

correlation may explain the higher odds of agitation and seizure in the SC-polydrug group compared to the cannabis-polydrug group.

The authors concluded that adolescents with SC exposure have a higher odds of CNS depression and seizures while adolescents with SC with polydrug exposure have a higher odds ratio of agitation and seizures when compared to cannabis groups. These results should raise concern and adolescents need to be educated about the adverse neuropsychiatric effects potentiated by synthetic cannabinoids.

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Comments: This study highlights the high incidence of neuropsychiatric sequelae of synthetic cannabinoids compared to their natural counterparts. It is important for Emergency Medicine physicians to be familiar with the neuropsychiatric toxidromes in adolescents seeking medical attention after synthetic cannabinoid use including “Spice” and “K2”. In addition, public health awareness of the dangers associated with synthetic cannabinoids use is warranted.

□ **WHOLE-BODY CT AFTER MOTOR VEHICLE CRASH: NO BENEFIT AFTER HIGH-ENERGY IMPACT AND WITH NORMAL PHYSICAL EXAMINATION.**



Belabbas D, Auger M, Lederlin M, et al. *Radiology* 2019;00:1-8

Performing a whole body computerized tomography (CT) scan after a motor vehicle crash (MVC) when the physical exam suggests no new injury remains a source of debate. It remains a common practice despite prospective evidence of no reduction in mortality. Prior retrospective studies have shown a potential mortality benefit of whole-body CT following these traumas compared to selective scanning, but the overall quality of evidence is lacking. Proponents argue that whole-body CT finds more injuries and injuries that may have been missed on exam, but it comes with the cost of radiation exposure, possible adverse effects of iodine contrast, and added expense. The Vittel criteria, originally used for field triage, now guide whole-body CT decisions in France. The Vittel criteria include physiologic variables, kinetic components or mechanism of injury, injuries sustained, and resuscitation required. Use of these criteria as an indication to perform whole-body CT has lacked specificity. Investigators in this retrospective study hypothesized that patients involved in an MVC with a GCS of 15, a normal exam of the torso, and only a kinetic component of the Vittel criteria, whole-body CT is not indicated.

The goal of this study was to determine whether whole-body CT scan detected unexpected injuries and whether these unsuspected findings on CT led to changes in management. All consecutive adult trauma patients seen at the investigator’s facility over a one year period were screened. Inclusion criteria included whole-body CT performed, age greater than 18, normal physical exam of the chest, abdomen, and pelvis, a Glasgow coma scale (GCS) score of 15, and at least one kinetic element

of the Vittel criteria. These criteria include ejection of the patient from the vehicle, fall >6m, blast, no seat belt, vehicle deformity, no helmet, and death, ejection, or crush of a passenger. A normal physical exam was defined as no pain or tenderness on exam and no abnormalities with auscultation. Patients who met non-kinetic Vittel criteria were excluded, as were pregnant patients and children. Whole body CT was defined as a non-contrast CT of the head with contrasted studies of the neck, chest, abdomen, and pelvis. The methods state that all patients who were brought into this facility who met kinetic elements of Vittel criteria received a whole-body CT, but that senior emergency medicine residents and attendings were responsible for the exam of each patient and the decision to obtain a whole-body CT was made after the examination. Imaging was independently reviewed by both a radiology resident and an attending radiologist who were blinded to the initial read. If there were differences between the reads, a joint review was performed.

Of the 93 patient included out of 459 patients screened, sixty-nine were involved in car accidents, 17 in motorcycle accidents, four in pedestrian versus vehicle accidents, and three in bicycle accidents. Eighty-one percent of patients had injuries affecting body regions other than the trunk with the most common being the limbs (53%). Whole-body CT showed unsuspected injuries in 11 out of 93 patients (12%). Of these 11 patients, 8 had lung contusions, 1 had a sternal fracture, 1 had an acetabular fracture, and 1 had an adrenal hematoma. No patients with lung contusion, including one contusion that affected over 30% of the lung parenchymal volume, recorded adverse events at follow-up 2 days later. The sternal fracture, adrenal hematoma, and acetabular fracture all required no specific medical therapy as well. In a separate analysis using specific kinetic elements of the Vittel criteria to identify patients at risk for unsuspected injuries, absence of a seatbelt and leukocytosis of 15,000 cells/L had positive predictive values of 33% (95% confidence interval (CI): 1%,95%) and 30% (95% CI: 12%,54%), respectively. None of the individual kinetic elements had a high sensitivity for CT depicting unsuspected injuries with airbags deploying being the highest at 60% sensitive (95% CI: 15%, 95%).

The authors report that whole-body CT following MVC may not affect clinical outcomes if patients have a normal physical exam of the trunk, have normal mental status (GCS 15), and have only a kinetic element of the Vittel criteria present. Overall, they felt there was a low incidence of unsuspected injuries and none required further intervention. They reported that the double-blind review by radiology residents and attendings was a strength, but the retrospective nature of the study was a significant limitation as it weakens the overall quality of the evidence and introduces the risk of selection bias. In conclusion, the authors felt this study adds to the data suggesting that whole-body CT scan may not be beneficial in patients with a normal physical exam of the torso and without mental status changes following an MVC

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This is a retrospective study of the incidence of missed injuries in patients with a concerning mechanism but normal torso

exam. While on the surface this study seems to support reducing whole body imaging in similar patients, this is a retrospective review with considerable bias and small sample size. 12% of patients had torso injuries with a normal physical exam, and while it appears the majority of these did not need surgical intervention, the frequency of missed injuries is concerning. Furthermore, the confidence intervals of the elements with the highest positive and negative predictive values are wide. I would encourage emergency physicians to interpret these data with caution, as higher quality trials are needed on this topic to determine if reducing whole-body CT would be appropriate in these patients.

