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Assessment of road traffic accidents trauma using computed tomography scan in King Khalid Hospital, Najran province, KSA

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Abstract

Road accidents have been considered to be one of the primary causes of mortality and lifelong disability in the early decades of life in different countries, and road traffic injuries (RTI) have been identified as the ninth most common cause of disability adjusted life years (DALYs) lost for all age and gender categories. Multi-Detector Computerized Tomography (MDCT) scanners are widely used because they rapidly produce high-resolution scans of large areas, offering short examination times for multiple body regions under emergency conditions. A retrospective descriptive quantitative hospital based study conducted in 2522 patients their ages ranged (1-80), aimed to assess RTA trauma in Saudi Population in Najran province (KSA) in King Khalid Hospital, using CT scan. Statistical analysis of the data was performed using the Microsoft Excel. The study found that there were 2295 males (91%) 227 females (9%), were effected by RTA, age group (21-30 years) which signified 1011(40.1%), were frequently affected, spine and head were more affected and reported (980) (38.9%), (692) (27.4%) respectively. The conclusion of the study achieved that CT imaging plays a major role in diagnostic workflow in the evaluation of patients with trauma those usually have simultaneous injuries to several anatomic regions or organs, it can decrease the serious time and increase survival.

Keywords: Computed Tomography; Road Traffic Accident; Trauma; spine; Head

1. Introduction

Road accidents have been considered to be one of the primary causes of mortality rates in different countries. An increase number of vehicles on the roads has been in parallel to the growth of the automotive sector in the last years. Also traffic accidents have increased in parallel to increased vehicle, and younger are nearly three times more likely to be killed or injured on the roads than the older [1]. The burden of road traffic accidents (RTA) is a leading cause of most trauma admissions in hospitals worldwide. [2] According to the World Health Report (WHR) in 2010 [3], road traffic injuries (RTI) have been identified as the ninth most common cause of disability adjusted life years (DALYs) lost for all age and gender categories. The World Health Organization (WHO) reported that 1.24 million people were killed on the road and up to 50 million people were injured worldwide and the number of road traffic deaths is expected to increase further by 2020 [3,4]. Road traffic fatality in the Kingdom of Saudi Arabia (KSA) accounts for 4.7% of all mortalities,

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while road traffic mortalities do not exceed 1.7% in Australia, United Kingdom (UK), or United States of America (USA) [5]. Similarly, road fatalities in KSA have increased over the last decade from 17.4-24 per 100,000 population compared with 10 in USA and in UK[5], where road safety has been taken seriously,[6] Saudi Arabia was found to have higher number of deaths from RTAs among high income states (accident to death ratio is 32:1 versus 283:1 in USA) and is considered to be the country's main cause of death for 16-30-year-old males.[7] Factors influencing RTAs may include human related factors (e.g., driver error, behavior, fatigue, speeding, use of mobile phones during driving, sudden change of road lanes, unawareness about traffic rules and regulations, and unlawful road crossings), and non-human or environmental factors (e.g., unreliable tires and lights, road conditions, traffic flow and weather conditions)[8].

Trauma is a one of the most common cause of death and lifelong disability in the early decades of life [9]. In trauma patients who have sustained multiple injuries, time is one of the most crucial factors in predicting prognosis. Outcomes greatly improved when critical interventions are provided within the golden hour following injury. The availability of high-performance diagnostic imaging methods is a key element in the early diagnostic workup of patients with severe blunt trauma [10]. Emergency CT plays a major role in diagnostic workflow in the evaluation of patients with trauma those usually have simultaneous injuries to several anatomic regions or organs, it can decrease the critical time and increase survival [11]. Multi-Detector Computerized Tomography(MDCT) scanners are widely used because they rapidly produce high-resolution scans of large areas, offering short examination times for multiple body regions under emergency conditions, the most often examinations include the head, cervical spine and thorax to pelvis [12].The introduction of multi-detector-CT (MDCT) scanners made total body CT (TBCT) technically feasible and its high diagnostic accuracy makes it an attractive diagnostic tool for the initial radiographic imaging of trauma patients]13-14]. In patients with multiple trauma-related injuries (poly trauma), the use of 'pan-scan' or 'trauma-CT' (i.e., whole-body scan acquiring a plain CT scan of the head and neck followed by an intravenous contrast enhanced scan of the chest, abdomen, and pelvis) has a paramount role in initial image diagnosis—ascertaining the pattern, severity and extent of injuries needed to direct management [15].

