Plain X-ray Findings Among Chest Trauma Patients in Lagos

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ABSTRACT

Background: Chest trauma survivors experience a complexity of problems. Plain radiography of the chest has being the standard diagnostic tool in the initial evaluation of chest trauma patients. The aim of this study is to identify plain chest radiograph findings seen in chest trauma patients and investigate the major causes of chest trauma. **Methodology:** The study is a cross-sectional retrospective study designed to identify plain chest radiograph findings in all patients with chest trauma in two public hospitals in Lagos, Nigeria from June 2012 to September 2012. The data was analyzed using epidemiology information (Epi Info) software. **Results:** A total of 200 patients that underwent chest X-ray due to chest trauma were reviewed. The majority of the cases were of the age group of 36–45 years, followed by age range 46–55 years. The majority of the cases at the National Orthopedic Hospital Igbobi were males 71 (61.7%) while females accounted for 44 (38.3%). The figures for the cases at The Lagos State University Teaching Hospital were 63 (74.1%) for males and 22 (25.8%) were female. Clinical information revealed that most cases of chest trauma were caused by road traffic accident, followed by gunshot injuries. The most common radiograph finding was rib fracture. **Conclusion:** Chest injury is more common in males. The majority of the chest trauma cases were related to blunt chest trauma. Rib fracture is the most common finding in chest radiographs of patients with blunt and penetrating trauma.

Key words: Chest; trauma; X-ray

Introduction

Trauma refers to a body wound or shock produced by sudden physical injury, either from violence or accident. It can also be described as a physical wound or injury, such as a fracture or blow.[1]

The term chest trauma, also known as thoracic trauma is a serious injury of the chest; it is a common cause of significant disability and mortality in Nigeria, the leading cause of death from physical trauma after head and spinal cord injury.[2] A chest injury is any form of physical injury to the chest including the heart and lungs. Chest injuries account for 25% of all deaths from traumatic injury.[3] Generally chest injuries are caused by a blunt mechanisms such as motor vehicle collisions or penetrating mechanism such as stabbings.[4]

Chest trauma can be classified as blunt and penetrating thus blunt, and penetrating injuries have different pathophysiology and clinical courses. Penetrating trauma occurs when the victim suffers an injury that breaks the skin, such as knife in the chest or a gunshot wound. Victims with blunt trauma may have some torn skin, but the tear is not the cause of the trauma itself, and the damage is often less localized. Blunt trauma accounts for 25% of all death due to trauma emergencies. Blunt chest injuries are the primary or contributing cause of about a quarter of all trauma-related death. The mortality rate is about 10%.[5] Thoracic injuries account for 20–25% of deaths due to trauma and contribute to 25–50% of the remaining deaths. Approximately 16,000 deaths/year in the United States alone are attributable to chest trauma.[6] Chest

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radiography is very important because it will identify most significant chest wall injuries. Chest trauma is caused by the recklessness of motorcycle riders, vehicle drivers, violence and so on. Car accidents and falls cause the most blunt chest trauma in contrast, gunshot wound cause the most penetrating trauma. Direct forces, abrupt deceleration, and other mechanisms can cause injury to thoracic structures like major intrathoracic vessels or the heart. Chest injuries often occur in combination with other severe injuries, such as extremities, head and brain and abdominal injuries. Chest trauma is an important cause of morbidity and mortality globally, however in recent years the overall survival rate has improved. Deaths are often due to airway obstruction, hemorrhage, flail chest, tension pneumo-thorax, cardiac tamponade, and associated intra-abdominal and skeletal injuries. In Nigeria, the spectrum of chest trauma cases varies from mild injuries to major life-threatening conditions.[7]

Motor vehicle accident is the most common cause of thoracic injuries. Wounds sustained either by accident or malice can cause thoracic trauma and these may include stabs wound to the chest, falls and physical abuse among other conditions. Early fatalities following severe trauma can be accounted for by injury to the chest wall and intrathoracic contents.

