

Studying of Blunt Chest Trauma in Sudan and Potential Diagnosis

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Abstract: A retrospective study on chest trauma in Sudan and potential diagnosis has been carried out in a sample consists of 280 cases collected from Niyala teaching hospital, Kosti teaching hospital, Khartoum teaching hospital and Omdurman military hospital. The data analysis showed that: that the chest trauma predominated among male with a percent of 66.4% relative to the female group that represents 33.6%, and the incidence is higher among male relative to female during the whole range of ages and the average age of patient was (31.9±14.8) and (32.9±14.6 year). The blunt chest trauma is more common than penetrating one and representing about 73.6% while the penetrating represents only 26.4% of the cases and the incidence of chest trauma found even during childhood i.e. age group of 4-8 years, and increases rapidly following aging and peaking at age group of 24-28 years old. The common causes of chest trauma were the road traffic accidents (RTA) represents 56.5%, Gunshot represents 19.4%, stab wound 13.0% and the least was the fall-down which represents 11.1% and the common involved side in chest was the right lung 55.5%, then the left lung 20.9%, middle 13.6% and both lung 11%. The patient presentation was 53.6% as Hemoptysis, Dysphnea, Chest Pain, and Rib fracture. A 21.8% as Chest pain and Rib fracture. A 12.7% as Chest pain and dysphnea, and 11.8% of patients presented with chest pain only. The findings only being revealed by CT scan were liver-hematoma, sternum fracture, emphysema and pneumothorax.

Keywords: Chest, Blunt, Trauma, CT, x-ray.

1. Introduction

Recently chest trauma has been dramatically increases in Sudan following the high number of natives who possess private cars for transportation, motor cycles and in addition to other factors such as violence attitudes in driving and internal wars in some sectors of Sudan. Chest trauma which has been commonly encountered in Sudanese hospitals and clinics is classified as blunt or penetrating. The penetrating trauma is characterized with an opening to the inner thorax caused by stabbing, fractured ribs or gunshot wounds [1].

Blunt thoracic injuries represent the 3rd. injury among polytraumatic patients i.e. after the head and extremities injuries [2] and as a second common cause of death, following head trauma, and mostly for young age group between 15 and 44 years old [3].

With special consideration, blunt chest trauma is directly responsible for 25% of all traumatic deaths [4]. Most blunt thoracic injuries are caused by motor vehicle crashes (MVC; 63–78%), with the remainder (10–17%) caused by falls from heights and a minority from blows from blunt objects or explosive devices [5].

Portable chest radiography is the initial imaging method used at the emergency workup of the polytrauma patient, and it is useful for detecting serious life-threatening conditions, such as a tension pneumothorax or haemothorax, mediastinal haematoma, flail chest or malpositioned tubes. However, the superiority of CT over chest radiography has been documented in the literature;

CT detects significant disease in patients with normal initial radiographs and in 20% will reveal more extensive injuries

compared with the abnormal initial radiographs, necessitating a change of management [6]. CT is far more effective than chest radiography in detecting pulmonary contusion, thoracic aortic injury and osseous trauma, especially at the cervicorthoracic spine. Multi Detector CT (MDCT) has dramatically decreased imaging times and offers multi-planar reformatted images. Therefore, it has been established as the gold standard for the imaging evaluation of chest trauma and trauma in general [7].

The general trend of this study was to study the blunt chest trauma in Sudan with consideration to diagnosis with conventional x-ray and CT and their relative findings.

2. Methodology

The study has been carried out as a retrospective study; and the data has been collected from picture archiving systems of different hospitals including Niyala teaching hospitals, Kosti teaching hospital, Khartoum teaching hospital, and Omdurman military hospital. The sample of the study which consists of 280 cases of chest trauma was targeting the patients who referred to those hospitals for thoracic injuries diagnosis. The reviewed variables were the gender, types of trauma, causes of chest trauma, anatomical site of injury, signs and symptoms, and the common radiographic appearance. The data analyzed using EXCELL software which shown in forms of bars and correlation.