□ **OBSERVING PNEUMOTHORACES: THE 35-MILLIMETER RULE IS SAFE FOR BOTH BLUNT AND PENETRATING CHEST TRAUMA.**



Eddine SBZ, Boyle K, Dodgion CM, et al. *J Trauma Acute Care Surg.* 2019;86(4):557–564

With the increased use of chest computed tomography (CT) in trauma patients, providers are detecting occult pneumothoraces more frequently. While standard practice has been to place a chest tube in all patients with a traumatic pneumothorax, more recently providers are observing some hemodynamically stable patients with pneumothoraces. Prior trials have concluded that using a cut-off of pneumothoraces <35mm could predict successful observation. This study aimed to demonstrate that there is an objective measurement that can be used to determine which traumatic pneumothoraces can be safely observed without requiring placement of a chest tube.

This was a single center retrospective study of patients admitted to a level 1 trauma center between 2011 and 2016. Inclusion criteria consisted of patients over age 18 that had chest CT at the time of admission following trauma. Exclusion criteria included patients who had no chest CT performed, had an ipsilateral hemothorax or hemopneumothorax, had a chest tube inserted before doing a chest CT, and patients who were mechanically ventilated during their index admission. To obtain the measurement for the cutoff value, study authors measured the distance between the parietal pleura and the mediastinum in a line perpendicular to the chest wall, measuring the largest air pocket. Measurements were categorized into those with a measurement greater than or less than 35mm. Patient management was categorized into those who were observed or those who had placement of a chest tube. Observation was defined as not requiring a chest tube within 4 hours of presentation to the emergency department (ED). The primary outcome was successful observation of the pneumothorax. Failure of observation included interventions such as delayed chest tube placement, video assisted thoroscopic surgery (VATS), intrapleural tissue plasminogen activator, or thoracotomy. Secondary outcomes included hospital length of stay and intensive care unit (ICU) length of stay.

1,767 patients with a traumatic pneumothorax were identified in the institution's trauma registry, of which 935 were immediately excluded due to presence of hemothorax or hemopneumothorax, 116 excluded due to initiation of mechanical ventilation, resulting in 336 eligible patients with CT identified

occult pneumothorax. 94.3% of the patients had a blunt mechanism of injury. The median measurement of pneumothoraces was 10.4mm, with 293 (87.2%) of the pneumothoraces measuring 35mm or less. The median length of stay in the hospital was 4 days. 47 patients received a chest tube within the first 4 hours and 257 (89%) were observed. There were 272 patients in the trauma registry with pneumothorax \leq 35mm; of these, 25 patients (9%) failed observation. There were 17 patients with a pneumothorax of >35mm, of which 41% failed observation. Reasons for failure included progression of pneumothorax, development of pleural effusion, tension pneumothorax, and hemothorax. In those with a pneumothorax of 35mm or less, there was a positive predictive value of successful observation of 90.8%, with a negative predictive value of 41.2%. Significant predictors for failing observation included: pneumothorax measurement category (\leq 35 mm vs. >35 mm) ($P < 0.0001$), GCS ($p = 0.012$), and number of rib fractures ($p = 0.048$) in a univariate logistic regression analysis, but in a multivariate logistic regression analysis, the size of pneumothorax \leq 35mm was the single predictor of success (OR for failure 0.142, 95% CI 0.047-0.428).

The authors of the article conclude that although Advanced Trauma Life Support (ATLS) suggests the placement of a chest tube for all traumatic pneumothoraces to prevent the development of a tension pneumothorax, given the lack of guidelines the decision to place a chest tube in these pneumothoraces should be balanced between the risks and benefits to potentially spare patients the avoidable morbidity and even mortality. The authors concluded that this study adds validity to the use of the 35-mm rule in guiding decisions to observe stable patients with pneumothoraces based on their low failure rate of 9% and use of the rule at a different institution and with a different practice group than prior studies. The limitations of the study include determination of a 4 hour cut-off for observation based on institution physician practice patterns, unclear reasons for placing the chest tube in 34.4% of the patients, visual measurement of the largest air pocket on CT, and imbalance between incidence of blunt (94.3%) and penetrating trauma. The latter raises the question as to whether the results are generalizable to penetrating trauma resulting in isolated pneumothorax.

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Commentary: Avoiding unnecessary chest tube placement in traumatic pneumothorax is a no-brainer. This study showed that pneumothorax size \leq 35mm was an independent predictor of successful observation without chest tube placement. However, the retrospective nature of this study does limit its applicability. Significant selection bias exists and it is not clear which of the patients who had physiologic deterioration or required a second intervention were in the observed cohort \leq 35mm and or not. A prospective observational or randomized trial will be needed before this suggested algorithm should be adopted for all traumatic pneumothorax.