



Objectives

The TASER eXtended Range Electronic Projectile (XREP) is a new conducted electrical weapon for use by law enforcement that is fired from a shotgun, and has a range of ~ 60 feet. As with other conducted electrical weapons, electrocardiographic evaluation during the exposure is not possible due to electrical noise and motion artifact.

In this study, we examined the cardiac rhythm utilizing echocardiographic imaging.



Methods

This was a study of human volunteers. The subjects had limited echocardiography before, during, and after a 20-second XREP exposure with pre-placed trans-thoracic skin electrodes 16 inches apart oriented vertically chest-to-abdomen in one of three positions: right side, center, or left side.

The ultrasound was performed and read by an emergency physician expert in emergency ultrasonography. The parasternal longitudinal view utilizing the M-mode through the anterior leaflet of the mitral valve was used. Heart rate and the presence of sinus rhythm were determined. Data were analyzed using descriptive statistics.

Results

Nineteen subjects were enrolled. One subject was excluded due to extreme hyperventilation prior to the exposure. There were no adverse events reported in any of the subjects. Mean baseline HR was 95.8 ± 19.4 range 60 to 129. During the exposure, mean HR was 133.5 ± 27.6 , range 60 to 169, and 1 minute after the exposure mean HR was 87.2 ± 18.9 , range 59 to 128. Sinus rhythm was clearly demonstrated in 9 (50%) subject during the exposure. Sinus rhythm was not clearly demonstrated in 8 (44%) subjects due to motion artifact.

In three of these subjects, heart rate could also not be determined because of this artifact. In one subject, the video did not record and could not be reviewed to determine the rhythm (HR was 126 during exposure). In those subjects in whom sinus could not be demonstrated but heart rate was determined, the highest exposure heart rate was 143.

Conclusion

Although motion artifact limited a few of the evaluations, we were able to document sinus rhythm in over half of the subjects and were able to obtain heart rates in all but three.

In all but those three subjects, we saw no evidence of myocardial capture or arrhythmia during a 20-second trans-thoracic XREP exposure.