3. Results

The results presenting the data related to chest trauma in Sudan and the potential diagnosis and highlighting the gender, types of trauma, age, causes of trauma, anatomical

site, sign and symptoms and the common radiographic appearance.

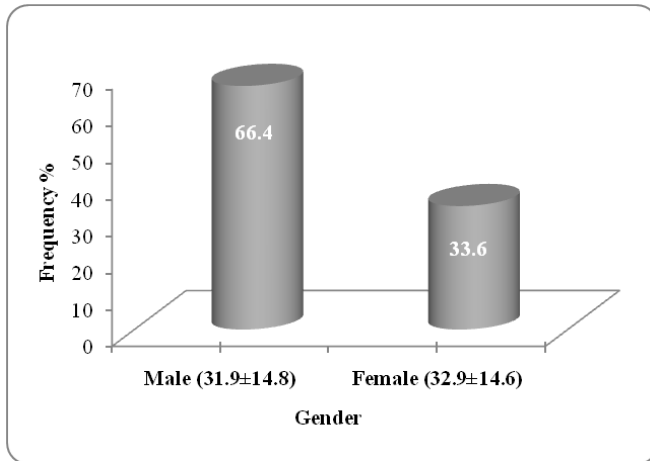


Figure 1: shows the frequency of blunt chest trauma distributed based on gender.

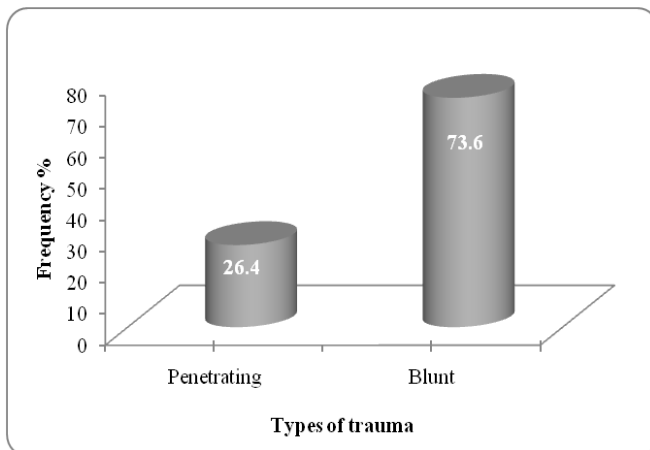


Figure 2: shows the frequency % of the chest trauma distributed based on the types of trauma

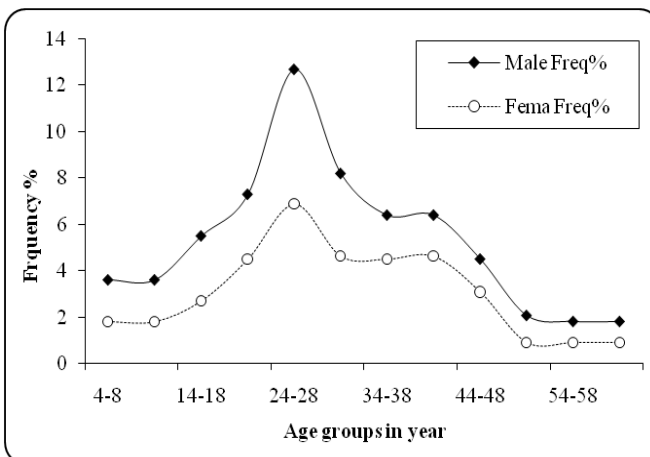


Figure 3: shows the frequency% of chest trauma distributed based on the age group for male (31.9±14.8 years) and female (32.9±14.6 year).