The study was aimed to assess RTA trauma in Saudi Population in King Khalid Hospital in Najran province in southern Saudi Arabia, and to identify patterns of RTA injuries detected on CT scans in patients who presented to the hospital emergency department.

2. Material and methods

This was a retrospective descriptive quantitative hospital based study which search through the entering patient's files, whom were confirmed with RTA trauma by CT scan in King Khalid Hospital, Najran province in southern Saudi Arabia. It was conducted on 4755 RTA male and female patients their ages between (1-80) years, who presented at hospital emergency department(between Jan 2015- Jan 2016), 2522 patients of them were investigated by CT scan, 1000 patients , with complete clinical information and radiologic imaging were selected for analysis in this study. Data collected based on patients record in PAC system. Statistical analysis performed by using the Microsoft Excel (2017).

2.1. Technique

Procedure varied depending on stander protocol/guidelines. Non contrast studies carry out with patient supine head or feet first according to the area under examination. Multiplanar reconstructions of the thoracic and lumbar spine, additionally depending on the injuries present, especially if the images are reviewed with the patient is still on the CT table.

2.2. Ethical issue

Ethical aspect was carefully considered at the time of the study. Permission was taken from the head of the radiology and imaging department of King Khalid Hospital to perform the study.

3. Results

The main objective of the study was to assess the incident and type of RTA trauma in Saudi population in King Khalid Hospital in Najran province (KSA).

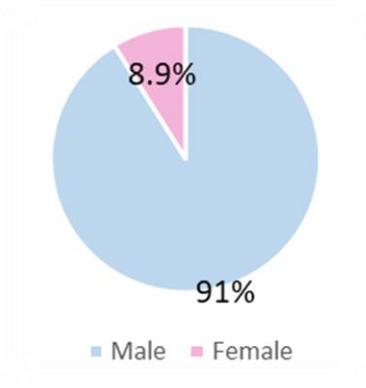


Figure 1 Gender distribution of traumatic patients in Najran province (2015-2016)

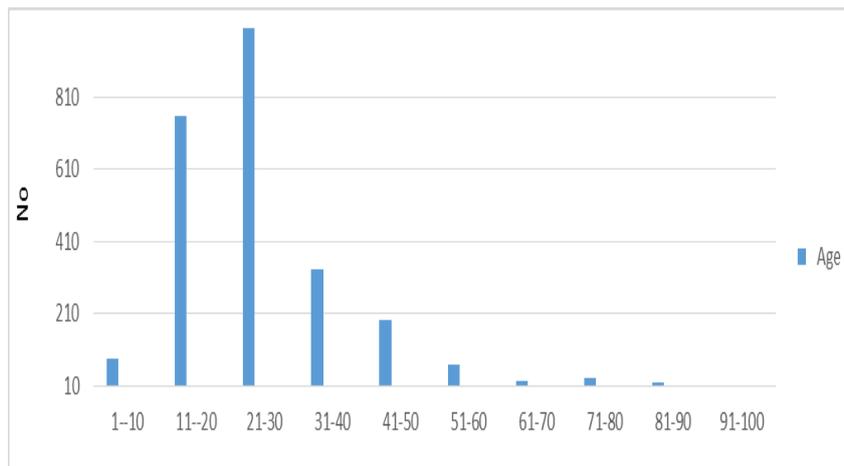


Figure 2 Age distribution of RTA traumatic patients in CT

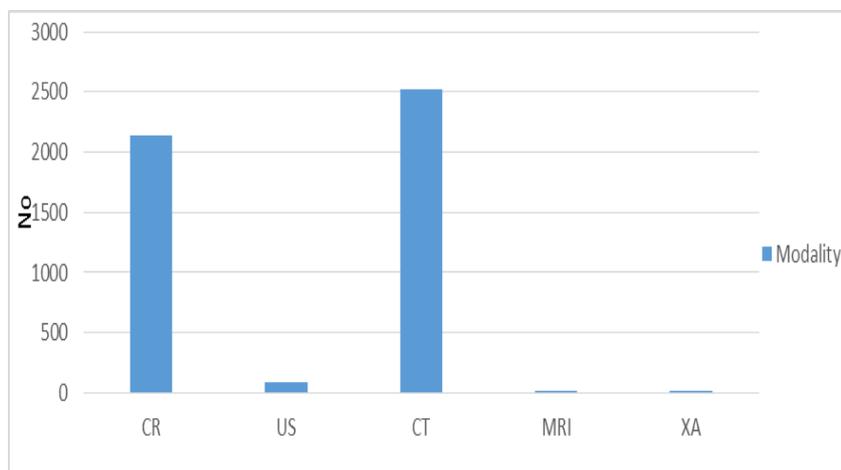


Figure 3 Incidence of modality commonly used for imaging trauma patients in Najran province

