Pattern and Management Outcome of Chest Injuries in Omdurman Teaching Hospital Sudan

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Abstract

Background : Thoracic trauma is one of the leading causes of morbidity and mortality in developing countries. The incidence of thoracic trauma has rapidly increased in this century of high speed vehicles, violence and various other disasters. A considerable number of preventable deaths occur due to inadequate or delayed treatment of otherwise an easily remediable injury.Objectives: to study Pattern and management outcome of chest injuries in Omdurman Teaching Hospital.Patients and methods: This study is Observational prospective analytical hospital based study,conducted in Omdurman Teaching Hospital of one year duration from May 2013 to April 2014 in which patients with significant thoracic trauma were managed ,questionnaires were used and variables were Age, gender, mechanism of injury, clinical diagnosis, associated injuries, complications, treatment, length of hospital stay.

Index terms— chest injuries, pneumothorax, thoracostomy, management, pattern, chest tube .

1 Introduction

he incidence of trauma has increased dramatically worldwide due to the rapid development of the motor vehicles and the rising rate of violence , which it impose a great challenge on the general surgeon to recognize and treat those patients . Most persons, who experience torso trauma, whether blunt or penetrating, sustain some degree of associated injury to the chest. Thoracic injuries are a primary or contributing cause of death in nearly half of all cases of torso trauma [1]. Thoracic trauma is responsible for over 70 per cent of all deaths following road traffic accidents. Blunt trauma to the chest in isolation is fatal in 10 per cent of cases, rising to 30 per cent if other injuries are present [1]. The majority of chest injuries are confined to the thoracic cage. These consist of rib fractures with underlying pulmonary contusion, haemothorax, or pneumothorax, which can usually be dealt with simply and effectively by chest drain insertion and fluid restriction [2].Advanced Trauma life support (ATLS) protocol forms the bedrock for the assessment and treatment prioritization of these patients. Which will lead to diagnoses of the twelve major life threatening injuries, may be encountered in victims of thoracic trauma. Six of them must be rapidly diagnosed and swiftly treated within the time frame of the primary survey because they have the potential to cause death (Lethal six) [3].They include Airway obstruction, Tension Pneumothorax, Flail chest, cardiac tamponade, Open Pneumothorax and Massive haemothorax. The other six are unspecific, delayed, or obscured by other injuries and may actually be overlooked until they reveal themselves by late onset complications (hidden six). These are tracheobronchial disruption, pulmonary contusion, Traumatic disruption of the aorta, blunt cardiac injury, esophageal perforation and diaphragmatic tear [3]. Pulmonary injuries requiring thoracotomy are uncommon even in busy urban trauma centers. Simpler surgical techniques are frequently used for their management. Stapled pulmonary tractotomy has become the most frequently used lung sparing technique, and can manage 85% of all pulmonary injuries requiring surgical interventions. Despite recent advances, pulmonary injuries requiring resective procedures are marked by high morbidity and mortality.Blunt thoracic trauma can result in significant morbidity in injured patients. Both chest wall and the Intrathoracic visceral injuries can lead to life-threatening complications if not anticipated and treated. Pain control, aggressive pulmonary toilet, and

mechanical ventilation when necessary are the mainstays of supportive treatment. The elderly with blunt chest trauma are especially at risk for pulmonary deterioration in the several days post injury and should be monitored carefully regardless of their initial presentation. Blunt : Results : 150 with various forms of chest injuries were managed 54.7% were males and 45.3% females. Mean age of patient was 27.41 years. The common cause of injuries road traffic accident 73% While 14 % are involved in attacks and 8% stab wounds, 4% sustained trauma from falls and 0.7% was a gunshots. All patients had chest radiographs .The commonest abnormal findings were rib fractures 56.7%, haemothorax 14.7%, pneumo-haemothorax 14%, pneumothorax 11.3%. Main modality of treatment was conservative (58.7%) and 41.3% required tube thoracostomy. The commonest extrathoracic associated injuries were limb fractures 37.3%, head and neck injuries 13.3%, 2.7% in the pelvis, The overall mortality rate was 2.1%.

