

Iranian 2012 earthquake: the importance of Focused Assessment with Sonography for Trauma (FAST) in assessing a huge mass of injured people

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The 2012 Iranian earthquakes took place in the cities of Ahar and Varzqan in East Azerbaijan province, on August 11, 2012, at 16:53 Tehran time. The twin earthquakes struck northwest Iran on magnitude scales of 6.4 and 6.3 Richter. The two earthquakes were separated by 11 min [1]. The earthquakes were strong enough to destroy 70–90 % of 100 villages, with 20 villages disappearing completely [2]. These twin earthquakes were disastrous events with significant medical and psychosocial consequences.

At the night of the event, Imam Reza Hospital, the main referral hospital and trauma center in East Azerbaijan province, was responsible for admission and medical care of injured people [2, 3]. According to Ghabili et al. [2], about 1,000 patients were transferred to hospitals in Tabriz, the capital city of East Azerbaijan province. General surgery residents and attending physicians were responsible for triage and providing trauma care for transferred injured people

[3–5]. In addition, emergency medicine residents and attending physicians and residents of neurosurgery, orthopedics, and radiology were at the hospital participating in providing trauma care.

General surgery residents and attending physicians did triage of patients on the basis of being in need of emergent care or not being in need of emergent care [3]. The patients who were in need of emergent care were admitted to the emergency department to be under direct observation [3, 4]. All injured patients, even patients who were not in need of emergent care, were supposed to have a blunt abdominal trauma to some extent. The initial evaluation of injured people with respect to their abdominal trauma consisted of a physical examination and a Focused Assessment with Sonography for Trauma (FAST) [4]. First, FAST was done by emergency physicians and general surgery residents, and then, it was repeated by radiology residents. In the cases of a positive FAST and stable vital signs, an abdominal IV contrast computed tomography (CT) scan was conducted. In the cases of unstable vital signs, diagnostic peritoneal lavage (DPL) was done. In the cases with both negative physical examination and negative FAST, interval follow-up visits were planned.

Two CT devices were available at the hospital for the management of injured people. Although both FAST and CT were available for the trauma team, decisions were made based on hemodynamic status and physical examination rather than radiologic findings. However, nonoperative management of blunt solid organ injuries of the abdomen is of potential clinical interest and necessitates availability of CT [6].

About 350 FAST examinations were conducted, and about 330 of them were repeated by radiology residents. FAST sonographies were done over a time period of about 5–10 min. About 50 individuals had positive FAST

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examinations and CT was done for all of them. Among these positive results, about 40 examinations were also reported positive by radiology residents. CT results were positive in about 40 patients. Most of the patients with positive CT had a positive FAST report by radiology residents. It seems that sensitivity of FAST did not increase when it was done by radiology residents, but specificity may have increased. Major diagnoses in abdominal CT scans were spleen lacerations, spleen contusions, and liver injuries.

We were able to follow the patients who had negative FAST results. Serial physical examinations were conducted to find any false-negative cases. Three patients had generalized abdominal tenderness at follow-up visits, and bedside DPL was done to find underlying causes. All three patients had positive DPL results, and subsequent laparotomy revealed hollow viscera perforations. These patients expired on the following postoperative days because of prolonged peritonitis and sepsis.

FAST ultrasound is a part of the educational curriculum of the radiology residency at Tabriz University of Medical Sciences, Tabriz, Iran. Emergency physician residents are also trained to conduct FAST sonography. In addition, general surgery residents participate in a 4-week workshop to be trained for conducting FAST. Being capable of conducting FAST ultrasound is one of the requirements of general surgery board certification in Iran. Routinely, all FAST ultrasound examinations of traumatic patients at the emergency department of our center are repeated by radiology residents. We suppose that conducting FAST by the Department of Radiology is more precise, but more accurate data are necessary to reach to this conclusion. More specificity of radiologist FAST could potentially decrease the number of unnecessary CTs. A comprehensive study is essential to illustrate whether radiologist FAST can increase the sensitivity of ultrasound and lessen the number of false-negative FASTs or not.

Besides the usefulness of sonography for the assessment of blunt abdominal trauma, thoracic ultrasound (US) has been shown to detect pneumothorax in blunt chest trauma when performed by trained individuals [7]. It would be of potential significance if US can be done at bedside of the patients in large-scale settings because transferring the patients to radiology units would not be necessary. In addition, it has been illustrated that sonography reveals more rib fractures than radiography and will reveal fractures in most patients presenting with suspected rib fracture [8]. These characteristics of ultrasound seem to increase the usefulness of ultrasound in assessment of

a huge mass of injured people in disaster management episodes. Further studies are necessary to evaluate the accuracy of ultrasound in these settings.

In conclusion, FAST was a very useful diagnostic tool for initial evaluation of blunt abdominal trauma in the setting of disaster management. When the emergency department encounters a huge mass of injured people in disasters such as earthquakes, FAST can effectively guide surgeons and emergency physicians to distinguish at-risk patients for further assessment. Wide use of FAST in large-scale injuries is strongly recommended. We learned from this event to pay precise attention to FAST examinations when encountering a large number of patients. However, possible false-negative results should be considered.

Conflict of interest The authors declare that they have no conflict of interest.

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