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Case Report

Seat Belt Syndrome

Kelechukwu M. Onuoha, Kingsley K. Ekwe, Ikechukwu Anosike, Bolarinwa Akinola, Felix E. Ogedegbe
Department of Surgical Services, Cedarcrest Hospitals, Abuja, Nigeria

Abstract

Seat belt syndrome is a term used collectively for all injuries associated with the use of seat belts during motor vehicular accident. It usually presents with seat belt sign with associated intra-abdominal, thoracic, pelvic and spinal injuries. A 42-year-old male presented to our hospital 15 h after a head-on collision with an oncoming vehicle. He was the driver of a saloon car and was seatbelted at the time of the accident. He sustained multiple injuries which included blunt abdominal injury, multiple rib fractures and right femoral fracture. Examination revealed the seat belt sign on both anterior chest and abdominal walls and progressive abdominal distension with right femoral fracture. Chest, brain and abdominal computed tomography scans confirmed the diagnosis. He subsequently had an exploratory laparotomy and damage control orthopaedics in which an external fixator was applied to the right femur and a locked intramedullary nail thereafter. He recuperated and discharged home 26 days after the accident. Patients who present with a seat belt sign on the anterior chest or abdominal wall following a motor vehicle accident should be managed with a high index of suspicion for seat belt syndrome. Thus, the presence of any of the injuries mentioned should warrant a search for other associated injuries. With increase in the compliance of seat belt use amongst car users in Nigeria, there will be a rise in seat belt syndrome, There is need to create more awareness about seatbelt syndrome and a classification system would help to know its severity.

Keywords: Cedarcrest hospitals Abuja, road traffic accident, seat belt syndrome

Introduction

Seat belt sign is the contusions or abrasions found across the lower abdomen and/or the chest wall of an individual involved in a car accident while wearing seat belt. Seat belt syndrome is classically defined as seat belt sign with an intra-abdominal organ injury and/or fracture of the thoracic or lumbar spine with or without chest injury.[1] The organ damage in seat belt syndrome varies considerably with non-specific signs and symptoms.[2] Seat belt syndrome results from the force applied to the body by the restraining effect of the seat belt.[3]

Road traffic accident is a common cause of mortality and morbidity worldwide and more so in developing countries.[4] It is the leading cause of death amongst young people with young males involved than females. Each year, more 1.2 million people are killed in road traffic accident around the world with about 20–50 million seriously injured, leaving many with lifelong disability.[4] The correct use of seat belt reduces the risk of fatality amongst front-seat passengers by 40%–50% and the rear seat passengers by 25%–75%.[4] Seat belt has also been shown to be effective in saving lives and reducing severity of injury, length of stay in the hospital and the number of surgeries needed on the patient.[5] However, the use of seat belt may cause seat belt syndrome while immediately preserving life and causing injuries which may be fatal if not immediately recognised and managed.[1-3]

Although seat belt syndrome is generally accepted, only a few cases have been reported in Nigeria despite high rate of road traffic accident and enforcement of it by the law enforcement agents.[6,7] This may be due to low compliance to the use of seat belt amongst drivers and passengers,[8,9] reduced awareness of the syndrome amongst doctors in emergency units and low number of well-equipped hospitals.[7] The non-specificity of the symptoms may lead to delay in diagnosis and management.[3] With increase in the compliance of seat belt use amongst car users in Nigeria,[10] there will rise in seat belt syndrome,There is need to create more awareness about seatbelt syndrome and a classification system would help to know its severity.

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Address for correspondence: Dr. Kelechukwu M. Onuoha, Cedarcrest Hospitals, Abuja, Nigeria.
E-mail: mckelng@yahoo.com

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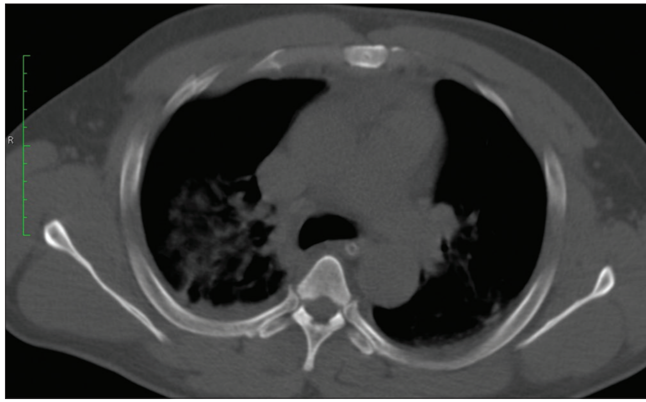