thoracic trauma is also a marker for associated injuries, including severe head and abdominal injuries [7-45].Rib fractures were the commonest specific thoracic injury. The diagnosis of rib fracture was both clinical and radiological, since the routine chest radiograph has only a sensitivity of only 20-50% in detecting rib fractures and chrondral rib fractures are almost always invisible on chest radiograph unless the fractures involves a strongly calcified cartilage. Clinical diagnosis was based on the findings of pain on breathing, localized tenderness and presence of bony crepitus. Studies have shown that Ultrasound scan has a higher sensitivity than plain chest radiograph in detecting rib fractures while others have shown it is either equally sensitive or slightly better [8]. This is an observational prospective analytical study hospital based study, conducted at Omdurman Teaching Hospital. The study population was composed of male and female patients who sustained chest trauma in the period May.2013 April.2014. A total number of 150 patients were included with the use of predesigned and pretested structured questionnaire. Non probability sampling including all patients admitted in the emergency department during the allocated period of study. Data analysis by using SPSS version 22.The percentage was calculated and chi-square test was used for the analysis. Test of significance was analytically accepted and P value0.000. Ethical clearance and approval for conducting this study was obtained from the ethical committee of Omdurman Teaching Hospital. Informed verbal consent was obtained from the patients participating in this study after full explanation of the study objectives.

2 III.

3 Results

During the study period a total of 150 were included in this study 54.7% (n=82) were males and 45.3% (n=68) were females with a male to female ratio of 2.5 : 2.1 , The age ranged from 4 ????? 80 years with a mean age of 27.41(SD ± 13.5 years) Most of the patients were in the third decade of life (Table 1)..Majority of the patients 73% (n=110) were involved in road traffic accident 37.3% (n=56) were either driver or occupant and 36% (n=54) were pedestrians.

While 14 % (n=21) are involved in attacks and 8% (n=12) in stab wounds, 4% (n=6) sustained trauma from falls and 0.7% (n=1) was a gunshot (Table 2).

26.7% (n= 40) of the cases were isolated thoracic injuries while 73.3% (n=110) were multiple injuries , 37.3% (n= 56) the injuries included the extremities, 19.3% (n=29) in the abdomen, 13.3% (n=20) were in the head and neck ,the head was 9.3% (n=14) while the neck 4% (n=6), 2.7% (n=4) the pelvis was involved and 0.7% (n=1) had injury to the spine.

94.7% (n=142) presented to the hospital in the time period of 1to 6 hours, while 4% (n=6) presented in less than one hour and 1.3% (n=2) presented in more than six hours (Figure **??**).

Most of the were clinically stable 61.3% (n=92), while 26.7% (n=40) experienced Dyspnea and 12% (n=18) were shock, no patient reported as cyanosed at the time of presentation.

Chest x-ray was the main modality of investigation 88.7% (n=133), 8.7% (n=13) had CT scan and ultrasound was done for 2.7% (n= 4) at the emergency room, no patient had ABG in the ER .Patients diagnosed as rib fractures were 56.7% (n=85), while 14.7% (n=22) as haemothorax, 14.0% (n=21) as haemo-pneumothorax, 11.3 % (n=17) as pneumothorax, 1.3% (n=2) had flail chest, 1.3 %(n=2) as lung contusion, 0.7% (n=1) as diaphragmatic injury, no cardiac , major vessels or oesophageal injury were reported (Table 3). Conservative treatment was the main modality 58.7% (n=88) while 41.3% (n=62) underwent chest tube insertion, 58.% (n=36) of them the chest tube was on the right , 40.4% (n=25) was on the left side and 1.6 % (n=1) was bilateral.

The durations of the chest tube from two days in which was 37% (n=23), stayed for 3days 46.8% (n=29) and 14.5%(n=9) the chest tube stayed for 4 days and 1(1.6%) patient the chest tube stayed for 5 days which was due Dyspnea following the clamping of the chest for trial of removal in which the treating doctor chose to leave for consultation with his senior (Figure **??**).

The admissions 61.3% (n=92) were admitted to the general ward while 32.7 (n= 49) who had uncomplicated chest trauma were discharged home after necessary investigations, treatment and 6 hours observation in the accident and emergency department ,3.3% (n=5) were admitted to the ICU and 2.7% (n=4) to the HDU.

The duration of hospital stay was 12% (n=18) stayed less than 3 days while 48%(n= 72) stayed between 3 to7 days ,6% (n=9) stayed for 8 to 14 days

4 Patient and Methods

Only 1.3% (n=2) required a hospital stay of more than 2 weeks (Table 4).