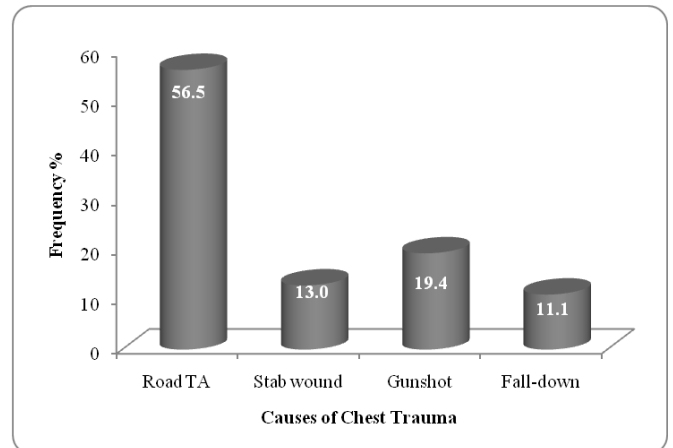


Figure 4: shows the frequency percent of common causes of chest trauma in Sudan.

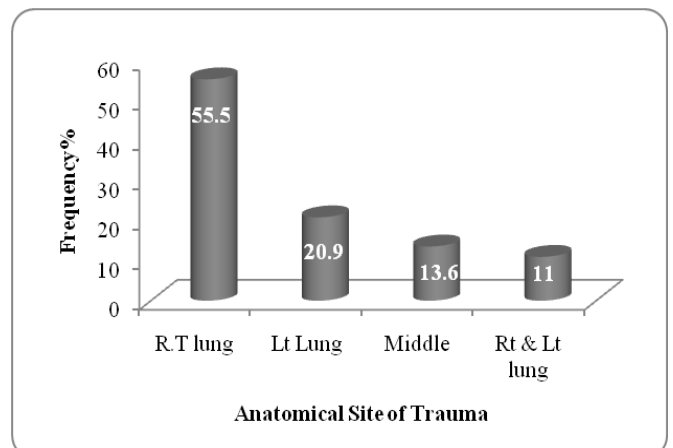


Figure 5: shows the frequency% of the common anatomical sites of chest trauma

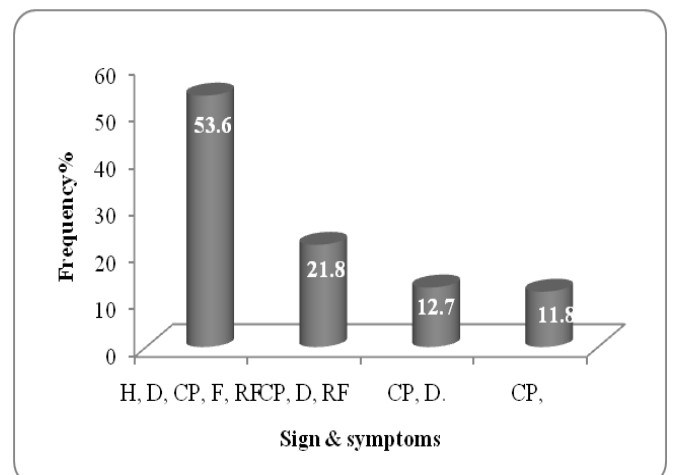


Figure 6: shows the frequency% of the common signs and symptoms of chest trauma (H = Heamoptysis, D = Dysphnea, CP = Chest Pain, F = Fever, RF = Rib fracture)