Figure 1: Chest computed tomography scan showing lung contusion

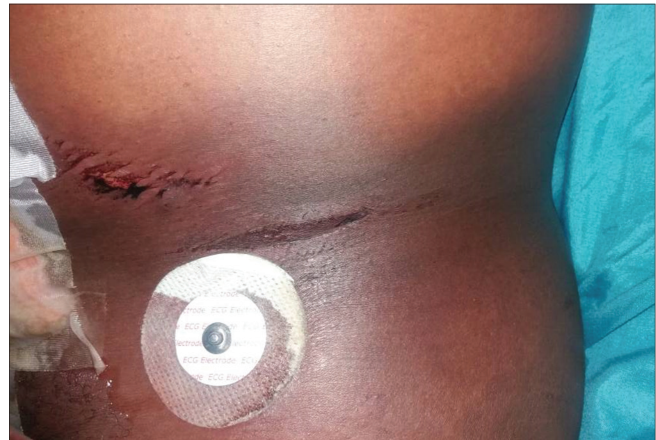

Figure 2: The seat belt sign in the lower abdomen

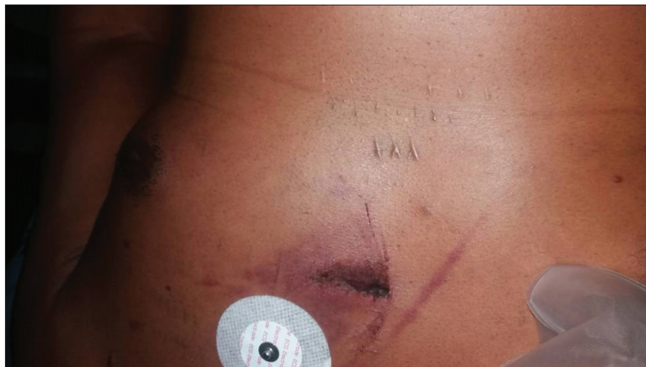

Figure 3: The seat belt sign on the anterior chest wall

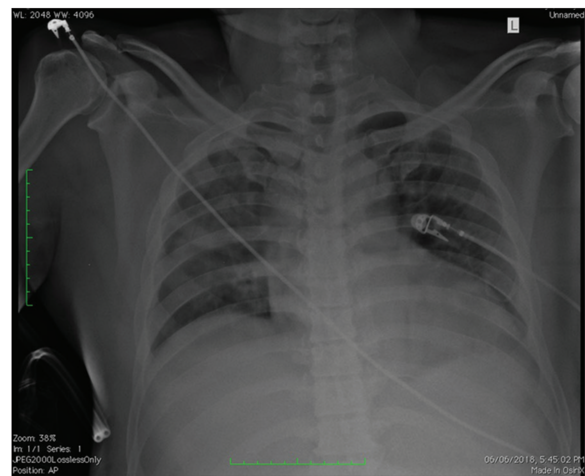

Figure 4: Chest X-ray showing multiple rib fractures on both sides

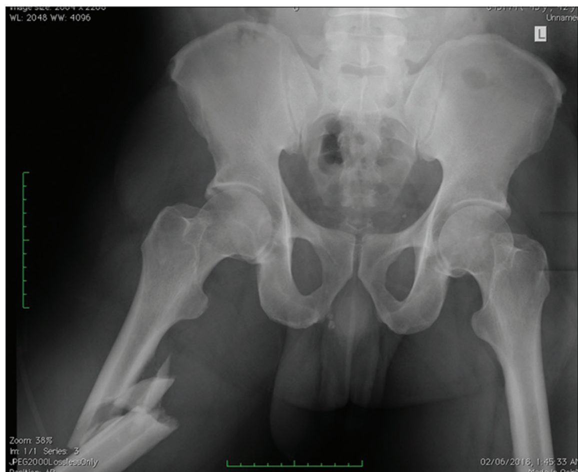

Figure 5: X-ray showing the right femoral shaft fracture

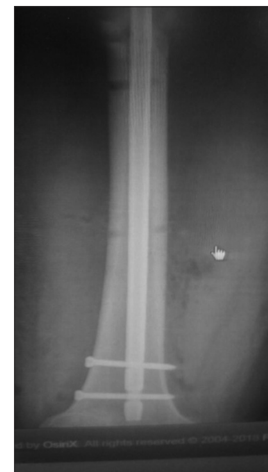

Figure 6: The locked intramedullary nailing done for the right femur

We present the case of a driver involved in road traffic accident who presented with seat belt sign alongside multiple injury and peritonitis whose exploratory laparotomy showed multiple intra-abdominal injury. Chest computed tomography (CT) scan revealed a lung contusion [Figure 1].

Case Report

A 42-year-old man who was wearing his seat belt was involved in a car accident. He presented to our facility 15 h after the accident with abdominal pain and distension, dyspnoea, inability to use his right lower limb, chest pain and laceration on the right parietal region. He was a driver of a saloon car that had a head-on collision with an oncoming car and airbag was deployed. He lost consciousness for 2 h and was taken to a peripheral hospital from where he was referred.