Of the 150 patients 87.3 %(n= 131) had uneventful course while 10.7% (n=16) developed complications and 3 deaths accounted for 2%. The complication which were 3.3% (n= 5) developed pneumonia, 3.3% (n=5) had non-functioning chest tube, 2.7% (n=4) developed surgical emphysema ,2% (n=3) had sepsis and 1.3% (n=2) developed wound infections.

Those who sustained rib fracture 62.6% (n=82) 18.8% of them developed complications while those with Haemopneumothorax 35.1% (n=46) 6.5 % died and 23.9% developed complications, 6.3% of patients with flail chest or diaphragmatic injuries developed complications (Table 5).

The highest rate of complications was noticed in patients with associated abdominal injuries as bowel injury 37.1% and spleen 31.3% , while the mortality was high in patients who suffered from extremities fractures 66.7% which was found to be statistically significant P value 0.000 (Table 6).

The causes of death were as follows one patient developed pulmonary embolism, one died from septicaemia and one patient had brain death IV.

5 Discussion

The study included 150 cases presented chest injuries with male predomance of 54.7% and it is consistent with other studies & the female population was 45.3% which showed higher incidence than other studies . (9,10,11,12) The most affected age group was those in the third decade of life 36% followed by teen agers 28% and it is consistent with all the studies reviewed.

Motor vehicle accident was the main cause of chest injuries 73% which similar to results in other studies (8)(9)(10)(11)(12)(13)(14)(15)(16)(17)(18)(19) In contrast to two studies done Ali,Gali (10) and Maxwell et,al. (11) Found that penetrating trauma was the main cause of injuries 61.5% and 77% respectively.

Rib fracture was the most commonly encountered clinical type of chest injury 56.7% It has also been reported as the commonest chest injury which is lower in comparison with Muhammad Saaiq (12) but higher to Monafisha K Lema (13) 20.7%, Massaga (14) 42.9%, Kesieme (7) 49.3%, followed by haemothorax and Haemopneumothorax of 14% and 14.7% respectively which is lower than A Adem (15) as haemothorax 23.6% and Haemopneumothorax 66.7% . Misaun, et al. (16) revealed that chest wall contusion was the commonest clinical type of chest injury, This was followed by Haemopneumothorax with the assumption that most of the rib fractures are associated with pleural or vascular injury due to their anatomical relations. P value 0.000

The most commonly associated injury in this series is extremity injury 37.3%which is higher than Massaga (14)25.2% , A Adem A ,et al. (15) 5,6% and Misauno ,et al. (16) 19.4%. head injuries were 19% This lower than Monafisha K Lema (13) 33.3%, while Massaga and Misauno ,et al, 21.8%,16.3% respectively studies lies within same range (14,16) and higher than Adem A,et al. (15) 4.2% and Mohamed N. Albadani (17) 5.4%. Abdominal injuries was 6% which is similar to A Adem (15) 5.6 and Hanafi (18) 5% but significantly lower than Misauno ,et al . (16) 12.2% and massaga (14) 16.8% and Mohamed N. Albadani (17) 10.7%.

The time of reporting to the hospital 94.7% were the in the time period of 1-6 hours while 4% did presented in less than hour and 1.3% presented after 6 hours which is comparable with result of Mohan Atri ,et al. as he found 75.8% of his cases presented in the first 4 hours (19) .

61.3% presented were heamodynamically stable while 26.7% were having Dyspnea and 12% presented with shock.

The majority of the patients (58.7%) were managed conservatively by observation analgesia and oral antibiotics 41.3% received management by chest tube one patient had a bilateral chest tube due to bilateral Haemopneumothorax , compared to Mohan Atri ,et al. chest tube was done in 48.4% patients, while in Mohamed N. Albadani 71.5% , HZ Ashraf ,et al. 41.38% were successfully managed by chest tube, the duration of the chest tube ranged from 2-5 days With mean duration of 2.9 days (17,19,20).

The complication rate is 10.7% which is low in comparison to Mohammed N.Albadani who had complication rate of 20%, Baily Rc has 30% while F.A Massaga who find rate of 32.9%, the complication rate depends on many factors the type and the severity of the injury the associated body part involved and the duration of the chest tube stays as it as linear relationship with complication rate (14,17,21) .

The total mortality was 2% which comparable with to Misauno 4.5%, Mohan Atri ,et al. 5%, Kesieme EB ,et al. 9.9% , Umer M. Tariq ,et al. 3.1% this low mortality may contributed to the fact that the majority of the patient did not suffer from severe trauma and the status of other organ involved ??7.16,19,21) .