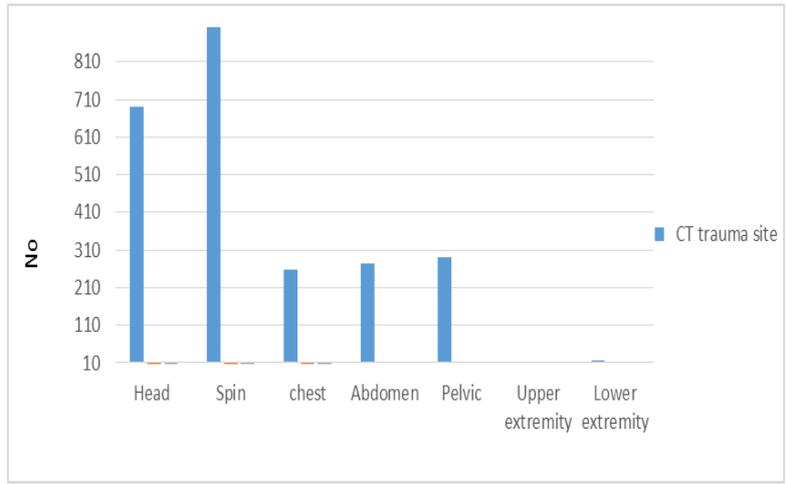


Figure 4 Site distribution of RTA trauma in CT

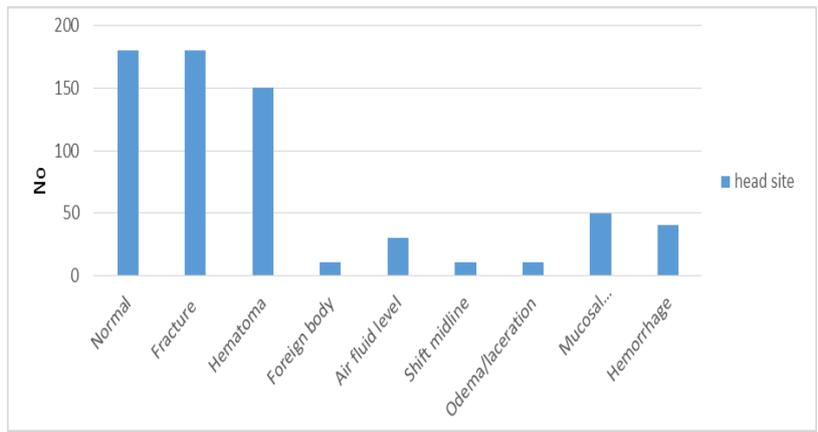


Figure 5 CT finding in head trauma

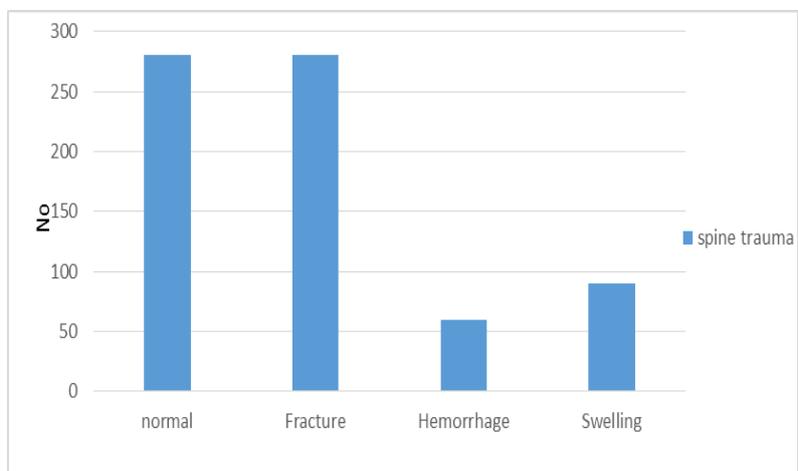


Figure 6 CT finding in spine trauma

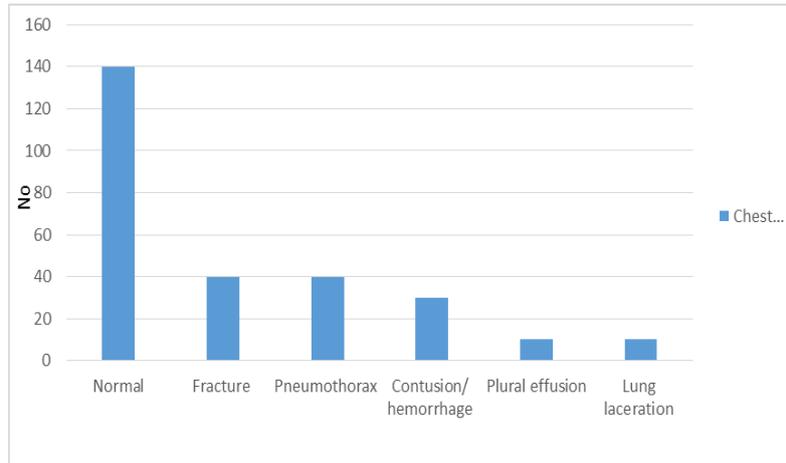


Figure 7 CT finding in chest trauma

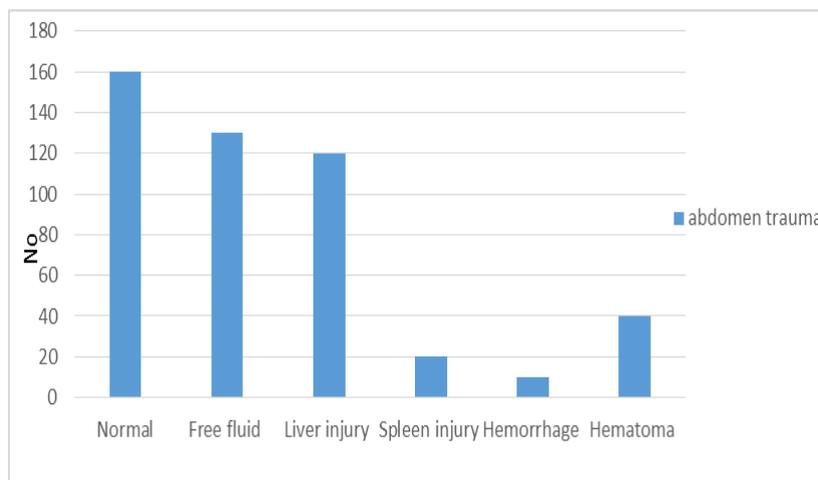


Figure 8 CT finding in abdomen trauma

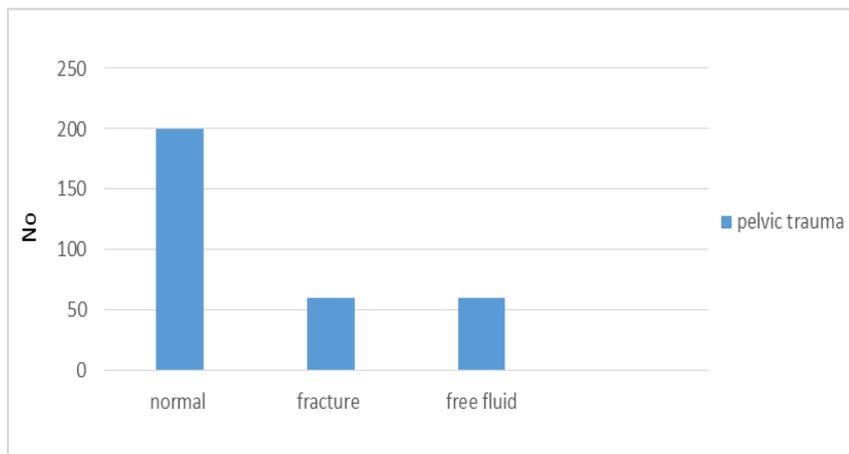


Figure 9 CT finding in pelvic trauma

4. Discussion

When the traumatic patients were assessed by emergency CT, we found that the most common vehicular injuries affected the spine and the head.

Figure (1) shown the gender distribution of traumatic patients in Najran province (2015-2016), and reflected that the higher percentage of the RTA trauma associated with male 4351 out of 4755 RTA patients (91%), while the affected female was 424 (9%), that was justify because driving system in Saudi Arabia allowing male to drive rather than female. **Figure (2)** reflected age distribution among the traumatic patients in CT and shown that the incidence of the RTA trauma was higher in the early ages, and the most affected age between (21-30) 40.1%, (11-20) 30.1%, (31-40) 13.2%, (41-50) 7.6%, (1-10) 3.4%, (51-60) 2.7%, (71-80) 1.3%, (61-70) 0.8%, (81-90) 0.7% and (91-100) 0.1%. this finding was reflected the Lack of awareness of the importance of commitment to traffic regulations and their consequences that may lead to death and disability, at those younger categories . Same finding achieved by Ali Al Orf, et al. in Damam, they were reported that young males are the most common victims is concerning as they represent a productive proportion of the population in terms of social and economic growth [16].