Chest trauma ranks third behind head and extremity trauma in major accidents in the United States. The motor vehicle accident is the most common etiology with the chest wall the most often injured. Many of these injuries are of moderate severity and rarely require surgical intervention.[6] Rib fractures are the most common finding after blunt chest trauma with an incidence reported up to 40%. Chest radiography is routinely used to assist in the diagnosis of rib fractures, even though it has limited sensitivity. It is even more insensitive in showing costochondral fractures. Computed tomography (CT) is the most sensitive technique for imaging rib fractures, since it can help to determine the site and number of fractures and more importantly, provide information regarding any associated injuries.[8]

The incidence of chest trauma has increased significantly since the turn of the century especially in developed countries where rapid transportation has become part of daily life, road traffic accident have become the scourge of peacetime and modern civilization. Chest X-ray remains a standard diagnostic tool in the initial evaluation of chest trauma in developing countries due to the relative high cost of the CT scan. The aim of this research is to identify plain chest radiograph findings seen in chest trauma patients and investigate the major causes of chest trauma.

Methodology

The study is a cross-sectional retrospective study designed to identify plain chest radiograph findings in all patients with chest trauma in two Public Hospitals in Lagos, Nigeria from June to September 2012. Patients with inadequate clinical details were excluded from this study. It focused mainly on the findings that were seen on the chest radiograph of the patients after chest trauma, inclusive of the major causes in both hospitals.

Data analysis

The data collated was analyzed using Epi Info version 3.5.1. Results were presented using frequency tables, bar diagrams and pie charts.

Ethical approval

Ethical approval was obtained from Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria.

Presentation of Results

A total of 377 patients had chest radiographs done due to chest trauma, but only 200 had adequate clinical and radiological records hence were recruited into the study [Chart 1].

Table 1 shows that 71 (61.7%) of patients with chest trauma were males and 44 (38.3%) females at Igbobi while 63 (74.1%) of patients with chest trauma were males and 22 (25.8%) were females in LASUTH.

Chart 2 shows that 42.6% of the chest trauma was caused by road traffic accident and 31.4% was caused by gunshot injury, 13.0% was caused by fall and stab wound injury at I gbobi and 45.9% was caused by road traffic accident, 18.8% was caused by gunshot injury, 18.8% was caused by stab wound injury and 16.5% was caused by fall at LASUTH.

Table 2 shows that rib fracture was the most common (37.4%), followed by collapsed lungs, which accounted for 15.7%, pulmonary contusion (13.0%) and pneumothora × 11.3% at Igbobi. While at LASUTH, rib fracture accounted for 44.7%, then hemothora × 18.8% followed by pneumothorax, which was 14.1%.

Discussion

The review of patients who had undergone chest X-ray due to chest trauma and had adequate clinical data at the National Orthopedic Hospital Igbobi and LASUTH showed a wide variation of findings.

Table 1: Sex distribution of patients

Sex	Frequency (%)		Total (%)
	Igbobi	LASUTH	
Male	71 (61.7)	63 (74.1)	134 (67)
Female	44 (38.3)	22 (25.8)	66 (33)
Total	115 (100)	85 (100)	200

Sex distribution of the patients with cases of chest trauma in Igbobi and LASUTH. Chest trauma occurred in 67% of males and 33% in females respectively. There is male predominance at both centers which is more noticeable at Igbobi. LASUTH – Lagos State University Teaching Hospital

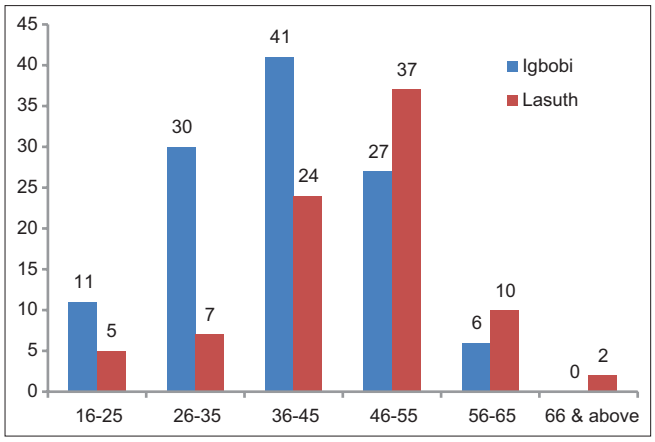

Chart 1: A bar chart showing age distribution in Lagos State University Teaching Hospital and Igbobi. Age distribution of the patients with cases of chest trauma at the National Orthopaedic Hospital Igbobi and Lagos State University Teaching Hospital. Chest trauma occurred mainly in 32.5% among patients with the age range of 36–45 years and it is very rare in patients within the age range 66 and above