6 Conclusion

Chest trauma is an important public health problem accounting for a substantial proportion of all trauma admissions at Omdurman teaching hospital, the pattern of chest trauma and its management was almost similar to many series although the female incidence showed to be higher than other series.

Road traffic accident continues to be the major etiological factor for chest injuries and the commonly affected victims are young adult males in their productive and reproductive age group.

Figure 1:

1

	Gender		
Age in years	Male	Female	Total
0 -0-10	3	2	5
10 11–20	23	19	42
20 21–30	31	23	54
30 31-40	15	12	27
40 > 50	10	12	22
Total	82	68	150

Figure 2: Table 1 :

2

Mode of trauma	Frequency	Percent
Road traffic accidents	110	73.3
Attacks	021	14.0
Stab	012	8.00
Fall	006	4.00
Gunshot	001	0.7
Total	150	100.0

Figure 3: Table 2 :

3

period of May 2013 to April 2014		
Diagnosis	Frequency	Percent
Rib fractures	85	56.7
Haemothorax	22	14.7
Haemopneumothorax	21	14.0
Pneumothorax	17	11.3
Flail chest	02	01.3
Lung contusion	02	01.3
Diaphragmatic injury	01	00.7
Total	150	100.0

Figure 4: Table 3 :

4

Duration in days Frequency		Percent
<3	18	12.0
3-7	72	48.0
8-14	9	6.0
> 14	2	1.3
No admission	49	32.7
Total	150	100.0

Figure 5: Table 4 :

5

Diagnosis	Outcome			Total
	Uneventful	Death	Complications	
Rib fracture	62.6%	00.0%	18.8%	56.7%
Pneumothorax	09.9	00.0	25.0	11.3
Haemothorax	14.5	66.7	06.3	14.7
Haemopneumothorax	10.7	33.3	37.5	14.0
Flail chest	00.8	00.0	06.3	01.3
Lung contusion	01.5	00.0	00.0	01.3
Diaphragmatic injury	00.0	00.0	06.3	00.7
Total	87.3	002	10.7	100%

Figure 6: Table 5 :

6

associated injuries	Outcome			
	Uneventful	Death	Complications	Total
Bowel injury	04.6% 0.00%		37.5%	8.0%
Diaphragm	0.00	0.00	06.3	00.7
Liver	0.00	0.00	06.3	00.7
Spleen	01.5	0.00	31.3	04.7
Soft tissue injury	09.9	33.3	06.3	10.0
Extradural hematoma	02.3	0.00	06.3	02.7
Extremities fractures	54.2	66.7	06.3	49.3
Pelvis injury	02.3	0.00	0.00	02.0
No other organs involved	25.2	0.00	0.00	22.0
Total	100	100	100	100.0 %
P value 0.000				

Figure 7: Table 6 :

161 The majority of the chest traumas are successfully managed by tube Thoracotomy and supportive measures
162 as well. Other organs or systems should be carefully assessed for associated injuries or damages. [1]

[Bailey and Short (ed.)] , R Bailey , Love Short . R.C.G Russell, Normans. Williams and Christopher j.k Bulstrode (ed.) (Arnold publications 2004.chapter 23 accident and emergency surgery)

[Hanafi et al. ()] 'Atef Abdelaziz. Pattern and presentation of blunt chest'. Moataz Hanafi , Hazem Al-Sarraf , Sharaf . 10.1186/1757-7241-17-8. *Resuscitation and Emergency Medicine* 2009. 17 (8) . (Scandinavian Journal of Trauma)

[Wanek and Mayberry ()] 'Blunt thoracic trauma: flail chest, pulmonary contusion, and blast injury'. Sandra Wanek , John C Mayberry . *Crit Care Clin* 2004. 20 p. .

[Tai ()] 'Boffard Thoracic trauma: principle of early management'. Nrm Tai . *Trauma* 2003. 5 p. .

[Adem et al.] 'Chest injuries in Tikur Anbessa Hospital, Addis Ababa: athree year experience'. A Adem , Hagoa , Mekonen . *East and Central African Journal of Surgery. 6* 1.

[Al-Koudmani et al. ()] 'Chest trauma experience over eleven-year period at al-mouassat University Teaching Hospital-Damascus: A retrospective review of 888 cases'. Ibrahim Al-Koudmani , Bassam Darwish , Kamal Al-Kate , Yahia Taifour . *Journal of Cardiothoracic Surgery* 2012. 7 p. .