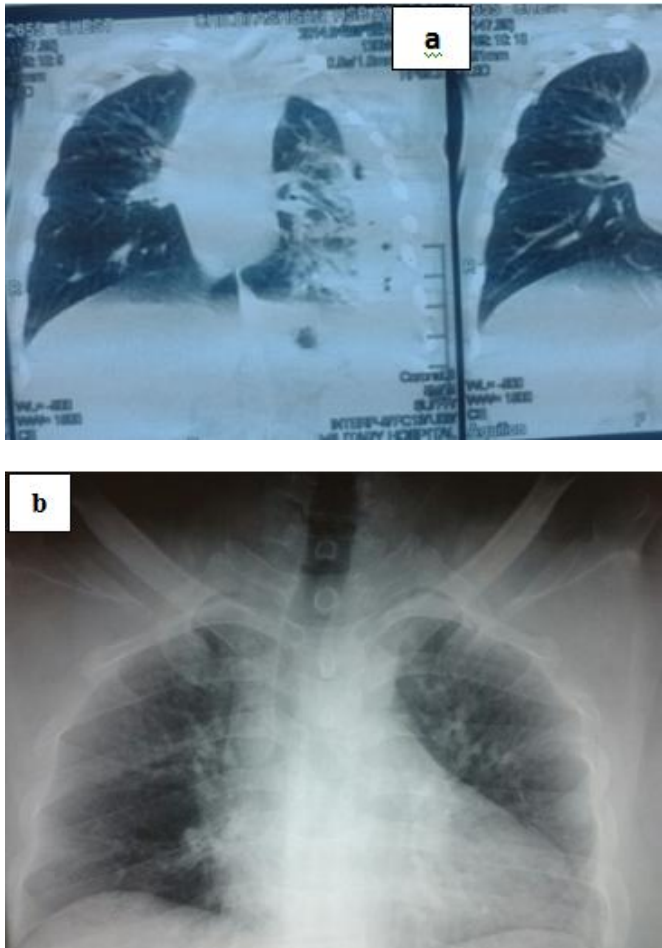


Figure 4.7: CT image showing (a) Lt Lingual and lower lobes consolidation, Lt obvious Emphysema thoraces, and fracture Lt 6th. Rib posterior, (b) CXR shows mild pneumothorax in the left side, multiple left posterior 3rd., 4th., 6th. and 8th. ribs fracture

4. Discussion

Figure 4.1 the Frequency of blunt chest trauma distributed based on Gender. It reveals that the chest trauma predominated among male with a percent of 66.4% relative to the female group that represents 33.6%, such high incidence of chest trauma among male could be ascribed to the fact that: male are more susceptible to chest traumatic factors than female e.g.in football, car accidents, violent entertainments and acrobatic games. In relation to this results, Oikonomou and Prassopoulos, [8] stated that: traffic accidents are the major source of blunt chest trauma representing approximately two thirds of the cases. Also among those traumatic victims, the mortality rate is high; hence the traumatic deaths tend to deplete the pool of human resources as the majority of the victims are working males and youth.

Figure 4.2 the Frequency % of the chest trauma distributed based on the types of trauma. It reveals that: the blunt chest trauma is more common than penetrating one and representing about 73.6% while the penetrating represents only 26.4% of the cases. The increasing incidence of blunt cases has a relation with mode of accidents, and in this realm Wong et al, [9] stated that blunt thoracic trauma causes 20%

of trauma related deaths which caused by motor vehicle crashes in 63% to 78%, while only 10% to 17% are related to fall from height. Also Sarita et al, [10] stated that the common type of chest trauma was the blunt (64%) of the cases and was due to motor vehicle accidents.

Also the result showed in Figure (4.3), that highlighted the frequency% of chest trauma distributed based on the age group for male and female, the incidence of chest trauma found even during childhood i.e. age group of 4-8 years, however the incidence increases rapidly following aging and plateau of incidence occurs at the age group of 24-28 years old, which represent the early youth that famous for violence, adventures and subjection to different causative traumatic factors. Indeed the incidence is higher among male relative to female during the whole range of ages and the average age of patient was (31.9±14.8) and (32.9±14.6 year) years for male and female respectively. This result is agreed with study carried out by EL-Menyar et al, [11] in which they found that the chest trauma is common among age groups of 33±15years and males comprised 94% of cases.

In Figure (4.4) the study showed that: the frequency% of the common causes of chest trauma were the road traffic accidents (RTA) represents 56.5%, Gunshot represents 19.4%, stab wound 13.0% and the least was the fall-down which represents 11.1%. The high incidence of chest trauma related to traffic accidents is depend on the area of the research, which ascribed to dramatic increase in the number of cars in the country as well as to the narrow constructed roads which ruined by rains and flood, as well the raising tribal and political wars and conflicts in some sectors of Sudan. In relation to this result Omert et al, [12] stated that: motor and vehicles accidents and falls down have high incidence causes and mortality in younger adults in the united state.

Figure (4.5) shows the frequency% of the common anatomical sites of chest trauma. It reveals that: the common involved side in chest trauma was the right lung 55.5%, then the left lung 20.9%, middle 13.6% and both lung 11%. The justification could be ascribed on the fact that: many vehicle drivers manage to save the left side depending on the rules of driving in Sudan i.e. the vehicles are left direct-soon which leading to increase the traffic accident at right site of the common cars and vehicles.