Table 2: X-ray findings in chest trauma patients

X-ray findings	Frequency (%)		Total (%)
	Igbobi	LASUTH	
Collapsed lungs	18 (15.7)	6 (7.1)	24 (12.0)
Hemopneumothorax	12 (10.4)	1 (1.2)	13 (6.5)
Hemothorax	8 (7.0)	16 (18.8)	24 (12.0)
Pulmonary contusion	15 (13.0)	8 (9.40)	23 (11.5)
Pleural effusion	6 (5.2)	4 (4.7)	10 (5.0)
Pneumothorax	13 (11.3)	12 (14.1)	25 (12.5)
Rib fracture	43 (37.4)	38 (44.7)	81 (40.5)
Total	115 (100)	85 (100)	200 (100)

LASUTH – Lagos State University Teaching Hospital

A large percentage of the patients who had chest trauma were adults. At Igbobi, 41 (35.7%) were adults and within the age range of 36–45 years In LASUTH, 37 (43.5%) were also adults within the age range of 46–55 years. In Nigeria, studies done by Mezue *et al*. in Enugu on chest injuries,[9] Adeboye *et al*. in Ibadan[10] and Ekpe and Eyo in Uyo, Nigeria[11] had similar results. Internationally, these findings are similar to the study carried out in Tirupati in India[12] and in America by Clark *et al*.[13] However, these findings differed from studies done by Dalal *et al*. in India,[14] which demonstrated a higher incidence in a lower 21–40 age group.

Sex distribution in the two hospitals showed that most of the patients with chest trauma are males. Male predominance in this study is similar to studies done both locally and Internationally.[10,13-16] The similarity in male preponderance for chest injury is due to the greater exposure to outdoor activities and a more mobile lifestyle in men such as driving and working as laborers.

This study revealed that most of the chest trauma cases were caused by road traffic accident in the two hospitals.[17]

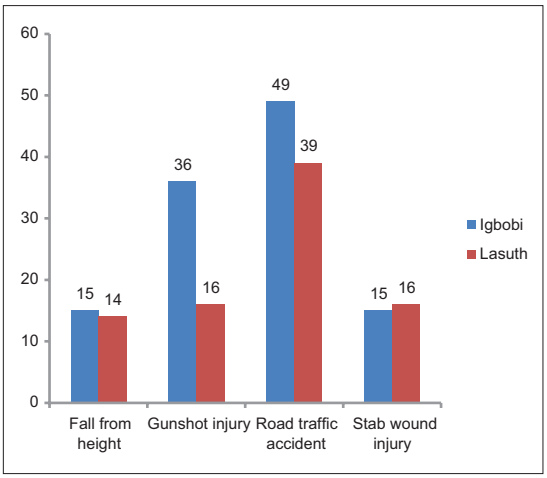

Chart 2: Different causes of chest trauma

Several studies reported similar findings.[10,11,14] This study differed from that done by Ali and Gali in Maiduguri in which penetrating chest wall injuries from a gunshot, arrow shot were the most common.[15] This is probably due to the fact that armed robbery and terrorism incidence in Maiduguri is high because it is the trading hub for North-Eastern Nigeria. It also has well-equipped Hospitals and Universities thus attracting foreigners from neighboring countries. Furthermore, from the mid-1960's, Maiduguri has witnessed several outbreaks of large-scale Islamic violence.

The most common finding on plain chest radiograph was rib fracture. Others included collapsed lungs, pneumothorax and hemothorax. These findings are similar to the study carried out by Mezue *et al*.[9] and several others.[8,10,14,16] Plain chest X-ray is the usual diagnostic work up done in emergency department for blunt chest trauma but because of its limited sensitivity other types of chest trauma may be missed hence the need for more sensitive tests such as CT. Marts *et al*. in their study, concluded that CT yielded additional information than chest X-ray alone and stressed that significant injuries such as lung contusion and pneumothorax can be missed on initial assessment.[18,19] Other studies by Zinck and Primack and Miller further buttressed the need for frequent use of CT instead of the standard chest X-ray.[20-22]

Conclusion

Chest trauma is a major health problem because it is associated with a high morbidity and mortality. Chest trauma is seen most commonly among the young male subpopulation.[23] This study revealed many causes of chest injury at two tertiary hospitals in Lagos, but the major causes are as follows: Road traffic accidents, gunshot injury and stab wound injury. These are the leading causes of hospitalization, disability, and mortality in the country.

There is a need for emergency chest X-ray check for all cases of trauma. Other imaging modalities such as sonography and

CT will assist in detecting all different types of chest trauma with better accuracy. And there is also need for immediate treatment of these patients in order to reduce the mortality rate.

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