Table 5
Mechanisms of injuries.

Injury mechanisms	Total (n = 828)
Splash	485 (58.6%)
Inhalation	301 (36.4%)
Blunt trauma	24 (2.9%)
Ingestion	7 (0.8%)
Explosion	6 (0.7%)
Complex	4 (0.5%)
Other	1 (0.1%)

should be aware of the kinds of harmful chemicals and the types of exposure by which each chemical cause injury. Moreover, decontamination and appropriate treatment at an early stage are necessary in cases of chemical exposure.

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Optic nerve sheath diameter ultrasonography in differentiation of ischemic and hemorrhagic strokes

Dear Editor,

We were interested in the paper by Manouchehrifar et al. regarding the ultrasound measurement of the optic nerve sheath diameter (ONSD) to differentiate ischemic and hemorrhagic strokes [1].

First, we would like to congratulate the authors for their remarkable article because it is a really blinded study, in contrast with other papers on a similar topic, even if we would like to comment some aspects regarding the measurement of the optic nerve sheath diameter (ONSD) with ultrasound to define intracranial hypertension.

For their study, Manouchehrifar et al. performed all the measurements with B scan technique, that is mostly utilized to diagnose ocular diseases [2,3] but unfortunately is not sensitive enough in measuring the orbital structures, as it is affected by the so-called blooming effect [4-6]. This one is related to the lack of a standard sensitivity setting in performing B scan and should not be confused with the Doppler associated blooming effect. In case of B scan it means that, if we measure ONSD with a lower sensitivity setting, this will give bigger dimensions compared to the ones obtained with a raised sensitivity setting. This effect could be less important when we handle large lesions, but it could be deceptive if we suppose a difference inferior to 0.5 mm, as it happens in ONSD assessment.

Due to the aforesaid limits, in case of further studies, we would like to suggest to use the Standardized A Scan: this method makes such measurements objective and more precise, because it shows easily discernible high reflective spikes from the interface between arachnoid and subarachnoidal fluid, and it is also blooming effect free. For this reason, it also allows more accurate reference range values, that can be utilized worldwide, without the need of laboratory – related references setting [7-9].

Furthermore, although the following comment does not concern this article, we would like to point out that an increase in ONSD diameter does not automatically mean that there is an increase of intracranial pressure but it could be also due to the presence of an optic neuritis or an optic nerve meningioma. With A scan, it is possible to prove the real presence of intracranial hypertension with the “30 degree test” that consists in a measurement of the optic nerve with the patient looking to the lateral side. A decrease in the maximal diameter of at least 5% proves that the distension of the ONSD is caused by increased subarachnoidal fluid, as in case of intracranial hypertension [10-13].

Moreover, we would like to highlight how the probe should be used in order to obtain more reliable measurements. As we cannot determine exactly the gaze direction of the patient with closed eyes, in ophthalmology, during the ultrasound examination, the B or A scan probe is routinely used with open lids, utilizing methylcellulose and anesthetic drops. This allows to clearly visualize the eye, making the probe orientation much more reliable, avoiding errors in detecting gaze direction [14].

Lastly, we are aware that the term “transorbital” is often used in literature and it is usually accepted [15], but we would like to suggest to use the terms “transbulbar” or “orbital”, in case of optic nerve examinations with ultrasound, because the term “trans” is a Latin word that means “beyond” or “through” and the word “transorbital” could be misleading [16].

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Carotid intima-media thickening predicts negative stress test in chest pain patients in an emergency department observation unit

Chest pain is a common presentation in the Emergency Department (ED) [1]. While most patients with chest pain are ultimately determined to have non-cardiac pain, a proportion of patients will have cardiogenic chest pain with no acute ECG changes and negative initial cardiac biomarkers.

The American Heart Association (AHA) recommends that patients in the ED with non-ultra low risk chest pain and the possibility for ACS be evaluated with serial ECGs, cardiac troponins and stress testing before discharge or within 72 h after discharge [2]. Thus, patients are frequently admitted to Observation Units (OU) for evaluation. The goal of stress testing is to evaluate for provoked ischemia requiring coronary intervention.