Figure (4.6) shows the frequency% of the common signs and symptoms of chest trauma. Hence the study revealed that: 53.6% of the patients presented with Heamoptysis, Dysphnea, Chest Pain, and Rib fracture. A 21.8% presented with Chest Pain, and Rib fracture. A 12.7% presented with Chest Pain and dysphnea. And 11.8% of patients presented with chest pain. The consequences of blunt trauma such as heamoptysis commonly indicates the piercing of the lungs with the broken ribs in the sample, and however due to interference of some signs and symptoms only a CT scan can reveals the pattern of the trauma, in this realm: the common signs and symptoms shown above have been mentioned by Vyhnánek et al, [13] in which they stated that CT is considered as an imaging modality of choice in the assessment of patients with clinical or symptoms following blunt chest trauma. In this study some findings only being

revealed by CT scan were emphysema and consolidation while pneumothorax has been shown in CT and CXR as highlighted in Figure (4.7)

References

- [1] Shanmuganathan K, Matsumoto J. (2006). Imaging of penetrating chest trauma. *Radiol Clin North Am.*, Vol. 44, P: 225–238.
- [2] Kaewlai R, Avery L. L, Asrani A. V., Novelline R. A. (2008). Multidetector CT of blunt thoracic trauma. *Radiographics*. Vol. 28, P: 1555–1570.
- [3] Clark D. E., Fantus R. J. National Trauma Data Bank (NTDB) Annual Report. (2007). Chicago, I. L: American College of Surgeons; P: 1 - 64.
- [4] Scaglione M, Pinto A, Pedrosa I, Sparano A, Romano L. (2008). Multi-detector row computed tomography and blunt chest trauma. *Eur. J. Radiol.* Vol. 65, P: 377-388.
- [5] Mayberry J. C. (2000). Imaging in thoracic trauma: the trauma surgeon's perspective. *J. Thorac Imaging*. Vol. 15, P: 76-86.
- [6] Exadaktylos A K, Sclabas G, Schmid SW, Schaller B, Zimmermann H. (2001). Do we really need routine computed tomographic scanning in the primary evaluation of blunt chest trauma in patients with "normal" chest radiograph? *J. Trauma*. Vol. 51, P: 1173 -1176.
- [7] Peters S, Nicolas V, Heyer CM. (2010). Multidetector computed tomography-spectrum of blunt chest wall and lung injuries in polytraumatized patients. *Clin Radiol*. Vol. 65, P: 333 - 338.
- [8] Oikonomou A. and P. Prassopoulos. (2011). "CT imaging of blunt chest trauma", *Insights Imaging*, Vol. 2, P: 281-295.
- [9] Wong H, Gotway MB, Sasson AD, Jeffery RB. (2004). Periarotic hematoma at diaphragmatic crura at helical CT sign of blunt aortic injury in patients with mediastinal hematoma. *Radiology* Vol. 231, P: 185-189.
- [10] Sarita Magu, Ashok Yadav and Shalini Agarwal. (2009). Computed Tomography in Blunt Chest Trauma. *Indian J. Chest Dis. Allied Sci.* Vol. 51, P: 75-81.
- [11] El-Menyar A., R. Latifi , H. AbdulRahman , A. Zarour , M. Tuma, A. Parchani, R. Peralta, and H. Al Thani. (2013). Age and traumatic chest injury: a 3-year observational study. *Eur J. Trauma. Emerg. Surg.* Vol. 28, P: 1-7.
- [12] Omert L. Yeane W. W, Protetch J. (2001). Efficacy of Thoracic computerized tomography in blunt chest trauma. *Am Surg*. Vol. 67; P: 660-664.
- [13] Vyhnánek F, Skála P, Skrabalová D. (2011). A contribution of multidetector computed tomography to indications for chest wall stabilisation in multiple rib fractures. *Acta Chir Orthop Traumatol Cech.* Vol.78(3), P: 258-261.

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