[Atri et al. ()] 'Chest trauma in Jammu region an institutional study'. Mohan Atri , Gurjit Singh , Arvind Kohli . *Ind J Thorac Crdiovasc Surg* 2006. 22 p. .

[Heng et al. (2004)] 'Complications of intercostal catheter insertion (ICI) using EMST (Early management of severe trauma) techniques for chest trauma'. K Heng , A Bystrzycki , M Fitzgerald , R Gocentas , S Bernard , L Niggermeyer . *Asian Cardiovasc Thorac Ann* 2004 Jun. 2011. 74 (6) p. . (ANZ J Surg)

[Bailey ()] 'Complications of tube thoracostomy in trauma'. R C Bailey . *Accid Emerg Med. Emerg Med* 2000. 17 p. .

[Freeman et al. ()] 'Indications for Using Video-Assisted Thoracoscopic Surgery to Diagnose Diaphragmatic Injuries After Penetrating Chest Trauma'. Richard K Freeman , Ghanam Al-Dossari , Kelley A Hutcheson , Lynn Huber , Michael E Jessen . *Ann Thorac Surg* 2001. 72 p. .

[Umer et al. ()] *Institutional report -Thoracic non-oncologic Changes in the patterns, presentation and management of penetrating chest trauma patients at a level II trauma centre in Southern Pakistan over the last two decades. Interactive CardioVascular and Thoracic Surgery*, Muhammad Umer , Ahmad Tariq , Hamza Faruque , Mansoor Ansari , Umar Ahmad , Shazia Rashid , Hasanat Perveen , Sharif . 2011. 12 p. .

[Albadani and Alabsi ()] *Management of Chest Injuries: A prospective study YEMENI JOURNAL FOR MEDICAL SCIENCES*, Mohamed N Albadani , Nabil A Alabsi . 2011. p. .

[William C. Wood (ed.) ()] *Oxford Textbook of Surgery 2nd edition by*, William C. Wood (ed.) 2000. By Oxford Press. p. 12. (Section 41 Thoracic surgery)

[Ali and Gali ()] 'Pattern and management of chest injury in Maiduguri'. N Ali , B M Gali . *Nigeria. Annals of African Medicine* 2004. (13) p. .

[Monafisha K Lema et al. ()] 'Pattern and outcome of chest injuries at Bugando Medical Centre in Northwestern Tanzania'. Monafisha K Lema , L Phillipo , Joseph B Chalya , William Mabula , Mahalu . *Journal of Cardiothoracic Surgery* 2011. 6 p. 7.

[Kesieme et al. (2011)] 'Profile of thoracic trauma in two semiurban university hospitals in Nigeria'. E B Kesieme , E F Ocheli , C N Kesieme , C P Kaduru . *Professional Med J* Sep 2011. 18 (3) p. .

[Misauno et al. ()] 'Severe chest trauma in Jos, Nigeria: Pattern and outcome of management'. M A Misauno , A Z Sule , H C Nwandialo , K N Ozoilo , A L Akwras , B T Ugwu . *Nigerian Journal of Orthopedics and Trauma* 2007. 6 (2) p. .

[Petrone et al.] *Surgical management of penetrating pulmonary injuries*, Patrizio Petrone , A Juan , Asensio .

[Massaga and Mchembe ()] 'The Pattern and Management of Chest trauma at Muhimbili National Hospital'. F A Massaga , M Mchembe . *Dar el Salaam. East and Central African Journal of Surgery* 2010. 15 p. .

[Hz Ashraf et al. ()] 'Thoracic Injuries in Indian Kashmir during Earthquake'. A G Hz Ashraf , M Ahangar , Ashai , Lateef Wani , Dar , Ra Lone , Irshad . *IRCMJ* 2005. 2010. 12 (3) p. .

[Saaiq et al. ()] 'Thoracic Trauma: Presentation and Management Outcome'. Muhammad Saaiq , Aslam Syed , Shah . *Journal of the College of Physicians and Surgeons Pakistan* 2008. 18 (4) p. .

[Maxwell et al. ()] *Use of presumptive antibiotics following tube thoracostomy for traumatic haemopneumothorax in the prevention of empyema and pneumonia*, R A Maxwell , D J Campbell , T C Fabian . 2004. 57 p. .