Ultrasound of Carotid Intima-Media Thickness (CIMT) has been proposed as a tool to non-invasively identify patients with increased atherosclerotic burden [3-6]. Studies have shown that CIMT is associated with cardiovascular disease [7-11]. The value of CIMT in the ED evaluation of chest pain is unknown. The goal of this study is to evaluate if CIMT in an ED OU population can be used as a tool to predict which patients will have a positive stress test.

This is an IRB approved, prospective, convenience sample of patients admitted to our ED OU with chest pain, dyspnea or coronary equivalents who received a stress test during their observation stay. The study was performed in a large, urban, academic ED with an annual volume of over 100,000 patients per year, an emergency medicine residency and emergency ultrasound fellowship.

CIMT scanning was performed with a Philips Sparq (Bothell WA) ultrasound machine using the L12–4 MHz linear transducer. The carotid artery was scanned at the level of the carotid bulb (Fig. 1). A registered vascular sonographer and ultrasound fellow performed scanning and data collection.

Three CIMT measurements were taken on each side 1 cm proximal to the carotid bulb (Fig. 2). The averages for each side were compared to a known standard for age and ethnicity [3]. The composite average of both sides was compared with the composite average of same reference standards. CIMT greater than the 75th percentile for age, gender and ethnicity was considered positive. Data was considered for 2 scenarios: average CIMT on *either* side or composite average CIMT of *both* sides. The reference standard differentiated patient ethnicity as black or white. For this study we used the categorization of white for all non-African ethnicities. Stress test results, interpreted by attending cardiologists, were considered the comparative standard. Results were categorized as positive or negative with indeterminate stress tests categorized as negative. Data was analyzed using Stata v 14.0 (College Station, TX).

The final analysis included 57 patients. Demographic and stress test information is shown in Table 1. Five patients had a positive stress test (8.8%).

When consideration was made for average CIMT of *either* side, 30 (52.6%) patients had a positive CIMT (Table 2). The sensitivity, specificity and negative predictive value (NPV) of CIMT for positive stress was 80% (0.95 CI 28.4–99.5%), 50% (0.95 CI 35.8–64.2%) and 96.3% (0.95 CI 81–99.9%) respectively with an odds ratio (OR) of 4 (0.95 CI 0.4–38.2 $p = 0.229$) using a univariate logistic regression analysis.

When consideration was made for average CIMT of *both* sides, 20 (35.1%) patients had a positive CIMT (Table 3). The sensitivity, specificity and NPV of CIMT for positive stress was 40% (0.95% CI 5.27–85.3%), 65.4% (0.95 CI 50.9–78%) and 91.9% (0.95 CI 78.1–98.3%) respectively with an OR of 1.3 (0.95 CI 0.2–8.2, $p = 0.81$) using a univariate logistic regression analysis.

Multiple studies have demonstrated a correlation between CIMT and increasing risk of cardiovascular disease. Chambless et al. [7] demonstrated a correlation between CIMT measurement > 1 mm and increased risk for coronary heart disease. O'Leary et al. [8] showed the risk of myocardial infarction or stroke increased with increasing CIMT. Coskun et al. [11] demonstrated that patients with CAD on angiography had a significantly thicker CIMT (1.48 ± 0.2 8mm vs 0.78 ± 21 mm).

To our knowledge, this is the first study to evaluate CIMT in the ED evaluation of patients with chest pain. In our study we demonstrated a trend toward positive stress test with a positive CIMT. We showed that an abnormal unilateral average CIMT demonstrated a modest sensitivity for positive stress (80%) but high NPV (96.3%) and odds ratio 4 suggesting that patients with normal bilateral CIMT measurements are not likely to have a positive stress test. Interestingly this result less predictive for the composite average of both carotids (sensitivity 40%, NPV 91.9%, OR 1.3).

We found that a normal CIMT measurement for both carotid arteries correlates with a negative stress test with an extremely high negative predictive value. Our data suggest that given further study, CIMT measurement may be a reasonable determinate of disposition in ED patients with chest pain.