Figure (3) reflected distribution of the modality frequently used for imaging trauma patients in Najran hospital, which presented that the CT is the most common modality that used for evaluating RTA trauma, with 2522 patients of 4755 (52.8%), followed by Computed radiography CR which represented 2138 (44.8%), ultrasound US 91 (1.9%), magnetic resonance imaging MRI 17 (0.14%) then X-ray angiography XA 7 (0.1%). This finding specified the bouncing rule of CT which characterized by high accuracy and rapid diagnosis of trauma.

Figure (4) demonstrated site distribution of RTA trauma in CT which reflected that the spine is the most common site that affected by RTA which present 980 patient out of 2522 (38.9%) followed by the head which was 668 (26%), pelvic 291 (11.5%), abdomen 274 (10.9%), chest 257 (10.2%), lower extremity 17 (0.7%) and upper extremity 11 (0,4%). This finding differ with previous studies conducted in the region which found that most involved regions were the head and neck and appendicular skeleton. Barrimah reported more head and neck injuries in the Al-Qassim region. [17] Another study done in Suryapratap Singh by Tomar, Anuj Bhargava et al, Narayana Medical College, Nellore, India (2013), which state that RTA trauma were more common in head and CT scan brain is a classical as radiological modality to define status of head injury patient and very helpful to treat the head injury patients in golden hours without wasting more time [2]. Akanj et al, (2015) reported that the major cause of head injury to be road traffic accident, and he found that. The most common CT scan finding was cerebral contusion [18]

But our study found that the spine is the most affected site followed by head trauma.

Figure (5) shown the CT finding of head trauma among the patients , which represented that the most head trauma were Fractures, which reported 180 trauma out of 660 and represent (27.3%) then hematoma 150 (22.7%), Mucosal thickening which represented 50 (7.6%), Hemorrhage 40 (6.1%), Air fluid level 30 (4.5%), Foreign body 10 (1.5%), shift midline 10 (1.5%), Edema /laceration 10 (1.5%) and normal cases of head trauma were 180 case (27,3%). **Figure (6)** shown the CT finding in spine trauma that represent the most spine trauma is the fracture which reported 280 (39.4%) out of 710 cases , then swelling 90 (12.7%), hemorrhage 60 (8.5%) and normal cases of spine trauma were reported 280 (39.4%). **Figure (7)** shown the CT finding in chest trauma, and represent that the most chest trauma were the fractures which reported 40 out of 270 case and represent (14.8%) , pneumothorax 40(14.8%) , contusion/ hemorrhage 30 (11.1%), Plural effusion 10 (3.7%),and lung laceration which represented 10(3.7%) and 140(51.9%),with normal finding . **Figure (8)** shown the finding in CT abdomen and reflected that the most abdominal trauma were the free fluid which reported 130 (27.1%), the liver injury 120 (25%), hematoma 40 (8.3%), spleen injury 20 (4.2%), hemorrhage 10 (2.1%) and normal abdomen cases were 160 (33.3%). **Figure (9)** shown the CT finding in pelvic that represent the most pelvic trauma were fractures 60 (18.75%), free fluids 60 (18.75), and the normal pelvic were 200 (62.5%).

in our study the significant finding in all regions were fractures , except for the abdomen where the free fluid was the common finding, ,also high percentages of normal finding in CT scans were observed in all traumatic regions , it was reported (27,3%, (39.4%), (51.9%), (33.3%) and (62.5%) for the spine, head , chest , abdomen and pelvic respectively, A proper clinical assessment of the patient should precede the request for a CT scan, so to limit unnecessary scans and to reduce association radiation dose.

5. Conclusion

The study concluded that, the incident of RTA is relatively high among Najran population, it were most common in early age of male, and the spine and head were more common site affected by RTA trauma. Also it was indicated that the CT scan is the useful method in diagnosis RTA trauma.

Compliance with ethical standards

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Disclosure of conflict of interest

There was no conflict of interest among the authors.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

This study does not involve information about any individual e.g. case studies, survey, interview etc.,

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