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On examination, he was conscious, orientated in time and place with Glasgow Coma Scale of 15. He had about 10 ml of Otorrhea and rhinorrhoea which was bloodstained and confirmed as it did not clot. Cranial nerve examination revealed normal findings. The patient was haemodynamically unstable with blood pressure of 120/96 mmHg, heart rate of 112 bpm and respiratory rate of 26 breaths/min with body temperature of 35.7°, which may have been due to his exposure and the triad of trauma. Ecchymosis was noted across his lower abdomen and on the chest wall [Figures 2 and 3]. He also had generalised abdominal distension and rebound tenderness with hypoactive bowel sound. Chest expansion was symmetrical with vesicular breath sound in all lung zones. He was unable to move his right lower limb which was externally rotated; however, sensation was intact. Spine and digital rectal examination revealed normal findings. Chest X-ray showed fractures of the 2nd rib on the left and first two ribs on the right [Figure 4]. CT abdomen showed grossly distended bowel loops while C-spine CT was normal. No sign of basal skull fracture was found on head CT but a feature of paranasal sinus collection which showed as hyperdense collection. He had a right closed femoral deformity and plain X-ray of thigh showed comminuted right proximal femoral shaft fracture [Figure 5].

Treatment

An exploratory laparotomy was done immediately which showed 0.5-cm perforation of the small bowel, sigmoid injury with stripping of the serosa of the bowel, transverse mesocolon tear and 500 ml of feculent peritoneal fluid mixed with blood; he also had a damage control surgery with a femoral external fixation.

He had 2 pints of blood transfused after the exploratory laparotomy, and after 12 days on admission, he had a locked intramedullary nail fixation of the femur after removal of the external fixation [Figure 6]. The rib fractures and cerebrospinal fluid leak were managed nonoperatively by frequent cleaning of the nostrils and plugging the ears. He also commenced chest physiotherapy with intensive spirometry and partial weight bearing. Antibiotics and analgesics were given and wound dressings were done. He was followed up in the outpatient clinic for 8 weeks after the femoral fixation and the last follow-up he was bearing full weight.

Discussion

Road traffic accident claims millions of life yearly globally, mostly affecting the younger age group[4] which poses a challenge in social and economic development with a significant impact on individual, family and society at large. Mechanism of death from car crash includes collision, summersaults, tire burst, violent ejection of passenger from the vehicle and throwing of passenger to objects within the vehicle such as windscreen, car seat.[7,11]

The use of modern vehicle with inbuilt safety tools such as seat belt, airbag and danger sensor has reduced the death from car accidents.[7] The compulsory use of seat belt by all motorists was enforced by the Federal Road Safety service Commission in Nigeria in 2003. Since then, the compliance of vehicle users has been reported as very poor.[8,9] However, a recent study in Makurdi, Nigeria, showed an improvement in compliance.[10]

There are two types of seat belts commonly associated with seat belt syndrome, and they include the lap belt and the three point belts. In this case report, the patient was wearing three point seat belts which are the type commonly seen in most vehicles in our environment. In a moving vehicle, the occupants move at the same speed as the vehicle. When the vehicle stops suddenly, occupant continues to move at the same speed.

The ecchymosis noted across the patient's lower abdomen and chest is suggested to be due to distribution of the force of restraint across the chest and abdomen as the seat belt acts as fulcrum,[3] restraining passenger from the continued motion as the vehicle comes to an abrupt halt. The mesenteric tear as in this case also results from the same share force applied on the intestine which was also moving at the speed as the vehicle even though the car has decelerated by the collision.[1,3] The late presentation also made the recognition of the abdominal signs very obvious; however, this delay probably made his recovery slow as he had to be managed in the intensive care unit for the first 3 days postoperatively.

The hyperflexion of the spine around the straps in sudden deceleration is suggested to crush intra-abdominal contents between the spine and the seat belt increasing the chance of intra-abdominal injuries.[1] Seat belt sign has been shown to be associated with abdominal injuries in about 65% of cases compared to 8% in the absence of seat belt sign.[3,12]

Although early diagnosis results in better outcome for the patient, this has remained a challenge due to various reasons. The abdominal pain in patient with multiple injuries may be masked by pain from extra-abdominal injuries.[3,13] Pain and tenderness from the abdomen may also be ascribed to the bruises notable on the abdomen or injury to the abdominal muscle.[14,15] CT scan alone has been reported to be insufficient in predicting patients who need early surgical treatment.[16] Few cases of radiological inconsistency with intra-abdominal injuries have been reported.[17,18] Therefore, there is a need for a high index of suspicion of intra-abdominal injuries in a patient who involved in road traffic accident and presents with seat belt sign irrespective of signs of peritonitis and radiological findings.

Conclusion

It is expected that with increase in road safety awareness in Nigeria, there will be increased use of seat belt and thus cases of seat belt syndrome. Therefore, high index of suspicion is needed for early diagnosis, prompt and adequate management of patients who presents with seat belt sign. Those whose abdominal pain and tenderness persist despite a negative CT may require an exploratory laparotomy or repeated examination and abdominal CT.

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Consent was obtained from the patient, and the authors have no conflict of interest to declare.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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