) followed by Bony crepitation's (29%), tachypnoea (27.2%). Kalliopi A et al stated that tachypnoea was the most common presenting feature along with localized chest tenderness.<sup>9</sup>

Majority of patients sustained chest trauma up to chest wall and beyond that fracture ribs was the most common damage (355, 71%). Saaiq M et al found that fracture ribs were most common chest injuries (74% patients) after chest wall tenderness and supports present study.<sup>6</sup> Mohan Atri et al also observed that rib fracture was the commonest injury (60%) followed by

hemopneumothorax (51.7%), surgical emphysema (37.9), lung contusion (10.4%), flail chest (6.2%) etc.<sup>3,6</sup>

In the present study, it was observed that majority of cases were having right side rib fracture (53.8%) at middle zone (4-9<sup>th</sup> rib) only (73.1%).

Majority of patients who were having chest trauma presented with associated clavicular fracture (35.2%) then followed by head injury (26.7%) and hemothorax and/or pneumothorax (21.9%). Veysi T et al found that head injury was most commonly associated (50.1%).<sup>10</sup>

Trauma leads to rib fracture and pain. It leads to increased mortality and morbidity. Severe pain disables patient's quality of life. He is unable to breathe deeply and can't even cough normally as it causes pain. There is decrease in efforts of ventilation, can lead to pneumonia, atelectasis and ultimately respiratory failure. Patient spends more time in intensive care unit and is associated with increased mortality.<sup>11</sup>

The management protocol should aim at pain relief to the patient. Patient should be given the chest physiotherapy. As well as respiratory care are vital in-patient management. Pain relief ensures proper breathing to the patient, he becomes able to cough out secretions and comply with chest physiotherapy.<sup>12</sup> Multiple pain relief treatment options are available, such as oral analgesics, intravenous opioids, patient-controlled opioid analgesia, inter pleural blocks, inter-costal blocks, paravertebral blocks, and epidural analgesia. Adegboye VO et al concluded that majority of blunt chest trauma (72.9%) can be managed by simple procedures such as care of analgesia and physiotherapy with minimal complications.<sup>12</sup> Simon B et al stated that most of blunt injury chest with fracture ribs even with pulmonary contusion managed medically needs only pain management.<sup>13</sup> Most patient of chest trauma treated with conservative management in this study (93.6%) that is almost equal to the above studies and supported by them.

Effective pain relief in case of trauma patients helps in smooth and faster recovery and decreases the morbidity, mortality and hospital stay.<sup>11</sup> The average duration of patients of chest trauma with VAS score 2 and 4 (who sustained trauma up to chest wall) had mean hospital stay (2.2±0.7) and (2.5±0.5) days respectively and patients of chest trauma with VAS score 6 had mean hospital stay (5.2±1.8) days and patients of chest trauma with VAS score 8 had mean hospital stay (7.6±1.4) days. Serife Tuba Liman et al found that the mean hospital stay was 4.5 days.<sup>14</sup>

Majority of patients (68%) came to the hospital within 6 hours of injury and presented early, which can be due to increase awareness about health and improved transport facilities. The remaining 24.8 % patients attended the hospital within 7-12 hours, 5.2 % within 13-18 hours, 1.6

within 19-24 hours and 0.6 % attended hospital after 25 hours of trauma.

In this study 26% of patient who sustained severe trauma contributed by alcoholism either by as a primary cause (in case of skidding of vehicle, fall from height) or loss of protective reflexes (in case of dash given by someone or in cases of assault).

## CONCLUSION

The most active age group and males were affected with commonly vehicular accidents. They mainly suffered chest injuries. This situation can only be controlled by increasing awareness for preventing morbidity and mortality among young and active age group.

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## REFERENCES

1. Wong-Baker. FACES Rating Scale. In: Wong DL, Hackenberry-Eaton M, Wilson D, Winkelstein ML, Schwartz P, eds. Wong's Essentials of Pediatric Nursing. 6<sup>th</sup> ed. St. Louis, 2001:1301.
2. Yazigi F, Kolluru A. Concomitant traumatic coronary artery dissection and tricuspid valve injury: a case report. *J Med Cases.* 2011;2(4):174-7.
3. Gabram SG, Schwartz RJ, Jacobs LM, et al. Clinical management of blunt trauma patients with unilateral rib fractures: a randomized trial. *World J Surg.* 1995;19:388-93.
4. Shorr RM, Crittenden M, Indeck M, Hartunian SL, Rodriguez A. Blunt thoracic trauma: analysis of 515 patients. *Ann Surg.* 1987;206:200-5.
5. Lu MS, Huang YK, Liu YH, Liu HP, Kao CL. Delayed pneumothorax complicating minor rib fracture after chest trauma. *Am J Emerg Med.* 2008;26(5):551-4.
6. Saaiq M, Shah SA. Thoracic trauma: presentation and management outcome. *J Coll Physicians Surg Pak.* 2008;18(4):230-3.
7. Atri M, Singh G, Kohli A. Chest trauma in Jammu region: an institutional study. *Indian J Thoracic Cardiovasc Surg.* 2006;22(4):219-22.
8. Gregory PL, Biswas AC, Batt ME. Musculoskeletal problems of the chest wall. *Sports Med.* 2002;32(4):235-50.
9. Kalliopi A, Gerzounis M, Theakos N. Management of 150 flail chest injuries: analysis of risk factors affecting outcome. *Eur J Cardio-thoracic Surg.* 2004;26:373-6.
10. Veysi T, Nikolaou VS, Paliobeis C. Prevalence of chest trauma, associated injuries and mortality: a level I trauma centre experience. *Int Orthop.* 2009;33(5):1425-33.

11. Bulger EM, Edwards T, Klotz P, Jurkovich GJ. Epidural analgesia improves outcome after multiple rib fractures. *Surg.* 2004;136:426-30.
12. Adegboye VO, Ladipo JK, Brimmo IA, Adebo AO. Blunt chest trauma. *Afr J Med Sci.* 2002;31(4):315-20.
13. Simon B, Ebert J, Bokhari F, Capella J, Emhoff T, Hayward III T, et al. Management of pulmonary contusion and flail chest: an Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg.* 2012;73(5):S351-61.
14. Liman ST, Kuzucu A, Tastepe AI, Ulasan GN, Topcu S. Chest injury due to blunt trauma. *Eur J Cardio-thoracic Surg.* 2003;23:374-8.

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